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Central States Interurban Map

A new map is always of interest, and the electric railway groups of the North Central States readily lend themselves to graphic presentation. No city of any size and hardly a county in Ohio, Indiana, Illinois and lower Michigan and Wisconsin is without its electric railway mileage. Some of the principal centers are even linked with more than one electric route. As a part of this issue we present a map which clearly shows the extent of electric interurban railway development in the Central States. It is noteworthy that, with a break of but 22 miles, and that now nearing closure, travel is possible on electric cars from Sheboygan, Wis., 52 miles north of Milwaukee, across the North Central States and into Central New York. Less than 50 miles of construction will complete the electric route from St. Louis to Chicago and the East. Several times electric cars have taken parties from Louisville, Ky., north to Detroit, Mich., and passengers might have journeyed 125 miles farther north to Bay City, had this extension of the trip been desired. The growth of the industry which has made these statements possible is not slackening. We look forward to seeing in the new year Canada linked electrically with the United States through the tunnels under the Detroit River. Missouri also will soon be joined with Illinois by interurban service over the new Mississippi River bridge at St. Louis, an electric railway enterprise. All these extensions are shown on the new map, and it is well worth while to examine the entire territory and so gain a new impression of the magnitude of the electric railway development.

Electric Railway Growth in the Western States

In 1909 the electric railways of the Rocky Mountain and the Pacific Coast States made substantial progress not only in extensions but in largely increased facilities for handling traffic on established lines. The West is large, and only a small part of the opportunity awaiting the investor has been grasped. The vast territory of the Pacific slope now is only beginning to receive the benefits of the rapidly increasing influx of settlers from the East that is following the remarkable revival shown by all lines of business in the West.

Only a few of the more densely populated business centers of the Western States are linked by electric railways. These cities have excellent local transportation facilities, which have been largely instrumental in the rapid urban expansion characteristic of the Far West, and scarcely one of these electric railway systems stood still during the recent lean period.

The great variety of operating methods in vogue in the Far West commands interest, as do the numerous undertakings that are novel from the viewpoint of the engineer. As typical examples of recent development in the Western electric railway field several interesting projects may be cited. In the

Rocky Mountain State of Colorado an example of heavy electric railroading is found on the Denver-Boulder division of the Colorado & Southern steam railway system. This division has been in electric operation since May, 1909, and to an engineer is particularly interesting because 11,000-volt current is distributed direct to the cars from a catenary supported trolley, without the use of step-down transformer stations. Traffic conditions on this road are largely indicative of many Western properties. The electric service so built up the passenger traffic during the first season of operation that not enough cars were available for handling the loads, even though steam coaches were borrowed and used as trailers. This upbuilding of traffic is, of course, characteristic of any electric line, and shows that electric service will initiate traffic in territory where the residents never before used parallel steam railroad facilities.

West of the Rocky Mountains, in the Salt Lake valley, similar electric railway conditions are found. The Utah Light & Railway Company has just completed rebuilding the Salt Lake City street railway system. Those in charge of the property are placing its operation on a most up-to-date basis, with new cars, shops, car houses, power stations and, most important of all, a new "work together" spirit. The growth of population in the Salt Lake valley has been so steady and local travel has so increased that a 40-mile standard-gage steam line, the Salt Lake & Ogden, is now being equipped for electrical operation between the cities whose names it bears. Also a quarry road, extending 14 miles up a canyon east from Salt Lake City, a year ago found it profitable to electrify, and now enjoys a steady passenger traffic, where before only rock was hauled. These roads and others have shown and will continue to demonstrate that in the West as well as in the East, though perhaps to a greater degree, an electric road will greatly stimulate traffic or originate it where there was none before.

Journeying now into the Northwest, we find communities whose existence is dependent entirely upon the development of their natural resources by transportation facilities. Several such districts, large in extent, have no means of transportation other than by electricity. Such conditions of dependence on electric transportation are found in the Inland Empire country south of Spokane, Wash., in the environs of Vancouver, B. C., near Seattle and Tacoma, on the Puget Sound, and in the district of which Portland, Ore., is the center. In each of these communities population and electric transportation facilities have advanced hand in hand. One year a trolley line is built out of a big city and into a country almost desolate of human inhabitants. The road is advertised—they do that well in the West—and a year later, because of increased traffic, the schedule of cars has to be boosted. We recall one road, now partly built, which will extend 63 miles straightaway into the woods and river prairies of lower British Columbia. A good portion of the cleared right-of-way of this line looks almost like a mountain canyon with the tall timber on either side. Conservative estimates based on earlier experience show that this road will haul enough lumber out of the woods and transport enough household goods and supplies into the newly opened territory to pay operating expenses from the start, and with practically no initial population. As fast as the timber is cleared market gardens flourish and passenger traffic follows.

In California numerous lines might be indicated, any one of which has been instrumental in bringing about largely increased settlement of the nearby agricultural and residence districts. Of course, other roads unfortunately have been built across ranches many thousand acres in extent which have not been subdivided, and therefore the growth of traffic in these localities awaits the time when legal or personal barriers will permit the parceling of the land to newcomers.

Los Angeles and its nearby neighbors offer an example of a most wonderful electric railway growth brought about by favorable natural conditions of land, sea and sky. Here a suburban business has been developed that requires the operation of more than 1200 large double-truck interurban cars, and many passengers are hauled 40 miles twice a day. The electric railroads in and about Los Angeles have struggled to meet the demands of travel, and now, in spite of what in the East would be considered an abnormal development, construction work is still in progress.

These conditions, indicative of the growth of electric travel in the West, are not overdrawn. When one begins to build an electric road in a Far Western community he must be prepared to keep up with a marvelous growth in population. Experience has shown this condition to be true from the Rocky Mountains to the Pacific Coast and from British Columbia to Mexico.

The Electric Railway Situation

Revival in business has minimized somewhat the conditions which have been disturbing elements in the electric railway situation, but it cannot remove them entirely, and they still remain problems for solution. The revival in industrial conditions, which has gained greater strength in substantially all parts of the country, has restored the gross revenues of electric lines to normal levels, and the decreases or irregular gains of the last few years are succeeded by the consistent improvement in gross earning power which is the expected attribute of electric railway operation.

The turn of the year is an appropriate time for retrospect, calm judgment and prophecy. When the events of the last 12 months are considered from the historical point of view it becomes plain that they can best be treated through the columns of the Electric Railway Journal by discussion and statistics. While the problems of the electric railway industry as the new year opens are not radically different in kind from those that prevailed at the beginning of 1909, they have been altered somewhat in degree; and it is the progress toward solution and the need of proper consideration of the great questions involved that the contributors to the symposium in this issue discuss. A reading of the various expressions of opinion concerning "The Electric Railway Situation" shows a general appreciation of similar conditions which demand attention in all sections of the country.

When the problems are analyzed it is seen that their existence is due in part to faults and mistakes of the past and in part to causes that are economic in nature and beyond the control of the railways. The object of the review of the year, which occupies so large a part of this first issue of 1910, is to present the railway point of view of the existing difficulties. The questions considered are applicable, in varying measure, to properties of every character and in every locality.

With some of these properties an improvement has been made in various directions which point to ultimate distinct betterment in conditions; with others a keen appreciation of the necessities of the situation has been essential first in order that plans might be made to overcome, if possible, the effect of the development of increased costs and public demands. In a number of communities definite steps have been taken to increase fares, reduce transfer abuse, or remedy other conditions which were plainly in error, and in other cities preliminary plans for improvement are well under way.

The review of the problems of the year contained in this number was compiled with the idea that the best interests of the industry would be served if the material published should deal largely with problems which are common to all properties rather than with questions which are purely local. Yet the fact is that the most important questions affecting any one property are either of immediate concern to all the others or will require attention eventually. One of the real problems which is before the leaders of the industry is whether each property shall work out its own salvation or its failure as best it may, or whether the serious questions can be answered with better advantage to all by an inquiry on behalf of the combined properties, say through the American Street & Interurban Railway Association. This view of the subject is taken by Mr. Sergeant, who concludes his careful study of the problems of the times with the definite recommendation that the American Association make a searching inquiry into the cost of doing business under different circumstances and in different localities in order that a true basis for the establishment of fares may be determined. Mr. Ford thinks it is questionable whether in large cities, with unlimited transfers, the 5-cent flat fare provides as much as a reasonable rate of return.

In any inquiry that may be undertaken concerning the cost of the service the element of value of the service should also be taken into account. Where there is extreme and assured density of traffic, month by month and year in and year out, the cost of the service, if full protection of all the property rights involved is certain, may be fairly regarded as a greater element in such an inquiry than in communities where the population is so small that consideration of the cost alone would not attract the investment required. Fares are more nearly uniform than costs of furnishing the service; and save where the system of accounts is prescribed by law the costs of providing the service are not determined by the same methods. If the costs of performing the service, if the elements which should be taken into account are questions upon which no analytical inquiry has been brought to bear by the companies themselves, the results of inaction may be seen in more experimental public inquiries of the nature of that which has just been imposed in Cleveland.

It is possible here to refer only incidentally to some of the questions discussed by the authors of the valuable papers published elsewhere in this issue. It should be added that the contributors to the symposium represent typical and prominent properties so located geographically as to give a representation to nearly every part of the United States and to most of the leading associations, as well as to widely differing classes of properties. We realize that many of our readers are students of the vital questions involved, and we offer our columns at any time for further discussion of these or kindred topics.

Passing to the statistical features of this number, attention will be directed to the figures of new track construction, which indicate a falling off as compared with the previous year. The returns are not complete, owing to the failure of some companies to respond to continued solicitation, but other causes are more directly responsible for the discrepancy. The figures of 1908 contained a large amount of new track construction, which was started before the panic and therefore had to be carried to completion to avoid heavy loss. This is true with respect both to extensions of existing properties and to new roads. New track construction is usually planned a year or two in advance, and since the financial and business conditions were not wholly propitious in 1908 for enterprises involving large outlays of capital, the effect is manifest in the returns for 1909. Our records as compiled, therefore, show an aggregate of 887.16 miles of new track construction during 1909. The returns from the same companies, however, show that the existing roads which made reports contemplate the construction of 1765 miles of new track during 1910. This figure, of course, makes no allowance for the total on account of projected properties that will carry their plans to completion during the present year.

Engineering Developments of the Year

Articles elsewhere in this issue describe the accomplishment in each branch of electric railway engineering in this country during the past year, and while all agree that there is nothing which can be considered as spectacular, the work undertaken has been solid and affords good foundation for future development. We had hoped that during the past 12 months a closer definition would have been made of the proper provinces and limitations of the four principal systems of electric operation, low-tension direct-current, high-tension direct-current, single-phase and three-phase. That this was not so may have been due to the fact that the number of new undertakings in which there was real opportunity for a choice was limited. On the other hand, the converse is equally true. Until the leading electrical engineers of the country are in closer agreement as to what can be done, and even what has been accomplished, so far as these different systems of electric traction are concerned, the managements of large corporations will be unwilling to make radical changes. The only large installation in which a choice of systems was reached this year was that of the Pennsylvania Railroad for its New York station and tunnels, and here the decision to confine electric operation to a limited terminal zone and the fact that the Long Island Railroad, which will also use the station and tunnels, was already far advanced in the work of converting its suburban tracks for low-voltage direct-current operation, made the selection of this system practically a necessity. The cause of steam railroad electrification in a new field of mountain grade operation has been advanced also by the successful initiation of the service of three-phase locomotives in the Cascade tunnel of the Great Northern Railway.

In electric locomotive design the use of side rods probably constitutes the most noteworthy improvement made during the year. It would be unsafe to say that the geared locomotive is doomed. It will undoubtedly be employed very generally in the future, but for heavy high-speed service the advantages of greater available space for motors, better distribution of

equipment and the reduction of dead weight on the axle which are gained by the use of side-rod connections more than counterbalance the slightly greater mechanical complications. In motors intended for heavy duty, as well as in generators, greater attention has been directed to increasing the output by forced ventilation, the practical result of which is the use of much smaller and less costly machines at a slightly increased cost of operation. The commutating pole motor is peculiarly adapted to operation with forced ventilation owing to its perfect commutation under extreme overloads. The limiting factor in the design of motors of this type is now the capacity of the insulation on the windings to resist high temperatures for long periods without deterioration.

Passing now to standard equipments for urban and interurban roads, the use of interpole motors is growing, possibly because of the increased interest in high-tension direct-current systems of distribution. With these motors there should be a reduction in commutator trouble, the most prolific cause for complaint in electrical equipments. These motors, of course, are equally well adapted for standard potentials. Multiple-unit control, in which the motor current is broken in contactors under the car body instead of in the controller on the platform, is also being more widely used for heavy interurban equipment, regardless of any immediate intention to begin train operation. So far as the rest of the car equipment is concerned, the most important subject for debate during the past year has been in regard to the design and in decreasing the weight of the car body. There is no doubt that general sentiment now favors a lighter car, certainly for city service, than was the case a few years ago, and that such a car can be constructed with due regard to strength is an opinion generally held. Closer scrutiny is being paid also to the weights of the parts carried on the car. The question of design, as distinguished from construction, has been practically confined to the different forms of prepayment entrances, and while no one form can be considered a standard, it is safe to say that the desirability of the prepayment idea for city roads is now settled. The plan has not yet been extended to any extent to the interurban field, and the line of demarcation as to its usefulness as regards cars in large cities and those on smaller systems and in suburban service has not been very closely drawn. Possibly next year there will be a different story.

In overhead construction there has been a distinct tendency toward the use of catenary work wherever a fair rate of speed is used. The adoption of this class of construction, and also of higher trolley wire potentials, has had a stimulating reflex action on the improvement of overhead insulation and appliances.

In power stations perhaps the most important development of the year has been the establishment of the exhaust steam turbine as practicable and economically desirable. Rateau, and possibly others, called attention several years ago to the peculiar fitness of the turbine for use with low-pressure steam, but it has principally been during 1909 that the results secured from the operation of such machines in railway power stations in Philadelphia and New York have become available. In steam turbines also the evidences of the trend to gain greater initial and operating economy by the construction of larger units are apparent.

In track construction, open-hearth steel is being favorably considered in place of Bessemer steel for rails. The use of T-rail in paved streets is not meeting with as much opposition as formerly from city engineers, and its advantages from the standpoint of the railway companies are being more generally appreciated. Standardization of rail sections, although much discussed during the year, made little real progress. Preservative treatment for ties has attracted the attention of many track engineers more forcibly than ever before on account of the increasing price of timber. The cost of preservative treatment is slowly decreasing and facilities for applying it are being extended all over the country.

Outside of the electric trolley car the chief candidate for favor is the car driven by gasoline, either directly by an internal combustion engine or through the medium of a self-contained engine and electric generator in the car body and motors on the axles. The gasoline car has undoubtedly gained favor during the past year, not so much because of the number of installations, which have been few, but because of the desire for an independent unit, and also because of the general recognition of the efficiency and reliability of the gasoline engine. As yet the use of the new cars has been confined chiefly to installations where the trolley system is out of the question, as in some of the narrow streets of New York and on cross-country lines of very light traffic. It is safe to say that the gasoline car will never replace the trolley car where the headway between cars is short. But for light suburban railway lines there is opportunity for its use, though the burden of the proof of its adaptability for this service is still on its advocates.

Electric Lighting of Cars

The recent hearings before the Public Service Commission with respect to the lighting of the subway and elevated railway cars in New York City, resulting in the decision by the Interborough Company to return to the 16-cp plain incandescent lamp bulbs originally used in the cars, again remind us of the backward state of car lighting as compared with the refinements which during the past few years have been introduced into the art of interior illumination.

Railway cars, both steam and electric, are still illuminated, with few exceptions, in the same general manner as they have always been. The transition from kerosene lamps to Pintsch gas on steam railroads, though gradual, has been general, but it has been effected with no particular change in the location and distribution of the sources of light. Electric car lighting, beginning in the early days of the trolley on very similar lines, was improved a little, perhaps, by the fact that single lamp fixtures are more readily distributed throughout the car in electric lighting than in gas lighting. But even in the most modern and carefully developed instances of electric car lighting in vogue in interurban and rapid transit electric cars, the location and distribution of the lighting units is far from satisfactory, from the standpoint of the passenger who desires to read while riding, without fatiguing the eyes. And if one does not wish to read, but desires simply to rest, as is frequently the habit of long distance travelers and suburban commuters late at night, the long vista of glowing filaments becomes an annoyance little short of intolerable, no matter how comfortable the seats or how agreeable the temperature of the car interior. The difficulty is, of course, inherent in the dis-

tribution of the lighting units, in a long compartment with a low ceiling, and usually a dark background.

Two years ago there was only one device on the market which indicated any tendency toward diffusing and softening the light for car illumination, and the price asked for it was practically prohibitive, in competition with the ordinary system. The various attempts to utilize prismatic glass shades are not radically different in conception from former ideas, and in practice have not so far shown themselves to be a generally acceptable solution. The fact that even the most recently designed motor cars show no signs of departure from the former practice seems to indicate either a lack of interest among electric railway equipment engineers in tackling a hard problem, or a lack of disposition on the part of the manufacturers to take practical steps away from the beaten path.

If one wishes to determine the extent to which illumination, when good, is used on cars let him look in a well lighted car and see the number of people who are reading papers. We believe those so occupied will average 50 per cent of the passengers during all the hours in which the lamps are used, whether the car is an electric car or a steam railroad coach. It is a fact, however, that in steam railroad car lighting, progress towards anything better than the oil lamp was extremely slow, and was inspired more by considerations of safety from fire than by any particular regard for the eyesight of the passenger. It is, therefore, not surprising that the lighting of electric cars should be treated from a similar point of view. We venture to believe, however, that the time has now arrived for the expenditure of some intelligent work on car illumination by equipment engineers. As the present system is defective not in the quantity of light but in the manner of its distribution, the cost of an improved system should not be greatly, if any, in excess of that now in use. Even at a slight increase in cost we believe that many railway companies would look upon any real improvement as upon any other step to attract travel by making the cars more attractive. The field should prove a fruitful one for the inventor.

Presentation of Grievances

We believe that every broad-minded electric railway manager is pleased to have real grievances, for which his company is responsible, brought to his attention, whether they affect the public or his own employees. No one is omniscient, and if the hardships are real they should be remedied or ameliorated if possible. If this cannot be done, the situation should be explained to those making the complaints, whether they are within or without the organization. In dealing with the class of grievances which relate to employees, many managers have adopted the practice of appointing a committee to listen to accounts of alleged defects in the service, or, where the manager himself attends to these matters, of having a committee of employees present directly to him the claims which require his attention. Where either plan is followed it is the obvious duty of the person presenting the grievances to be sure that his cause is just. Otherwise, he puts himself as well as his complaint in a ridiculous light.

A short time ago a representative of this paper was present during a discussion between the general manager of a large Western property, comprising both interurban and city divisions, and a committee from a group of carmen who were employed at a small city division and were urging the cause of one of their number, the president of their local organization, who had been discharged for running his car over several steam railroad crossings without flagging them. Two members of the committee repeatedly called the attention of the general manager to the high grade of the men who make up their body, and emphasized the earnest desire on the part of all the men to abide strictly by the rules of the company. The general manager whom they were addressing agreed with the committeemen that organized men, as well as all other men, should be progressive and should abide by the rules. After a little fatherly talk on this subject by the general manager, two of the committeemen quickly volunteered assurance that all rules of the company were being observed by the men they represented. Immediately the general manager asked one of the two spokesmen, both of whom were in uniform, for his rule book and asked the other for his pad of accident blanks. The company's rules, subscribed to by the men, required that both rule book and accident blanks should be carried whenever uniforms were worn. One man, who had boldly pleaded the cause of another that had been discharged for running railroad crossings, did not have his rule book. The other did not have his accident pad, and both were in uniform. Then followed a lecture from the general manager of undoubted good to the men, and with an obvious moral.

This case well illustrates a statement made recently by a well-known railroad man, that if men persistently and maliciously break the rules of the company they cannot reasonably expect any organization to be successful in protecting them in their positions. As in any other well-regulated business, a railway system must maintain strict discipline if it is to be successful.

We are prompted to review here some of the charges frequently calling for discipline, and charges that have placed soliciting committees in embarrassing situations when seeking the mitigation of punishment. One of these is the practice of giving transfers to employees riding on badges, for which, it is needless to say, no reasonable excuse can be offered. Under the rules of practically all companies the badge is sufficient for free transportation. If the employee does not desire to make known his identity by showing his badge, he should pay his fare, thus permitting the conductor to keep his own record clear. On another road motormen have frequently to be admonished for running ahead of time. On a steam road this practice would mean dismissal. Of course, the danger to life is not so great on a street railway, but there are excellent reasons why cars should not precede their schedule time. Principal among these is the desire of the transportation department of any company to afford a uniform and reliable schedule as a means for retaining the high regard of the public which it serves.

A paper which has for its avowed object the welfare of transportation men has said that drinking on duty and spending time in saloons are serious charges and that no committee has been able to justify this most dangerous conduct—which usually results in a grievance case being "thrown upon the mercy of the court." It is easy for one to hold up to the light the faults of another, but we may not be overstepping our province if we suggest that it is hardly within the province of a grievance committee to extenuate avoidable violations of the rules. It can endeavor to mitigate too rigorous a regulation, but so long as a rule is in the books it should be enforced.

THE ELECTRIC RAILWAY SITUATION

A REVIEW OF THE PROBLEMS OF THE YEAR

PROBLEMS CONFRONTING STREET RAILWAYS

BY CHARLES S. SERGEANT, VICE-PRESIDENT, BOSTON ELEVATED RAILWAY

Perhaps the most pressing question at present which is common to street railways in all sections of this country is the one of satisfying the public demands, whether they be for extension of lines, lower fares for longer journeys, new systems of more rapid transit, increased taxation or payments for franchises, reduction of capital to valuation figures, or the many indirect burdens of paving, bridge construction or other highway expenses. The problem of reconciling such demands with a fair wage for employees and a reasonable return to investors may well engage the attention of all managers.

Nearly every one will concede in theory that capital actually invested is entitled to a fair return, but in practice such a right is not always considered by public authorities when new demands are made upon the railways. The most conspicuous example is the tendency to grant only short-term franchises.

The enormous capital outlay required for a first-class city system is absolutely unjustified unless the privilege is to endure sufficiently long to provide for amortizing the major part of the investment by the provision from revenue of suitable sinking funds before the expiration of the franchise.

Most railway men know that this amortization is impossible under ordinary American conditions, and will doubtless agree that investment under short-term franchises is hazardous in the extreme.

There are many causes for a public opinion which is so mistaken as to the conditions of so important an industry, not the least being over-capitalization, and the exaggerated ideas of possible profits which have been so widely disseminated. Street railway investors have come to a realizing sense of the narrow margins of profit afforded by the business, but the general public needs to be enlightened.

To this end some authentic source of information to the public should be supplied, and this can best be done by systematic reports to some public board having jurisdiction. From such reports may be deduced the amounts invested, the costs of the business, the facts as to what constitutes a reasonable fare. Such reports should be of great value to the investor as well as to the public.

One of the great factors in creating erroneous ideas of profits has been the failure in many instances to maintain suitably the property, and in still more instances the failure to provide from revenue for suitable maintenance. When necessity arose provision has too often been made from some reorganization or rehabilitation fund supplied by the issue of additional stock or bonds.

It is probably true that upon the whole the revenue of American street railways has never been charged with sums even approximating the actual costs of maintenance, notwithstanding the fact that due and proper maintenance is as essential to the getting of revenue and to the rendering of a suitable service as it is to the preservation intact of the assets against which securities are issued. Evils of this sort would be disclosed by suitable accounts and authentic reports, and remedies would then be devised and adopted.

REDUCTION OF TAXATION OR INCREASE OF FARE

It is proper to ask what those remedies could be. If the revenue is insufficient to maintain and operate the property when the operation is carried on efficiently, can there be any other remedy than reduction of taxation or increase of fare?

All taxation of a transportation company's *business* (as distinguished from its real property) reduces its ability to serve the public, for which end alone it presumably exists.

Payments for franchises and divisions of profits with city or State are therefore direct burdens upon the people who ride or ship goods. This is especially true when dividends are restricted by law to ordinary interest rates.

With the ever-increasing waste and expense of government, new sources of taxation are continually sought and under such circumstances relief for street railways by abatement of taxation will be difficult or impossible to obtain.

INCREASE OF RATES OF FARE

Our last remedy lies in the increase of rates of fare. This may be accomplished by reduction of free transfers, by direct reduction of journey lengths through the establishment of new fare limits, or by direct increase of fare.

The almost universal American system of a uniform 5-cent fare was established in the days of the short journey in a light-weight horse car drawn at a slow rate upon a cheap track. The purchasing power of 5 cents was then very much greater than at present, and the service rendered the public in every way very much less.

Still further, the fare was not attenuated by the free transfer—a comparatively modern invention.

The theory upon which a uniform fare rests is that of the postage stamp, a common payment for all, regardless of length of journey. Hence the short-distance rider pays for the losses of carrying the long-distance rider. The company must make from its short journeys the expense of the long journeys, and any and all possible profits. It is obvious, therefore, that any extension of the journey of the short-distance passenger by free transfer or otherwise is absolutely inconsistent with the theory upon which a uniform fare is based. With the growth of cities and extension of lines to more sparsely settled tracts the ride of the long-distance passenger is continually increased, and there is no relief for the transportation company until a sufficient local short-distance traffic can be created by the growth of density in population after a lapse of much time.

This condition must constantly tend to become worse, and is one of the strongest reasons for revision of fares.

The benefits of the uniform low fare undoubtedly have been great from the sociological point of view, and still greater in the development of real estate and taxable property, but all at the expense of the investors in street railways, who would have been well advised had they long since adopted the more logical European system of fare rates proportioned to journey lengths.

In Massachusetts, outside of the metropolitan district, the uniform fare has often been established sentimentally in response to the cry of "one fare in one town," frequently without any regard to the sparseness of population or the length of the journey. In the metropolitan district of Boston and its suburban cities journeys for one fare may be made to include a number of cities.

The fixing and regulation of fares would seem properly to be a function of the owners of the street railways. It is only when business is performed under a public franchise that the owner is deprived of the right to fix the price of his wares, and there would seem to be very good reasons why this should not be the case.

It may be argued that the franchise is a necessary preliminary in the case of public service corporations to securing for the general public the facilities for transportation or lighting or other public services. The object of granting the franchise is not that certain investors may make money, but that the public may have the great benefits of the service to be

provided. Full protection of the public would seem to be secured where the rate of dividend or profit to the investor is fixed by law. That the law should go further than this and undertake to determine the rates to be charged seems an encroachment upon private right, and one which clearly, under the circumstances of legal limitation of dividends, is unnecessary. Under such circumstances the owners of the property will be certain, either to make rates as low as possible in order to secure a large revenue, or to produce with their rates surplus revenue which may be applied to needed improvements in the service. The public is bound to benefit in either case, and it would therefore seem that the public control of rates should be limited only to rates which were unfair or discriminative.

I believe that the question of rates in its broad sense is one of the most pressing and difficult problems to be solved by street railways; that it necessarily involves inquiry and publicity, and therefore I would urge upon the American Street & Interurban Railway Association the importance of a careful and searching inquiry into the costs of doing business under different circumstances and in different localities in order that a true basis for the establishment of fares may be determined.

THE AMERICAN STREET & INTERURBAN RAILWAY ASSOCIATION

BY JAMES F. SHAW, PRESIDENT, BOSTON, MASS.

The prosperity or success of an organization representing an industry can be judged by any one of several standards. The only proper criterion is the benefit which an association renders the industry which it represents. Other standards sometimes taken to measure the standing of an association are its financial condition and the size of its membership. Considered in any of these three aspects, the American Street & Interurban Railway Association has never been in more flourishing condition, and it is entering upon the fifth year of its history in better shape than ever before to serve the electric railways of the country. The success from every standpoint of the Denver convention is now a matter of history, and every one who was in attendance will treasure it in his memory as one of the most pleasant as well as one of the most profitable ever held. It may be of interest to give here the figures of the attendance at that convention and at the previous convention in Atlantic City, which was by far the largest of any previously held by the association or by its predecessor, the American Street Railway Association. The membership of the association is made up very largely of Eastern companies, and the majority of the manufacturers of electric railway apparatus who exhibit at conventions live in the East, so that few people expected that the registration at the Denver convention would be anywhere near so large as that at Atlantic City in 1908. Nevertheless the total number which registered at the convention was 2800 as compared with 3300 at the 1908 convention or a difference of only 500. It may also be of interest to state that since the report of the secretary and treasurer was presented at that convention and up to Dec. 15 there has been a notable increase in the membership, which now consists of 328 active members and 900 associate members.

MIDYEAR MEETING

In accordance with a decision reached at Denver, a midyear meeting of the association will be held at the headquarters of the American Street & Interurban Railway Association in New York on Jan. 28. This meeting has been called because of the feeling often expressed on the convention floor and elsewhere that it is impossible with but one meeting a year to accomplish all the work of which the association is capable, or even for the member companies to keep in touch with the subjects upon which co-operative effort is desirable.

In one sense this midyear meeting, which will be confined to the American Association or parent body, will be an innovation; in another sense it will not be without precedent even in our own association because it will correspond to the joint meeting which has been held in New York for several years during the winter by the executive and other committees of the association. These meetings have always proved so mutually helpful and profitable that it is thought even greater benefit will result from the meeting during this January. Arrangements have been made for the presentation to the association at this time of papers by well-known members upon subjects of timely interest and the meeting will be preceded by sessions of various committees of the association.

THE NEW YORK OFFICE

Outside of its committee work and that accomplished at its midwinter and fall conventions, the activities of the association are represented by the work carried on continually throughout the year at its New York office. This office, of course, is also the main office of each of the affiliated associations, and owing to the growing needs of these organizations the demands made upon it are constantly increasing. This is a healthy sign and indicates a condition which we are glad to have. It is now proposed to add still further to the duties of the central office by having it keep closely in touch with the officers of the various State and other local street railway organizations throughout the country. Tentative plans by which these local organizations and our own can be of great assistance to each other have been suggested, but to define a future line of work invitations will be extended to each of these organizations to send a representative or representatives to a meeting to consider the subject to be held in New York on Jan. 27. At this time it is hoped that a plan of close co-operation, which will be mutually beneficial, can be adopted.

THE FUTURE WORK AND POLICY OF THE ASSOCIATION

The assignment by the main association to the various affiliated associations of all subjects of an accounting, engineering, claim, transportation and traffic character, leaves to the main organization, as its chief work, that of the broader aspects of the relations between the railway companies and the public and of the companies with their employees. So far as one can now look ahead, these two subjects afford sufficient scope to occupy the best efforts of the association for many years to come. Under the general subject of public relations can be grouped such important topics as those of national and State regulation in its various forms, franchise requirements, taxes, including the new corporation tax, publicity in its wider aspect, the fare question and the proper issuance and regulation of transfers. In the second division naturally fall questions relating to wages and welfare of employees, pensions, accident insurance, etc. There are also certain other matters of broad policy, such as fire insurance, which will naturally be assumed by the executives of the different companies and so will undoubtedly come within the province of the main association.

THE NEXT ANNUAL CONVENTION

To assist in the solution of these questions it has been proposed that at the next annual meeting of the association half a day or an entire day should be devoted to addresses from men prominently connected with the Federal or State governments, financial institutions of national importance, and members of the bench and bar who have been giving attention to electric railway problems of this kind, but have not in the past attended many of our conventions. Assurances have been received from several of these gentlemen that they will accept invitations of this kind, if extended by the association, and it is believed that if a part of the time of the next annual convention should be devoted to a meeting of this kind it would be exceedingly helpful.

The location of each convention in recent years has been determined in the spring by the executive committee, as the result of a report made by a special committee appointed at the January midwinter meeting. As this course will probably be followed in connection with the 1910 meeting, it is impossible yet to make any announcement of the place to be selected. I might say, however, that invitations have been extended to the association to meet in St. Louis, Saratoga, Niagara Falls,

Atlantic City, Portland, Ore.; Rochester, N. Y., and in one or two other places.

IMPORTANCE OF ATTENDING THE MIDYEAR MEETING

The writer sincerely hopes that the plan of a midwinter meeting will meet the approval of the executives of the member companies and that there will be a large and enthusiastic attendance at the meeting on Jan. 28.

RECENT ELECTRIC RAILWAY PROGRESS

BY A. H. ARMSTRONG, RAILWAY DEPARTMENT, GENERAL ELECTRIC CO., SCHENECTADY

While the past year has not been characterized by the large number and magnitude of its electric railway installations, some of those made are of special interest as giving indication of the development of the industry along new and broader lines. To the evidence of actual installations should be added the papers and discussions in the various engineering societies, which, while largely describing apparatus already built and in operation, yet unfold to some extent the designs and plans under way for the present and immediate future. Taken all together, it is conservative to state that the electric railway industry has made most important advances during the year just passed and is now entering into untrodden fields of great extent.

LARGER UNITS AND HIGHER POTENTIALS

One of the controlling reasons for the broader outlook is undoubtedly found in the preparedness of the manufacturing companies to furnish the more powerful machinery required to meet the demand for larger generating and transforming units operating at greater efficiency and still higher potentials. Nowhere is this shown to such an extent as in the construction of electric locomotives capable of replacing the largest and most powerful steam locomotives that 80 years of development has perfected.

The placing on the market of turbo-generator units of 18,000 kw capacity, rotary converters of 3000 kw, transformers of 10,000 kw, operating at practically any line potential asked for, and of switchboard apparatus able to control reliably any aggregation of these units, has resulted only in effecting economies in generating and distributing systems and increasing their radius of usefulness. The development of electric railway rolling stock has, however, continually opened up new fields until now when the limitations of the steam locomotives are being most acutely felt upon our increasingly congested trunk lines, the electric locomotive is so far perfected and proven successful in the daily operation of the electrified divisions of several well-known steam roads, that the most conservative must admit its fitness for certain classes of service.

ELECTRICITY ON MOUNTAIN DIVISIONS

The electrification of steam roads presents a problem of such tremendous importance that interest naturally centers in the progress made in this direction. In this connection attention is drawn to the installation of electric locomotives at Cascade Tunnel on the Great Northern Railway, fully described in the paper by Dr. Hutchinson before the American Institute of Electrical Engineers. This is our first example of large electric locomotives being used on mountain grades, and the immediate reason for their adoption in this case was the desire to eliminate the dangers of steam locomotive operation through an unventilated tunnel over 2 miles long. It is worthy of note, however, that the installation is of such a character that it is readily adapted to extension over the entire Cascade Mountain division of the Great Northern.

It is evident that the Western roads offer a particularly attractive field for the operation of electric locomotives on their mountain divisions. The conditions are none too favorable for steam locomotive operation, and double tracking to avoid congestion is a much more expensive way to gain increased track capacity than electrification. That the present Great Northern installation is but the forerunner of another of much greater magnitude was indicated by Mr. Sprague in his discussion of Dr. Hutchinson's paper.

LOCOMOTIVE DESIGN

A considerable variety of locomotive construction has been offered. The Great Northern locomotives comprise four three-phase induction motors mounted on two four-wheel bogie trucks articulated. The Detroit River tunnel locomotives are of much the same construction, with, however, 600-volt d. c. motors in place of three-phase induction motors. In both types of locomotives, the motors transmit their torque to the axles through twin gears and the feasibility of this form of construction appears to have been demonstrated.

While side-rod locomotives have been in use for some time in Europe, it was not until this past year that the first experimental unit of this type appeared in Schenectady, followed by the completion of the first Westinghouse locomotive for the Pennsylvania tunnels, also of the side-rod type. In both of these locomotives, the motors are mounted on the side frames, housed in the superstructure and transmit their power to the driving axles through intervening side rods and a countershaft. They thus pattern largely after standard steam locomotive construction, the cylinders being replaced by electric motors.

The advantages of side-rod construction appear three-fold, greater motor capacity made possible with the larger space available above the axles, higher center of gravity and all motor construction spring supported on the side frames. For moderate outputs per axle, the axle motor, either geared or gearless depending upon the speed, probably offers a type of construction that is most efficient both in first cost and cost of operation. Together with the steam locomotive boiler, however, the axle motor suffers by reason of the space restrictions imposed by a 4-ft. 8½-in. gage. Mounting motors in the superstructure gives the additional motor space needed for units of large output and at the same time gives a better riding locomotive.

Present developments have not clearly defined the limitations of side-rod construction. The advantages enumerated are obtained at the expense of a considerable increase in weight and cost, together with a decreased efficiency over types of locomotive construction possible with geared and gearless axle motors. Continued developments may, however, result in a more efficient utilization of material, sufficient to eliminate cost of construction as a controlling factor.

Both steam and electric locomotives of recent construction give evidence of the acceptance of the necessity of leading or guiding trucks, preferably a four-wheel guiding truck for locomotives designed for high speeds. While this adds to the weight and cost, it undoubtedly increases the reliability in operation and will probably be seen in future designs of large units.

To add to the perplexity of those endeavoring to solve the single-phase vs. d. c. motor tangle, come the tidings of the complete success of the Great Northern installation. While it is true that this is an a. c. installation, it employs three-phase induction motors and double overhead trolley, and while thus differing from all other installations in this country, it appears from Dr. Hutchinson's paper well fitted to fulfill the service requirements.

There are thus three types of motors which have been given commercial trial in the haulage of trunk line trains, the single-phase and three-phase motors utilizing alternating current and the 600-volt d. c. motor. The two former are particularly adapted for trunk line operation by reason of the high trolley potential that can be used. Indeed, the direct current motor would have been hopelessly distanced in the race for recognition in mountain road electrification had it not been for the continued development of the commutating pole motor with its higher voltage possibilities.

The 1200-volt d. c. motor equipments operating or in construction in this country aggregate 60,000 hp operating over upwards of 400 miles of track. The operation of the equipments already installed indicates the entire success of the higher

voltage system. A brush life reaching 100,000 miles gives ample proof of the absence of commutator troubles and indicates that the limit of high voltage d. c. design has not yet been reached with 1200 volts. Control difficulties at the higher potentials were found to be less than expected, and the entire equipment indicates a life and reliability in service practically as good at 1200 volts as at 600 volts.

The success of the 1200-volt third rail on the Central California Railway gives promise of a still further increase in voltage before reaching the limitations of the high voltage third rail as a means of secondary distribution. Perhaps, after all, the question of d.c. vs. a.c. for mountain road electrification will be decided by the superior qualifications of third rail or overhead trolley. In any case it is becoming recognized that any disagreement of engineers as to details of equipment does not fundamentally effect the fitness of the electric locomotive, as such, for haulage of trunk line trains. Indeed, after all these years of development, there is sharp disagreement as to types and details of steam locomotive construction, and the relative claims of d. c. or a. c. govern the selection of the electric locomotive no more than a decision as to simple or compound determines the superiority of the steam locomotive as the type of motive power for a specified duty.

ELECTRIC OPERATION OF TERMINALS

The electrification of steam road terminals in and about large cities has been given increasing attention. Although a decision has been reached to postpone indefinitely the electrification of the Illinois Central, this does not seem to be a final solution of the terminal problem in Chicago if the continued agitation properly reflects public opinion. In this connection it is disappointing to witness the construction of a large steam terminal station in which no provision has been made to benefit from future electrification.

As to the economic value of establishing a terminal electric zone, no figures have yet been made public other than general assurance that the savings effected are sufficiently great to pay a moderate return on the admittedly large expenditure required. The far-reaching decision to adhere to the 600-volt third rail made in the case of the Pennsylvania Railroad terminal in New York City would indicate its general acceptance as the system possessing the greatest all-round advantages for this class of service. The relations of steam, elevated and subway roads are so close as to call for a uniform secondary distribution system, and the 600-volt direct-current motor possesses qualifications for traction service superior to all others. Hence the recent decision to use this system in and about New York may be looked upon as most sound and one that will not in any way act as an obstacle to the possible future extension of the electric zone.

GASOLINE CARS

Not all of the steam road electrification problem concern locomotive operation and the movement of heavy trains. Many miles of branch lines are now being operated at a loss through a territory that would support an electric line giving a reasonably frequent service. To meet such conditions as do not immediately warrant electrification, the gasoline car has been perfected and has given assurance during the past year of its reliability and economy in operation. Two types of cars are available, the first using a mechanical drive, the second having a generator direct connected to the engine and driving the axles through standard 600-volt direct-current motors. Operating figures so far available indicate that such cars have a wide field of application, perhaps extending to some lines now operated electrically and contending with adverse conditions. The gasoline car appears suited for lines where only infrequent headway is demanded or where the available receipts would not justify the heavier fixed charges of electrification. It is also especially suited for repair cars, inspection cars and to replace the electric car during hours of extremely light traffic, thus permitting shutting down the generating and substations. From present indications, the gasoline-engine car has come to stay and will demand an increasing amount of consideration.

The 1200-volt equipments, with a single exception, have utilized two motors in series rather than motors wound direct for the full potential, in order to save weight and cost. As a single motor may be subjected to practically full line potential if its wheels slip, its rotative speed must be low enough at normal voltage to stand double voltage and double speed without injury. This has given rise to the development of a line of motors, designed to run at considerably lower speeds normally than is considered good practice with standard 600-volt motors. The resulting life of armature bearings and commutator has been greatly increased thereby, and it is an economic question if a corresponding reduction in the speed of standard 600-volt motors in general would not result in a decreased maintenance expense that would amply compensate for their increase in weight and cost.

COMMUTATING POLE MOTORS AND CONTROL

While the introduction of the commutating pole into railway motor design is not strictly new, it has borne fruit during the past year to the extent of relegating commutator troubles to the past. The selection of a railway motor then becomes a matter of finding out if it has sufficient radiating surface to dissipate the internal losses developed in a given service.

In the smaller motors, natural ventilation is still used, but forced ventilation is resorted to where the restricted space limitations are more keenly felt, as in motors designed for the heavier locomotives. The attitude towards forced ventilation in general seems to be that while recognizing its benefits for all motors, it is considered cheaper in the end to pay a little more for a slightly heavier motor and avoid the addition of a motor-driven blower. As the capacity of a commutating pole motor with its perfect commutation is practically limited only by its heating, it is not unreasonable to expect that more general advantage will ultimately be taken of forced ventilation, extending possibly to the smaller motors.

The improvements in control apparatus are mostly of a detail nature. Hand operated type "K" controllers are being provided with auxiliary contactors to make and open the circuit, thus leaving the controller cylinder to effect the various resistance combinations only. Train control for 1200-volt equipments is being made selective, that is, it provides that the proper connections shall be automatically made when the car enters a 600- or 1200-volt section. Air compressor motors are being wound for 1200 volts and thrown directly on full trolley voltage, thus following 600-volt practice.

POWER GENERATION AND DISTRIBUTION

The electric railway field is very broad and embraces generating, transmission and distribution systems. Keen interest is therefore taken in the rapid introduction of the low pressure turbine in those generating stations employing reciprocating engines. The resulting increase in capacity and economy of operation has been most satisfactory.

In transmission line construction there is shown a tendency to adopt a type of flexible pole or tower designed to yield when a line breaks, thus distributing the strain over several poles. Although the great majority of electric railways are supplied at rather moderate transmission line potentials, a departure is being made in the case of the railways in San Francisco which will soon be run from Stanislaus over a line operating at 110,000 volts.

A recent railway substation installation of interest contains a 60-cycle 600-volt rotary converter of 2000-kw capacity. The steady improvement made in the design of high frequency converters has thus resulted in the successful development of a size of 60-cycle unit that would have been considered impossible a few years ago.

While the year just passed cannot be considered as epoch-making, it has reflected the steady development of electric railway apparatus in general. Marked progress has, however, been made in electric locomotive construction, the perfecting of the gasoline-electric car and the further extensions of the 1200-volt d. c. system. All of these developments have a direct bearing upon the steam road electrification problem, and therefore command widespread attention.

FARES, TAXES AND REGULATION

BY C. L. S. TINGLEY, SECOND VICE-PRESIDENT, AMERICAN RAILWAYS COMPANY

Fares, taxes and regulation; these three questions of great importance confront the electric railroad managers to-day. While they seem separate and distinct questions, they are so closely correlated as to be really one.

In most municipalities the fare is fixed by ordinance, usually that empowering the road to operate by electricity. The rate, namely, 5 cents, was originally determined in the old horse-car days, when the length of ride varied from 2 to 4 miles, usually over a single line, involving no transfers, and if a transfer was issued it was apt to be called an exchange ticket, an additional charge being made therefor. At the time of electrification, however, or in some instances prior thereto, came the era of consolidation and unification. The old, disjointed horse railways were united into systems, chartered routes were departed from, and in order to prevent legal complications transfers were issued without charge, thus enabling the rider to follow the charter route of the several constituent lines without paying an additional fare. Then came electricity, the great solvent which was to make all railway men millionaires, and joyously the companies extended their lines out into the country, giving longer and longer rides for a nickel, enriching the real estate operator, enhancing the value of real estate by leaps and bounds, thereby enriching the municipality by increasing its taxable values, and all the time steadily decreasing the return which was received for the only product which they had to sell—namely, rides—until now in many cases the length of ride obtainable for a single fare is out of all proportion to the fare paid. If it were not for the numerous short riders the companies would be quickly thrown into bankruptcy.

Through stress of competition for franchises many companies in the early days, more particularly in the Middle West, have been foolish enough to issue reduced rate tickets and to agree in their franchises to issue the same, thereby materially curtailing their revenue on the supposition that a man with tickets in his pocket, having already spent his money, will ride more frequently than if he had to pay his fare each time. The nickel has been purchasing more and more year by year in the way of street-car transportation; its power to purchase in other directions has been declining year by year; wages have been steadily advancing, and if the demands made by organized labor and the platforms which they are promulgating are any criterion, the end is not yet. Materials have kept pace with or outrun labor. In a table published in a recent number of the *Railway World* giving the costs of materials used on steam roads, all of which would enter largely into the operation of electric roads, for a 10-year period from 1897 to 1907, the increase ranges from 24.70 per cent on brick to 136.34 per cent on pig iron. It is apparent that something must be done if the electric road is to stay in business and make a return on the capital invested. The most obvious means of meeting this difficulty would seem to be the adoption of the system so prevalent in Europe, commonly known as the zone system, whereby the rate of fare paid by each individual is proportionate to his ride. This is undoubtedly a logical and scientific method; it is, however, open to a number of objections. The American public has been educated to the other system, and the outcry against any change would undoubtedly be great, particularly as it would undoubtedly be supported by philanthropic individuals and associations on the ground that the zone system tends to create congested districts, forcing the workingman into the tenements, producing unsanitary conditions and handicapping his children in their physical, moral growth.

QUESTION OF TAXATION

The question of taxation is a much-vexed one. Few, if any, of the States have made any effort whatever at developing a scientific system of taxation; the result is that most of their schemes of taxation are crude and are laid upon subjects which in the judgment of the lawmakers are the easiest to reach—and obviously the corporation is one of these—rather than apportioned on a basis of equity. Among the illogical features of the burdens imposed upon electric railways, for example, is the care of the highway. This, of course, is a relic of the horse-car days, for in those days wear was imposed upon the paving, dirt was deposited in the street, and there was some show of justice in imposing upon the corporation the duty of making good this wear and removing this dirt. As the case stands to-day, however, the railway imposes no wear upon the pavement, nor does it contribute to the dirt and it should therefore in all justice bear no greater proportion of the expenses of maintaining the pavement or cleaning the street than any other tax-payer.

When we come to the question of taxation upon the property of the corporation it is equally illogical and shows many relics of the past. Undoubtedly the most scientific method of taxing any public service corporation and particularly a street railway is to base the tax on the gross receipts. The tax would then bear some relation to the ability of the property to pay; would be uniform throughout the State and many sources of controversy and litigation would be eliminated. The fair cash value method of taxation is one which brings into the question the individual judgment of the assessor or official making the appraisement, and therefore is apt to give a different basis of valuation for each separate property in each State. This is equally true whether the assessment be made, as is done in Pennsylvania, by the officials of the company, or whether it is done, as it is in some of the States, by the local assessor.

While it is perfectly true that the individuals who furnish the capital to operate electric railways throughout the United States did not go into the business from philanthropic motives and expect a profit upon their investment, it is equally true that the electric railways perform very valuable public service and that many companies now in existence can only justify their existence by the fact that they do perform this public service because they never have earned a dollar for their owners. It would seem to be the part of wisdom and of enlightened policy for the State to recognize the public service performed and instead of heaping upon the electric railways all the burdens possible, to so apportion its taxation that the burdens of the governments, municipal and State, should be borne equitably by all parties at interest, thereby enabling the electric railways to give better service to the traveling public and enabling their officers to devote more time to their proper business of managing the property and caring for the public and less time to watching and combating vicious legislation.

PUBLIC REGULATION

This raises the question of public regulation. Regulation may be a good thing for both the electric railway and traveling public or it may be a very harmful thing for the railway and the community at large. A conservative commission law honestly administered will insure justice, not only to the traveling public, but to the company and the community at large. Such a law and commission may stand as a bulwark of defence against the demands of an unreasonable public or city council. An ill-considered commission law or a dishonest or incompetent commission will lead to many evils and quickly produce intolerable conditions.

The relation between the rate of fare, taxation and other franchise requirements is largely the margin of profit in the operation of the road. If taxation is heavy, franchise requirements burdensome and rates of fare limited, poor service is the inevitable and immediate result, with bankruptcy always a future possibility. If rates of fare are to continue to be limited by law the same law should limit the burdens which can be placed upon the corporation. An ideal situation would be created if all power to impose burdens upon public service corporations was removed from the local authorities and a general State law passed prescribing conditions under which railroads should be operated within the State; prescribing a reasonable tax upon the gross receipts, a portion or all of which should be returned to the municipalities traversed by the road in lieu of local taxation, and the power of the municipal legislature limited simply to saying to the road, "You can or you cannot occupy the streets."

And lastly and most unjust and unreasonable of all taxation comes the corporate income tax amendment to the recent tariff bill. This amendment is a most unwarranted invasion of the rights of the State. To most companies, and particularly most railway companies, the United States Government has no relation; from it they get nothing except what every other citizen gets and for which they pay as every other citizen pays, and to impose upon them an income tax under the guise of excise is unwarranted and unjust. The provisions of the law for ascertaining the net income upon which this tax is to be levied are exceedingly crude and conflict with the accounting requirements of the Interstate Commerce Commission and of the various State bodies having jurisdiction over corporate accounts. They are not based upon sound principles of accounting and were protested against by the American Association of Public Accountants.

POWER STATIONS AND DISTRIBUTION SYSTEMS

BY LOUIS BELL, PH. D.

Progress in power stations and electrical distribution during the past year has been of a gradual and somewhat unsensational character, especially as regards power station practice. Really all that can be said regarding the year's work in power station design is that the big steam turbine units have steadily come into greater favor, the average outputs being each year larger and the turbine itself being upon the whole more and more reliable. It is only within a comparatively short time that the higher economies have been realized from turbines. At the present time it is within bounds to say that they give as high steam economy as any other prime mover used in railway stations, or indeed in electrical stations generally. Whether the turbine can actually meet the highest economies of the triple expansion reciprocating engine at steady load is, from the standpoint of the railway engineer, chiefly of academic importance. The fact is that the railway generating station, so long as it is, as usual, purely an alternating current station, must depend on the steam turbine if high economy is desired, since the more efficient types of reciprocating engines have seldom or never been installed in railway plants. Whether in stations of the larger sizes triple expansion engines can be worked to good advantage is a debatable question. The writer is disposed to think that they can be, and that where any considerable amount of direct current is to be generated from the prime movers that such engines should regularly be used. In making any comparisons between prime movers it must be remembered that high vacuum and high superheating have been introduced with the steam turbines, while they have been scandalously neglected in the case of the reciprocating engines.

Another important recent use of the steam turbine in such plants as are here under consideration is the employment of the exhaust turbine electrically linked to the general generating system. Such turbines, worked of course at high vacuum, furnish a simple, compact and economical means of utilizing the last limits of expansion. They should be considered in the light of apparatus designed to convert the ordinary compound engine into a triple-expansion machine of excellent efficiency in an exceptionally cheap and simple manner. While no results of long operation on such plants of considerable size are now available it is perfectly safe to say that the exhaust steam turbine for heavy service is making good here as it has already made good abroad. The direct current turbo-generator has not as yet come into considerable use and must be regarded so far as a somewhat dubious success, although the writer believes that it is promising better things and deserves more extensive trial than it has yet had, preferably in stations wholly equipped with turbines.

With respect to distribution, the marked present tendency toward higher distributing voltages has not made itself strongly felt in railway practice, although voltages are steadily and gradually rising. Most railway plants have been, and still are, working on very conservative line pressure, from 10,000 or 15,000 up to 25,000 or 30,000 volts. Electrical transmission for railway purposes is peculiar in the amount of public inconvenience that may be caused by relatively slight interruptions of service, and such have been felt in various instances during the past year. The moral is thoroughly plain, that railway distribution lines should be designed and constructed with rather more care than has been customary, as thoroughly indeed as would be a line designed for ordinary transmission purposes.

The tower construction now so frequently used for transmission work does not lend itself very readily to many cases of high-tension distribution for railways on account of the large space required for the towers, scarcely available on the public right-of-way that commonly is utilized for railway distributions. Whenever and wherever the voltage to be utilized is more than 25,000 or 30,000 the use of suspension insulators is worth careful consideration. These insulators have succeeded remarkably well and they constitute in point of fact decidedly the most important advance in power transmission equipment within the last few years. Wherever such construction is undertaken the ordinary wooden pole line becomes somewhat inconvenient, and the use of steel latticed poles with fairly long spans deserves very careful consideration. Such poles have come into extensive use for transmission work in Northern Italy and other places on the Continent, and combine in no small measure the simplicity and cheapness of ordinary pole lines with the mechanical security and durability of the tower line. Used as they customarily are abroad they are designed not to hold up rigidly against the greatest possible strains that a hypothetical load may place upon them, but are deliberately intended to spring, of course within their elastic limit,, sufficiently to drop the catenary enough to relieve dangerous strains so that the damage due to a break will be confined to the point at which it occurs. Construction of this character for the feeders of moderate size which are commonly used is a good deal cheaper than tower construction and mechanically quite as sound.

Another matter to which attention should be directed in the interest of economy is simplicity in power station equipment for transmission purposes. Some of the most successful and reliable transmission lines are conspicuous for almost rudimentary simplicity of the generating and switching plants, and, in the opinion of the writer, the point has been reached in the design of not a few recent stations at which the added possibilities of failure on account of intricate apparatus intended to secure safety, is greater than would be the risk of failure with simple equipment.

The one very striking novelty in electric railway service during the year has been the equipment of the Cascade Tunnel of the Great Northern Railway, where for the first time in this country, for heavy service, the three-phase motors have been adopted on a considerable scale. The possibilities of economical distribution to be secured by the use of such motors with their high voltage distribution on the working conductors is notoriously great, and while many engineers still fight shy of double trolleys, foreign experience, as well as that in the Cascade Tunnel shows that this hesitation is not well founded.

The high-voltage direct-current road has also made very gratifying progress of late, but there is nothing to indicate, as yet, that the working pressures can be carried high enough in this way to justify the use of the system on a large scale when the alternating current motors are as thoroughly available as they are at the present time. The convenience of direct-current equipment is too well known to need comment, but when it comes to heavy traction over long distances the success of a direct-current distribution depends on the utilization of voltages which have not yet been reached, at least with constant potential machinery.

The chief difficulty with any distribution for heavy service lies in the yards at the terminii. In how far such difficulties can be met by a mere substitution of electric for steam locomotives is one of the questions which the near future must settle. There is at least a strong probability that a change of motive power will entail some radical modifications in operating methods and in terminal equipment.

REGULATION, BUT NOT CONFISCATION

BY R. P. STEVENS, PRESIDENT, LEHIGH VALLEY TRANSIT COMPANY

I have every confidence in the ultimate result which the National and State governments have in view in their efforts to regulate electric and steam railroads, and all other corporations; the people created these corporations, and have the undoubted right to regulate them.

In the past few years, however, there has been passed, in accordance with public demand, much legislation, which, up to this time has hardly been comprehended, and I believe that the best interests of every class will be served well, if, before additional laws affecting corporations are passed, a proper trial be given to those which have recently been placed upon the statute books, and agitation be allowed to rest a bit in order that we may properly digest what has taken place, and calmly consider from the experiences of the past year what is the best course to pursue for the best interests of all.

It would have been very strange, indeed, if, in recruiting the army of 2,000,000 men employed in railway service, a great many bad men should not have been included. In the magnitude of the transactions, and in the rush of construction and reconstruction, it would have been strange indeed if exceedingly grave evils and abuses did not develop. But is it unreasonable to ask that the corporations as a whole be judged by what they have accomplished; by the character of a very great majority of their shareholders, directors, officers and employees, rather than by the comparatively few wrongdoers, and by the abuses and evils which have crept in, but which it is hoped have been to a very great extent eradicated?

It is this very small proportion of wrongdoers, and the popular idea that no matter how great the expense on the part of a corporation in performing a service, a certain fixed price established by custom and by long continuance should be paid for it, that has done much to unsettle business in our country in the past two years.

Our street railway lines must only charge five cents for their passenger fares, whether the cost of conducting their lines has remained the same or increased 100 per cent or 200 per cent over that of former years.

Our railway companies which are struggling to afford facilities for the greatly increased volume of traffic that has been thrust upon them, and which find that prices for everything they have to buy have doubled or trebled their burden of expense, are not only prohibited from charging higher rates for the freight they carry, but must actually lower these, and passenger fares as well.

Meanwhile all other lines of industry are suffered by public sentiment to conduct their business on ordinary lines; that is to say, to adjust the prices of what they have to sell in such a way that their ratio of profit shall not be diminished.

There is a wrong in all this sort of thing that must be remedied before the business relations of the country can ever be soundly established. There must not be one economic law for the steam and electric railways and the like, and another for the farmer and manufacturer; and this brings the thought whether a national prosperity which permanently affects one part of the population at the expense of the other is a prosperity that can be said to be likely to endure.

It should not be assumed that the mixture of private ownership and public regulation in the manner now prevalent will be successful. On the contrary, it is against all rules of political economy and the teachings of history. The public service corporations, starting as a purely private industry, have been appropriated in parts, and other parts are apparently to follow.

Regulation, and not confiscation, will bring success and equity, and ordinary commercial decency requires that the present tendencies of close restriction and supervision should be accompanied by some guarantee of return.

Unless assurance can be had—not of condoning wrongdoing or winking at abuses, but of friendly co-operation, of protection and aid in every fair and legitimate manner against oppression and injustice; of such guarantee as the Government can give of protection from legislation which will prevent earning a reasonable return on money invested, and of a fair participation in increased values and general prosperity which investments of this kind aid in promoting, it is going to be impossible for public service corporations to obtain the money necessary for the vast improvements and extensions necessary to provide facilities for the immensely increasing volume of business for which they are expected to provide.

Again, I say the masses have assumed, without giving the matter the careful thought and consideration that it deserves, that the present methods will bring the desired result, and have demanded drastic legislation; but careful reflection, and at the most a little more experience, will, I believe, prove the present methods to be of doubtful policy.

Let us have regulation that does not approach confiscation.

AMERICAN STREET & INTERURBAN RAILWAY TRANSPORTATION & TRAFFIC ASSOCIATION

BY R. I. TODD, PRESIDENT, INDIANAPOLIS, IND.

The last annual convention of the American Street & Interurban Railway Transportation & Traffic Association, which was held in Denver, Oct. 4 to 8, was only the second in its history. But the wisdom of the establishment of the association was amply demonstrated by the work accomplished during the year and at the convention. The attendance at the meetings was large, and the enthusiasm in the work of the association was everywhere apparent. Too much cannot be said also of the splendid work accomplished by the committees during the year.

It is very doubtful whether all the members and associate members of the association, even those who attend the annual convention, realize the time and labor spent by the members of a committee upon the preparation of the reports submitted to our association. During the period between the appointment of a committee and the time when its report is due at the main office of the association the members are called upon to attend a number of meetings at considerable sacrifice of time and comfort to themselves. I do not mean that each committee member does not receive benefit from the opportunity afforded at these meetings of broadening his knowledge by contact with others engaged in the same line of work as himself, or that the company with which he is connected does not also profit by the new ideas which he thus acquires. But this in no way detracts from the benefit which the association as a whole receives from the time gratuitously given to its service.

Possibly of the different reports presented at Denver those which attracted the most attention were the reports on city and interurban rules. This is due largely, I believe, to the universal desire toward standardization, which is just as strong in the field of transportation as it is in engineering. The adoption at Denver of these two codes, however, constitutes only a beginning of the work of standardization. The great amount of work done by both committees will be practically futile unless the action of the association at Denver is generally accepted and the rules are incorporated in city and interurban electric railway practice throughout the country. I do not mean that no changes will ever be made in either code, or that slight changes may not be recommended by the committee even during the coming year. Standardization does not mean stagnation, and if after careful thought certain modifications of the present rules seem desirable, they will undoubtedly be carefully considered and adopted by the association. Minor changes will also probably be necessary in individual cases owing to local conditions. But the best interests of the industry as a whole, even those of every individual road, demand the use of a general code which has received the sanction of the national association. Our position before the public and the courts would be greatly strengthened and we could insist upon a higher standard of discipline with our employees if

every one knew that the code used was that which represented the best thought of all electric railway operators.

I have not referred to any of the other work undertaken and being undertaken by the American Street & Interurban Railway Transportation & Traffic Association, because I have been asked to speak particularly of what I consider the most important development of the year in the field covered by this association, but in the other branches of the work nearly or quite as valuable progress is being made. During 1910 all of the important leads for investigation initiated at Denver will be followed up. The future of the Transportation & Traffic Association is bright, and there is plenty of work ahead for all members and associate members.

FARES ON CITY LINES

BY W. H. GLENN, MANAGER OF RAILWAYS, GEORGIA RAILWAY & ELECTRIC COMPANY

The street railway companies of to-day are confronted with more vexing problems than any other line of business. This is largely due to the fact that they are brought into daily contact with millions of people, eager to criticise, and exacting in their demands; and to the additional fact that they are answerable to so many masters. Many a manager is asking himself at this time: "How can I please the public; how can I meet the requirements of city legislation; how can I comply with the demands of the Public Service Commission, and how can I do justice to my stockholders?" It is in the endeavor to find answers to these questions and to reconcile such answers that the problems develop. A thorough discussion of all of the above queries would consume more space than can here be allotted to it. In passing over these questions, however, I feel that they should not be dismissed without saying that the street railway companies would not be looked upon with such suspicion if the public could be brought into close relationship with them and could know their methods and the extent to which they go in order to please the public and to deal justly and fairly with all concerned in their operations. This question of dealing with the public and with the various governing authorities involves the perplexing problems of taxes, paving, types of cars, transfers, rates of fares, and a great many others equally important. But in the limited scope of this discussion I shall confine myself to the matter of fares on city lines.

It has always seemed to me that little logical reasoning is displayed in the attempt to justify the existing rates of fare as charged by the street railway companies. The almost universal unit of fare is 5 cents—the same 10 years ago and doubtless the same 10 years hence. It is the same for 1 mile as it is for 10 miles. Can a man of sound business judgment say that this is right when with the utmost accuracy and precision he figures his expenses on a car-mile basis? Why should not the same skill and ability that is used in regulating expenses so that they will not exceed a certain amount per car-mile be expended in regulating fares in the same way? I concede that in many cases the franchises granted are so hedged about with fare restrictions that no changes can be made. I concede, further, that it is impractical to establish ticket agencies on city lines and charge a mileage rate. But I do think that there are cases in which the city fares can be regulated and controlled, and it is with just such cases that I wish to deal in this article.

There was a time with all street railway companies, perhaps, when the maximum haul was about 2 miles. The fare was 5 cents. With the growth of the cities the lines were extended so that the haul was lengthened to 3 miles, the fare remaining the same. In time another extension was necessary, making the haul perhaps 5 or 6 miles—the fare being still 5 cents. Now the problem confronting the street railway companies to-day is, how much longer can these lines be extended and charge the same fare? Surely the limit must be fixed at some distance, be it 5 miles, 6 miles, or even 7 miles. There is naturally a demand from the public that the fare remain the same regardless of the length of the haul. Consequently the companies must do one of two things. They must refuse to extend their lines beyond a certain limit, or they must charge an additional fare in case the extension is made. I think they have been too lenient in lengthening their hauls, probably due to a desire to yield to public demands. Let us see if there are any good reasons for increasing the fare on a haul which exceeds the limit that may be agreed upon.

Probably no one will deny the assertion that there has been more phenomenal improvement, more rapid strides in transportation facilities, during the past 20 years than in any other line of business. The industry has commanded the ingenuity of the most expert engineers; it has received the attention of the highest order of executive ability, and has been backed at all times by an unlimited amount of capital. The combined resources of these three great factors have been engaged in the accomplishment of one common end: To furnish to the riding public the quickest and most comfortable means of transportation. And the systems of to-day are the results of these successful efforts. It would be unwise to say that they have reached a degree of perfection, for each succeeding day tells the story of a new subterranean or subaqueous tunnel; and not content with this the more daring are now meeting with considerable success in their attempts to master aerial navigation, and who can say but that, in the next decade, this mode of travel will be reduced to a commercial basis.

This rapid process of evolution naturally causes retrospection, and we recall the days of stage coaches and horse cars. Twenty years ago electric cars were unknown and horse cars were the greatest medium of city travel. This method was slow and tedious; the driver was the change maker and the passenger was the collecter. The longest ride at that time was not more than 2 miles and the fare was 5 cents, just as it is to-day. The investment in equipment was comparatively small, yet no complaint was made that the fare was too much. On the other hand, oftentimes passengers would drive the car so that the driver might go inside to warm himself, or would willingly assist in putting the car on the track after it had left the rails. Can you imagine passengers doing such things in this day and generation? This fare of 5 cents has been universally adhered to from that day to this, notwithstanding the fact that the facilities offered by the transportation companies to-day are vastly more rapid, more comfortable, more convenient, more safe, more reliable, and the average maximum haul is at least five times as great. If, then, passengers are hauled five times as far to-day as they were 20 years ago; if they are hauled five times as rapidly and five times more comfortably than they were then, by what process of reasoning do we arrive at the conclusion that the charge for this transportation should remain the same?

In reality the fare of to-day is only one-half of that collected 20 years ago, for in that length of time the price of almost everything entering into the cost of street railway transportation has increased 100 per cent. Lumber that was bought then for $10 per 1000 ft. is now $28; steel rails that were bought then for $24 per ton are now $42, and a ton does not go half so far; copper, once at 12 cents per lb. has lingered around 20 cents for the past few years, and has gone as high as 26 cents. In 1898 day laborers could be employed for 75 cents per day, while in 1907 they received $1.50 per day and their work was not nearly so satisfactory. Twenty years ago such things as damage claims were almost entirely unknown, while to-day they appear in hordes, consuming from 5 per cent to 15 per cent of the gross revenue of the companies. In like manner all other costs have increased; yet all this time the fare of 5 cents has remained the same, while five times as good service has been given at an increased cost to-day of 100 per cent over what the same service could have been furnished for 20 years ago. If these figures are correct then the horse car companies of that time received 5 cents for what the transportation companies of to-day get one-half a cent. The men, women and children who ride on the cars receive more for their labors or for their wares than they did 10 years ago. Every one of them pays more, not only for the luxuries

of life, but for its necessities, than 10 years ago. When a laborer walks into a butcher shop the buying power of the 5-cent piece in his hand decreases 50 per cent under 10 years ago; yet the instant he steps on a car and tenders it to the conductor in payment for his transportation it immediately increases 500 per cent in buying power.

In the face of these facts can there be any possible justification for lengthening the haul year after year and allowing the fare to remain the same?

It is often said that the cost of carrying long-haul passengers is more than equalled by the revenue derived from the very short hauls. This is true up to a certain point, for if it were not few companies would be doing business to-day. Now it is this certain point that should be located and beyond which no lines should be extended if the existing fare is to obtain. In locating this point it would be manifestly unfair to place it at the end of the average haul, but it should be far enough out to compensate amply for the short hauls.

Not infrequently we hear the argument made that a street railway owes a great debt to the public for the valuable franchises which it enjoys, and should, therefore, give long hauls and comfortable accommodations. I acknowledge the debt but not the method of collection. Aside from the numerous and heavy taxes they pay and the contributions which they make to various public enterprises, I feel safe in saying that the street railways of to-day are the most potent factors in the upbuilding and development of the country. With a network of steel they traverse the streets of the city and ramify the remotest sections of the country. They enhance the holdings of the millionaire and bring the humble dwelling of the laborer into close contact with his place of daily toil. They annihilate space and have proven themselves to be the greatest time savers in the history of the world. It is in this way that they have liquidated their debt for franchises, and the proposition still stands that in addition they are to-day furnishing transportation facilities to the public, the compensation for which is far from being commensurate with the service rendered.

Again I say that it is high time for the street railway companies to pause and consider well the inevitable results of this indiscriminate extension of city lines without additional compensation therefor.

PROTECTION AGAINST STRIKES

BY G. W. WATTLES, PRESIDENT, OMAHA & COUNCIL BLUFFS STREET RAILWAY

One of the principal problems with which the managers of street railways should prepare to deal is the labor agitator and his destructive weapon, the strike. It has been said that in times of peace we should prepare for war. To wait until a strike is declared before making preparation to meet it is both unwise and expensive. To-day there are two organized forces, one whose business is strike-making, and the other strike-breaking. Regardless of the question of whether or not a street railway company is paying satisfactory wages and maintaining fair conditions, strikes are frequently planned and declared. No street railway company of any importance in the country can insure itself by any reasonable course against a possible strike. When one is declared the only recourse is the strike-breaker, who, with a band of experienced operators, comes quickly to the scene to take charge of the cars. They usually steal the revenues and insult the patrons of the unfortunate company during the time of their stay. The cure is almost as intolerable as the evil.

There is no excuse in this enlightened age for the strike in the first instance, but as long as strikes are used as weapons by unscrupulous labor agitators, street railway companies should be prepared to meet them in an intelligent and effective manner. This could easily be done if the managers of the principal street railway companies of the country would organize among their employees a defensive army that could be called out in such numbers as might be required to take charge of the operation of any road as soon as a strike was declared. If every street railway in the country having 500 or more employees would agree to furnish its pro rata number of experienced operatives at $10 per day and expenses, to go to any other city where a strike had been declared against a member of this organization, and, with like drafts of men from other members, furnish a full quota of experienced operatives to carry on the business of the company in the regular manner, accounting for all of the fares and treating the patrons in the same courteous manner as they would at home, the losses of strikes would be much lessened, and the labor agitator would soon learn that his most effective weapon had been destroyed.

RAILS AND SPECIAL WORK

BY VICTOR ANGERER, VICE-PRESIDENT AND GENERAL MANAGER, WM. WHARTON, JR., & COMPANY, INC.

A year seems almost too short a time to assign to its limits the complete development of any improvement in the manufactures pertaining to the railway industry. Such improvements in most cases have to be preceded by experiments and the results must be awaited before an attempted innovation can be classed as a newly developed improvement. In railway track work such developments are necessarily slower than in other branches of the railway industry, where the results and advantages of an improvement are more quickly ascertainable.

In the track work for electric railways, the past year has been most marked by the electric railway track engineer following the lead of the steam railroad track engineer in the demand for open hearth steel rails in place of the Bessemer steel rails. Whether or not the electric railways, in their girder rail tracks, will gain advantages equivalent to those claimed for open hearth steel rails in steam railroad track remains to be seen. Rail failures, which constitute such a serious problem to the steam railroad engineer, owing to the heavy loads and high speeds of the steam railroad equipment, have so far not troubled the electric railway engineer. Better wearing and lasting qualities of the rails under the frequency of electric car traffic is what is looked for only. Whether the higher percentage of carbon which the open hearth steel rails require to give the same wearing qualities as the former Bessemer rails, and the still higher carbon that is necessary to make them likely to wear better, will not in the girder rails bring other troubles, including failures in the thinner parts of the section or when the parts wear thin, is a matter that time only will tell.

In the manufacture of special track work out of the harder and more brittle rails, more difficulties than had been anticipated were encountered in the sawing, bending and other machining of these rails, making the manufacture more costly and bringing to mind the possibility of an increased number of rail failures under service.

Another burning question of the past year was the use of high T-rails in paved streets, instead of girder rails. The writer regrets that he is not qualified to enter into that question, except to say in a general way that while it would seem that the T-rail is desirable from the railway standpoint, where it can be used, the girder rail will for an indefinite period remain by sheer necessity the rail for use in the surface tracks in our largest cities.

Nearly all new girder rail sections designed and rolled in the past year have embodied in their contour the feature to provide for wider wheels by a sloping extension of the back of the head of the rail. In this connection it may be of interest to quote from a discussion about the relation of rails to street paving before the American Society of Civil Engineers in December of the year 1896, where the writer then advocated such a rail, and, in answer to serious objections raised against it, said:

"This beveled extension of the head has been put on not solely for the purpose of allowing the wheels to clean off the dirt towards the outside, but also to provide for a wider tread on the wheel, without having it strike some projecting paving

stone. In the writer's opinion, wider treads on the wheels are quite certain to become one of the requirements of the street railways, owing to the suburban lines, and, further, to lessen the severity of wear of the heavy motor cars on frogs and switches. If the life of the latter could thereby be lengthened and the disturbance of the pavement around them due to their comparatively frequent replacements be minimized, it would be one advantage gained from the paving side of the question."

In special work provision and clearance for wide wheel treads up to 4 in. were quite generally called for during the past year, but in anticipation of the future, rather than for present wheel treads. When wide treads come into general use they will doubtless increase the life of frogs and crossings.

"Manganese steel," no matter what the differences in the products of various manufacturers may be, is now generally regarded as the synonym for the "best-wearing metal for track work." The past year has recorded a more extended use of switches, frogs and crossings cast in one piece, entirely of manganese steel. In tongue switches great improvements have been made during the past several years in the design of the tongue and tongue pivots, and when combined with solid manganese steel bodies the tongue switch need no longer be regarded as the most vulnerable and short-lived part of special work. Hard center work with manganese steel centers, however, still holds its own for frogs and crossings.

The finish and general accuracy of special track work has reached almost an extreme for the class of work. Still, the destructive action on special work of the heavier cars and the ever-increasing frequency of car traffic in our populous cities call for the best, and most exact product, by which the destructive effect may be minimized.

The problem of the rail joints in electric railway track and the problem of that bugbear, rail corrugation, have not as yet been solved, and the past year has not witnessed much progress towards the solution. Let us hope that 1910 may bring us the Archimedes of the electric railway track, who in regard to these two problems can exclaim a triumphant "Eureka!"

WORK OF THE NEW ENGLAND STREET RAILWAY CLUB

BY W. D. WRIGHT, PRESIDENT, PROVIDENCE, R. I.

The New England Street Railway Club has carried on the work of having addresses and papers presented at its monthly meetings that are of interest to street railway men. The club has been very successful during the past few years, and its members take a great interest in its meetings, which are largely attended. Discussions usually follow the presentation of papers.

I believe the club is of great benefit to its members; they have an opportunity to meet each other and discuss various problems, and also to enjoy the addresses and papers from time to time. I believe the street railway industry as a whole is greatly benefited by the existence of organizations like the New England Street Railway Club.

The managements of street railways in New England take great interest in our organization.

I do not know of any program in contemplation for next year that will bring about any special result, further than to continue the active work that has been in vogue since the organization of the club, with splendid results, satisfactory in all ways to every member all of the time.

Outside of the regular monthly meetings, the club does everything possible toward stimulating trolley traffic by the publication of trolley books and maps, and during the summer months conducts a free trolley information bureau, which is visited by thousands of people who are in search of reliable information. The street railways furnish an abundance of booklets, timetables, maps and general printed matter that are eagerly sought by people who are arranging or taking trolley trips. The information bureau is fully appreciated by trolley tourists, and I am sure the companies are considerably benefited by its work.

Our club has nearly 800 members, and its membership is continually increasing; 40 names were added during October.

THE SIGNS OF THE TIMES

BY THOMAS N. M'CARTER, PRESIDENT, PUBLIC SERVICE CORPORATION OF NEW JERSEY

The country has been through a period of five years or more of turmoil. Around those of us engaged in any kind of public-service work the flame has burned savagely—so fiercely, in fact, that many of the great properties of the country have been severely scorched and certain conspicuous systems entirely consumed.

It is perhaps idle to speculate on the cause of all this agitation. Unbridled prosperity for a period of years breeds license, and perhaps a disregard of the public welfare. Insofar as the country has been brought to a realization of real abuses, and has demanded their cessation, it is a gainer, and the business too, in the long run, will be benefited. To the extent, however, that the country in its excitement has impulsively followed and enacted into legislation the captivating but specious reforms urged by political adventurers, neither the country, our business, nor the political adventurer has been benefited; and the reason is easy to understand, for the sound development of the country and the prosperity of the public-service business must go forward in parallel lines, and legislation which militates against the latter over a period of years will retard the former. The adventurer is not benefited, for when his demagogy is enacted into legislation he has lost his issue and his opportunity to keep himself before the public, until he can frame up something new and more startling.

The indications are that the agitation to which I have been referring has reached its maximum height, and that the wave of radicalism is subsiding. The country seems to want repose and an opportunity for the quiet and energetic prosecution of its business and the development of its resources. Perhaps the best expression of this changing public sentiment is the placid tone of the recent message of President Taft.

If the storm has spent its force, it is perhaps well for those of us who have embarked for our life work upon the public-service vessel to examine into the condition of the old ship after the storm, to investigate what has happened to her, and to see how she is equipped for the balance of the voyage.

Referring first to the more agreeable matters—the fetich of municipal ownership has apparently made no headway in this country. Various small municipal electric plants have singularly failed, and some have been abandoned and sold. The comprehensive investigation made abroad under the auspices of the Civic Federation failed to demonstrate the efficiency of this system, at least as applied to conditions on this side of the Atlantic. The failure of Tom Johnson's plan in Cleveland has been illuminating, and this most un-American doctrine, which three or four years ago was hailed as the panacea for all abuses, real and imaginary, seems to have become possessed of the paralytic microbe in its infancy. It does not follow, however, that the child will not outgrow this first attack and again present itself for serious consideration before the American people, but that it can during our lifetime ever seriously prevail I do not believe, and for this overshadowing reason if for no other: One of the greatest problems threatening the country is municipal extravagance and municipal financing. The expenses of municipal government connected with the absolute essentials thereof, such as water supply, paving, education, the development of parks, etc., are running into such vast sums and in so many cases threatening municipal insolvency, not to speak of confiscatory taxes, that the public will surely hesitate to embark upon new, untried and unnecessary municipal operations at the behest of theoretical doctrinaries.

RATE REGULATION

A more serious condition threatening our business is that of rate regulation, by whatever duly constituted authority the power may be exercised. The existence of this power as a legislative function, provided it is not carried to the limit of confiscation, seems now to be definitely settled, and the Supreme Court of the United States has decided in the Consolidated Gas

Company case that a rate only yielding approximately 6 per cent upon the true value of the property actually used in the business is not so confiscatory as to invalidate the statute prescribing the rate. This has become the established law of the land, and the result is that we must all recognize that this vital power is located in the various legislative bodies to which we respectively owe allegiance, and that the generous exercise of it within the constitutional limits, as laid down in the Consolidated Gas Company and Knoxville Water Company cases, may result disastrously to our business without redress in the courts. Within the limits above referred to, the legislative discretion will be controlling.

Without criticising the legal principles which justify the decision, I am of the opinion that the business principle involved is vital, and if generally put into effect by legislative sanction would retard and stagnate the development of the public-service business throughout the country, and consequently react on the very prosperity of the country itself. It is beyond my comprehension that any investor should put his money into the stock of a new and undeveloped public-service enterprise, bearing with fortitude its early years, with its customary drought of earnings, only to be limited by legislative action when the property has at last become successful to 6 per cent annually on his then investment, regardless of the lean years through which he has passed. Certain it is that if the necessary funds are to be obtained from year to year to properly develop these enterprises and the territory which they serve, it must be upon the confidence of the American public that these properties will not be discriminated against by legislative caprice. But I do not have enduring faith in the ultimate common sense of the American people, and in the resultant attitude of their law-making representatives. I would unhesitatingly recommend allowing one's money to remain in a savings bank, drawing 4 per cent interest, rather than in an investment of the character of which I have spoken.

It is true, and properly so, that the day of exploitation of this class of property is over; that we shall never again see connected with them gross abuses of over-capitalization, resulting in the amassing of large individual fortunes overnight, to the scandal of the community. It is probably true, although I am not entirely sure of its wisdom, that we shall never see any more over-capitalization or water connected with any of our public-service enterprises. To my mind the investor who has the courage to risk his money in a new and untried public-service enterprise which the majority of prudent men would hesitate to embark upon, but which is manifestly to the advantage of the public, is entitled to receive a return upon his investment proportionate to the hazard involved, and I do not see that it makes so very much difference whether it is done by the payment of very moderate dividends upon a capitalization in reasonable excess of the actual cost of the property, or by larger dividends upon its actual cost. By way of illustration, take the case of what is commonly known as the McAdoo tunnel system. I am not familiar with either its cost of construction, nor with its capitalization, but I do know the construction of that system has been one of the greatest boons for the convenience of the public, and especially for the public living in New Jersey, ever created in these parts; and I know, further, that it was a most hazardous undertaking from a financial and engineering standpoint. To say that the gentlemen who had the courage and nerve to push this stupendous enterprise through to completion should only be allowed to receive 6 per cent upon their actual expenditure is, to my mind, a veritable absurdity. Surely the application of this doctrine can never be made general if the country is to develop.

GOVERNMENTAL SUPERVISION

The other remaining serious barnacle that we find upon the hull of our ship as we emerge from the storm is that of government by commission to the extent of administration of public-service corporate property. No one objects to proper governmental supervision over the issuance of securities and the like. My own view is that this can best be accomplished as we have undertaken to do in New Jersey, by strict enactments providing vigorous penalties for their infringement, rather than by the expensive mechanism of a commission clothed even with moderate powers. These statutes are automatic, and are found in practice to accomplish the desired result. With such statutes in existence I can see neither the alleged protection afforded to the public nor to the companies by the existence of such commissions. This, however, is a subject about which some of us may disagree. The constitution of a commission clothed with full powers of administration, such as is the case under the New York act, presents another and very serious problem. To my mind it is almost as radical and un-American a proposition as is that of municipal ownership. I was bred as a lawyer, and as such I was taught to love and respect the rights of property. When it comes to taking away the management of any corporate property in which I am interested from the authorities duly constituted by the stockholders and placing it in the hands of a politically constituted State commission, I utter my vigorous protest and sound the note of warning. Where this may lead to it is easy to see. Again will appear, and is appearing in New York State, the stagnation of enterprise and absence of investment. Such is the despair of the people over inactivity of investment of this character in New York City that the people of the State have actually approved a constitutional amendment in New York authorizing New York City to further strain its credit by issuing bonds for the construction of so-called "self-sustaining" enterprises.

Again placing my confidence in the deliberate judgment of the American public, I do not believe this particular danger will increase. Supervision by commission may grow, but administration by commission must retrograde. Fortunately in this matter, should legislative discretion forsake us, we still have the courts to fall back on, as evidenced by the recent decision of the Court of Appeals of the State of New York in the Delaware & Hudson case.

FRANCHISES

The so-called short-term franchise, for 20 years or thereabouts, is a snare and a delusion. It is of no benefit to anybody, including the public. In suburban and rural communities a property cannot be financed upon it, and it is doubtful if it can be in urban communities. Moreover, the experience of expiring franchises, notably in Chicago, has demonstrated that for years approaching the end of the period there is involved a deterioration of plant, equipment and service which works to the direct injury of the public, but which must exist as long as human nature exists. Nor do agitations like those which have existed and are existing in Cleveland and Detroit benefit the public. It is probably true, on the other hand, and I am willing to admit perhaps wisely so, that the day of unrestricted perpetual franchises near populous centers is over.

What, then, is the happy medium? Opinions will differ. My own view is in favor of a perpetual or very long term right of operation, providing, however, for certain stipulated periods when the conditions under which operation takes place shall be readjusted by agreement between the municipality and the company if possible, and, if not, settled by arbitration. This has always seemed to me—since the question has arisen—to solve the problem of financing and to offer fair and reasonable protection, both to the municipality and to the corporation. Where urban properties are to be financed solely by the sale of bonds it can probably be done upon a franchise for 50 years' duration, if the mortgage securing the bonds contains an adequate sinking-fund provision.

PROPER METHOD OF TAXATION

The question of the proper method of taxation of public-service franchises is one of great moment, concerning which there has been an infinite variety of experiment. My own experience has led me to believe that, all things considered, the most satisfactory method is the payment of a reasonable fixed percentage of gross receipts, although I appreciate that this method is open to the objection that it may result in taxes being paid for a franchise upon unremunerative property. It is, however, definite and automatic, and the company knows each year just what it has to pay. Certainly up to date the method

adopted in New York State under the so-called Ford franchise law cannot be said to have given satisfaction, either to the State or to the corporations. Millions of dollars of taxes assessed under it are now in litigation, and payment thereof withheld by the corporations. This method, also, in practice is open to the same objection referred to above, namely, of corporations being obliged to pay taxes for unremunerative franchises.

While it is, of course, right and proper that corporations of this character should bear their fair proportion of the public burden, in the long run communities will be better served by public-service corporations and more benefited in their growth and development by imposing fair methods of taxation than by keeping the noses of such corporations down to the grindstone of extortionate exaction.

I abstain from any reference to the governmental tax provided by the Payne tariff bill, other than to record the old-time observation that "misery likes company," and, if the act be valid, to point out to you the figure of the public-service ship, rolling in its waves, surrounded by a myriad of craft of every corporate description.

I have only sketched the surface of the great problems involved in our business. As the responsible executive of one of the largest public-service corporations in the country, I have full confidence that the right will prevail, and that when the still ruffled waters have subsided the great public-service corporations of the country will proceed upon a calmer sea, all doing their proportionate work in the development of our unlimited national resources.

TERMINAL FACILITIES FOR INTERURBAN ELECTRIC RAILWAYS

BY J. N. SHANNAHAN, VICE-PRESIDENT AND GENERAL MANAGER, WASHINGTON, BALTIMORE & ANNAPOLIS ELECTRIC RAILWAY

The problem of proper and adequate terminal facilities for interurban electric railways in the large cities in this country is one of vital importance to such properties. In a number of instances properties that were flat failures without adequate terminals, subsequently proved very profitable when such terminals were provided. By adequate and proper facilities are meant not only the building and tracks forming the terminal station, but the tracks by which such station is reached from the private right-of-way. Undoubtedly the ideal arrangement would be a terminal station situated in the center of the retail district, and reached by surface tracks built on private right-of-way. But in this case, as in many others, the ideal arrangement is not often the practicable one, because of physical, financial or legal conditions. The nearest approach to it is probably in having tracks built either on an elevated structure or in a subway. There are, however, several objections to such an arrangement, among others the fixed charges incident to a heavy initial cost, and the loss of advertising due to cars of a distinctive type operating through city streets. The advantages of such an arrangement are, however, great, particularly in enabling "the interurban" to land its passengers in a central terminal in the shortest possible time, as well as the elimination of accidents and delays due to vehicular traffic and pedestrians. If the railway in question connects large cities, the volume of traffic heavy, and the distance from private right-of-way to the terminal station considerable, the advantages will probably be found to outweigh the objections. But undoubtedly, in the great majority of cities in this country, neither an elevated structure nor a subway is practicable, or advisable. Track built on the surface of the street is the natural alternative, and if it be possible for the interurban company to build its own track on streets not already occupied by other lines, then this plan has much to commend it.

But in the writer's judgment, the essential thing for the interurban company's success is to be able to carry its passengers without transfer to the center of the city.

There are two cases which demonstrate the truth of the above statement in one of the largest cities in the Middle West. In the first instance the interurban line connected with and transferred to, not a slow-running surface line at the outskirts of the city, but with an elevated railroad, which furnished the best of service into and through the heart of the city. Before this transfer was eliminated the financial results were unsatisfactory. An arrangement was made for running the trains of this company through on the elevated structure, and since that time the results obtained have been eminently satisfactory. To the elimination of this objectionable transfer more than to anything else the present success of the property is undoubtedly due. In the second instance in the same city, a high-speed interurban line, built in the most substantial manner, and tapping a territory with a much greater population, is now in the hands of a receiver. The financial embarrassment of this company is due in no small measure to the lack of adequate terminal arrangements.

In another instance which has recently come under the writer's observation, a property had been operating on private right-of-way to a point within 1700 ft. of the public square or business center of a city of 35,000 population. Even under these favorable conditions the passenger receipts were unsatisfactory. The company sought and obtained an entrance over the 1700 ft., thus reaching the public square, or business center, and the immediate improvement in passenger travel was remarkable and is still increasing. In this instance the owners of the property believe the improvement is due in a large measure to the advertising value of having their cars run through the public street and around the square.

The writer has also recently had the opportunity of studying a problem of this character. The conditions in this particular situation may be of interest, and the results eventually obtained will go far toward determining to what extent the success of an interurban property is affected by adequate terminal facilities.

The railway under consideration connects the cities of Baltimore and Washington and is a double-track line built in the most substantial manner. The maximum grade is 2 per cent, the sharpest curve (with one exception) on private right-of-way is 4 deg., the track is laid with 80-lb. A. S. C. E. rail, and practically all grade crossings have been eliminated. Baltimore has a population of approximately 650,000, Washington, 350,000, and the distance between the two cities is 40 miles. In Baltimore the terminal facilities are all that could be desired; a fine station through which the cars pass is located in the heart of the retail district and is reached in a run of ten minutes from the private right-of-way. In Washington, however, the terminal arrangement is not as good; the station at which the interurban cars complete their run is located 2 3/4 miles from the Treasury Building. The transfer between the cars of the city company and those of the interurban company was made as easy and comfortable as possible, entirely under cover. The interurban passenger is provided with a ticket entitling him to transportation on the line of the Washington Railway & Electric Company (the city company) with transfer privileges to any interesting line of that company, reaching thereby practically any point in the city. In other words, the terminal arrangement in the city of Washington was all that could be desired with the single exception that the passenger was compelled to transfer and make a short portion of the trip in the cars of the city company. Although operation has been under such comparatively favorable conditions, and the line has been in full operation about 18 months, yet the passenger traffic has fallen short of the estimates of the projectors of the line and what might have been reasonably expected.

After a careful study of the earnings, and conditions affecting them, the management has been able to reach but one conclusion, namely, that the terminal arrangement in Washington is unfavorable to the best results, and, therefore, a supplementary arrangement has been made with the city company by which the cars of the interurban company will run to Fifteenth Street and New York Avenue, which is directly opposite the United States Treasury Building and within a block of the White House. The principal advantages of the change will be:

In making the cars of the interurban company equally convenient of access in both cities.

In enabling a considerable portion of its passengers to make their entire journey without any transfer whatever.

In benefiting by the advertising value which unquestionably accrues from running a car of distinctive type through one or more of the principal streets. This should prove of much value in Washington, where the transient population is large.

The specific instances hereinabove cited prove, in the writer's opinion, the extreme importance and value to interurban properties of proper and adequate terminal facilities.

NECESSITY OF INCREASE IN REVENUE SUFFICIENT TO MEET INCREASED COSTS

BY CHARLES O. KRUGER, PRESIDENT AND GENERAL MANAGER, PHILADELPHIA RAPID TRANSIT COMPANY

In common with all other street railways, we have felt the necessity of increasing our revenue by an amount at least sufficient to cover the increased cost of operation, maintenance and equipment. How great have been the increases under these headings is, I find, scarcely realized even by many actually engaged in the transportation business. Some of the items of increased expense are startling. For example, when the roads that now compose the Philadelphia Rapid Transit system were consolidated, in 1895, a 90-lb. girder rail was used which cost $25 a ton; to-day we are using 141-lb. rail for which we pay $38.20 a ton. Switches used to cost $122.50; we now pay $150. Frogs that formerly cost $83 now cost $97.50. Ties have gone up from 50 cents to 65 cents. Our standard car costs us exactly 100 per cent more than the standard car of 10 years ago. Coal, another big item, has increased from $1.72 to $2.30 per ton. We all remember the time when cast-iron wheels costing about $4 each were considered satisfactory for street railway purposes; steel wheels at $18 apiece are now required. These are only a few of the more important examples of the high prices of materials. Wages have also largely increased. The wages of motormen and conductors on this system were raised from 21 cents to 22 cents an hour June 1, adding about $180,000 to our annual payroll.

Prior to May 1 we issued six tickets for 25 cents and an exchange for 8 cents. On May 4 we withdrew the six-for-a-quarter tickets. The average fare per passenger, which was 3.94 cents in the fiscal year ending June 30, 1909, and 3.56 cents in 1908, almost immediately increased to 4.20 cents, but has since dropped, as shown by the following:

AVERAGE FARE PER PASSENGER

	Cents.		Cents.
June	4.194	September	4.116
July	4.143	October	4.121
August	4.133	November	4.127

The decrease in the average fare per passenger is mainly due to the fact that the sale of exchange tickets has increased. These tickets are largely used by passengers changing from one line to another at points where no transfers are given. Free transfers, which numbered 55,631,765 in the year ending June 30, 1909, are now being used at the rate of 6,370,141 per month.

There was considerable public opposition to the withdrawal of the six-for-a-quarter tickets, but this has almost entirely subsided. The matter was taken into the courts, which have decided twice that the company acted within its rights in withdrawing the tickets, which were held to be not "a rate of fare."

Speaking generally, it seems to me that there is need of a general effort among street railways to educate the public up to a better understanding of street railway problems. The experience of the New England roads shows that fares can be increased, as I believe they must be all over the country, without serious public opposition, if the reasons for the increases are plainly set forth in advance. It should not be difficult to convince the public that the fare unit of 5 cents established in horse-car days is the minimum price at which first-class services can be given, and that when this rate of fare is diminished by free transfers or any other means the operating company's revenue is reduced below a point at which it can give adequate service and provide for the upkeep of the property.

THE AMERICAN STREET & INTERURBAN RAILWAY CLAIM AGENTS' ASSOCIATION

BY ELLIS C. CARPENTER, PRESIDENT, ANDERSON, IND.

The enthusiasm manifest by the claim agent delegates at Denver was most gratifying. Delegates representing many of the more important properties along the Pacific coast were in attendance for the first time. This infusion of "new blood" acted as a stimulus throughout the entire convention. Enthusiasm, like the measles, is "catching" and we are looking forward to a larger representation from the West and South at our future conventions.

The cordiality of the delegates from every section indicated a bond of friendship, good-will and sympathy reaching from coast to coast. The subjects dealt with were live subjects, and were ably presented in both written and oral discussion. The causes of certain kinds of accidents were dealt with and many remedies suggested. The duty of the claim adjuster is not merely to adjust losses, but also to seek the causes for troubles and suggest remedies therefor, thus preventing the occurrence of trouble, and likewise the adjustment of claims incident thereto.

The policy of the claim department toward the newspapers; the relationship of the medical and claim departments; boarding and alighting accidents; the instruction of employees; the unreported accident, its evil and remedy, as well as other subjects, were all discussed from a practical standpoint.

During the past year, through the office of the secretary of the Claim Agents' Association, much information was asked for, secured and furnished regarding fraudulent claimants. In many cases photographs have been secured and mailed to the various claim departments for identification, and to serve as a warning and protection against such frauds. Two fake claimants were arrested, convicted and are now serving sentences, important evidence in each case being furnished by the Claim Agents' Association.

All companies having knowledge regarding claimants of this character should furnish full information as soon as possible to our secretary so that other companies may have the benefit of it. We all have to contend with the class of claimants that seek the advice of the professional damage lawyer who, when asked by the client as to what he would charge for looking after the case, replied:

"If you furnish the witnesses, $100; if I furnish the witnesses, $200.

In dealing with these matters, it has been demonstrated that an index bureau would be very valuable in detecting this kind of claimants and would also furnish valuable data regarding other claimants. By co-operation with accident and life insurance companies and other corporate interests, evidence can be procured that should materially reduce the amount of damages paid claimants directly or after litigation.

The committee appointed to look into the matter of the advisability of taking out a membership for the American Street & Interurban Railway Association in some index bureau, whereby all claim departments of the member companies would be entitled to reports from the index bureau upon application, reported that it had secured a satisfactory proposition from an index bureau and made a favorable report. This will be referred to the executive committee of the parent organization for action.

The subject committee for the 1910 convention is at work and is expected to make its report at the midwinter meeting of the executive committee. In dealing with the subjects for the next convention, the committee will so arrange the subjects as to call for the actual results achieved as well as theories.

Some good missionary work is being done by various delegates and it is expected to have a very large attendance at the 1910 convention. The enthusiastic efforts of the officers, supported by the committees, receiving the hearty co-operation of a large number of willing workers, ought to make the next convention the best ever held.

RELATIONSHIP OF THE ELECTRIC RAILWAY TO THE PUBLIC

BY JNO. BLAIR MACAFEE, PRESIDENT, NORFOLK & PORTSMOUTH TRACTION COMPANY

I have chosen for the topic of this communication the question of relationship of the street railway company, electric light, gas or water company to the public. This is not so broad a question, to the writer's mind, as from its title would appear. It is a confined question. Upon it, nevertheless, depends the other questions which harass the minds of operating officers and stir up public animus.

Questions of fare, transfers and taxation are all related to this one proposition.

A corporation is a creature of the State, created by the laws of the State; its relationship, therefore, to the body politic is that of a child. It should never rise superior to its position.

The difficulties under which corporations labor to-day, due to unbusinesslike supervision, antagonistic legislation and adverse public sentiment, are primarily due to the fact that in the past the officers and directors of such corporations overlooked this relationship. The defiance of the public was flaunted publicly. Even stockholders who were not of the majority or controlling party were denied proper information respecting the conduct of the business of the company. Great public utilities companies came to feel that they were a power and a law unto themselves.

The uprising came. Laws that were thought to be adverse to the interests of such corporations were enacted; corporation commissions were created with supervisory power, taxes were increased, but as yet, save in isolated instances, not to the real detriment of the corporation.

The greatest asset of a public utilities company is good-will. The more patent the attempt of the officers of the corporation to improve its service to the public, the greater the degree of good-will. Officers of all grades are being taught now to feel that they are public servitors. They are taught as the child to respect the parent. Complaints are welcome. They are not thrown in the waste basket, but in well-operated and properly conducted companies are immediately inquired into, with the thought that, though even so large a proportion of them as 90 per cent may be unfounded, yet failure to inquire into all may result in neglect of the 10 per cent that should be properly considered. Once get the public to feel that the utilities companies operating in the community are operated with the thought and desire on the part of their management of pleasing the public, then such a relationship is established as should be. The citizen becomes part of his street railway, his electric light company, his gas or water company. Once this disposition, this degree of good-will, has been established, it is but like a conference of co-partners to discuss with the representatives of the public the necessity of an increase in fare or the abandonment of a transfer.

The American public is not an unreasonable body, but broad-minded, fair and liberal, ready to be convinced by proper argument and presentation of facts that are not distorted. They will uniformly agree to a sound business proposition. In Massachusetts we have seen during the past 18 months various street railways allowed to increase their fare, with the full approval of the Railroad Commission. In other States, where municipal authorities have applied to corporation commissions to raise taxes of the utilities companies and the utilities companies have presented sound arguments, based upon an unperverted statement of facts, such requests of municipal officers have been uniformly refused.

Demonstration to a community that the electric light company is giving the best service at the lowest price commensurate with a reasonable profit has prevented the construction and operation of competing companies. The average taxpayer does not want his city burdened with the ignominy of financial disaster to his utilities companies. His personal interest in the community is such that he hopes to be able to speak with pride of the successful financial operation of the utilities supplying his wants.

Therefore it is that years ago we reached the conclusion that the moving idea in the operation of utilities which damned the public was inherently wrong and calculated to ultimately bring disaster. Nothing so aggravates the general public as to feel that the utilities operating in their particular vicinity are controlled by a political machine. Every honest effort should therefore be taken by the officers in command of the situation to demonstrate to the satisfaction of the public that they are free from political domination. Once convince the voting citizen that such is the case and that the utilities company is operated as a plain, straightforward business proposition, his services, his aid and his vote can ordinarily be commanded for the benefit and the upbuilding of such utilities.

Therefore it is that we say that the fare question, the transfer question and the tax question were relative to the subject of this article. The earnest effort of every operating officer, every executive head and every board of directors should be directed to the encouragement of the proper relationship of his company to the municipal and State governments. Those of the citizens of this country who desire to inordinately and improperly tax and restrict are but few in number comparatively. The average business man is bright enough to realize that his public utilities company should grow with the growth of his city, and that with the utility company and the territory in which he does business advancing perceptibly in the scale of commercial progress, he is bound to be carried along by the tide and reap the resultant benefit.

We appreciate fully the difficulty attendant upon this policy, which difficulty is made greater by the errors of the past. Great obstacles have been raised in the paths of the directing heads of companies by the methods in use not many years ago. It is hard to convince the public of the change of thought, and some will forever doubt the possibility of such a change. Even this disposition will be overcome by continued attention to the wants of the public. When that period has been reached, as it is generally being reached in many of the cities and States of our country, we will hear less of restrictive legislation, less of undue taxation, and will ultimately find that the public will not be led astray by demagogic suggestions of 3-cent fares and 5-cent electric light.

A MONOPOLY OF TRANSPORTATION

BY E. G. BUCKLAND, VICE-PRESIDENT, THE RHODE ISLAND COMPANY

Transportation is a commodity by whatever means it be accomplished. Passengers and freight should be carried by that kind of transportation which can perform the service most efficiently and cheaply. Sometimes that service is by water, sometimes by steam or electricity over a private right-of-way, sometimes by electricity over a highway, and sometimes by a wagon and team of horses. That seller of this commodity—transportation—will be the most successful and efficient who so controls all of it that he can apply each kind where economic laws dictate. For instance, pig iron, ingot copper, cotton, raw wool, hides and similar non-perishable raw materials may well be carried by the cheapest method of transportation, to wit, by water.

On the other hand, the finished product of these raw materials, to wit, cotton cloth, steel, iron and copper products, boots and shoes, woolen cloth and the like can afford and deserve a speedier method of transportation, to wit, steam or electricity operating on a private right-of-way.

Distribution from industrial centers which cannot be accomplished by either of the two foregoing methods should be furnished with transportation over highways by electric street railways or, last of all, by the wagon and horse.

All of these methods are naturally co-operative, and should not be competitive. Being, however, subject to one control that is a monopoly, there must be some check to prevent an abuse of monopolistic powers. That check is properly found by governmental regulation. This regulation may well in the first instance be brought about by an administrative body, but finally

the rights and obligations of a transportation company must not rest with an administrative body subject to political influences, but must be determined by a judicial body which so far as may be is free from such political influences.

I believe in a monopoly of transportation. I believe that such monopoly should be required by law to furnish reasonable facilities at fair prices, and I believe that governmental regulation along the lines suggested is the surest safeguard of transportation properties.

THE SINGLE-PHASE SYSTEM IN THE YEAR 1909

BY N. W. STORER, RAILWAY DEPARTMENT, WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, PITTSBURGH

The single-phase system has made very substantial progress during the past year. It is reported that the commission appointed by the Swiss Government has decided in favor of single-phase alternating current for the standard railway system for the State Railways, and several projects are in an advanced state. In France the Midi Railway has adopted single-phase and ordered 30 multiple-unit car equipments and a number of locomotives, the latter to be built by as many companies. The German State Railways have adopted single-phase as standard, and are pushing the development rapidly. In Norway and Sweden substantial progress has been made along the same line. In most of the electrifications under way in Europe high voltage is being used, ranging from 10,000 to 15,000 volts on the trolley. The favorite frequency is 15 cycles. This frequency has been recommended most strongly in Switzerland and Germany, and has been adopted by the Midi Railway in France.

It is probable that the advantages secured for the motors by the use of 15 cycles will be sufficient to influence its adoption in this country for heavy work, except in instances where a large supply of 25-cycle power is available. The advantage for car equipments alone is not sufficient to pay for the introduction of a new frequency.

In this country single-phase has not had as smooth sailing. Equipments for only one new road have been sold this year, and several of the old roads have been changed from single-phase to direct current, with either 600 or 1200 volts on the trolley. Judging from this fact alone, it would appear that the single-phase system has received a backset. However, careful analysis of the reasons for the abandonment of single-phase on the lines that have changed shows that they were not properly single-phase propositions in the first place. On one line, for instance, it was necessary to have direct current at both ends of a road of moderate length, with connections for underground conduit as well as overhead trolley on d.c., resulting in complications which outweighed the advantages gained by the use of single-phase current for the interurban portions of the line. In another case a large part of the mileage made by the equipments was over d.c. lines. While in this case there was not as much complication as in the first instance, it was extremely expensive with the heavier and more expensive single-phase equipments to operate them so large a part of the time on direct current. The entire line might as well be direct current.

In the first years following the introduction of the single-phase system there were undoubtedly extremists who wished to apply single-phase everywhere. This over-enthusiasm has resulted in injury to the system, because of its misapplication. Further, the equipments on a large part of the roads over which they have been operated have been overloaded and overspeeded, performing heavier service than would be possible with direct-current equipments of the same capacity, because of the speed characteristics and the high voltage available at the motors. It is refreshing to see, however, that in spite of the abuses and misapplications of the system, the equipments have operated so well in so many instances. Examples of steam railway electrification, notably the New York, New Haven & Hartford and the Grand Trunk, have been conspicuously successful during the past year. The train delays have been greatly reduced over those formerly encountered with steam operation, and very little trouble has been experienced in any way. On the New Haven lines the locomotives are doing far more work than was ever contemplated by their builders. On some of the interurban lines the operation has been thoroughly successful, resulting in a low cost of operation. In others there have been troubles, due, as stated above, to abuse of the equipments, including overloading and overspeeding. In this connection it is significant to note that there has not been a single instance of change from single-phase apparatus to direct current where the equipments were furnished by the largest manufacturer of single-phase apparatus. On the contrary, several of the lines have ordered new equipments for extensions, and further extensions are probable in the near future.

The new railway for which equipments are now being built is the Rock Island & Southern Railway, a road designed primarily for freight traffic, which will also be used for frequent and high-speed passenger service. This line will be operated exclusively from single-phase alternating current, which makes it possible to use inductive rather than conductive compensation for the motors, thus rendering the most vulnerable part of the field winding perfectly safe from injury. The motors will also be operated from a two-coil transformer instead of an auto-transformer, so that the circuits will not be grounded, and thus the liability of breakdown of insulation will be much reduced. These equipments will possess a degree of simplicity which should be attractive to any one who is operating electric railways.

The net results of the experience with single-phase apparatus up to date are that single-phase equipments can unquestionably be built to operate successfully in either interurban service or on heavy railroads. The complication of making equipments operate interchangeably on direct current and alternating current is an undesirable one, but one which need not cause any trouble, provided the equipment is properly cared for.

Preventive leads between the armature winding and the commutator are still advocated as reducing the losses in the motor and making it possible to reduce the size of motors beyond those built for a given output without leads. All that is necessary to make the resistance lead construction satisfactory is to have the leads of sufficient thermal capacity to stand the current for the maximum length of time necessary for the motor to develop its torque at a standstill, and to make the resistances substantial, so that they may not be affected by the mechanical vibration to which all railway motors are subject. It is a well-known fact that the resistance leads of the armatures of the New Haven locomotives have never given the slightest trouble, even though they are subject to the most severe starting conditions, and the motors are required to develop at starting from 100 to 150 per cent overload torque. The worst that can be said of resistance leads is that they furnish an expensive addition to the armature winding; however, the total cost of the motor with resistance leads will not exceed that of the motor built for equal performance without resistance leads, since the number of armature conductors for the motor without leads must be very greatly increased, and frequently the number of poles increased on account of the lower inductions which are necessary.

A discussion of single-phase naturally raises some question as to the natural competitors of that system. These are high voltage d.c. and three-phase. The 1200-volt d.c. system has made considerable progress in the past year for interurban railway service, and while there is apparently not much to be gained in applying this to heavy railway work, it is undoubtedly receiving favor for interurban roads where a large part of the operation must be over standard 600-volt lines. The chief objection to this system is that the voltage is not high enough to meet the requirements for long lines, and it seems certain that if direct current is to be used for heavy work, the voltage must be very considerably increased.

The three-phase system has also made a start in this country in the Great Northern electrification. While apparently

nothing has been demonstrated by this installation, which could not have been foreseen, it indicates a tendency to develop all of the possible systems of electric traction to the fullest extent, so that each problem may receive the most careful consideration as it arises, and the best system for that particular one may be applied. Undoubtedly this attitude will make for the greatest progress in electrification of steam railways. The best part of it is that whichever system is adopted it is certain that it can be made thoroughly successful from an operating standpoint, the main difference between them being questions of first cost and cost of operation.

ADVANTAGES OF SINGLE-PHASE

The reasons for favoring single-phase system are just as strong at the present time as at any period in the past 10 years. The simplicity of the distribution and the possibilities for extremely low first cost make it most desirable from that point of view of any of the three systems. The speed possibilities of the motor make it extremely desirable from that point of view. The handicap is, of course, that the locomotives must in all cases, except where very slow speeds are required, be heavier and more expensive than for either of the other systems. Consequently, the maintenance must be higher. However, this extra cost of maintenance for the locomotives will for lines of any considerable length be more than offset by the decrease in first cost and cost of operation of the distribution system.

The matter resolves itself, as has frequently been said before, into a matter of dollars and cents, to decide which of the three systems will be the proper one to install for any given set of conditions.

Judging from the great interest which is being manifested at the present time in railway electrification, there will be sufficient comparisons made before long, which will determine the particular field that each system is best adapted to serve. At the same time, it is possible that new developments may arise which will very materially change the outlook. At present the outlook for still further extensions of the single-phase system is very good.

PERMANENT FRANCHISES AND REASONABLE RETURNS

BY ARTHUR W. BRADY, PRESIDENT, INDIANA UNION TRACTION COMPANY

The most striking phase of the electric railway situation of to-day is not found in the progress or development of the art of constructing, maintaining and operating electric railways, highly important as this is, but in the growing recognition by street railway interests and public alike of the necessity that electric railway companies be placed on a basis of permanence with respect to franchises and of reasonable compensation and return with respect to fares. Both electric railway interests and the public have been driven to recognize these facts by the pressure of experience, frequently unpleasant, and in some cases disastrous.

The sanguine hopes of the pioneers in electric railway construction and development that the low rates of fare originally adopted for both urban and interurban properties would so stimulate travel as to overcome the apparent inadequacy of return as compared with service have been largely disappointed. The unit of service furnished by urban companies has been greatly expanded through extensions of lines and enlargements of transfer privileges, as well as abuses of those privileges. This increase in the service unit has reduced the financial return to a point dangerously near, and in some cases below, the point of actual compensation. The correctness of the electric railway position in this respect has been publicly demonstrated within the past few years in the case of some of the largest and most important properties in the country through investigations made in connection with franchise negotiations or complaints before public commissions, and through reports of public supervisory boards.

In the case of the interurban companies of the country the same result has become widely apparent. The extension of the length of the ride paid for by the unit fare is not a disturbing factor in the case of the interurban lines, but it is generally true that the basic rates of fare originally fixed by the interurban companies—in some cases as little as 1 cent per mile—were unduly low. These rates were fixed when lines were first put in operation, and when the amount of travel that would be obtained was purely a matter of conjecture. Furthermore, the heavy expense of renewals and replacements was disregarded, or minimized, when these lines were first constructed, and track, rolling stock and power equipment new. Interurban cars cannot be operated at the speed which the traveling public demands and service cannot be satisfactory in other respects unless these properties are maintained at a high standard. The original rates have, therefore, in many cases, been found non-compensatory, and increased rates established. In a number of instances, notably in Massachusetts, these increased rates have been attacked, but have been almost uniformly upheld by the public tribunal passing upon them. In the course of these attacks exhaustive investigations have been made of the revenues and expenses of the companies in question, and the result has been to demonstrate the fairness, and even the necessity, of most of the increases that have been made. While the notoriety of these attacks has doubtless been highly annoying and unpleasant to the companies immediately affected, the general result has been most helpful to the electric railway interests of the country. The fact that public tribunals, the bias of which would naturally be against rather than in favor of electric railway inteersts, have found these advances justified has done much to convince the public of the fairness of such fare changes as have been elsewhere made.

The result of the various investigations and reports that have been made touching both urban and interurban companies, as well as of a few very instructive object lessons, is that what before the managements knew, but the public could not be made to accept, the public now knows and believes. The idea encouraged by the rose-colored prospectuses of a few years ago, than an electric railroad is a mine of wealth, constantly enriched by unreasonable profits filched from the public, is largely dissipated. Electric railway interests themselves universally recognize to a greater extent than ever before the necessity of adequate fares and the danger of gradually rendering inadequate fares originally adequate by an enlargement, through extensions and transfers, of the service rendered. At the same time, the public is more than ever disposed to take a reasonable and dispassionate view of conditions, and to recognize the unsoundness of the demands for reductions in fares and enlargement of privileges prevalent a few years ago.

With respect to franchise rights, there can be no doubt that we are in a period of transition, and that the final outcome will be to place these rights on a higher plane of permanence. A few years ago the individual who would contend that an electric railway franchise should be for other than a brief period of years was regarded as corrupted by corporation bias, and an enemy to the community. A remarkable recent development is that the defects and weaknesses of short-term franchises from the standpoint of public welfare are now widely recognized. Among the most revolutionary of the public utility laws recently enacted are those of Wisconsin and New York. Yet the Wisconsin law provides for an indeterminate franchise, and in New York, Commissioner Maltbie, of the Public Service Commission for the First District, has made to that commission a report in which, after discussing the merits and defects of the various forms of franchises, the indeterminate form of franchise is advocated.

There is doubtless serious objection to the indetermine franchise as defined and limited by the Wisconsin act, and as described and advocated by Commissioner Maltbie, but this is generally true of pioneer work. The important fact is that the Wisconsin act and the New York report alike indicate a realization on the part of the public authorities that under short-term franchises electric railway properties cannot be developed to the point of rendering the greatest possible service to the pub-

lic, and that, therefore, the public interest demands long-term tenures.

On the whole, the electric railway interests of the country are to be congratulated on the tendencies of the times in reference to the two phases of the electric railway situation above discussed. It is not too much to hope that the next few years will see a settlement of some of the most vexatious of the questions confronting the public and the electric railway companies on a fair and reasonable basis, satisfactory and advantageous to both.

STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK

BY E. F. PECK, PRESIDENT, SCHENECTADY, N. Y.

The three meetings of the Street Railway Association of the State of New York, which were held during 1909, were well attended, and the results were beneficial in the highest degree to the companies represented. Thorough discussion of papers has always been one of the most interesting features of our meetings, and the general participation of the delegates is of great encouragement to all who are concerned in the wise settlement of the various problems which are considered by the association at its meetings.

During the coming year the work of the association may follow to advantage some lines of action which the present tendencies of the times appear to make desirable, although our efforts will not necessarily be confined closely to any subjects which seem advisable now. I can indicate, however, some topics which affect various members of the association, and if they are not taken up at this time they may be made a subject for future consideration.

The question of block signals for interurban railways has been suggested by C. R. Barnes, of the Public Service Commission, Second District, as an appropriate subject for discussion and action by the association, and this topic will probably be placed on the program of one of the meetings of the coming year.

Of the problems facing electric railways at the present time, none is more serious than the transfer situation, and we should endeavor to formulate a system of rules governing the issue of transfers, which will minimize the general public misuse of the privilege. If a system could be devised that could be made the basis of the rules of all companies it might be desirable, but I do not know whether such a system is practicable. It would have to contain rigid conditions designed to prevent abuse of the transfers, and yet be somewhat flexible, in order to meet the requirements of companies operating under different conditions. However, the subject is one which is of deep interest to all our members, and whatever we can do in the direction of solution of the problem will be of value. Systems for the collection of fares may be taken up with profit at the same time.

The interurban companies are especially interested in the subject of operating rules, which will be discussed during the year. At the last quarterly meeting, C. Loomis Allen stated that he would recommend the adoption by this association of the code of rules adopted at the Denver convention of the American Street & Interurban Railway Association, with such modifications as may be needed to meet our local conditions. It is hoped that members of the Street Railway Association of the State of New York will give a careful study to the American Association rules, so that they may be prepared to discuss the subject when it is brought formally before them at an early meeting.

A topic of equal importance is the classification of accounts promulgated by the New York Public Service Commission, Second District. The operating accounts, as prescribed by the commission, have been used by the street railroad corporations for the last six months. Some of the companies have had a full year's experience with the classification as they introduced it, in order to gain experience, before the order of the commission required them to do so. Many points have arisen in connection with the accounts, which a full discussion will help to make clear.

At our last meeting in Albany, C. Percy Hooker, chairman of the State Highway Commission, suggested that a friendly suit be instituted in court by one of our member companies, with the object of securing a decision to determine the relative rights of the State and interurban companies in connection with the construction of new State highways, and it appears advisable to act on this suggestion.

The question of co-operation with the American Association should receive the earnest consideration of members. It is wise for us to strengthen our own organization in every way, but we should also bear in mind that the National Association is entitled to our support in all questions that work for the betterment of the industry as a whole. A working agreement between the American and the State associations should be advantageous.

TERMS FOR USE OF CITY FACILITIES BY INTERURBAN COMPANIES

BY ALBION E. LANG, PRESIDENT, TOLEDO RAILWAYS & LIGHT COMPANY

Since the advent of the interurban railways, the question of how they should gain entrance into cities and upon what terms and conditions, whether over the tracks of already existing city roads by direct negotiation, or whether with independent franchises, and upon their own tracks over streets not already occupied, has been one of the most troublesome problems we have had to solve. No one will question the wisdom of having interurban roads enter cities over their own tracks, upon independent streets, except when it may be detrimental to the best interests of the city company, but in most cases, owing to physical conditions which preclude any other course, it is an absolute necessity to use a portion of city railway tracks in order to reach the business center; and in only a few known instances are the interurban roads required to transfer their passengers at the city line.

I assume that laws have been passed by most, if not all of the States, governing this subject, but it may be of general interest to say that the laws of Ohio provide that interurban railways may enter cities without consulting city authorities, provided they do so over existing street railways, and also authorize existing street railways to make contracts with interurban railways for such entry. This law has been very beneficial in promoting the construction and operation of interurban railways in Ohio, because the interurban railways have not been delayed in obtaining such contracts upon equitable terms; whereas, had it been necessary to consult city authorities before such rights could be procured, great delay would have resulted, with possibly opposition from the city roads and others whose rights might be adversely effected. The right to enter cities and to make such contracts has undoubtedly influenced many city companies, because of general benefit to the city irrespective of financial return to the city company, to make such terms for the use of its tracks and power as would encourage the building of interurban railroads. I do not know what statistics may show, but I venture the opinion that the construction and development of interurban railways in the State of Ohio have been equal to the record in other States, if not far more rapid, and largely because of the ease with which city terminals could be obtained.

In the city of Columbus the gages of the tracks differ, the interurban being 4 ft. 8½ in., as against the city road's 5 ft. 2 in., and here the interurbans enter by independent tracks in such a manner as to avoid interference with the operation of the city cars. In Cincinnati the same gage of tracks exists as in Columbus, but the interurban roads transfer passengers to a city car especially scheduled to take care of the traffic. In Cleveland the interurban cars are received by the city company and treated as their own, the city company paying to the interurban

companies a given sum per mile for the use of the car. In Toledo, Dayton and some of the smaller cities the interurban companies are required to pay to the city companies something less than maximum fare, and assume all risk of accidents and other minor burdens.

There is a popular impression on the part of city officials and many individuals that city roads derive a large financial return from the interurban railways entering over the tracks, but I believe that a careful analysis of the subject, considering the additional power house investment required to meet extraordinary demands, weight of cars, delay in traffic, etc., will show no benefit to the city roads except indirectly by stimulating the growth of cities and bringing to business houses some new and additional customers.

THE CENTRAL ELECTRIC ACCOUNTING CONFERENCE

WM. H. FORSE, JR., PRESIDENT, ANDERSON, IND.

The Central Electric Accounting Conference is an organization of the accounting officers of electric railways of the Central States, as its name indicates. The constitution of the conference restricts its membership to persons connected with electric railways operating in the States of Ohio, Indiana, Illinois, Michigan, Kentucky and Western Pennsylvania. All of these sections are well represented in the roster of membership.

The conference was formally organized on March 2, 1907. M. W. Glover, who was then auditor of the Ohio Electric Railway, conceived the idea of forming an association of the accounting officers of electric railways of neighboring States, on the plan followed by similar associations of the steam railroads. At the organization meeting Mr. Glover was elected president of the conference, in which capacity he served for two terms.

From its inception the conference was found to be a valuable organization. Its first important work was the formulation of rules governing the interchange of freight and passenger business by electric railways. The growth of this business had been so rapid that much difficulty was experienced by the railways in making proper settlements between themselves. The topography of the country, the density of rural population and the class of communities served by the interurban lines of the Central States were all favorable to the rapid development of traffic. The network of electric railway lines in this territory was made up of a few large interurban systems and many smaller "feeders" and connections. Previous to the organization of the Central Electric Accounting Conference, the interline accounting of these lines was far from uniform and much difficulty was experienced in equitably pro rating the revenue from interline business.

The uniform rules governing the accounting and settlements of interline business were adopted by the conference in 1907, after careful consideration and extended discussion. In brief, these rules may be said to follow the general plan of steam road interline accounting. Certain modifications were made necessary, however, because of the peculiar conditions found in interurban railway operation. Other changes were considered desirable as effecting economies. By taking advantage of the latest saving devices it was found possible to simplify the accounting methods and yet secure greater efficiency than by using certain features of the steam road system of accounting. The steam railroads are hampered by the fact that any change in existing methods would be annoying and expensive, hence they find it better to avoid radical departures from some of the most antiquated methods. The electric railways have not had the misfortune of precedence in this respect, consequently they have been enabled to select the best features of modern accounting methods.

The rules adopted were distributed in printed form to the members of the conference and have since been very generally observed by the electric railways operating in the conference territory.

In March, 1909, a special committee of the conference submitted a set of uniform blanks to be used in the settlement of interline transactions. The conference adopted these blanks, after making some slight alterations, and the railways are now using the uniform printed matter, as well as the methods of settlement. The result has been very gratifying and there is none of the confusion which existed when each railway company used a method of its own in reporting its traffic with connecting lines.

The blanks and rules of the conference were made the basis of a report submitted at the Denver convention in October, 1909, by the committee on interline accounting of the American Street & Interurban Railway Accountants' Association. This report was fully discussed in the convention and was adopted as submitted. In view of the fact that the National Association has adopted the Central Electric Accounting Conference plan of settlement for interline business it is altogether likely that in the future the plan will be generally followed throughout the country.

The conference holds meetings quarterly, in the months of March, June, September and December. The program generally consists of several papers on railway accounting and the resulting discussions are usually interesting and instructive.

One of the valuable features of such an organization as the Central Electric Accounting Conference is its ability to get together upon short notice and take action upon present-day topics. In this respect the neighborly conference has a distinct advantage over the National body whose membership is distributed over an entire continent. The value of the "get together" ability was shown in a convincing manner when the tentative classifications of accounts of the Interstate Commerce Commission were submitted for criticism. At that time the electric railways in several of the Central States met on call of the president of the Central Electric Accounting Conference and thoroughly discussed the tentative classifications. The uniform criticism which was subsequently forwarded by the several electric railways to the Interstate Commerce Commission was received very favorably by the commission, as it bore evidence of a thorough knowledge of actual conditions and contained the suggestions of practical railroad men, unanimously agreed upon every feature of the subject under discussion. In consequence most of the suggested changes were accepted and put into effect by the Interstate Commerce Commission.

The work of the conference in the future will be governed to a considerable extent by the trend of affairs.

At its meeting in Dayton, Ohio, on Dec. 11, 1909, the conference adopted a basic plan for the uniform compilation of statistics relating to car-miles and car-hours. As is well known, the value of statistics of this character is almost nil unless the statistics are used for comparative purposes. The operation of the same property may be compared month by month or year by year. Divisions or lines operated by the same company may be compared with each other. Such statistics are valuable as throwing light upon the internal workings of the railway, but to stop there is to miss the greatest good of the statistical work. Comparison of property with property has always been unsatisfactory and always will be, as long as the interests in control are indifferent to the methods used in compiling statistics. A car-mile, for example, may be a mile run by a little single-truck city car weighing 10 tons with 60-hp motor equipment, or a 62-ft. interurban motor car weighing 50 tons with 600-hp motor equipment. It may be a mile run by a motor and trailer, a single motor car, or a three-car train with multiple-unit control. If these varying conditions can be taken into consideration, and methods adopted that will lead to substantial uniformity in the final results, statistics will be real and valuable instead of misleading and unsatisfactory, as they so often are at present.

If the conference can successfully grapple with such problems as these and others that are bound to arise from time to time, it will continue to uphold its reputation as an organization of real value to its membership.

THE CORPORATION TAX LAW

BY WILLIAM F. HAM, COMPTROLLER, WASHINGTON RAILWAY & ELECTRIC COMPANY

I have followed the controversy with reference to the regulations about the enforcement of the corporation tax law with a great deal of interest, and think we are all indebted to the expert accountants who took a determined stand for an interpretation of the law which would be practical and sound from an accounting standpoint. At the same time, I have never felt alarmed over the possibilities of being compelled to report the income and expenses on a strictly cash basis. Some of my friends had suggested the possibility of hiring expert accountants or of increasing their own office forces to meet the requirements of the law. Nothing of this kind appeared to me to be at all necessary, for I believed that any company which made an honest return in compliance with the spirit of the law would not be the subject of criticism.

The spirit of the law is clearly stated in the first paragraph of Section 28. Boiled down, it reads as follows: "Every corporation * * * shall be subject to pay annually a special excise tax * * * equivalent to 1 per centum upon the entire net income over and above $5,000 received by it from all sources during such year, exclusive of amounts received by it as dividends upon stock of other corporations * * * subject to the tax hereby imposed."

The law, as above stated, is clear, and is only made confusing by the balance of the act, stating the method of determining the net income, in which it would appear the lawmakers were attempting to combine the methods of accounting used by the corner grocery store and the large corporation, with the natural result.

If some of these instructions were to be interpreted as to reflect only cash transactions, it would become impossible to truly state the net income, and the law does not contemplate that any one should perform an impossibility. An account is a statement of facts. Accounts cannot state facts that do not exist. For example, if a railroad company owes a manufacturing company $10,000, of which one-half is for current supplies used in maintenance and the other half is for new and additional equipment, and on the last day of the year makes a payment of $5,000 on account without specially applying it to any portion of the account, it becomes an impossibility to state what portion of the account was settled by that payment, because, in fact, it did not settle anything in particular, but was simply a partial payment on the whole account. True, it would be possible to prepare a statement which would be approximately correct, and if it had been determined that the net income should be prepared on the basis of actual cash receipts and expenses, I believe accounting officers could have prepared a statement which would have been reasonably correct and which would have fulfilled the spirit of the law.

However, the Secretary of the Treasury in the recent interpretation placed upon the act has entirely cleared the atmosphere in the two rulings below quoted:

"It is immaterial whether any item of gross income is evidenced by cash receipts during the year or in such other manner as to entitle it to proper entry on the books of the corporation from Jan. 1 to Dec. 31 for the year in which the return is made."

"It is immaterial whether the deductions are evidenced by actual disbursements in cash or whether evidenced in such other way as to be properly acknowledged by the corporate officers, and so entered on the books as to constitute a liability against the assets of the corporation, stock company, association or insurance company making the return."

These instructions are strictly in accordance with correct accounting and good common sense, and will, I have no doubt, command the approval of all accountants. From an accounting standpoint, there is nothing which now stands in the way to prevent an easy compliance with the law by transportation companies.

COMMENTS ON THE ELECTRIC RAILWAY SITUATION

BY EDWIN S. WEBSTER, OF THE FIRM OF STONE & WEBSTER, BOSTON

The problem of securing an adequate revenue from passenger fares appears to be the most serious issue now confronting the electric railway industry. In the early days of electric transportation the 5-cent fare unit was, on the whole, appropriate to the standards and cost of service rendered. The rolling stock was composed of small, light cars, usually of the single-truck type; the speed of operation was relatively low; the power demands per car were moderate; the cost of labor and materials was far below present figures; comparatively light roadbed, track and line construction met the requirements of the traffic, and the investment per mile of track varied from one-half to one-sixth that of the present, depending upon the size of the community served and other local conditions. Even in the larger cities the transfer facilities were greatly limited, and the average haul per passenger was much shorter than to-day.

The standards and costs of service now rest upon an entirely different plane. The expansion of city systems into suburban territory has raised the average length of haul independently of other causes. The transfer situation has become serious, through its extension beyond reasonable limits. The purchasing power of the nickel from the standpoint of the passenger has greatly increased. From the point of view of the operating company, however, the nickel pays for the conduct of considerably less transportation and for the maintenance of less service and equipment than a few years ago. The cost of power has been reduced to some extent by improved technical administration of generating and distributing equipment, but not enough to offset the enlarged demands of heavier cars operated at increased speeds. The growth in the size and weight of cars has increased the rolling stock investment account and necessitated the expenditure of large sums of money for physical plant, including heavier track and more permanent roadbed construction, multiplied capacities in power stations and lines and enlarged facilities for the economical maintenance of equipment. The advances of the past few years in the cost of labor and material have placed a premium upon new construction work and have narrowed the margin between receipts and expenses. Under the early conditions, average fares of from 1 to 1¼ cents per mile enabled the companies to make progress; to-day these returns are insufficient to provide a reasonable dividend in many properties and maintain the most modern standards of service. The increased length of ride now possible upon a single fare of 5 cents makes it difficult for the larger city properties to earn a reasonable dividend, and only in a less degree does this condition bear upon the companies of smaller size. The relatively great density of traffic in the larger city is sufficient to offset the burdens of the transfer, the extension of lines into outlying districts and the rising cost of operation.

In the larger cities there must be some change in the transfer situation in order to secure a fair return to the companies. Scientific administration of properties is insufficient to meet the rising costs of service rendered to the traveling public. The average haul per fare must be reduced, through the restriction of the transfer privilege or the imposition of some sort of a charge for transfers issued. The policy of selling fares at reduced rates must be closely scrutinized, and in many instances abolished. The fare unit in itself will have to be raised to 6 cents or over in cases where it is clear that a line cannot be operated with reasonable profit on a 5-cent fare basis, or else the fare zones will have to be shortened. Otherwise, a line honestly capitalized will have to reduce its capital to a point below the actual investment in the property. Denial of a reasonable return upon a proper investment and insistence upon the highest standards of service closely approach confiscation. The maintenance of a reasonable return through adequate fares and controlled transfer situations, through economical administration and a liberal executive policy is to the advantage of the

public as well as of the companies, for in the last analysis the cost of an unsuccessful utility operation and the benefits of a profitable public service fall upon the community supplied with facilities. So long as present fare limitations apply, the expansion of existing systems and the development of new enterprises can only be retarded.

THE PROPER TREATMENT OF ELECTRIC RAILWAY PROPERTIES

BY J. M'MILLAN, GENERAL MANAGER, PACIFIC ELECTRIC RAILWAY

It is quite plain to the student of electric railway problems that the most serious mistake that has been made, and is still being made, by both the public generally and many of the people responsible, or who should be responsible, for the proper treatment of electric railway properties, is in thoughtlessly treating and handling them as "cheap John" concerns, when exactly the opposite should be the case.

Every "Tom, Dick and Harry" seems to think it is an easy matter to build, equip and operate an electric, commonly called street, railway, and it is true that a great many undertake such propositions and after expending the money of themselves and friends make failures. So are there a great many failures of steam railway undertakings, and, doubtless, more real "cheap John" or "jerkwater" steam roads, the most of them now being branches of the larger systems of steam railways, than there are of such electric railways; but the idea seems to prevail, almost generally, that, if a neighborhood or village wants a railway, all there is to be done is to organize a company, even though a neighborhood company, sell a few thousand dollars of stock, and a railroad will be the result. The actual results from such undertakings are, as a general proposition, more failures than successes and the construction, or partial construction, of a lot of railroad mileage under misapprehension as to the amount of traffic necessary to support a railway line, even though its mileage be limited. The time for constructing cheap railroads and cheap operation of railroads is fast passing away; in fact, has long since passed in this part of the country.

It seems to be beyond the comprehension of many railway promoters, as well as many railway operating men, that electric railways cost, if well constructed and equipped, more than double the cost of construction and equipping the same mileage of steam railways. In the first place, the rights-of-way, both street or highway, franchises and private rights-of-way, cost more for electric railways and are more restricted and burdensome than for steam railways.

In the State, and in many States, electric (street) railway franchises have by law to be, after being applied for, advertised and sold at auction to the highest bidder. In Los Angeles and many other cities and towns in this State laws have been passed, at the behest of the advocates of municipal and government ownership of public utilities, restricting the life of such franchises to 21, and in some cases only 20 years, which, of course, makes such franchises uninviting, as the railways cannot dispose of securities covering short-lived properties; and, notwithstanding these adverse conditions and the provisions by such franchises for the payment by the railway company of 2 per cent of its gross earnings from lines constructed under them, along comes the United States Government with its new corporation tax law, imposing another percentage tax upon the earnings, which simply means a still further tax, and adding that much more to the already heavy burden of the railway company.

OTHER COSTS

Then, after all the restrictions, the first cost of the right-of-way, franchise or otherwise, is only the beginning.

After rebuilding and paving or repaving streets, frequently to the extent of two-thirds their width, the railways are restricted as to the use of them; are subjected to all manner of assessments, taxes and whatever licenses, in addition to all these, any and every city and town council, or board of supervisors, generally politicians, sees fit to levy, and from which there does not seem to be any adequate recourse.

With the steam roads the conditions are entirely different. If a steam road wants a franchise for tracks over streets, all it does is to apply for it and for such term of years as may be desired up to 50 years. Such applications are passed upon by the councils and boards of trustees, or supervisors, and granted or declined, generally granted, without any advertising or bidding. In fact, the State charters of the steam roads generally give them the right to build upon and occupy with tracks public highways not under the jurisdiction of city or town municipal bodies.

The burden of crossings with steam roads, cost and maintenance is, as a general rule, upon the electric road, whether the crossings be in the streets under franchise rights or otherwise. This crossing and special work expense is one of the largest items of the cost, both construction and maintenance, of anything like an extensive system of electric railway lines.

The first cost of the most of the interurban passenger cars of the Pacific Electric Railway Company, equipped and ready for service, several hundred in number, averages about $10,000 per car.

How many steam railway coaches in the country cost anything approximating such figures?

The cost of constructing up-to-date electric railways, through localities able to support such transportation facilities, is, mile for mile, about three times that of a steam railway.

The cost of operation, due to the enormously large number of employees necessary for conducting suitable and anything like satisfactory transportation, is, for the same mileage, more than twice, if not three times, that of steam roads. As an example of this: The Pacific Electric Railway, with a distance mileage of roadway of approximately 325 miles, carries upon its operating pay-rolls a monthly average of more than 3500 employees, of whom approximately 1000 are trainmen, motormen and conductors; shopmen 600 to 800, and correspondingly large numbers in all other departments. How many passenger cars, costing a less price per car, and how many employees are required by the steam roads for operating the same mileage? One-half? No; not one-third!

Still the prevailing impression seems to be that electric railways and their service are cheap and should be cheaper; and, strange to say, the most electric railway owners and managers have tried, and are still trying, to conform to this view of the matter in handling the properties under their management, thus encouraging and fostering the general belief that it costs next to nothing to build, equip and operate electric railways.

PUBLIC DEMANDS MORE AND MORE

As a whole the owners and promoters of electric railway properties, men of means, who should also be men of experience, are responsible for the failures of their properties to meet their operating expenses and fixed charges, due to insistence upon "getting along with the public" without friction and lawsuits, without considering and realizing the dear public, like Oliver Twist, continues to demand more; yes, more and more.

Every manager knows that the general demand is for improved service as well as improved and more expensive equipment and facilities generally. The public demands that the employees be better paid in support of the demands of the employees themselves, but let the electric railway company make a move toward increasing its rates a half cent or a cent per passenger or per trip, or toward effecting any economy in the direction of readjusting its service by cutting out a few light and losing trips, or correcting abuses of the transfer privileges and limiting the use of transfers and commuters' tickets to strictly their legitimate purposes, and a howl goes up all along the line and turns loose upon the company every demagogue and "citizen fixit" who can get the newspapers to print his views and his name.

Electric railway taxes, licenses and like fixed charges are almost constantly being increased arbitrarily by political as

sessors and municipal bodies, principally for the purpose of showing their constituents they are doing something to earn the salaries they are drawing from the public, and because the public service corporations are "easy marks" for them. The Pacific Electric's taxes have been practically doubled over what they were only two years ago, with very little additional mileage and equipment.

The price of almost everything used in the construction and operation of electric railways, as well as wages, is constantly advancing, and we are expected to meet these conditions without increasing passengers' fares and rates one iota.

Does the ordinary person or electric railway manager stop to think how the 5-cent street carfare originated, and that half a generation ago it was considered cheap for an uncomfortable ride in an uncomfortable horse or mule-car, and that such rides were limited to a few miles, at most, and transfers were unheard of and unexpected? Why is it the public does not object to paying largely increased hotel rates, or higher prices generally for the necessaries for living, without protest or raising a fuss about the increased cost of living, and at the same time raises such a row over the refusal of a transfer or the increase of a passenger fare by a cent or such matter, due to the efforts of the railway company to meet its increased expenses while constantly improving its facilities and service? If a citizen is charged $1 for a steak he has been in the habit of buying for 75 cents or 80 cents, or 25 cents for a cigar he has been getting for 15 cents or 20 cents, does he raise a row about it and run to the newspapers, city councils or legislative bodies complaining of the "robbery?" No! Why? Because upon being told the cost of the article has increased, he says he believes in the policy of "live and let live" and lets it go at that. But let the street railway, or any other railway company, attempt to meet its fast increasing expenses and public demands in the same manner, and note the "tempest in a teapot" that is raised.

The costs of constructing and operating electric railways in an up-to-date manner have increased correspondingly with the cost of operating first-class hotels and other enterprises of a public or semi-public nature and with the general increase in the cost of living.

INCREASED COSTS AND INCREASED RATES

Then why cannot the electric railway companies increase their prices by an amount corresponding to the increased cost of their service?

The electric railway managements themselves have a large share in the responsibility for such adverse conditions and general beliefs and lack of understanding on the part of the public of the actual necessities for fair and living revenues for their railways.

They have themselves cheapened their properties and their service by voluntarily, if not upon noisy demands by agitators, reducing fares or extension of transfer limits, etc.

In many, many cases where city lines have been extended beyond city limits, as they existed when franchises were secured, and even where interurban lines have been built between nearby towns and cities, no notice has been taken of the increased mileage and consequent increased operating and maintenance expenses, and the city 5-cent fare has been allowed to apply almost indefinitely. In many cases where city lines have been extended to outlying districts, Government posts, smelters, parks, etc., with little or no local traffic between terminals, the 5-cent fare, like the Constitution following the flag, has followed to the ends of the rails of the electric roads; and not only is this too often the case, but the transfer habit has been allowed to follow to the same extent. One of the best known firms of street and electric railway promoters and owners in the United States has done more damage to the electric interurban railway interest in this respect than can well be reckoned, and is found, sooner or later, to suffer severely for its carelessness or recklessness in the respect indicated, which seems to indicate either incompetent management, or misinformation and misguided judgment. Incompetence on the part of the owners as well as on the part of managers, because the owners employ the managers.

As one example of many of the public's view of the electric railways operating cost: A shipper of cement in large quantities recently offered the Pacific Electric a shipment of several thousand tons of cement from a port to a point to which the rate is 80 cents per ton, a very low rate for the haul. The shipper's condition upon which he would route the business via the electric road was that it should cut the rate below the published tariff. Upon being told that this electric road's freight rates are the same as the steam roads and its service quite superior, which latter fact he conceded, he "cussed" the office out, saying he could not see any use for electric roads unless they were to cut the rates. He routed his shipments via the steam road. He was and still is under the general impression that it doesn't cost anything to own and operate electric railways. Why this impression? Because of incompetent or inexperienced managements of electric railways.

As a general thing where electric railways have entered into the package, express, or freight carrying business, they have done so at ridiculously low and unremunerative rates and resorted to irregular methods of securing and handling the same.

EXPRESS SERVICE AT LESS THAN FREIGHT RATES

I am told that in many parts of the country the interurban electric roads take boxes of freight, boots and shoes, hats, clothing, etc., from the trade or jobbing centers into the country along their lines on the platforms of passenger cars at rates very much less than those of the old established steam roads, thus giving very superior express service at less than fair and living freight rate, while, as a matter of fact, the service of the electric roads, being superior to that of the steam roads, the electric roads should, if any difference in rates is to be made, get higher rates, particularly on their freight and express service, on the general rules that the "servant is worthy of his hire"—in other words, the buyer paying the value for what he gets. The question is how long can they last at it, and do they realize how much such practices are losing for their companies?

How many men doing this for their companies know what the service is costing and look ahead far enough to realize what the result of this kind of thing will be?

In looking over the rates of one interurban road, which was, and is still, doing a package and freight business, I found rates provided as follows: "Meat, little pieces 5 cents; big pieces 10 cents; baby carriages, without baby 10 cents, with baby 25 cents," and so on throughout the list; the conductors being provided with the sheets, and using their own discretion as to what is a little or big piece of meat.

Is is any wonder that the established steam roads refuse to join the electric roads in the application and prorating of joint through rates? Can they be blamed for refusing to do so as long as such practices by the electric roads prevail?

Every traffic man of experience must know that the steam roads, having been in the business for so long a time, have the carrying business down to an exact science, and that competition in transportation long since brought all rates down to figures as low as the roads can well exist on and keep apace with the demands of the times for improved service at increased operating expenses, and that it is no longer a question of competition in rates but in service.

It is very easy for anyone to reduce rates and give more for the money. Any incompetent man can do that, but, oh! how hard it is to increase rates and fares correspondingly with increased operating expenses and get a fair price for the service given. It takes an able and competent man to do so, and nine times out of ten he sacrifices his position and his reputation making the effort and becomes the most unpopular manager in the company, both with the public and the company for which he is working.

The general impression seems to be that street and electric railways are "mints" when it comes to making money, and it is quite true that some of them have made a little money from

operation, but how many? The number is extremely small as compared to the number of companies and the amount of capital invested in the business.

Many companies, or the owners thereof, may have made money out of electric railways by selling their stocks and bonds and "unloading" them, leaving the properties in fit condition for the hands of the courts and receivers. But how many electric roads have really made their fixed charges, taxes, licenses, street and road assessments, etc., and paid any dividends upon their legitimate stock, and at the same time performed good service and maintained their properties, roadway, equipment and facilities in first-class shape as they should be from their transportation revenues?

As already stated, they are the exception and are very few and far between in the electric railway world, and unless the owners and managers of such properties awaken to a realization of the situation that is now confronting them and unite in getting the governing powers, National, State and municipal, to allow them fair returns for their service and upon the capital invested in them, they are, before many years more elapse, going to be fewer.

AMERICAN STREET & INTERURBAN RAILWAY ENGINEERING ASSOCIATION

BY F. H. LINCOLN, PRESIDENT, PHILADELPHIA, PA.

This year, as last, a meeting of the executive committee of the American Street & Interurban Railway Engineering Association was held as soon as possible after the annual convention, so as to plan the work of the coming year, select the committees and allow the maximum time for committee work. There were five standing committees last year. Each presented a report at the Denver convention and it is a matter worthy of note that every one of these reports was ready for distribution and was sent out with the first package of papers issued from the secretary's office.

It is unnecessary to review for the readers of the ELECTRIC RAILWAY JOURNAL any portion of the work accomplished at Denver. The convention was all that could have been desired and the reports submitted by the committees were concise and complete and the discussions were well maintained. The visit to Denver was also particularly instructive to the members of the Engineering Association, because of the novel type of cars and track in use in that city. If any criticism of the sessions of the association could be made, it is that there was an attempt to cover too much ground. It is undoubtedly true that the time at the disposal of the association did not permit it to devote as much time to all of the reports as might have been desired and which they deserved. It should be remembered, however, that one advantage of committee work is that the entire range of investigation required in any topic does not have to be done on the floor of the hall. A great deal of the preliminary study of any subject can best be undertaken in the committee meetings so that the association has to consider only the carefully selected and final product. Again, the committee reports presented this year so many interesting topics that it would have been impossible to have exhausted their possibilities of debate if the convention had been extended continuously over a week. Both of these conditions form arguments, consequently, not against association work, but in its favor, and as many of the subjects taken up in the reports presented at Denver will be continued by committees during the year, there will be ample opportunity for their further consideration.

Among the topics which will form part of the program of the Engineering Association during the coming year will be those connected with mechanical and electrical problems of heavy electric railroads. This branch of electrical engineering seems to fall particularly within the province of the Engineering Association. Most of the questions relating to this class of engineering are similar in kind, though perhaps not in degree, to those confronting street and interurban railway companies and are even more closely approximated on the subway and elevated railroads of the country. The question of standards for the heavier class of electric transportation has become serious and calls for immediate attention. Some work along these lines had already been undertaken, especially by the equipment committee of this association, but under the direction of our special committee on heavy electric traction, which has just been appointed, progress can be made much more rapidly and systematically.

The greatest need of the association this year is more members and the hearty support of all member companies. Our committees for 1910 will soon begin work on the preparation of their reports and many of them may ask for information by mail on data sheets. Every effort will be made to select and frame the questions so as to minimize the work of replying to them, but it is very important for the committees to have the hearty co-operation of the managements in securing data in regard to practice in different parts of the country. With this information available the Engineering Association can be of even greater value to the industry than ever before.

HELP THE PUBLIC IN CORRECT THINKING

BY JOHN A. BEELER, VICE-PRESIDENT AND GENERAL MANAGER, DENVER CITY TRAMWAY

While it is true, as you say, that "a large part of the problems which affect one property affect all in some degree," yet there is so great a difference in the degree by which they are affected that almost all questions not purely technical are in a way local.

We, in the growing cities of the West, have to make our business to a considerable extent, while you in New York devise the best means of carrying the people that are clamoring for transportation. Your patrons are waiting for you while we are, in a measure, waiting for them and are always building in advance of present needs. This difference affects all consideration of questions of taxation, franchises, fares and transfers, and an argument from our point of view may not be at all pertinent in large and older cities where from the very beginning of the industry the business was there for the taking. The most difficult problem for us is to keep up with the reasonable demands of the public and get a living while doing it.

In a city covering so much ground as Denver, the increasing length of the 5-cent ride, even though confined to the city limits, is a problem of constantly growing anxiety. We know that a part of our business is done at a loss, but we feel that, having the whole city, it is our duty to do this losing business because we have the good lines to support it. There is, however, a limit to it and we find difficulty often in deciding where to draw the line and in keeping a proper balance between the good and the bad ends of the business.

These thoughts, of course, apply with equal force to transfers which are only an artificial method of lengthening the 5-cent ride. We have avoided, of course, transferring so as to allow a round trip, but, much more to the point, we have avoided and intend to avoid the deadly transfer on a transfer which has done such an injury to lines in larger cities. Our idea of a transfer is not to allow a passenger to get from anywhere to anywhere for 5 cents, but to give a transfer good on one specified line to be used within a reasonable time for one fare. So far and no further we consider the interests of the public and our own to be identical.

In connection with these matters, while we pay franchise taxes in addition to taxes on property, we fully believe, from the standpoint of the public interest alone, that franchise and all other taxes not paid by everyone are indefensible and we are constantly trying to show the public that a special tax of any kind is, so far as it goes, a limit upon the service and a wrong to the poorer part of the community. We hold and we preach the quantity and quality of service are by far the best contribution that street car companies can make to the "common good."

And in this same line of thought we think that long-term and even perpetual franchises properly guarded, are for the best interest of the public. This heresy, too, we preach at every

opportunity at the risk of being charged with false pleading, selfish interest and with forgetfulness of the rights of the people to the streets. But all of these unfashionable heresies which I have expressed are true, and if hammered into the people, will stick soon with some and finally with all. All franchises being revocable if the public good required under eminent domain should be in the true interest of the public perpetual. There is no use, in a street railway journal, in setting forth the public injuries that result from limited franchises. Recent history is too full of them.

You will perhaps think that what I have written is fitter for an audience at a town meeting than for one of street railway managers, but I really think that we should take high ground in these matters and, so far as we can, help the public in the direction of straight thinking about their and our affairs.

AMERICAN STREET & INTERURBAN RAILWAY ACCOUNTANTS' ASSOCIATION

BY H. S. SWIFT, PRESIDENT, TOLEDO, OHIO

During the past year the Accountants' Association, through its classification committee, has taken up with the Interstate Commerce Commission many questions in reference to the application of the new system of accounts under certain conditions, and has obtained rulings which have been distributed by the commission in pamphlet form. Many of these questions were important, and the decisions show a logical interpretation of the theory of accounting.

A joint committee was appointed by the Engineering Association and by our association to bring about a more uniform cost system for shop and power station work. A large amount of data has been secured from member companies, and progress made toward compiling the information. Both committees were continued for the coming year and no doubt the report will be presented in good time so that the recommendations can be discussed and acted upon at the next convention of the association.

Another question, that of statistics for interurban electric lines, was brought before the last convention. A large number of the members of our association operate interurban lines which have been developed by extensions and consolidations into large systems that have already become an important element in the transportation field. With their development has arisen the necessity for more uniform and more serviceable statistics, and this subject is of such interest that it should be given more attention during the coming year.

There is also a demand for data as to the prevailing practice in many branches of our work, such as methods of paying employees, computing mileage, handling invoices, stores, etc., not with the expectation or intention of bringing about any uniformity, because the varying local conditions will make this impossible, but that the experience of others may be available as a guide.

Reviewing the work of the association, it seems that up to the present time its members have given much of their time and attention to their duties to the executive officers of their companies. This is unquestionably of most importance, but the educational work of the association must soon broaden along other lines, and at this time especially accounting officers may well consider their duties and responsibilities to stockholders, to investors and to the public. One kind of statistics furnished for years, the cost of carrying passangers, is a subject of great interest, and no doubt many accountants have theories about some items of cost in addition to operation and maintenance which should be added to their reports to give the correct answer. A number of years ago there was no experience to guide them in solving some questions, but for some time electric lines have been operating under conditions as nearly uniform as can be expected in the future, and accounting officers should work out this important problem and be prepared to defend their analyses, for at the present time in many localities the public is greatly interested in this question, and executive officers and directors, too, are giving this basic item of cost and the other problems which grow out of it more serious attention.

THE FUTURE OF STREET RAILWAY SERVICE IN LARGE CITIES

BY WILLISON FISH, ASSISTANT TO THE PRESIDENT, CHICAGO RAILWAYS COMPANY

Street railways as a thing by themselves have a history of 50 or 60 years—a large part of it being a blank; but street railway service is a branch of transportation in general which is as old as almost anything else. The old street car was, of course, a horse car. It began as a slightly transformed coach or stage, with the driver sitting up in front, drawing $1 per day, and with passengers mounting on a step at the rear. Except for the two tracks that it ran upon it was very little different from any other omnibus. No doubt all the old rules for omnibuses were applied to the new vehicle. It would be interesting to inquire how long a time elapsed before the people made an ordinance requiring that these tracks were not to be continuously held by other vehicles. I will venture the guess that it was some considerable time, and that the owners and drivers of other vehicles feigned to believe that their own rights in the street were grievously infringed. But here was one change made from the older times; here was the beginning of the specialization of the track.

I do not know what the old custom was, but I have no doubt that at one time omnibuses stopped wherever a passenger signaled them. Of course, they stopped at the curb. Here, then, when passengers went out onto the street to get a car and when the car itself stopped only at the street intersections was another considerable change from the old time. In fact, this limitation of stops at the street intersections was so great a change and so sudden an innovation that the world has not become entirely accustomed to it yet, and in many cities will still be found ordinances requiring street cars to stop in the middle of long blocks.

Now, when the above changes had been instituted, the street car of former days was fairly well provided for. It was drawn by horses or mules, and there was no particular harm, if the slower traffic teams could occasionally be induced to leave the track, in allowing the street car teams and the other teams to move along together. The cars, too, were light, and the speed was slow, so there was no great loss of time in making these one-block stops. Moreover, the cities in the old days were much smaller, and what there was of them was more congested, so that the trips were short even with the slow speed and the frequent stops.

The circumstances of street railway service are now, of course, vastly different. Here in Chicago, instead of a service extending 3½ miles to the "Limits" on the north, or 3 miles to Western Avenue or 4 miles to Thirty-ninth Street, we have true street car service extending to the north end of Evanston, about 15 miles; to the west line of Maywood, 11½ miles; to Jefferson, 9½ miles; to Lyons, 9 miles; to the south limits of the city, 17 miles. The distances are now three times what they were in 1875 and twice what they were in 1885.

At the same time the cars have increased in size and weight. They were formerly mere stages on car wheels, weighing, perhaps, 2 tons. They are now like the cars on steam roads, and weigh 25 tons. The motive power is no longer the horse, with its limited speed, but electricity. In 1875 here in Chicago we had about 400,000 people; now we have 2,500,000. Moreover, the 400,000 lived close together and did not need to ride on the street cars; the 2,500,000 live with great distances to traverse, and depend on the street cars.

The people of Chicago have for a considerable time felt a strong need of radical improvements in the street railway service. Many of the necessary improvements have been made.

Since 1906 about $40,000,000 has been spent in Chicago largely in the physical rehabilitation of cars and tracks, but with all this outlay of money on the physical parts of the system the method of operation remains practically the same as in the simple old horse-car days. The cars still divide the right-of-way with the teams, and they still stop at each street intersection and "in the middle of long blocks where signs are placed."

I believe that easily practicable changes in the system of operation would add as much or more to the comfort and efficiency of street railway service as has the expenditure of this large sum of money. I see in the history of transportation in the past, and in evolution of all kinds, assurance that presently the large cities will ask for and demand a street car service unimpeded by other traffic, and with stopping points for the cars at intervals corresponding to the length of the routes traversed. I understand that the first railroad charter in the United States provided that the rails should be so designated and laid as to allow wagons to use them, but when the steam cars attained a high speed the road of the steam car was made special to itself. In the early history of steam railroading, too, all the passenger trains stopped at every station, but now this is changed, to the vast improvement of the service.

While cities have been multiplying their population and still more rapidly extending their limits, there are yet some things that remain as they were, and to which, if possible, all other things must be made to fit. Thus, the people now who live 6 or 8 miles from the center of the city have still only 24 hours a day in which to live and do their work; they have no more time to devote to riding on street cars than they had when the trips were half as long. Whatever the maximum speed of a car, trips from the center of the city to the residence district will take more time than people can afford to use if the cars are to be obliged to work their way like a wedge through the other traffic. And again, if there were no other traffic upon the tracks, and the cars still followed the old horse-car rule of stopping every block (not forgetting to stop in the middle of long blocks where signs are placed), the average trip would still consume altogether too much time.

I thoroughly believe that, to as great an extent as possible, the right-of-way of street cars should be reserved for street car use, and that it should not, except when necessary, be used at all by other traffic. I know that a very great saving would be made in time, and a vast addition made to the satisfaction of the public if the number of stops were to be greatly curtailed.

I think that the public authorities and the street railway men should study this problem with their minds entirely free from old methods, which are to a great extent merely an unmeaning heritage from the old days of stages and omnibuses. I think that the kinds and amounts of traffic upon streets should be ascertained and that then rules should be made governing this traffic, according to its kind and amount. For instance, I know that about one and a half million people who pay cash fares ride on the surface roads of Chicago every day of the year, and that this traffic is one of enormous importance. It would not be difficult to determine what the team traffic amounts to: we know that in Chicago there are about 2800 miles of streets and 1400 miles of alleys, and that less than 450 miles of Chicago streets are occupied by street car tracks. On a street that has a double track 16 ft. is taken up by the tracks, and outside of this width about 22 ft. remains. Now, it seems to me very likely that a little figuring would show that this 16 ft. on the 450 miles of streets could well be devoted almost exclusively to the use and accommodation of these 1,500,000 daily travelers, and that when the 22 ft. remaining on these 450 miles of streets, together with the entire roadway on the other 2350 miles of streets not occupied by tracks, are left to the exclusive use of team traffic, the latter has all that it needs, and certainly all that its comparative importance would justify. The paved streets in Chicago amount to 1618 miles.

I am absolutely satisfied that a large proportion of the stopping places should be eliminated. Unless boulevards or steam or railroad crossings interfere, or unless the blocks are of unusual length, street cars in the large cities should have established stopping places at every fourth block.

I have made a great many observations, and find in brief that on the lines of the Chicago Railways this rule as to establishment of stopping places would eliminate 64 per cent of the stopping points; out of 199,000 actual stops counted 53,000 were unnecessary, or 26 per cent. I find that of all passengers carried on the trips observed 68 per cent already made use of the main stopping points, and I found that only 16 per cent of the passengers would be at all inconvenienced by the establishment of these stopping points.

Between Monroe and Dearborn Streets and Devon Avenue there are now 125 points at which cars will stop for passengers. Of course, the cars do not, in fact, stop every block, but in the rush hours the percentage of stops becomes very large. There should be but 46 stopping points on this line, instead of 125. On Lincoln Avenue the 71 present stopping points should be reduced to 23; on Ogden Avenue the present 108 should be reduced to 40, and on Madison Street the present 84 should be reduced to 30. These figures assume that in the downtown district the cars will stop once at each intersection.

I believe that both of the changes which I suggest here are practically bound to be brought about. The rapidly growing population of the cities and the more rapidly growing area of the cities demand these changes. The benefits from these changes will be many. They will not only greatly shorten the time, but they will make the schedule far more certain. They will do away, too, with some of the extreme vexations and irritations of street car travel. Every one now who has definite hours to keep must allow from 15 minutes to half an hour every day for possible and even probable delays beyond the time required by the actual schedule.

With the best of cars, the best of roadbeds, with abundant power and with the energy of the people and their keenness in getting at the reason and logic of things, it seems to me that it will not be very long before the old haphazard horse-car methods will be abandoned and street-car service be made rapid and certain.

SOME PRESENT TENDENCIES IN CAR CONSTRUCTION

BY S. M. CURWEN, VICE-PRESIDENT AND GENERAL MANAGER, THE J. G. BRILL COMPANY, PHILADELPHIA

For some time the question of lighter city cars has been most carefully considered by railway managers and car builders. After the discontinuance of short single-truck cars, which were superseded on most of the larger roads by cars having double-trucks and greater capacity, the trend of practice was toward the use of still larger and heavier cars. This tendency continued until in many places the cost of operation, from the increased weight, became such a factor that railway managers began to turn their attention to the possibilities of using a car which would be much lighter but would have a slightly decreased carrying capacity. A number of experiments have been made and show that for most types of service and under ordinary conditions it is easily possible to build a car varying in length of body between 28 ft. and 32 ft. and fitted with pay-as-you-enter platforms, which seem now to be almost universally used, light enough to enable the car to be operated by two motors and mounted on single-motor trucks. At the same time the electrical manufacturing companies have developed for such a service a light motor of increased capacity, which, in proportion to its output, makes a two-motor equipment weigh much less than a four-motor equipment.

The best construction to obtain lightness and strength is governed by so many conditions that it is almost impossible to give any fixed rule for obtaining these results. In some instances lightness may best be obtained by the use of steel underframes strengthened by steel plates reaching to the windows.

In other instances it is better to build cars almost entirely of wood with strengthening steel members in the underframes and platforms. I believe, however, that more intelligent effort is being directed now toward the economic utilization of every pound of weight in a car body than at almost any previous period.

In the case of interurban equipment, managers do not appear to consider the question of lightness as important as other features which affect the operation of their roads. The tendency has been rather to use a large and proportionately heavier car with a view of competing with cars of steam railways.

The American Street & Interurban Railway Association standardization committee has been doing excellent work in endeavoring to standardize a number of wearing parts on car trucks, notably wheels and brake shoes. Its efforts are being appreciated by the different roads and its specifications are being used largely in orders for new equipment. This principle of standardization can be, and no doubt will be, extended gradually with benefit to the industry.

TENDENCY OF DIMINISHING PROFITS AT 5-CENT FARE

BY FRANK R. FORD, OF FORD, BACON & DAVIS

The most important problem to the street railway industry to-day, in my opinion, is: How long can the nickel remain the flat rate of fare for unlimited street transportation within large cities?

The tendency of diminishing profits at the 5-cent fare is shown from the following brief consideration of the income account:

A. *Gross Receipts.*

It is believed that, due to the recent experiences in Cleveland, Philadelphia, New York City and elsewhere, the tendency will be away from a further imposition of decreased fares with unlimited transfers, such as six tickets for a quarter, 4 cents cash; seven tickets for a quarter and 3 cents cash. The charge made for transfers in Cleveland indicates this tendency.

In large cities there is a greatly increased investment obligation with increased gross earnings; as the city expands the transportation interests must keep pace, providing, first, surface lines; second, elevated railroads, and third, subways. The investment per mile of street quadruples approximately at each of these steps.

The larger the city the longer the ride and the slower the speed on the surface: real estate and operations become more expensive. The largest cities sometimes demand the underground trolley for surface railways.

Street railway rates should be determined as scientifically as are those for steam railroads, electric light, etc. All other transportation rates, such as steam railroads, steamboats, stage coaches, cabs, etc., are based on a charge per weight-mile and, as the passenger will average about 150 lb., in passenger transportation, this unit is usually the passenger-mile.

The 5-cent nickel is a convenient fare piece and its use as a flat rate has been advocated largely because street railways owners and managers have thought it would produce more than a reasonable return. In large cities with unlimited transfers it is questionable to-day whether this provides as much as a reasonable rate.

B. *Operating Expenses.*

The tendency of increased cost of operation is shown for the period 1902 to 1907 by an increase of the operating ratio for the street railways of the United States from 57.5 per cent to 60.2 per cent of gross earnings, due largely to

1. Increase of service per 5-cent passenger, caused by increased length of ride, from:
   1. Increase of populated area. This has resulted in a decrease of passenger receipts per mile of track of the larger street railways during recent years.
   2. Increased use of transfers. The per cent of transfer to fare passengers for the entire United States has increased from 22.3 per cent to 26.8 per cent during the same period.
2. Increased cost of labor, due to increased cost of living, high tariff, gold production, etc., is shown as follows:

	1902.	1907.
1. Wages per employee	$605	$658
2. Wages per car-mile, cents	7.1	8.5
3. Wages per cent of gross earnings	32.7	33.0

The increased rate of wages is offset partly by more wholesale business and by use of labor-saving devices.

3. Increased cost of materials and supplies. The average wholesale prices of railroad materials and supplies, as reported by the United States Bureau of Labor, show large increases from 1897 to 1907. For the period from 1902 to 1907 the cost of materials and supplies of street railways of the United States, as evidenced by operating expenses, less wages and salaries, increased from approximately 4.7 cents to 6.2 cents per car-mile, or from approximately 21.9 per cent to 24. per cent of gross earnings.

4. Increase due to heavier weight of cars per seat. The weight of 650 lb. per passenger seat of the single-truck car of 1900 compares with over 1300 lb. for the double-track four-motor pay-as-you-enter car of 1909. The cost of transporting this increased weight has been estimated at from 6 cents to 10 cents per pound per year. This accounts largely for the increased power consumption per car-mile of recent years.

5. Increased cost of maintenance due to higher standards required by:
   1. More scientific management.
   2. Public opinion as expressed generally and through authorities.
   3. Heavier rolling stock and increased cost of labor and materials, as stated above.
   4. Renewals due to wear charged to operating expenses, where formerly capitalized.

   The total cost of maintenance charged to operating expenses for the larger street railways has increased considerably during recent years, both per car-mile and in percentage of gross earnings.

6. Increased cost of fuel. From records of United States Geological Survey average cost of bituminous coal at mine increased from 81 cents per ton in 1897 to $1.14 in 1907. For street railways the fuel cost per car-mile has increased, but due to power-house economies the cost of fuel and the entire cost of power in percentage of gross earnings have not changed materially.

7. Increased cost of damages. During recent years damages and legal expenses in connection have increased considerably in percentage of gross earnings.

8. Increased cost of general officers and clerks due to:
   1. Necessity for more scientific management.
   2. Cost of statistics for security holders and public authorities.
   3. Increased salaries.

   The increase from 1902 to 1907 of the average salary of general officers and clerks was from $1,040 to $1,100 per man, or from 3 per cent to 3.1 per cent of gross earnings.

9. Small decreased cost of operation of cars. During recent years the cost of operation of cars, the remaining large operating expense, has continued practically stationary in percentage of gross earnings, although this is usually the item to which economies are directed.

C. *Fixed Charges.*

The tendency to increase fixed charges is shown as follows:

1. Taxes. While taxes paid directly in cash have not increased during recent years in percentage of gross earnings other tax items have increased largely, such as:
   1. Paving renewals (formerly capitalized).
   2. Paving maintenance.
   3. Change of grade or relocation of track due to street improvements (formerly capitalized).
   4. Street sprinkling.

5. Snow removal from streets.
6. Cleaning streets.
7. Bridge tolls.
8. Free passes for government employees.
9. Free lighting and use by municipality of poles and conduits.

2. Division with municipalities of net income, such as:
   1. In Chicago the city receives 55 per cent of net income.
   2. In Cleveland the city will receive all net income above 5 per cent on bonds and 6 per cent on stock, representing a low valuation of actual investment.
   3. In Philadelphia the city will receive 50 per cent of net income above 6 per cent on capital stock.

3. Reserve funds for:
   1. Depreciation. This is required by such State commissions as the Public Service Commissions of New York and Wisconsin and provisionally by the Interstate Commerce Commission. Some of these commissions go so far as to require this fund to provide not only for present renewals, but also for both past and current depreciation due to wear, "obsolescence," "supersession" and "inadequacy."
   2. Unliquidated damages for previous and current years. This is required by the Chicago traction settlement ordinance, and is provided for by many other companies.
   3. Amortization of tangible capital:
      1. Due to mortgage requirements, such as sinking funds.
      2. Due to franchise requirements by which city obtains physical property at end of franchise without payment, such as New York subway.
   4. Amortization of intangible capital:
      1. Bond discount.
      3. Cost of organization.
      3. Interest and taxes during construction.
      4. Franchise cost and additional franchise value, including promotion profits.

Most of these reserves are recommended or required by the commissions mentioned.

4. Interest.
   1. The average rate of interest on bonds has remained practically the same from 1902 to 1907, being 4.39 per cent and 4.25 per cent, respectively.
   2. The proportion of total capital allowed to be issued in bonds has decreased, thus increasing the cost of financing the remainder.

5. Return on capitalization.
   1. Dividends and surplus decreased from 1902 to 1907 from 12.2 per cent to 9.4 per cent of gross income.
   2. Compare total return on capitalization with other industries of the United States.

The return per $1,000 of capitalization for 1905 is given by Logan G. McPherson, in the *Railway World*, as follows:

Industry.	Gross.	Net.	
1. Manufactures	$1,216	$151	(15.1%)
2. Agriculture	191	98	(9.8%)
3. Steam railroads	150	44	(4.4%)
Compare street railways for 1907	$127	$46	(4.6%)

Where the period from 1902 to 1907 is given above reference is made to the preliminary report of the United States Census and to all street railways of the United States.

The Ft. Wayne & Wabash Valley Traction Company has equipped one of its large interurban cars with tungsten lamps as an experiment. The new lamps are said to give a better light when the trolley voltage is low than can be obtained with ordinary carbon filament lamps.

Every street car in Rotterdam carries a small package of first-aid-to-the-injured supplies. It is placed in a case beside the fare register, and contains bandages, adhesive plaster, antiseptics and other supplies useful in case of injury.

TRAFFIC PROBLEM IN CHICAGO

BY THOMAS E. MITTEN, PRESIDENT, CHICAGO CITY RAILWAY

The chief problem which the new year will press upon Chicago traction is traffic and the scientific operation of the rehabilitated properties. Unification and co-ordination of the various street railway lines of the city is the obvious first step in its solution. A beginning has been made in this direction in the consolidation of the lines operated in the southern division of Chicago.

Congestion of traffic in the downtown or intra-loop district is steadily increasing, and is adding not only to the hazards of operation, but to the difficulty of maintaining schedules and up-to-date service. The situation is crucial in many respects, and there is little room for ill-considered experimentation or blundering. Mistakes made at this time would prove costly, both to the public and to investors in street railway securities. Personally, I am confirmed in the opinion that Chicago can obtain relief only by extending the limits of the present central business district and by reducing to a minimum interruptions to traffic in the heart of the city. This, in my judgment, can be accomplished only by straight-line operation and by use of the zone system. At present the elevated and surface lines are being operated at cross purposes with the actual demands of the traffic. In short, what we need most is system based upon the traction needs, present and future, of the entire city. To work out in theory and practice such a system is the task and opportunity of traction management in Chicago.

The Chicago City Railway has practically completed its work of "immediate rehabilitation" as required by its franchise ordinance, and is well equipped to meet the greater problem of operation which confronts it. Our relations with employees and public during the past year have been most gratifying, and the prospects for increased prosperity are likewise encouraging.

CONVENTION SOUVENIR NUMBER OF GERMAN STREET RAILWAY PAPER.

Under date of Sept. 11, 1909, the *Deutsche Strassenbahn und Kleinbahn Zeitung* published a special number in connection with the Hamburg convention of the Vereins Deutscher Strassenbahn und Kleinbahn Verwaltungen (German Street & Interurban Railway Association). This is said to be the first convention issue ever published by a German railway paper. The introductory feature is a very interesting description of Hamburg, accompanied by a frontispiece illustration of the colossal Bismarck monument and numerous views of other noteworthy places in the famous Hanseatic city. This is followed by a brief statement showing the size and track conditions of the Hamburg street railway system. About 18 miles of track in Hamburg are thermit-welded. Mr. Stahl, of the Dusseldorf tramways, contributes an article describing several special cars developed on his system for cleaning grooved rails, sprinkling car using compressed air and a vehicle for the transportation of invalids. G. A. A. Culin, of Hamburg, writes on the mystery of corrugation, and F. Melaun, of Berlin, on the oxy-acetylene process as applied to rail cutting and rail welding. Dr. Dietrich, manager of the Berlin municipal lines, describes an automobile tower wagon. Another striking feature of this convention number is the number and length of the articles written by several of the most important manufacturers of electric railway equipment to describe their shops and general facilities.

The first electric railway in Bolivia was opened in July, 1909, at La Paz, by the Bolivian Rubber & General Enterprise Company, which is a corporation with headquarters in London, England. The company will furnish free electric lighting to the city and the latter is to grant subsidies as the railway system is extended.

ELECTRIC RAILWAY ROLLING STOCK ORDERED IN 1909

The orders placed by electric railways for rolling stock in 1909 are shown in detail in the accompanying table. The total of all cars, locomotives and miscellaneous rolling stock ordered was 4957, an increase of 53 per cent over 1908. As in previous years the table has been compiled from our own records kept from week to week, from returns received from the railway companies known to have placed orders and from reports obtained from the car-building companies. It is therefore exceptionally complete and accurate in the details given.

The orders classified according to the service in which the cars are used are given below:

	1907.	1908.	1909.
Passenger cars, city	3483	2008	2537
Passenger cars, interurban	1327	727	1245
Freight and miscellaneous cars	1406	176	1175

The cars shown in the table marked with an asterisk (*) are of the prepayment type. A total of 1096 out of 2537 city cars ordered were of this type.

The prospects for large orders of cars to be placed in 1910 are indicated by partial returns which show that 101 roads expect to purchase more than 2600 cars next year.

ROLLING STOCK EQUIPMENT ORDERED IN 1909.

Purchaser	No.	Class	Length	Serv.	Truck	Builder
Albia Int. Ry.	1	Closed	28–0	Both	S. T.	McGuire-C.
	1	Coal	....	Mine	S. T.	McGuire-C.
Amarilla St. Ry.	1	Gas. Mot.	....	.....	S. T.	McGuire-C.
Aroostook Valley R. R.	2	Comb.	43–9	Int.	D. T.	Brill
	1	Bag & Ex.	36–0	Int.	D. T.	Brill
	3	Flat	50–0	Trail	D. T.	Brill
Asheville & E. Tenn. R. R.	1	Closed	27–8	Int.	S. T.	Am. Car
	2	Convert.	43–0	Int.	D. T.	Brill
	2	Trail., O.	43–0	Int.	D. T.	Brill
	1	Flat	36–0	Int.	D. T.	Hicks
Ashland Lt., Pwr. & St. Ry.	1	Snow Plow	20–0	City	S. T.	Co. Shop
Atchison Ry., Lt. & Pwr. Co.	5	Semiconv.	27–8	City	S. T.	Am. Car.
Atlantic & Sub. Trac. Co.	3	Semiconv.	41–9	Int.	D. T.	Brill
	1	Work	40–0	.....	D. T.	Brill
	1	Flat	40–0	Freight	D. T.	Brill
Atlantic Shore Line Ry.	3	Semiconv.	30–8	Int.	D. T.	Wason
Auburn & Syracuse Ry.	2	Open	....	City	S. T.	Kuhlman
Augusta Ry. & Elec. Co.	6	Semiconv.	21–0	City	S. T.	St. Louis
Aurora, Elgin & Chicago	5	Closed	22–8	City	S. T.	Niles
	1	Comb.	46–0	Int.	D. T.	Niles
Austin Elec. Ry.	2	Closed	33–0	City	S. T.	Am. Car
Balt. & Ohio.	2	Elec. Loco.	39–6	.....	D. T.	Gen. Elec.
Bangor Ry. & Elec. Co.	2	Closed	28–0	City	S. T.	Brill
	1	Snow Plow	....	.....	S. T.	Russell
Beaumont Trac. Co.	5	Semiconv.	25–0	.....	D. T.	St. Louis
Beloit Ry. Co.	2	Closed	28–0	City	D. T.	St. Louis
Benton Har.-St. Joe Ry.	2	Closed	46–0	Int.	D. T.	Danville
	4	Semiconv.*	20–8	City	S. T.	Danville
	2	Flat	34–0	.....	D. T.	Hicks
	1	Gondola	36–0	.....	D. T.	Hicks
Birm'gham Ry., Lt. & P. Co.	1	Closed	39–6	City	S. T.	St. Louis
Bloomington & Nor. Ry.	3	Closed*	46–0	City	D. T.	Danville
Blue Hill St. Ry.	5	Open	21–0	City	S. T.	Wason
	7	Semiconv.	21–0	City	S. T.	Wason
	1	Work	....	.....	S. T.	Wason
	2	Snow Plow	....	.....	S. T.	Wason
Boston & Nor. St. Ry.	32	Semiconv.	39–6	Both	D. T.	Laconia
British Col. Elec. Ry.	4	Closed*	55–0	Int.	D. T.	Ottawa
	5	Closed*	43–0	City	D. T.	Ottawa
	24	Semiconv.	43–4	City	D. T.	Co. Shops
	6	Semiconv.	43–4	City	.....	Ottawa
	5	Semiconv.	28–0	City	S. T.	Stephens
	2	Comb.	43–4	Int.	D. T.	Am. Car.
	4	Comb.	55–0	Int.	D. T.	Ottawa
	2	Bag & Ex.	53–8	Int.	D. T.	Ottawa
Buffalo Construction Co.	2	Comb.	31–8	.....	D. T.	Kuhlman
Buffalo & Lock. Trac. Co.	10	Closed*	43–0	City	D. T.	Cincinnati
	2	Exp., M.	50–0	Int.	D. T.	Cincinnati
	1	Snow Plow	40–0	Int.	D. T.	Cincinnati
	1	Sweeper	27–6	City	S. T.	Brill
Buffalo, Lock. & Roch. Ry.	6	Comb.	51–6	Int.	D. T.	Cincinnati
Burlington Trac. Co.	4	Open	....	Int.	D. T.	Jones
Cairo Ry. & Lt.	3	Closed	28–0	City	S. T.	Danville
	6	Semiconv.*	20–8	City	S. T.	Danville
	1	Express	....	.....	.....	Danville
Calgary St. Ry.	8	Semiconv.*	41–0	City	D. T.	Ottawa
	4	Semiconv.*	41–0	City	D. T.	Preston
Calumet & So. Chicago Ry.	2	Funeral	43–1	City	D. T.	Kuhlman
	2	Sprinkler	29–6	City	D. T.	.....
Camden & Trenton Ry.	1	Sweeper	....	Int.	S. T.	McGuire-C
Cape Girard-Jack. Int. Ry.	2	Open	34–0	City	S. T.	St. Louis
	1	Closed	26–0	City	S. T.	Brill
	1	Trailer, O.	35–0	City	S. T.	Brill
Capital Traction Co.	39	Semiconv.*	41–0	City	D. T.	Cincinnati
	15	Semiconv.*	42–8	Both	D. T.	Cincinnati
	2	Sweeper	27–6	City	S. T.	Brill
Carlisle Construction Co.	2	Semiconv.*	41–0	Int.	D. T.	Brill
	2	Comb.	41–0	Int.	D. T.	Brill
Cedar Rapids & Iowa City.	1	Trailer, C.	58–0	Int.	D. T.	Niles
	1	Comb.	58–0	Int.	D. T.	Niles
	4	Box	34–0	Int.	D. T.	.....
	2	Flat	36–0	Int.	D. T.	.....
	4	Gondola	34–0	Int.	D. T.	.....
	2	Ballast	36–0	Int.	D. T.	Rodger
	1	Sweeper	....	.....	S. T.	McGuire-C.
	2	Refrig.	34–0	Int.	D. T.	.....
Cedar Rapids & Marion.	1	Sweeper	....	.....	S. T.	McGuire-C.
Centerville Lt. & Trac. Co.	1	Closed	42–0	Int.	D. T.	St. Louis
	1	Closed	32–0	City	D. T.	McGuire-C.
	1	Comb.	....	.....	D. T.	McGuire-C.
Central Ill. Construction Co.	20	Closed*	48–8	City	D. T.	Am. Car
	10	Trail., C*	48–8	City	D. T.	Am. Car
Central Kentucky Trac. Co.	2	Comb.	46–1	.....	.....	Brill
Central Penn. Trac. Co.	5	Semiconv.	31–5	.....	S. T.	Brill
	3	Semiconv.	41–9	.....	D. T.	Brill
	1	Sweeper	27–8	.....	....	Brill
Charleston Consol. Ry. Co.	2	Open	44–8	City	D. T.	Brill
	8	Semiconv.	31–9	City	.....	Brill
	4	Open	....	.....	.....	Brill
Chattanooga Ry & Lt. Co.	10	Closed*	44–0	City	D. T.	Brill
Cheyenne Elec. Ry.	1	Closed	28–0	City	S. T.	Danville
Chicago & Mil. Elec. R.R.	12	Open	49–0	City	D. T.	St. Louis
	8	Closed	51–2	Both	D. T.	Am. Car
	1	Trail., C.	51–2	Both	D. T.	Am. Car
	1	Cafe	51–2	Both	D. T.	Am. Car
	1	Express	....	Int.	D. T.	McGuire-C.
	1	Sweeper	....	Int.	D. T.	McGuire-C.
	1	Sprinkler	....	City	D. T.	McGuire-C.
Chicago & Oak Park El. R.R.	20	Closed	47–4	City	D. T.	Brill
	2	Express	50–0	Elev.	D. T.	Danville
Chicago & Southern Trac. Co.	4	Trail., O.	47–10	Int.	D. T.	Niles
	1	Sprinkler	....	.....	D. T.	McGuire-C.
Chicago, Aurora & DeK. R.R.	4	Closed	47–0	Int.	D. T.	.....
	1	Express	45–0	Int.	D. T.	.....
Chicago, Blue Is. Jol. Trc. Co.	1	Comb.	56–0	Int.	D. T.	McGuire-C.
Chicago City Railway.	50	Semiconv*	46–0	City	D. T.	Brill
	2	Sweepers	....	.....	D. T.	McGuire-C.
	2	Funeral	42–1	City	.....	Kuhlman
Chicago, L. S. & So. Bd. Ry.	1	S. Plow	....	Int.	.....	Russell
Chicago, Ottawa & Peoria Ry.	2	Express	50–0	Int.	D. T.	Danville
Chicago Railways Co.	350	Closed*	46–0	City	D. T.	Pullman
	12	Work	34–0	.....	D. T.	McGuire-C.
	2	Dump	....	.....	.....	.....
	10	Sprinkler	....	.....	.....	.....
	1	Garbage	....	.....	D. T.	McGuire-C.
Chicago, So. Bd & N. Ind. Ry. Co.	1	Express	51–0	Int.	D. T.	Niles
	1	S. Plow	45–0	Both	D. T.	Russell
Chicago, Wheaton & W'n Ry.	2	Closed	52–10	Int.	D. T.	Kuhlman
Chihuahua Tramways.	2	Open	28–8⅜	City	S. T.	Am. Car
	4	Conv.	30–0	City	S. T.	Am. Car
	1	Conv.	11–4	Private	S. T.	Am. Car
	4	Open	....	City	S. T.	Danville
	1	Flat	24–0	City	S. T.	Am. Car
Chillicothe El. R.R. L.&P.Co.	2	Semiconv.	28–0	City	S. T.	Kuhlman
Chippewa Val. Ry. L. & P. Co.	2	Closed	45–0	Int.	D. T.	St. Louis
	4	Trailer, O.	30–0	Int.	S. T.	St. Louis
Cia del Ferrocarril Ogarrio.	6	Gondola	18–0	Int.	D. T.	Sta Ana Sh.
	1	Elec. Loco.	30–0	Int.	D. T.	Gen. Elec.
Cicero-Proviso Ry. Co.	1	Sweeper	....	.....	S. T.	McGuire-C.
Cincinnati Traction Co.	50	Closed*	44–0	City	D. T.	Cincinnati
Cleveland & Erie Ry. Co.	1	Express	44–10	Int.	D. T.	Niles
	4	Dump	23–0	Int.	D. T.	Cincinnati
Clev., So'w'rn & Columbus Ry	3	Pass.	56–0	Int.	D. T.	Niles
	1	Parlor	56–0	Int.	D. T.	Niles
	3	Express	50–0	Int.	D. T.	Niles
Columbus, Del. & Marion Ry.	1	Express	52–0	Int.	D. T.	Jewett
Columbus Ry. & Light Co.	30	Closed*	28–8	City	D. T.	Kuhlman
Comp. Elec. y de Fer. de Chi.	2	Open	30–0	City	S. T.	American
	4	Conv.	30–0	City	S. T.	American
	4	Trailer, O.	30–0	City	S. T.	Danville
	1	Special	18–4	City	S. T.	American
	1	Flat	24–0	City	S. T.	American
Conestoga Traction Co.	6	Open	40–8	Int.	D. T.	Brill
	6	Closed	40–0	Int.	D. T.	Brill
	6	Closed	30–0	Int.	S. T.	Brill
	6	Semiconv.	20–8	City	S. T.	Wason
	6	Semiconv.	30–8	City	D. T.	Wason
Connecticut Valley St. Ry.	2	Closed	30–0	Int.	D. T.	Wason
Consolidated Traction Co.	1	Sweeper	....	.....	S. T.	McGuire-C.
Co-Operative Constr. Co.	3	Trailer, C.	44–0	.....	S. T.	McGuire-C.
	1	Comb.	41–6½	.....	D. T.	McGuire-C.
Corpus Christi St. & Int. Ry.	6	Convert.	28–0	City	S. T.	.....
Corsicana Transit Co.	2	Semiconv*	25–4	City	S. T.	Danville
Cumberland Ry. Co.	2	Comb.	29–0	.....	.....	Brill
Dallas Consolidated Elec. Ry.	2	Pass.*	....	.....	.....	Cincinnati
Dayton & Troy Electric Ry.	4	Flat	34–0	.....	D. T.	Hicks
Dayton, Sp'fld & XeniaSo.Ry.	6	Semiconv.	30–0	.....	S. T.	Jewett
Denison & Sherman Ry. Co.	2	Pass.	....	City	D. T.	American
Denver City Tramway.	1	Trailer, C.	38–1	City	D. T.	Woeber
	30	Comb.	43–10	City	D. T.	Woeber
	2	Sweeper	45–0	.....	D. T.	McGuire-C.
Des Moines City Railway.	2	Closed	39–6	City	D. T.	Co. Shops
	1	Snow Swp.	....	.....	S. T.	McGuire-C.
Detroit United Railway.	25	Closed	42–3	City	D. T.	Kuhlman
	25	Closed	42–3	City	D. T.	Cincinnati
	1	Work	....	.....	D. T.	Co. Shops
Durham Traction Co.	2	Pass.	31–9	.....	D. T.	Southern
Eastern Pennsylvania Rys.	2	Semiconv.	....	.....	.....	Cincinnati
East St. Louis & Sub. Ry.	5	Closed	45–8	Int.	D. T.	American
Edmonton Radial Ry. Sys.	6	Semiconv*	41–0	City	D. T.	Ottawa
	1	Snow Swp.	....	.....	D. T.	McGuire-C.
El Paso Elec. Railway Co.	4	Closed	21–0	City	S. T.	Cincinnati
Emigration Canyon Railroad.	2	Closed	40–6	Int.	D. T.	Danville
	2	Trailer, O.	43–5	.....	D. T.	Danville
	1	Elec. Loco.	28–0	.....	D. T.	Westingh.
Enid City Railway Co.	1	Pass.	31–4	City	S. T.	Barney & S.
Evansville Sub.&Newbgh.Ry.	1	Box	35–0	.....	D. T.	Hicks
Fairmont & Clarksburg Tr.Co.	4	Pass.	30–0	City	S. T.	Jewett
	6	Comb.	43–9	.....	D. T.	Brill
	1	Express	44–0	Int.	D. T.	Jewett
Fairmont & Mannington R.R.	2	Semiconv.	38–8	Int.	D. T.	Kuhlman
	1	Express	44–0	.....	D. T.	Kuhlman
Farmington St. Ry.	1	Open	30–0	City	D. T.	Wason
Ft. Dodge, Des Mo. & So R.R.	2	Closed*	40–0	City	D. T.	American
	75	Box	36–0	Freight	D. T.	Haskell B
	75	Gondola	40–0	Coal	D. T.	Haskell B
	2	Elec. Loco.	.....	Freight	D. T.	Westngh.

Purchaser	No.	Class	Length	Serv.	Truck	Builder
	1	Elec. Loco.	....	Freight	S. T.	Westngh.
Ft. Wayne & Wabash Val. Tr.	1	Pass.	....	Int.	D. T.	Co. Shops
	20	Semiconv.	32–1	City	S. T.	Cincinnati
	4	Comb.	55–0	Int.	D. T.	Cincinnati
	4	Exp. Trail.	40–0	Int.	D. T.	Cincinnati
	2	Exp.	60–0	Int.	D. T.	Cincinnati
	10	Gondola	40–0	.....	D. T.	Haskell-Bar.
	1	Sprinkler	....	City	S. T.	McGuire-C.
	1	Steel Tr.	....	.....	D. T.	McGuire-C.
Fresno Traction Co.	10	Calif. type	37–2	City	D. T.	American
Galesburg Ry. & Lt. Co.	1	Sweeper	....	City	S. T.	McGuire-C.
Gallatin Val. Elec. Ry.	1	Semiconv.	51–2	Int.	D. T.	Brill
	1	Elec. Loco.	.....	.....	.....	Baldwin
	1	Comb.	....	Int.	.....	A. C. & F.
Galveston Electric Co.	10	Open	28–8	City	S. T.	American
	5	Narragan.	36–0	City	D. T.	American
	3	Closed	20–0	City	S. T.	Kuhlman
Gary & Interurban Ry.	4	Pass.	....	.....	D. T.	McGuire-C.
Geneva, Waterloo, Seneca Falls & Cayuga Lake Trac. Co.	13	Closed	47–0	Int.	D. T.	Wason
	3	Closed	28–0	City	S. T.	Wason
Georgia Railway & Elec. Co.	6	Closed	39–0	City	D. T.	Co. Shops
	12	Closed	30–0	City	S. T.	Co. Shops
Grand Forks St. Ry.	1	Pass.	....	.....	S. T.	McGuire-C.
	3	Semiconv.	30–8	City	S. T.	American
Grand Rapids Railway	12	Pass.	43–6	City	D. T.	American
	2	Closed	42–0	Int.	D. T.	American
	2	Trailer, C.	42–0	Int.	D. T.	American
Great Falls Street Railway	2	Closed	20–0	City	S. T.	American
Gulfport & Miss. Coast Tr. Co.	3	Semiconv.	....	City	S. T.	Brill
Hagerstown Railway	1	Comb.	42–0	Int.	D. T.	Cincinnati
Halifax Electric Tramway	2	Closed	30–0	City	S. T.	Ottawa
Helena Lt. & Ry. Co.	2	Closed	....	City	S. T.	Cincinnati
The Hocking-Sun. Crk. Tr. Co.	1	Gas.-M.	57–0	Int.	D. T.	McKeen
Houston Electric Co.	25	Pass., S.E.	* 31–0	.....	S. T.	Cincinnati
	5	D. E.	* 31–0	.....	S. T.	Cincinnati
	5	Closed	28–0	City	S. T.	Cincinnati
Hudson & Manhattan R. R.	90	Closed	48–0	Int.	D. T.	Pressed St.
	2	Bag & Ex.	50–7	.....	D. T.	Brill
Hull Electric Co.	2	Closed	30–0	C.&Int.	S. T.	Ottawa
	1	Snow Plow	32–0	C.&Int.	D. T.	Ottawa
	1	Snow Plow	45–0	C.&Int.	S. T.	Russell
	1	Sweeper	28–0	C.&Int.	S. T.	Ottawa
Huntington Railroad	1	Snow Plow	17–0	Int.	S. T.	Russell
Illinois Central Electric Ry.	2	Closed	44–0	Int.	D. T.	McGuire-C.
	1	Comb.	49–1	Int.	D. T.	McGuire-C.
	1	Work	43–0	.....	D. T.	McGuire-C.
Illinois Central Traction Co.	2	Trailer, C.	44–0	.....	D. T.	McGuire-C.
	1	Gas. Mot.	54–0	.....	D. T.	McGuire-C.
Illinois Traction System	7	Trailer	52–6	Int.	D. T.	Danville
	4	Comb.	52–6	Int.	D. T.	McGuire-C.
	2	Sleepers	....	.....	.....	A. C. & F.
	1	Trailer	52–6	Private	D. T.	Danville
	4	Exp. Mo.	52–6	Int.	D. T.	McGuire-C.
	32	Ex. Trail.	41–5	Int.	D. T.	McGuire-C.
	40	Frt., Box	40–0	Int.	D. T.	A. C. & F.
	50	Gondola	40–0	Int.	D. T.	A. C. & F.
	4	Cabooses	....	.....	D. T.	Hicks
Indiana Union Traction Co.	6	Gondolas	34–0	.....	D. T.	Hicks
Ind'lis, New Castle & Tol. Ry.	6	Pass.	60–0	Int.	D. T.	Jewett
	2	Express	58–0	Int.	D. T.	Jewett
Ind'lis Traction & Term'l Co.	10	Open	42–2	City	D. T.	Cincinnati
	44	Closed	46–8	City	D. T.	Cincinnati
Interborough Rap. Tran. Co.	40	Closed, M.	47–0	Elev.	D. T.	Barney & S.
	20	Closed, M.	47–0	Elev.	D. T.	Jewett
	110	Closed, M.	51–0	Sub.	D. T.	A. C. & F.
	40	Closed, M.	51–0	Sub.	D. T.	Standard
	100	Closed, M.	51–0	Sub.	D. T.	Pressed
	20	Trailer, C.	47–0	Elev.	D. T.	St. Louis
	20	Trailer, C.	47–0	Elev.	D. T.	Wason
	20	Work	33–0	S. & E.	S. T.	Ralston
Ithaca Street Railway Co.	2	Closed	43–0	City	D. T.	Brill
Jacksonville Electric Co.	5	Pass.	* 31–0	City	S. T.	Cincinnati
Jacksonville Ry. & Lt. Co.	2	Pass.	32–0	City	S. T.	Danville
Kansas City Ry. & Lt. Co.	25	Trailer, C.	26–0	.....	S. T.	McGuire-C.
Lack. & Wyom. Val. R.R. Co.	1	Frt., Box	36–0	.....	D. T.	A. C. & F.
	5	Gondola	36–0	.....	D. T.	Hicks
Lake Shore Electric Co.	10	Gondola	36–0	Coal	D. T.	Haskell
Lawrence Ry. & Lt. Co.	7	Open	....	City	S. T.	St. Louis
	12	Semiconv.	21–0	City	S. T.	St. Louis
Lehigh Valley Traction Co.	4	Closed	29–5	.....	S. T.	Brill
	1	Bag & Ex.	....	.....	D. T.	Brill
Lehigh Valley Transit Co.	2	Snow Plow	....	C.&Int.	S. T.	Russell
	2	Snow Plow	....	City	D. T.	Russell
Lewiston & Youngstown Frontier Ry. Co.	6	Trailer, C.	....	.....	.....	Co. Shops.
Lew'n, Aug. & W'ville St. Ry.	2	Frt., Box	36–0	Int.	D. T.	Co. Shops
	3	Flat	36–0	Int.	D. T.	Co. Shops
	1	Snow Plow	....	C.&Int.	S. T.	Russell
	1	Sprinkler	28–0	City	S. T.	Co. Shops
Lexington & Interurban Rys.	3	Pass.	31–0	City	S. T.	Kuhlman
	1	Freight	45–0	Int.	D. T.	Co. Shops.
Lincoln Traction Co.	3	Express	41–0	Sub.	D. T.	Co. Shops
Linwood Street Railway	1	Closed	42–0	Int.	D. T.	Stephenson
Long Island Railroad	100	Closed	62–0	Tunnel	D. T.	A. C. & F.
	15	Comb.	62–0	Tunnel	D. T.	Standard
	15	Exp. Comb.	62–0	Tunnel	D. T.	A. C. & F.
Los Angeles & Redondo Ry.	10	Pass.	47–0	Int.	D. T.	Co. Shops
	1	Elec. Loco.	30–0	.....	D. T.	.....
Louisville & Eastern R. R.	5	Closed	....	Int.	D. T.	A. C. & F.
Louisville Railway	33	Pass.	* 45–0	City	D. T.	Cincinnati
Lowell & Fitchburg St. Ry.	2	Pass.	41–0	Int.	D. T.	Wason
Mah'g & Shen'go Ry. & Lt. Co.	6	Closed	51–0	Int.	D. T.	Niles
	12	Closed	40–0	City	D. T.	Niles
	2	Express	45–0	Int.	D. T.	Niles
	2	Freight	....	.....	.....	Niles
Manor Valley Ry.	2	Semiconv.	28–0	City	S. T.	Kuhlman
	1	Semiconv.	20–8	City	S. T.	Kuhlman
	1	Express	28–0	City	D. T.	Kuhlman
Maryland Electric Railways.	3	Passenger	56–9	Int.	D. T.	Jewett
Mason City & Clear Lake Ry.	2	Passenger	57–3	Int.	D. T.	American
Memphis Street Railway	1	Express	.....	.....	.....	Co. Shops
	1	Flat	.....	.....	.....	Co. Shops
Metropolitan St. Ry. Co.	6	Passenger	36–0	City	D. T.	Jewett
	50	Passenger	47–0	City	D. T.	Jewett
	25	Trailer, C.	....	.....	S. T.	McGuire-C.
Michigan United Railways	5	Passenger	40–0	City	D. T.	St. Louis
	2	Express	50–0	Int.	D. T.	St. Louis
Milford & Uxbridge St. Ry. Co.	1	Sprinkler	17–0	City	Single	Brill
Milwaukee Elec. Ry. & Lt. Co.	100	Passenger	50–0	City	D. T.	St. Louis
	10	Closed	53–5	Int.	D. T.	Kuhlman
	1	Work	....	.....	.....	Hicks
	20	Flat	....	.....	D. T.	Hicks
	15	Dump	....	.....	.....	Hicks
Milwaukee Northern Ry.	2	Comb.	50–4	Int.	D. T.	Niles
Missouri & Kan. Int. Ry. Co.	2	Closed	43–10	Int.	D. T.	American
Montreal & So. Counties Ry.	8	Closed	49–8	Int.	D. T.	Ottawa
	1	Snow Plow	....	.....	.....	.....
	1	Swpr., D.	32–0	C.&Int.	S. T.	Ottawa
Montreal Street Railway	25	Closed*	45–0	City	D. T.	Ottawa
	1	Snow Plow	Size 3	Int.	D. T.	Russell
	1	Snow Spr.	27–8	.....	S. T.	Brill
Morris County Traction Co.	2	Closed	34–0	C.&Sub.	.....	Barber
Mt. Pleasant & Red Spg. Ry.	2	Gas.-Motor	....	.....	S. T.	Fairbanks
Municipal Traction Co.	25	Passenger*	52–0	City	D. T.	Kuhlman
Muskogee Elec. Trac. Co.	6	Semiconv.	* 21–0	City	S. T.	Danville
Mutual Lt. & Wtr. Co.	4	Closed*	33–10	.....	S. T.	Brill
Nashville Interurban Ry.	1	Semiconv.	33–4	Int.	.....	Danville
	1	Express	....	.....	.....	Danville
Nebraska Trac. & Pwr. Co.	1	Pass. & B.	44–4	C.&Int.	D. T.	American
New Paltz, H'l'd & Poug. Ry.	3	Open	20–0	City	S. T.	Wason
N. Y. & No. Sho. Trac. Co.	3	Passenger	34–4	.....	....	Brill
	4	Semiconv.	34–4	.....	D. T.	Kuhlman
	1	Work	35–0	.....	D. T.	Brill
N. Y., Auburn & Lansing R.R.	10	Closed	50–0	Int.	D. T.	Jewett
N. Y., N. H. & H. R. R.	2	Elec. Loco.	.....	Freight	.....	Westingh'se
New York State Railways	4	Passenger	....	Int.	D. T.	Kuhlman
	25	Pass.	* 30–11	City	D. T.	Kuhlman
	2	Snow Spr.	....	.....	S. T.	McGuire-C.
Niagara, St. Cath. & Tor. Ry.	2	Closed	55–0	Int.	D. T.	Brill
	1	S. P. & B.C.	41–0	C.&Int.	D. T.	Russell
Nipissing Central Ry.	4	Open	45–0	Int.	D. T.	Preston
North Alabama Traction Co.	1	Semiconv.	....	.....	....	Brill
Northern Ohio Tr. & Lt. Co.	1	Closed	35–6	Int.	D. T.	Kuhlman
	6	Closed	51–6	Int.	D. T.	Kuhlman
	4	Closed	22–6	City	S. T.	Kuhlman
	6	Convert.	35–6	City	D. T.	Kuhlman
	1	Private	52–0	Int.	D. T.	Niles
Northern Texas Trac. Co.	12	Closed	28–0	City	D. T.	Cincinnati
	1	Closed	21–0	City	S. T.	Cincinnati
	4	Closed	51–6	Int.	D. T.	Kuhlman
North Jersey Rapid Tran. Co.	6	Closed	30–0	Int.	D. T.	Jewett
Ocean Electric Railway	6	Passenger*	34–0	Int.	D. T.	St. Louis
Ogden Rapid Transit Co.	5	Semiconv.	41–0	City	D. T.	Cincinnati
Ogden Street Railway Co.	1	Sweeper	....	.....	S. T.	McGuire-C.
Ohio & Southern Railway Co.	1	Elec. Loco.	....	.....	D. T.	McGuire-C.
Ohio River Ry.	1	Closed	20–0	City	S. T.	Kuhlman
Ohio Electric Company	6	Closed	61–6	Int.	D. T.	Cincinnati
	6	Express	50–0	Int.	D. T.	Cincinnati
	8	Freight	38–6	Int.	D. T.	Cincinnati
Oklahoma Railway	3	Passenger	54–0	Int.	D. T.	Niles
	6	Open Pass.	45–0	Int.	D. T.	Niles
	6	Closed	20–0	City	S. T.	American
	10	Closed	30–0	City	S. T.	American
	4	Semiconv.	30–0	City	D. T.	American
	2	Work, Lo.	34–0	.....	D. T.	Co. Shops
Old Colony Street Railway	12	Semiconv.	39–6	Both	D. T.	Laconia
	3	Express	39–6	.....	D. T.	Laconia
Omaha & Council Bluffs	10	Closed*	....	40–4 City	D. T.	American
Orange County Traction Co.	1	Snow Spr.	....	.....	S. T.	McGuire-C.
Ottawa Electric Railway Co.	12	Semiconv.	30–0	City	S. T.	Ottawa
	18	Semiconv.	* 40–0	City	D. T.	Ottawa
Pacific Electric Railway	30	Passenger	39–1	City	D. T.	St. Louis
	25	Open	41–2	Int.	D. T.	St. Louis
	5	Passenger	34–10	City	D. T.	.....
	52	Frt., Box	36–8	Int.	D. T.	Mt. Vernon
	60	Flat	41–11	Int.	D. T.	Pressed Stl.
	15	Gondola	36–0	Int.	D. T.	Hicks
	200	Dump	34–0	Int.	D. T.	Hicks
	4	Elec. Loco.	36–2	Int.	D. T.	Co. Shops
	1	Pile Driver & Tender	.....	Work	D. T.	Llewellyn
Parsons Ry. & Lt. Co.	5	Semiconv.	31–0	.....	S. T.	St. Louis
Peninsular Ry.	4	Closed	44–0	Int.	D. T.	St. Louis
Penna. Tun. & T. Co.	24	Elec. Loco.	....	Tunnel	.....	Westing.
Peoria Railway Co.	10	Passenger*	32–0	City	S. T.	Danville
Peoria Railway Terminal Co.	1	Comb.	56–0	Int.	D. T.	McGuire-C.
	1	Spklr.	.....	.....	D. T.	McGuire-C
Phila. & Easton Elec. Ry.	1	Gondola	.. 40–10	Int.	D. T.	Brill
Phila. & West Chester Tr. Co.	1	Frt., Box	50–0	Int.	D. T.	Jewett
	1	Express	46–0	Int.	D. T.	St. Louis
	1	Frt., Box	36–0	Int.	D. T.	Co. Shops.
Phila. Rapid Transit Co.	10	Passenger	49–7	Elev.	D. T.	Pressed
	2	Ash	33–6	.....	D. T.	Brill
Pittsburg, Harmony, Butler & New Castle Ry.	4	Passenger	46–0	Int.	D. T.	St. Louis.
Pgh. & Kan. City Ry. Co.	4	Closed Pas. & Smok.	40–0	Int.	D. T.	American
Pittsburgh Rys. Co.	1	Passenger*	....	Int.	D. T.	Niles
	20	Closed	52–8	Int.	D. T.	Kuhlman
	80	Semiconv.	* 46–8	City	D. T.	Brill
	2	Express	45–0	Int.	D. T.	Kuhlman
Port. Arth. & Pt. Wil.	4	Closed*	42–0	City	D. T.	Preston
Port Arthur Traction Co.	12	Closed	34–0	C.&Int.	S. T.	Barber
Portland, Eugen & East. Ry.	1	Open	....	City	S. T.	Danville
	1	Semiconv.	25–4	City	S. T.	Danville
Portland Ry., Lt. & Pwr. Co.	40	Passenger*	28–8	City	D. T.	American
	1	Closed*	46–6	City	D. T.	American
	20	Flat	....	.....	.....	Hicks
Public Service Railway	9	Closed*	44–0	City	D. T.	Co. Shops
Puget Sound Elec. Ry.	1	Closed	55–0	Int.	D. T.	Cincinnati
	1	Parlor, tr'l	55–0	Int.	D. T.	Cincinnati
Quebec Ry., Light & Pr. Co.	2	Pass.	....	Int.	D. T.	Ottawa
	10	Open	....	.....	S. T.	Ottawa
	6	Closed	29–0	City	S. T.	Ottawa
	2	Closed	60–0	Int.	D. T.	Ottawa
	2	S. Plow	30–0	City	S. T.	Ottawa
	1	Snow Swp.	....	.....	S. T.	McGuire-C.
	2	Sweeper,	28–0	City	S. T.	Ottawa
Quincy Horse Railway & Carrying Company	8	Open	....	.....	.....	American
	1	Snow Swp.	....	.....	S. T.	McGuire-C.
Rochester Ry.	4	Closed	41–4	Int.	D. T.	Kuhlman
Rochester, Syracuse & East R. R.	13	Pass.	.....	.....	.....	St. Louis
	13	Closed	42–9	Int.	D. T.	Kuhlman
	1	S. Plow	39–0	Int.	D. T.	Russell
Rockford & Interurban Ry.	5	Closed*	37–5	Both	D. T.	American

Purchaser	No.	Class	Length	Serv.	Truck	Builder
Rock Island Southern R. R.	8	Pass.	62–0	Int.	D. T.	Niles
	20	Open	57–0	.....	D. T.	St. Louis
	2	Trailer, C.	50–0	Int...	D. T.	Niles
	5	Comb.	57–0	.....	D. T.	St. Louis
	2	Express	50–0	Int.	D. T.	Niles
	50	Box	36–7⅜	Coal	D. T.	Haskell-B
	75	Gondola	40–0	Coal	D. T.	Haskell-B.
Rockland, So. Thomaston & St. George Ry.	2	Open	31–0	Both	S. T.	Wason
	2	Closed	28–0	Both	S. T.	Jones
Rome Railway & Light Co.	1	Semiconv.	31–0	City	S. T.	American
Sacramento Elec., Gas & R. Co.	10	Pass.	....	.....	.....	Co. Shops
Saginaw & Flint Railway.	4	Closed	51–0	Int.	D. T.	Niles
	2	Express	51–0	Int.	D. T.	Niles
	1	S. Plow	....	Both	S. T.	Russell
St. Joseph Ry., Lt., Ht. & Pr.	5	Pass.	....	.....	.....	St. Louis
St. Joseph Valley Traction Co.	1	Coach	....	.....	D. T.	Hicks
St. Lawrence Elec. Ry. Co.	1	S. Plow	....	Both	.....	Russell
St. Lawrence Int. Elec Ry. & Land Co.	1	Gondola	34–0	.....	D. T.	Hicks
St. Louis Elec. Term. Ry. Co.	20	Pass.	50–0	City	D. T.	American
	10	Trailer, O	50–0	City	D. T.	American
	1	Sweeper	....	City	D. T.	McGuire-C.
Salt Lake & Ogden Ry.	10	Comb.	56–0	Int.	D. T.	Jewett
San Antonio Traction Co.	10	Semiconv.	42–0	City	D. T.	American
San Diego Electric Railway.	12	Pass.	40–0	.....	D. T.	Co. Shops
San Francisco, Vallejo & Napa Valley Ry.	2	Comb.	56–0	Int.	D. T.	Niles
Sapulpa & Int. Ry.	4	Pass.	....	.....	.....	St. Louis
Saunders Motor Car Co.	1	Semiconv.	34–8	.....	D. T.	Brill
Savannah Electric Co.	2	Closed	22½	City	S. T.	Co. Shops
Schuylkill & Dauphin Tr. Co.	4	Open	30–0	Int.	S. T.	Co. Shops
	1	Gasoline	26–0	Int.	S. T.	Buckeye
	1	Box	28–0	Int.	S. T.	Co. Shops
	1	Sweeper	26–0	Int.	S. T.	Brill
Scioto Valley Traction Co.	3	Freight	36–0	.....	D. T.	Barney & S.
Seattle Electric Co.	30	Comb.	47–8	City	D. T.	St. Louis
	1	Elec. Loco.	40–0	City	D. T.	Co. Shops
Seattle & Everett Int. Ry.	6	Closed	51–0	Int.	D. T.	Niles
	1	Freight, B	40–0	Both	D. T.	Co. Shops
Seattle, Renton & South'n Ry.	9	Pass.	50–0	Both	D. T.	Moran
	2	Dump	25–0	Both	S. T.	Co. Shops
Sea View R. R. Co.	1	Closed	42–0	Int.	D. T.	Co. Shops
	1	Work	36–0	Int.	D. T.	Co. Shops
Second Avenue R.R. of N. Y.	2	Snow Swp.	27–6	.....	S. T.	Brill
Sheboygan Lt., Pr. & Ry. Co.	2	Comb.	50–0	Int.	D. T.	Cincinnati
Shelburne Fls & Coleran St. Ry	1	Comb.	34–4	Int.	D. T.	Wason
Shore Line Electric Ry.	12	Closed	30–0	Int.	D. T.	Jewett
Sioux Falls Traction System.	1	Closed	....	City	S. T.	McGuire-C.
S. Bethlehem & Saucon St. Ry.	2	Open	25–0	Both	S. T.	Brill
	2	Closed	28–0	.....	.....	American
Southern Cambria Ry.	2	Pass.	48–0	Int.	D. T.	Niles
	2	Comb.	48–0	Int.	D. T.	Niles
Southern Michigan Ry.	1	Express	52–0	Int.	D. T.	Niles
Southern Wisconsin Railway.	1	Closed	....	.....	.....	American
Southwest. Mo. R. R. Co.	4	Open	46–0	Int.	D. T.	Co. Shops
	4	Closed	46–0	Int.	D. T.	Co. Shops
	1	Express	36–0	Int.	D. T.	Co. Shops
Southwestern Interurban Ry.	1	Closed	29–5	City	S. T.	American
	3	Semiconv.	30–1	Int.	.....	American
	2	Semiconv.	41-8	Int.	D. T.	American
	1	Baggage	24–0	City	S. T.	American
Southwestern Traction Co.	1	Express	....	Int.	D. T.	Niles
Spokane & Inl. Empire R. R.	10	Passenger	....	City	D. T.	St. Louis
	4	Trailer, C.	55–11	City	D. T.	Brill
	4	Combin'n	56–3	Int.	D. T.	Brill
	6	Refrig'r	....	Int.	D. T.	Co. Shops
	2	Elec. Loco.	....	Int.	D. T.	Westing.
	3	Elec. Loco.	....	Frt.	D. T.	Baldwin
	4	Caboose	....	Frt.	S. T.	Seattle
Springfield Consol. Ry. Co.	5	Closed	32–0	City	S. T.	American
	1	Sprinkler	....	.....	S. T.	McGuire-C.
Springfield Street Railway Co.	12	Closed	34–4	City	D. T.	Wason
Springfield Traction Co.	2	Pass., trail.	45–0	City	D. T.	American
	4	Closed	30–8	City	S. T.	American
	1	Work	....	.....	S. T.	Co. Shops
	1	Work	....	.....	D. T.	Co. Shops
	1	Sweeper	....	.....	S. T.	McGuire-C.
Springfield & Wash. Ry.	1	Comb.	53–0	Int.	D. T.	Jewett
Sterl., Dix. & East. Elec. Ry.	4	Closed	32–2	City	S. T.	St. Louis
Stroudsburg Pass. Ry. Co.	1	Open	34–0	.....	D. T.	Brill
Sunbury-North. Elec. Ry. Co.	2	Closed	31–0	Gen'l	S. T.	American
Syracuse & Suburban R. R.	3	Semiconv.	42–9	Int.	D. T.	Kuhlman
Syracuse R.R. Construction Co.	1	Snow Plow	Size 3	Int.	D. T.	Russell
	2	Closed	42–9	Int.	D. T.	Kuhlman
Tampa Sulphur Spgs. Tr. Co.	4	Open	30–0	City	D. T.	American
Taylorville Lt., Ht. & Pwr. Co.	1	Closed	29–5	City	S. T.	American
Terre H., In's. & East. Tr. Co.	1	Passenger	61–6	Int.	D. T.	Cincinnati
	1	Frt., trail.	45–0	Int.	D. T.	Cincinnati
Texas Traction Co.	3	Trailer, C.	....	Int.	D. T.	American
	1	Wk. & Loco.	.....	.....	.....	St. Louis
Texarkana Gas & Elec. Co.	6	Semiconv.	....	City	S. T.	Danville
Third Avenue R. R.	375	Convert.	43–0	City	D. T.	Brill
	1	Gas.-Mot.	27–0	City	S. T.	Wason
	3	Sprinkler	31–0	.....	D. T.	Brill
Tide Water Power Co.	3	Closed	51–0	Int.	D. T.	Brill
	4	Semiconv.	31–9	City	S. T.	Brill
Toledo Rys. & Lt. Co.	20	Semiconv.*	41–6	City	D. T.	Kuhlman
Topeka Railway.	12	Passenger	40–8	City	D. T.	American
Tri-City Railway.	10	Closed	33–0	City	S. T.	Cincinnati
Tulsa Street Railway Co.	3	Passenger	31–4	City	S. T.	Barney & S.
Twin City Rapid Transit Co.	11	Closed	46–8	Both	D. T.	Co. Shops
	3	Snow Plow	44–2	Both	D. T.	Co. Shops
Union Electric Co.	6	Closed*	21–0	City	.....	Danville
Union Railway Co. of N. Y.	5	Snow Swp.	....	.....	S. T.	Brill
Union Street Railway.	12	Closed	30–0	.....	.....	J. M. Jones
Union Traction Company.	1	Open	42–2	Int.	D. T.	Cincinnati
	2	Closed	45–0	Int.	D. T.	Cincinnati
	2	Semiconv.	30–1	City	S. T.	American
United Railways Co.	2	Closed	56–3	Int.	D. T.	American
United Traction Co.	1	Port. S. S'n	36–6	.....	D. T.	Brill
Urb. & Champ. Ry. & Lt. Co.	3	Passenger*	32–0	City	S. T.	Danville
Vancouver Power Co., Ltd.	2	Comb.	53–8	Int.	S. T.	American
	2	Bag & Ex.	53–8	Int.	S. T.	American
Vancouver Traction Co.	1	Semiconv.	39–4	City	D. T.	American
Visalia Electric Ry. Co.	2	Comb.	....	Int.	.....	Moran Co.
Wab. & North. Ind. Tr. Co.	7	Closed	30–0	Int.	D. T.	Jewett
Warren Street Railway Co.	2	Semiconv.	30–1	.....	S. T.	Brill
Wash., Alex. & Mt. Vn. Ry.	3	Semiconv.	28–0	Int.	D. T.	Shop
Wash., Bal. & Annap. El. Ry.	17	Closed	50–0	Int.	D. T.	Niles
[illegible]	10	Comb.	50–0	Int.	D. T.	Niles
[illegible]	1	Express	50–0	Int.	D. T.	Niles
Wash. Ry. & Elec. Co. System.	50	Closed*	42–0	City	D. T.	Brill
	2	Snow Swp.	27–6	.....	.....	Brill
Washington Water Power Co.	10	Closed	43–0	City	D. T.	Brill
	15	Semiconv.	43–0	City	D. T.	Brill
Wassau Street Railway.	1	Semiconv.	42–0	Int.	D. T.	Niles
Webster, Monessen, Belle Vernon & F. C. St. Ry. Co.	2	Semiconv.	21–4	City	S. T.	Brill
West Chester El. R. R.	25	Convert.*	43–0	.....	D. T.	Brill
Westchester, Ken. & Wil. El. Ry.	1	Express	25-0	Int	S. T.	Co. Shops
W'n N. Y. & Penn. Trac. Co.	2	Semiconv.	30–1	City	S. T.	Brill
W. Jersey & Seashore R. R.	6	Closed	....	Int.	D. T.	A. C. & F.
Whatcom Co. Ry. & Lt. Co.	3	Dump	16–0	.....	S. T.	Western
Wheeling Traction Co.	8	Semiconv.*	30–0	Sub'n	D. T.	Kuhlman
Wichita Falls Traction Co.	4	Semiconv.	30–0	Both	Single	St. Louis
	4	Trailer, O.	....	Both	S. T.	St. Louis
Wichita Railroad & Light Co.	10	Closed*	42–0	City	D. T.	American
	5	Closed*	40–0	City	D. T.	American
W'msport Pass. Ry. Co.	1	Sweeper	....	.....	S. T.	McGuire-C.
W.-B. & Wyom. Val. Tr. Co.	10	Comb.	42–1	Int.	D. T.	Brill
Wil., N. Castle & So. Ry. Co.	1	Express	40–0	Int.	D. T.	A. C. & F.
Wis. Trac., Lt., Ht. & Pwr. Co.	6	Closed	53–5	Int.	D. T.	Kuhlman
Wor. & B'stone Val. St. Ry.	2	Closed	30–4	City	D. T.	Wason
Waterloo, Ced. Falls & No. Ry.	10	Open	28–0	City	S. T.	McGuire-C.
	13	Closed	28–0	City	S. T.	McGuire-C.
	5	Closed	....	.....	S. T.	McGuire-C.
	8	Closed	....	.....	S. T.	McGuire-C.
	4	Comb.	60–0	Int.	D. T.	McGuire-C.
	1	Express	50–0	Int.	D. T.	McGuire-C.
Yakima Valley Transp. Co.	2	Closed	30–0	City	S. T.	Danville
	1	Comb.	45–0	Int.	D. T.	Niles
	1	Express	44–10	.....	D. T.	Niles
	1	Work	41–0	Int.	D. T.	Niles
Yazoo City Light, Water & Sewerage Plant.	1	Semiconv.	30–1	City	S. T.	American

NEW ELECTRIC RAILWAY TRACK CONSTRUCTION IN 1909

The accompanying table shows in detail the new electric railway track mileage built and opened for operation during the year 1909 in the United States, Canada and Mexico. The table has been compiled from answers received from the railway companies whose names appear, and the mileage given in each instance is therefore correct. Unfortunately, replies were not received from all the railway companies to which a request for information was sent, and hence there are probably some omissions. The only mileage represented in the table is track which was completed and placed in operation during the year. A number of long lines made substantial progress in track construction during the year, but were not opened for operation up to the time the returns were sent in. This mileage does not appear in the table. In a few instances mileage will be found in the table this year which also appeared in the table compiled last year. This duplication arises from the fact that, through a misunderstanding in sending in the returns, track which was built but not opened for operation in 1908 was given and included in the table published at the beginning of 1909.

The total new mileage represented this year is 887.16, as against 1258.51 miles built in 1908. The new construction in 1908 was much less than the unofficial figures compiled for 1907, and the mileage of 1909 represents another large decrease over 1908. This is due in a large measure to the after effects of the period of financial depression in 1908, with the uncertainty of securing the necessary funds for the completion of electric railway projects which had been under consideration for two or three years. The falling off in 1908 was not so great as in 1909 because those projects that were nearly completed were finished and placed in operation, while few, if any, of the new projects on which work was started in 1909 were finished by the end of the year. Much new work has been going on during the past 12 months, however, and the results will no doubt appear as a large increase in 1910. According to reports received, much new work will be started early in 1910, with good promise of rapid completion.

In the classification of the mileage by States, New York again heads the list, with 129.08 miles, as against 183.76 miles of single track built last year. The largest mileage built by any one company in New York State was that of the Rochester, Syracuse & Eastern Railroad, which completed 44 miles between Port Byron and Syracuse. The extension of the electric zone of the Long Island Railroad and the construction by that

company of a number of double-track cut-off lines accounts for another 20 miles in the State of New York, and if to this be added the 15 miles of the Huntington Railroad which is owned and operated by the Long Island Railroad, the construction work of the latter would total 35 miles of single track. Ohio again appears second in the list of States, with 77.13 miles. This is largely made up of two long interurban extensions, that of the Cleveland, Southwestern & Columbus Railway from Ashland to Leroy, 30 miles, and that of the Ohio Electric Railway from Lima to Defiance, 42 miles. The latter road is a steam railroad which has been rehabilitated and equipped for electric operation.

Reports from railway companies up to the time of going to press indicate that at least 1800 miles of new electric railway track will be built in 1910.

	Miles.
ALABAMA.	
Birmingham Railway, Light & Power Co	1.00
Mobile Light & R. R. Co	1.13
Montgomery Traction Co.—Oak Park, Chisom and Pickett Springs	4.00
North Alabama Traction Co	0.50
Sheffield Co	0.05
Total	6.68
ARIZONA.	
Phoenix Railway Co	1.75
Total	1.75
CALIFORNIA.	
Bakersfield & Ventura R. R.—Oxnard	2.00
East Shore & Suburban Ry	2.00
Glendale & Eagle Rock Ry—Between Glendale and Eagle Rock	2.25
Los Angeles Ry	5.80
Los Angeles & Redondo Ry	2.61
Pacific Electric Ry.—Between Wilmington, San Pedro and Long Beach; between Santa Ana and Huntington Beach	25.86
Peninsular Ry.—Los Altos, Mayfield, Palo Alto	4.00
Sacramento Electric, Gas & Railway Co	1.00
San Diego Electric Ry	2.00
South San Francisco Railroad & Power Co	.50
United Railroads of San Francisco	5.13
Total	53.15
COLORADO.	
Colorado Springs & Interurban Ry	1.50
Denver City Tramway Co	10.00
Denver & Interurban R. R.—In Fort Collins	1.00
Grand Junction & Grand River Valley Ry	4.00
Total	16.50
CONNECTICUT.	
New York, New Haven & Hartford, R. R.—East of Glenbrook	1.13
Total	1.13
DISTRICT OF COLUMBIA.	
Capitol Traction Co	10.00
Total	10.00
FLORIDA.	
Pensacola Electric Co	1.63
Total	1.63
GEORGIA.	
Columbus R. R.—Spur track into Base Ball Park	0.23
Georgia Railway & Electric Co	10.50
Rome Railway & Light Co	1.50
Total	12.23
IDAHO.	
Boise & Interurban Ry. Co., Ltd	1.50
Total	1.50
ILLINOIS.	
Bloomington, Pontiac & Joliet Electric Ry.—Pontiac to Chenoa	10.00
Calumet & South Chicago Ry	5.15
Chicago City Ry	0.12
Chicago Railways Co	8.08
Chicago & Southern Traction Co.—In Chicago Heights	1.00
Dixon, Rock Falls & Southwestern Electric Ry.—Tampico, Yorktown and Hooppole	10.00
Illinois Central Electric Ry.—Brereton and Norris	5.00
Murphysboro Electric Railway, Light, Heat & Power Co.—Murphysboro and Carbondale	2.50
Total	41.85
INDIANA.	
Bluffton, Geneva & Celina Traction Co.—Bluffton, Vera Cruz, Linn Grove and Geneva	18.50
Chicago, Lake Shore & South Bend Ry. (Kensington & Eastern R. R.),—Hammond, Ind., to Kensington, Ill	7.33
Indianapolis, Newcastle & Toledo Electric Ry.—Indianapolis to Newcastle	20.00
Winona Interurban Ry.—Warsaw and Mentone	11.00
Total	56.83
IOWA.	
Centerville Light & Traction Co.—Centerville to Mystic	7.00
Colfax Springs Ry	1.00
Fort Dodge, Des Moines & Southern R. R.—Ogden, Ogden Mines and Fraser	6.00
Mason City & Clear Lake Ry	1.02
Sioux City Service Co	5.00
Tri-City Ry	2.00
Waterloo, Cedar Falls & Northern Ry	10.00
Total	32.02
KANSAS.	
Kansas City-Western Ry.—Marshall Creek	1.50
Lawrence Railway & Light Co	9.00
Manhattan City & Interurban Ry	2.00
Southwestern Interurban Ry.—Arkansas City and Winfield	14.00
Wichita Railroad & Light Co	7.00
Total	33.50
KENTUCKY.	
Central Kentucky Traction Co.—Lexington to Nicholasville	12.00
Total	12.00
LOUISIANA.	
Alexandria Electric Railways Co	1.75
Lake Charles Railway, Light & Water Works Co	1.25
Total	3.00
MAINE.	
Bangor Railway & Electric Co	0.25
Rockland, South Thomaston & St. George Ry	0.27
Total	0.52
MARYLAND.	
Maryland Electric Railways	1.52
Total	1.52
MASSACHUSETTS.	
Boston Elevated Ry	15.00
Boston & Northern Street Ry	1.10
Dartmouth & Westport Street Ry	.83
Lowell, Acton & Maynard Street Ry.—South Acton to West Acton	1.60
Middlesex & Boston Street Ry	1.00
Old Colony St. Ry	.60
Total	20.13
MICHIGAN.	
Benton Harbor-St. Joe Railway & Light Co.—Benton Harbor to Coloma	10.68
Michigan United Railways Co.—Jackson, Lester, Mason and Lansing	37.00
Saginaw & Flint Ry.—Flint, Mt. Morris, Clio, County Line, Birch Run and Frankenmuth Junction	24.00
Saginaw Valley Traction Co	.64
Twin City General Electric Co	1.00
Total	73.32
MINNESOTA.	
Duluth Street Ry	2.46
Twin City Rapid Transit Co	2.41
Total	4.87
MISSISSIPPI.	
Columbus Railway, Light & Power Co	1.25
Municipal Street Ry—Yazoo City	1.00
Total	2.25
MISSOURI.	
Cape Girardeau-Jackson Interurban Ry	1.00
Kansas City, Lawrence & Topeka Electric R. R.—Shawnee to Monrovia	1.00
St. Louis, Lakewood & Grant Park Ry	3.00
Springfield Traction Co	1.00
Total	6.00
MONTANA.	
Butte Electric Ry	2.00
Gallatin Valley Electric Ry	18.00
Total	20.00
NEVADA.	
Reno Traction Co	0.50
Total	0.50
NEW YORK.	
Binghamton Ry.—Extension of Downsville division to Stella	0.68
Brooklyn Rapid Transit Co	2.34
Buffalo & Lake Erie Traction Co	9.00
Buffalo Southern Ry.—Buffalo City Line through Ebenezer to East Seneca	5.40
Elmira, Corning & Waverly R. R.—Wellsburg to Elmira	6.00
Elmira Water, Light & Railroad Co	0.40
Hudson & Manhattan R. R.—Between Jersey City and New York	6.80
Huntington R. R.—Huntington, Farmingdale and Amityville	15.00
Long Island R. R	20.00
New York City Interborough Ry	4.50
New York & North Shore Traction Co.—Flushing and Whitestone; Roslyn and Manhasset	8.00
New York State Railways—Rochester Lines	1.75
Oneida Railway Co.—Sherrill to Kenwood	1.70
Rochester, Syracuse & Eastern R. R.—Port Byron, Weedsport, Jordan, Memphis, Warners, Amboy, Belle Isle and Syracuse	44.00
Syracuse Rapid Transit Ry. Co	1.79
Utica & Mohawk Valley Ry	1.72
Total	129.08
NORTH CAROLINA.	
Charlotte Electric Railway, Light & Power Co	1.00
Durham Traction Co	0.75
Weaverville Electric Co	4.80
Total	6.55

OHIO.	
Cleveland, Southwestern & Columbus Ry.—Ashland, West Salem, Lodi and Leroy	30.00
Dayton, Springfield & Xenia Southern Ry.—In Spring Valley; in Dayton	1.50
Hocking-Sunday Creek Traction Co	3.00
Northern Ohio Traction & Light Co.—Between Canton and Massillon	0.63
Ohio Electric Ry. (Columbus & Lake Michigan R. R.)—Lima to Defiance	42.00
Total	77.13
OKLAHOMA.	
Oklahoma City & Suburban Ry	5.00
Oklahoma Ry.—Oklahoma City to Putnam City	8.00
Oklahoma Union Traction Co.—Tulsa to Orcutt Lake	2.50
Total	15.50
OREGON.	
Oregon Electric Ry.—From West Woodburn to Woodburn	2.50
Portland Railway, Light & Power Co	3.00
Total	5.50
PENNSYLVANIA.	
Allegheny Valley Street Ry	3.00
Central Pennsylvania Traction Co	1.05
Chambersburg, Greencastle & Waynesboro Street Ry.—Through Chambersburg	2.50
Conestoga Traction Co.—Connects Christiana and Parkesburg	5.00
Mahoning & Shenango Railway & Light Co	2.20
Pittsburg Railways Co	10.00
Scranton Ry	3.00
South Bethlehem & Saucon Street Ry.—Friedensville and Centre Valley	3.40
Southern Cambria Ry.—Johnston, Conemaugh, Echo, Mineral Point and South Fork	11.00
Stroudsburg & Water Gap Street Ry	0.50
Wilkes-Barre & Wyoming Valley Traction Co.—Wilkes-Barre to Hudson, Parsons, and Miners Mills	6.00
Total	47.65
RHODE ISLAND.	
Rhode Island Co	1.38
Sea View R. R	0.10
Total	1.48
SOUTH DAKOTA.	
Sioux Falls Traction System	1.50
Total	1.50
TENNESSEE.	
Memphis Street Ry	0.75
Total	0.75
TEXAS.	
Corpus Christi Street & Interurban Ry	5.50
Houston Electric Co	0.93
Mt. Pleasant & Red Springs Street Ry	1.13
Northern Texas Traction Co	1.00
Port Arthur Traction Co	7.00
San Antonio Traction Co	6.43
Uvalde Street Ry.—Sansom to Uvalde	4.00
Wichita Falls Traction Co.—In Wichita Falls; to Lake Wichita	8.00
Total	33.99
VIRGINIA.	
Norfolk City & Suburban Ry	1.00
Roanoke Railway & Electric Co	1.50
Total	2.50
WASHINGTON.	
Everett Railway, Light & Water Co	0.08
Great Northern Ry	6.25
Seattle Electric Co	25.00
Seattle-Everett Interurban Ry.—Seattle and Everett	8.00
Seattle, Renton & Southern Ry	3.00
Spokane & Inland Empire R. R	17.00
Whatcom County Railway & Light Co	4.50
Yakima Valley Transportation Co	13.00
Total	76.83
WEST VIRGINIA.	
Morgantown & Dunkard Valley R. R.—West Morgantown, Riverside, Granville and Randall	3.00
Total	3.00
WISCONSIN.	
Ashland Light, Power & Street Railway Co	0.75
Chippewa Valley Railway, Light & Power Co	0.64
Eastern Wisconsin Railway & Light Co	2.00
Grand Rapids Street R. R.—Grand Rapids, Centralia, Port Edwards and Nekoosa	8.00
Milwaukee Northern Ry	2.00
Wausau Street Ry.—Weston	1.00
Total	14.39
CANADA.	
British Columbia Electric Railway Co., Ltd	12.35
Calgary Street Ry	16.00
Hull Electric Co	2.25
International Transit Co	0.31
Montreal & Southern Counties Ry	6.00
Niagara, St. Catharines & Toronto Ry.—Welland, Humberstone and Port Colborne	9.00
Nipissing Central Ry.—Cobalt, Port Cobalt and Haileybury	5.00
Port Arthur & Fort William Electric Ry	3.00
Sandwich, Windsor & Amherstburg Ry	0.25
Sarnia Street Ry. Co., Ltd	0.38
Total	54.54
MEXICO.	
Compania Electrica y de Ferrocarriles de Chihuahua	3.89
Total	3.89

HEAVY ELECTRIC TRACTION PROJECTS IN 1909

A large amount of work was done in 1909 on the construction and extension of heavy electric traction projects in the United States. New York City was the center of activity with the Pennsylvania cross-town tunnels nearing completion and important extensions of their terminal electric zones being made by the New York Central & Hudson River, New York, New Haven & Hartford and the Long Island railroads. In the Middle West the Michigan Central's tunnels and approaches under the Detroit River, which are to be operated by electric locomotives, will be opened early in 1910, good progress having been made on the construction and equipment. The Great Northern three-phase division over the Cascade Mountains was put in operation during July, 1909. No new track to be operated electrically was built during the year by the Baltimore & Ohio in Baltimore or by the St. Clair Tunnel Company at Sarnia.

In the following paragraphs the progress of the year on each of the projects on which active work was done is briefly summarized.

PENNSYLVANIA TUNNEL & TERMINAL RAILROAD

The Pennsylvania Railroad is building its new entrance into New York City under the name of the Pennsylvania Tunnel & Terminal Railroad. The extension begins at Harrison, just east of Newark, and crosses the Hackensack Meadows to the west portal of the tunnels under Bergen Hill on the west side of the Hudson River. The tunnels extend under the Hudson River, the Island of Manhattan and the East River, emerging in Long Island City and connecting with the Sunnyside yard. The extension connects with the Long Island Railroad near Woodside Avenue, Borough of Queens. The total length of the extension is 14.9 miles, of which 9.83 miles is on the surface, 2.29 miles under the two rivers and 2.78 miles under ground. Exclusive of the switching tracks in the Harrison transfer and Sunnyside yards, the total length of track in the extension will be 49.75 miles, all electrically operated. The Harrison and Sunnyside yards contain nearly 80 miles of track, not all of which will be electrically operated.

During the year 1909 the work has progressed actively on the extension, including the Harrison and Sunnyside yards. All the tunnels have been completed and main tracks have been laid in the tunnels and approaches from Harrison to Winfield, east of the Sunnyside yard. Ballasting is in progress and will be completed early in the spring of 1910. Yard tracks have been laid at Harrison for the interchange yard, and practically all the tracks in the Sunnyside yard have also been laid. Work is progressing actively on the interlocking and signaling throughout. Yard buildings at Sunnyside yard are under construction and will be finished early in the spring. The main station, facing Seventh Avenue between Thirty-first and Thirty-third Streets, has been completed on the exterior, and the work of finishing the interior is well advanced. It is anticipated that it will be practically completed early in the coming spring.

The installation of electric power cables, third-rail, power plant and substations is well advanced and will be completed in the spring of 1910. It is believed that early in the spring partial service of the Long Island Railroad into the station will be inaugurated, and in the early summer a partial service of the Pennsylvania Railroad will be in operation.

The initial order for electric locomotives to haul through trains in the tunnels included 24 double units of 4000 hp. Two of these locomotives have been delivered. They were described in the Electric Railway Journal of Nov. 6, page 982. The proposed initial daily service to be handled in the terminal station is 400 trains of the Pennsylvania Railroad and 600 trains of the Long Island Railroad.

LONG ISLAND RAILROAD

The Long Island Railroad completed the equipment for electric operation of 40 miles of track on which work was commenced in 1909, thus increasing its electric trackage to 140 miles. The most important pieces of work completed, or well

advanced during the year, were the construction of two additional running tracks, reduction of grades and elimination of grade crossings between Winfield and Jamaica, thus providing four tracks from the portal of the Manhattan tunnels to Jamaica, and the construction of the Glendale cut-off from Glendale to Woodhaven Junction to furnish a double-track connection from the Far Rockaway and Rockaway Beach divisions. Work has been begun on the double tracking and electric equipment of the North Shore division from Winfield to Port Washington. This will be finished by the end of next summer.

On Feb. 1, 1910, the company hopes to begin through electric operation from Jamaica to the Manhattan terminal and by June 1 to run all trains into Manhattan.

Contracts were placed during the year for 130 new steel cars for suburban service which will be delivered before May 1. This will give the company 400 steel motor and trail cars for the service on the electric lines betwen Manhattan and the present Brooklyn terminal at Flatbush Avenue. The through service to Manhattan will effect a saving in running time on all trains of 25 minutes each way as compared with the present ferry and crosstown street car trip required to reach the station site in New York.

NEW YORK CENTRAL & HUDSON RIVER RAILROAD

During the year 1909 the extension of the New York Central electric traction system has progressed a distance of 12 miles, between Wakefield and North White Plains, and it is contemplated that on or about Feb. 1 all passenger trains on the Harlem division will be operated electrically between Grand Central Station and North White Plains, thus eliminating the temporary terminal at Wakefield.

The extension includes the erection of two new substations, one known as No. 8, located at Tuckahoe, and the other as No. 9, at White Plains. Each station contains three 1000-kw rotary converters, with the necessary step-down transformers and switching equipment. The general arrangement of the two new substations is the same as those already in service on this system, with the exception that electric storage batteries, with their boosters, regulators, etc., have been omitted. The electric signal equipment, which at the other stations is in a detached building, in the two new stations has been installed under the same roof.

The aerial transmission lines have been extended a distance of about 13 miles to the end of the North White Plains yard. The construction is identical with that previously adopted, except that it has been necessary in several instances to use temporary wooden poles where a change in track alignment or the elimination of grade crossings prevented the permanent poles being located.

The third-rail work includes about 27 miles of new third-rail on main track and in yards. The type of construction is the same as that formerly adopted, with the exception that since the first installation it has been possible to obtain rolled steel offset side inclines in place of cast iron. This is a decided improvement, both in conductivity of the rail and from a construction standpoint.

There will be six new circuit-breaker houses containing the remote controlled circuit breakers through which the third-rails will be fed, the arrangement conforming to the existing practice on this road.

All passenger and freight stations on the division will be lighted electrically and the current will be taken from the 2200-volt signal circuits, which are carried on the high-tension transmission line poles. A 2200-volt signal circuit from substation No. 9 will feed a small light and power station which is located in the North White Plains engine house, and will replace the present steam-driven generators.

The temporary inspection sheds and repair shops for electric equipment located at Wakefield will be abandoned, the plant dismantled and the forces transferred to the permanent electric inspection shed and repair shop at North White Plains. The temporary steam locomotive house, turntable, water supply, etc., will be no longer required.

During the past year the electrical work has kept abreast of the civil engineering developments at the Grand Central Station terminal, and as existing tracks were dismantled the third-rail and feeders were taken down and returned to stock, while the new tracks were equipped with third-rail and permanent feeders, so that they were ready for electric operation as soon as the construction work permitted them to be turned over to the operating department.

For light and power purposes in the Grand Central Station terminal a 1500-kw lighting rotary has been temporarily installed in the Fiftieth Street substation. The primary current is obtained from the main generating station at Port Morris. This rotary, with an auxiliary connection to the Edison service, will be used for temporarily lighting the Grand Central Station terminal pending the construction of the terminal plant.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD

The New York, New Haven & Hartford Railroad made no extensions of its electric zone between Woodlawn, N. Y., and Stamford Conn., during 1909, but in the Stamford yard and east of Stamford it erected a number of experimental catenary sections. The most important of these was a section about 6000 ft. long erected east of Glenbrook, the object being to study the best type of catenary construction to be adopted for future four-track and six-track electric operation. The partially electrified Stamford yard was completely equipped with a new form of catenary construction.

As the company made no extension of its suburban electric passenger service during the year, it did not order any additional passenger locomotives. In May, 1909, however, an order was placed with the Westinghouse Electric & Manufacturing Company for two electric freight locomotives, one of which has been received and the other rapidly nearing completion. These locomotives will be capable of hauling the heaviest freight trains on the New Haven road at an average schedule speed much higher than that now obtained with steam locomotives. In 1908 the company ordered four steel motor cars and six steel trail cars to be equipped for multiple-unit operation. These cars have been received and after thorough tests have been made they will be placed in suburban service early in the year. The activities of the New York, New Haven & Hartford in 1909 were concentrated chiefly on a study of the cost involved in the contemplated extension of its electric zone from Stamford to New Haven, within which it is proposed to operate both freight and passenger trains by electric locomotives.

GREAT NORTHERN RAILWAY

On July 10, 1909, electric operation was begun on the Cascade tunnel section of the Great Northern Railway in the State of Washington. This is the first mountain section of a steam railroad to be equipped and operated by electric locomotives. Its distinguishing feature is the use of the three-phase alternating current system taking current at 6600 volts from two overhead trolley wires. The total length of track which has been equipped for electric operation is 6.25 miles, which includes 13,873 ft. of tunnel, the remainder being in the yards at each end. The tunnel has a rising grade of 1.7 per cent eastbound and at the present time all eastbound freight and passenger trains are hauled through it by electric locomotives, but passenger trains only are hauled by electric locomotives westbound. The electric rolling stock consists of four locomotives each equipped with four three-phase motors having a one-hour rating of 475 hp or 1900 hp for each locomotive.

As previously stated, electric operation was begun on July 10, 1909, and was continued until Aug. 11, when the hydroelectric generating station was shut down on account of failure of both water wheels. The service was resumed on Sept. 9 and has been continued regularly since.

DETROIT RIVER TUNNEL OF THE MICHIGAN CENTRAL

The Michigan Central Railroad is building a double track tunnel under the Detroit River connecting Detroit, Mich., and Windsor, Ont. It will be operated electrically by direct-current locomotives, which were described in the ELECTRIC RAILWAY JOURNAL of June 19, 1909, page 1125. Six of these locomo-

tives of 1200 hp each will be delivered by March 1, 1910. The tunnel and approaches will contain about 6.25 miles of single track equipped for electric operation. The progress made in the construction and equipment of the tunnel and approaches may be summarized as follows:

With the exception of rodding the ducts and cleaning up, the construction of the approach tunnels is completed. The last section of the subaqueous tunnel was sunk Sept. 14, and on Oct. 15 an opening for passage from portal to portal was made. The work of placing the 20-in. ring of reinforced concrete inside the forms is progressing rapidly, and if the present rate of progress continues the tunnel construction will be finished early in March.

The electrical equipment is being installed as fast as conditions permit. The substation is nearing completion and the duct system follows closely the completion of the tunnel and yard work. Track bonding and the installation of the third-rail work are going forward on the Canadian side of the river and will be completed during the winter months. The placing of special ties in concrete in the approach tunnels has been started.

The entire reconstruction and enlargement of the Detroit yards and the separation of the grades between Fifteenth and Twenty-fourth Streets is going forward rapidly, and such tracks as are needed for the handling of trains through the tunnel will be ready when needed. It is expected that the tunnel will be ready for regular operation by electric locomotives early in the spring.

SWISS ELECTRIC RAILWAY STATISTICS AT THE END OF 1907

The Swiss Government has just issued its railway statistics for the year ending 1907. There were then 36 street railways in operation with a total length of 402 km (249 miles), of which 31 meter-gage lines having a combined length of 261 km (162 miles) were served by electric apparatus only. The only 4 ft. 8½-in. gage street railway reported in Switzerland is a 2.9 km (1.8 mile) line in Lucerne. The street railways carried 97,367,553 passengers and 181,561 metric tons of freight over 23,072,029 train-km (14,304,664 train-miles). Their total gross income was 12,313,430 Fr. ($2,376,492) and the total operating expenses were 9,455,353 Fr. ($1,824,874). These results were obtained with 2848 employees, eight steam or electric locomotives, 109 freight cars and 859 passenger coaches, of which 661 were motor cars.

There were in service 42 interurban narrow-gage railways, of which 21 roads with a total length of 416.6 km (258.3 miles) were operated exclusively with electricity, while three others with a total length of 24.7 km (15.3 miles) used a mixed service with steam locomotives. All of the electric and mixed lines were of meter (39.37 in.) gage. The total length of the steam narrow-gage lines was 514 km (318.7 miles). The combined railways carried 11,317,588 passengers and 787,616 metric tons of freight over 5,586,722 train-km (3,463,768 train-miles). Their total gross income was 13,402,307 Fr. ($2,616,645) and the operating expenses were $8,527,102 Fr. ($1,645,731).

The rack and pinion railways numbered 12 and totaled 97 km (60 miles) in length. Only three lines having a combined length of 16.9 km (10.5 miles) were all-electric and three more totaling 26.1 km (16.44 miles) were mixed steam and electric. The 12 roads carried 1,031,006 passengers and 69,989 metric tons over 302,538 train-km (187,573 train-miles). Their total gross income was 3,793,781 Fr. ($732,200) and the operating expenses were 2,026,505 Fr. ($391,115).

The cable railways numbered 36 and had a total length of 31.66 km (19.63 miles), mostly of meter gage. Of these lines, 22 having a total length of 21.32 km (13.22 miles) were operated electrically. They carried 6,060,926 passengers and 163,698 metric tons of freight over 570,716 train km (353,833 train-miles). Their total gross income was 1,879,714 Fr. ($362,785) and the operating expenses were 1,049,889 Fr. ($202,628).

RECENT WORK OF THE GERMAN STREET & INTERURBAN RAILWAY ASSOCIATION

BY A GERMAN ENGINEER

The plan originally followed by the German Street & Interurban Railway Association to secure technical papers for its meetings was to assign the subjects which required investigation to temporary committees. Later on, the association appointed four permanent committees, among which all topics were divided. This method proved unsatisfactory because the number of committees was too small to permit thorough work, but a remedy was found in the appointment of subcommittees. The men selected for the subcommittee work are always those who have had considerable experience in the matters assigned to them, but before a subcommittee report goes before the association it must be examined and approved by the parent committee. This method has proved very satisfactory, because it insures a thoroughgoing report by specialists, and the recommendations can be moderated if necessary by the broader point of view of a second body. The subcommittee system has also created considerable enthusiasm for association work, because it gave a larger number of members a chance to participate actively. Still another good feature of the plan is that the subcommittee reports attract more attention and are apt to be more valuable when signed by individuals than if the work of a committee. It was originally believed that the report of a single person would not be as unbiased as that of several men. This in a sense is true, but when a report has to be signed by several men with different ideas there is danger of its being a colorless compromise which provokes little debate. The committee method had also the great disadvantage in the German association of keeping out men of strong convictions who did not wish to see their personalities lost, or merged with the inferior work of others.

The standing committees of the association now are:

Committee "A," on organization and legal matters.
Committee "B," on construction and operation.
Committee "C," on electrical matters.
Committee "D," on steam interurban railways.
Committee "E," on miscellaneous city railway topics.

The following statements summarize the work accomplished during the last two years of committees "B" and "C," which are those in charge of technical subjects connected with electric railway matters:

WORK OF THE COMMITTEE ON CONSTRUCTION AND OPERATION

An idea of the importance of this committee may be gained from the fact that it discussed 15 topics, as follows: Rail specifications, standardization of rail sections, preparation and modification of the contract with the selling agency of the associated lamp manufacturers, rail corrugation, revision of the present ordinances relative to permissible braking distances, value of snow plows, co-operative buying of rails and other materials, rolling stock serviceable for both track and trackless operation, switches with cleansing and drainage means, manganese rails and ties, tire shrinkage for car wheels, projecting fenders, noiseless paving such as wood and asphalt, sprinklers.

RAIL SPECIFICATIONS AND STANDARDS

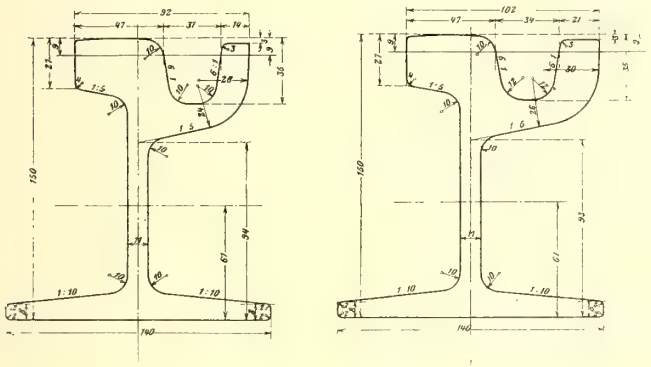
The rail specifications were prepared particularly for railways which are too small to employ engineers competent for that purpose. Up to the time of its adoption such lines were obliged either to buy what the rolling mills offered or to imitate without reason the practice of large railways with heavier traffic conditions. Conditions in Germany in regard to rail standards before this committee commenced its work were even worse than in the United States, for the "Phœnix" mills alone have been obliged to roll 129 different types of grooved rails to satisfy their customers. To terminate this condition the German association undertook a comparison of about 200 rail sections which had been used in Germany under various traffic conditions for the past 10 years, and, as a result, has recom-

mended just four sections of straight track and four companion sections for curves. The lightest section is shown in the accompanying illustration. The others are of the same general form, and the data concerning them appear in the following table. The suffix "a" refers to curved rails.

TABLE OF APPROVED RAIL STANDARDS.

	Sec. 1.	Sec. 1a.	Sec. 2.	Sec. 2a.	Sec. 3.	Sec. 3a.	Sec. 4.	Sec. 4a.
Weight in kg. per m.....	42.8	45.7	49.2	52.4	56.0	59.8	57.8	61.0
Height in mm.....	150	150	160	160	160	160	180	180
Base in mm.....	140	140	150	150	180	180	180	180
Thickness of web in mm..	11	11	12	12	12	12	12	12
Width of groove in mm..	31	34	31	34	31	34	31	34
Depth of groove in mm..	35	35	40	40	40	40	40	40
Width of head in mm....	47	47	51	51	56	56	56	56
Width of lip in mm.....	14	21	15	24	16	26	16	26
Moment of resistance in cm²	208	215	251	259	299	307	342	356

It will be observed that the lightest rail recommended weighs 42.8 kg per m (about 85.6 lb. per yd.), although it has been customary for many roads to use rails weighing only 32 kg per m (64 lb. per yd.). A heavier minimum was adopted because experience had shown that the slight saving in metal was more than balanced by the increased cost of maintenance. Furthermore, the committee rejected rails higher than 180 mm (7.1 in.), although some of the larger systems had been experimenting with rails 200 mm (7.8 in.) high. On this point the committee was of the opinion that the lower rail was ample for ordinary stone paving and that from the standpoint of maintenance the higher rail had not proved so superior when set in concrete foundations as had been expected. In high rail



Typical German Standard Rail Sections for Straight and Curved Track

work with asphalt foundations it had been found that the cost of the extra concrete and the heavier expense involved in removing it at the time of renewals amounted to more than the reduction in the repairs of loose rails.

Many roads in Germany have in the past followed the practice of using for the outside rail on a curve a rail with a shallow groove (8 mm or 0.31 in.) so that the outer wheel runs on its flange instead of its tread. This reduces the wheel slippage as it increases the effective diameter of the outside wheels and has been employed successfully for 10 years by such large systems as that of Hamburg, where not a single derailment has occurred from this cause. The original groove depth in Hamburg was 8 mm (.31 in.), but the standardization committee has recommended that users of this method employ a depth of 10 mm (.39 in.) to be on the safe side. In future the railways will build up their curves either of two similar standard wide-groove rails or of a wide-groove rail for the inner side and a flat-groove rail for the outer side. It may be mentioned here that the committee also recommended four standards for the Haarman or two-part girder rail, which are quite popular in Germany.

MISCELLANEOUS TOPICS

The committee on structures and operation broadened its contract with the associated lamp manufacturers to include the new metallic filament lamps. Under this agreement a rebate of 25 per cent is made to all railways which buy their total annual supply through the common sales agency. Following the method pursued in the purchase of rails, specifications were drawn up for buying copper wire, but the committee complains that the wire syndicate refuses to accept the minimum requirements laid down.

Corrugation, of course, has been a prominent subject with this committee. It has now entered into an agreement with the International Street & Interurban Railway Association and German rolling mill interests whereby all concerned will share the expense of determining whether corrugation is due to the composition or the rolling of the rail. It is agreed that the rail makers will conduct mill and laboratory tests; that the German and the International railway associations will pay the greater part of the market price for the rails tested, and that the expenses of installation will be borne by the companies operating over test tracks. Arrangements have been made to conduct the roadway trials in Berlin, Hamburg, Cologne, Dresden, Düsseldorf, Essen, Munich, Nurnberg, Leipsic and Frankfort.

The proposal to use manganese rails owed its origin to the belief that corrugation was caused by hard wheel-tires running over the softer rail. On conferring with the rail manufacturers, the committee learned that even a trifling percentage of manganese would involve great difficulties in rolling. Hence this subject has been closed for the present.

The subject of snow plows has received little attention as snowstorms in Germany rarely are as severe as in Canada and the northern part of the United States.

During the past eight years several German railways have been interested in the development of a vehicle capable of operating over railway tracks as well as the highway. The Hanover company, for example, desires such a vehicle to bring produce into the city without reloading. No satisfactory method has yet been devised for this purpose, but the committee is trying to persuade car and wagon makers to study the problem, owing to the large field there would be for the sale of a successful type.

The necessity for finding a standard tire shrinkage was brought about through disagreements between the wheel makers and wheel users. The committee found that the most common shrinkage allowance to avoid loose tires was 1 mm (.039 in.) for wheels of 600 mm to 800 mm (23.6 in. to 31.4 in.) diameter, but several companies have gone up to 1.5 mm (.058 in.) without serious results.

The fender question was revived by the Hamburg-Altona Railway, which presented for wider adoption a fender devised on its own lines. The committee investigated this device and concluded that it presented no novelties or unusual efficiency.

The committee was pleased to receive from several municipal railways data confirming the complaints made by privately owned lines against the expense of asphalt paving. It is hoped that this evidence from unprejudiced sources will help the companies in their campaign against asphalt. Wood paving blocks have not yet been used in Germany.

REPORT OF THE COMMITTEE ON ELECTRICAL EQUIPMENT

The committee on electrical equipment confined itself to the discussion of interpole motors, main circuit fuses and oxydized aluminum wire. The study of electrolysis was also continued by this committee in co-operation with the German Electrotechnical Society and the German Gas & Water Association. Measurements have been made in Braunschweig, Cassel, Nurnberg, Benthen, Düsseldorf and Warsaw (Russian Poland). When the experiments are completed, the test commission will prepare a specification covering the installation of return current circuits.

GROWTH OF THE ASSOCIATION

The German Street & Interurban Railway Association was founded in 1896 at Munich with 38 member companies. The membership now numbers 128 out of 172 street railways and 64 out of 137 interurban railways in Germany. During the first eight years the administrative work of the association was in the hands of the Hamburg Street Railway Company after which it was turned over to the Great Berlin Street Railway Company. The latter company is still in charge.

INTERURBAN PROGRESS IN THE CENTRAL STATES

WITH ACCOMPANYING MAP

Electric railway construction in the Central Western States has not been at a standstill in 1909. Some work of importance has been carried out in each State within the territory shown on the accompanying map. The new mileage in several instances was composed of connections of more than passing interest. Groups of electric railways have been united, and to-day, as compared with a year ago, it not only is possible to make longer trips over unbroken electric routes, but it also is easier to travel "the electric way," because of the excellence of the "through limited" cars now operated. Ambitious plans have been announced for new fast through lines and some existing systems have greatly improved their roadbeds with a view to shortening the schedule time over existing routes. This development of through long-distance service becomes more important with each added line in the already vast network of electric railways which covers the Central States.

How farreaching the electric railways are and how thoroughly they have linked the population centers can best be appreciated by a study of the map of interurban roads in the Central States which accompanies this issue. The original drawing from which the engraving for this map was made is owned by The Arnold Company, Chicago, Ill.

This year, as in the past, the new lines and those under construction or recently proposed are shown on the map. The information added has been checked with the track and roadway items as published from week to week in the news department of the Electric Railway Journal. Special care has been taken in revising the map, but on account of the wide scope of the territory there may be some errors of location; and if such are observed this paper will greatly appreciate any advice that may assist in making more complete its records of new construction.

One who studies the trend of interurban growth from year to year will note that in Ohio and Indiana the existing large mileage so well fulfills the needs of the territory that the annual additions to that mileage are mostly extensions and connections, rather than new construction of independent roads. Several projects in Illinois, in addition to the Illinois Traction System, are striking out across country and promise to become extensive lines similar to their forerunners in Ohio and Indiana. In the States between the Mississippi and Missouri Rivers the interurban railway systems are few in number, but the program for 1910 announces the construction of several long lines extending from the larger population centers into new territory.

Referring particularly to the projects in the several States it is found that in Ohio the Cleveland, Southwestern & Columbus Railway, during the last week of February, 1909, inaugurated service on its important Seville-Ashland-Mansfield extension. This line, 42 miles in length, joins the interurban network near Cleveland with the lines radiating from Columbus and offers a new through route from Cleveland to Columbus by way of the Cleveland, Southwestern & Columbus from Cleveland to Mansfield; the Ohio Central Traction Company from Mansfield to Bucyrus, and the Columbus, Delaware & Marion from Bucyrus to Columbus. The roadway construction of the Mansfield-Seville division follows the latest design. One feature of particular interest is the type of substation construction, employing metal lath and concrete for structural materials in buildings 70 ft. long by 16 ft. 8 in. wide.

Service recently has been inaugurated over the lines of the Cleveland, Southwestern & Columbus Railway between Cleveland, Mansfield and Bucyrus. The route is 116 miles long and three limited trains daily now cover the distance in 4 hours and 30 minutes. These trains connect at Bucyrus with those of the Columbus, Marion & Bucyrus Railway operating to Columbus. The railway companies owning this through route are said to be planning a fast limited service for the 170-mile run between Cleveland and Columbus.

The Ohio Electric Railway opened its electric service between Lima and Defiance late in December. This line formerly was operated by steam, but it has recently been reballasted, and with the completion of new concrete culverts, steel bridge spans and the erection of overhead lines, regular interurban service on a three-hour headway was inaugurated. One year ago the Ohio Electric Railway had completed its 72-mile Lima-Toledo division, but had not entered the city of Toledo. An excellent roadbed has been built on private right-of-way to a new terminal station within a few blocks of the hotel district in Toledo, and through passenger and express service is now operated to and from this terminal.

Early in the year the Youngstown & Ohio River Railway Company completed its line from Leetonia to East Liverpool and traffic arrangements were made jointly with the Youngstown & Southern Railway for the operation of through cars from Youngstown to East Liverpool. Some of the longer routes of electric travel in Ohio now available are from Cincinnati through Dayton, Springfield and Lima to Toledo over the Ohio Electric Railway; from Dayton through Lima and Findlay to Toledo over the Western Ohio route, and from Columbus to Cleveland by way of Marion, Bucyrus, Mansfield and either Norwalk or Seville, as earlier mentioned. In addition to these there is an unbroken electric service over the older high-speed lines of the Lake Shore Electric Railway from Toledo to Cleveland, and over the Cleveland, Painsville & Eastern to Ashtabula, thence over the Pennsylvania & Ohio to Conneaut, and over connecting lines in Pennsylvania and New York to Buffalo and the larger cities along the route of the New York Central & Hudson River Railroad. A passenger may also travel from Cleveland to Wheeling, W. Va., or Pittsburgh, Pa., by electric lines.

In Michigan two important connections have been made during the past year. The Saginaw & Flint Railway on Feb. 22 opened service on its line from Saginaw to Flint where connection is made with the through service of the Detroit United Railway to Detroit. The connection of the Detroit United system from Detroit to Flint with the Saginaw & Flint line, and the existing Saginaw & Bay City line, makes possible through electric travel northwest from Detroit 125 miles to Bay City. The Michigan United Railways Company recently completed an important line connecting its Kalamazoo-Battle Creek-Jackson division with its Lansing-St. Johns division. The new line is 37 miles long and was constructed closely in accord with the standards which were followed in building the Jackson-Battle Creek line. Current is distributed to the cars through a 60-lb. third rail supported on vitrified insulator blocks. Limited cars will make the run between Lansing and Jackson in one hour and there connect with the limited trains of the Detroit United Railway, which give service between Jackson and Detroit. The running time between Detroit and Lansing will be 3 hours and 45 minutes for the 113 miles.

Considered broadly, the most important electric project in Michigan is that of the Detroit River tunnel of the Michigan Central Railroad, which is referred to in the summary of heavy electric traction projects on page 37 of this issue of the Electric Railway Journal.

In Indiana the one break in the otherwise continuous chain of electric railways between Wisconsin and Central New York is rapidly being closed. This break is found in the line of the Winona Interurban Railway between the towns of Mentone and Akron, in the north central part of the State. A recent item in the Electric Railway Journal stated that cars were operating over a 10-mile section at the southern end and a 12-mile section at the northern end of the 44-mile section which intervened a year ago. On the remaining 22 miles the grading is largely completed and rails are being laid. It is expected that through cars will be in operation by Feb. 1. This link will make possible through electric travel between Indianapolis and Chicago and will complete the electric route from Wisconsin into the State of New York.

Arrangements have been completed for opening the first section of the Indianapolis, Newcastle & Toledo Railway and the



Map Showing Electric Interurban Railways in Operation, in Construction or Proposed in the Central States

larger part of the construction work between Indianapolis and Newcastle has been finished. This section is about 45 miles long and as originally promoted was intended as part of a through route between Indianapolis and Toledo, running northeast from Newcastle. During the early part of the year the connection between the western end of the Chicago, Lake Shore & South Bend Railway in Indiana and Pullman on the Illinois Central Railroad in Illinois was completed. For some months through fast service has been operated by this road between Chicago and South Bend, the electric cars connecting with the Illinois Central suburban express trains at Pullman. A passenger from Chicago to South Bend taking a suburban express train on the Illinois Central road to Pullman, 14 miles, and there changing to a limited car of the "South Shore Route" running east to South Bend, 76 miles, may make the 90-mile trip in 2 hours and 57 minutes. The running time for the first 14 miles on the Illinois Central Railroad is 36 minutes and for the 76 miles to South Bend on the electric line is 2 hours and 17 minutes.

In Illinois the most important electric railway project which has been under construction during the past year is the St. Louis terminal of the Illinois Traction System. This company is spending $6,500,000 in building an entrance into St. Louis, Mo. The project includes the construction of a bridge over the Mississippi River, which, with its approaches, will be about 2 miles long. On the Illinois side a double-track line connects the eastern approach to the bridge with the main line of the Illinois Traction System. On the Missouri side a double-track route 2.5 miles long, partly through the streets of St. Louis and partly on private right-of-way, connects the western approach to the bridge with the large terminal station property located within one block of the commercial center of the city. This double-track entrance into St. Louis has been completed and awaits the erection of two more spans of the Mississippi River bridge before service can be inaugurated. Other important work carried out by the Illinois Traction System during the past year has included the construction of high-speed belt railways from 3 to 5 miles long around the cities of Edwardsville, Springfield and Decatur. With the completion of these belt lines it will be necessary to haul long freight trains over the city streets, and the through passenger schedules may be shortened.

A year ago the plans for the northern extension of the Illinois Traction System toward Chicago had not been announced. During the past 12 months construction work has been completed on one section of the through line which the Illinois Traction System eventually will operate between St. Louis and Joliet or Chicago. It has been announced that the northern extension of the through line now operating from St. Louis though Springfield and Lincoln to Mackinaw, 157 miles north, will soon be extended through Eureka to Streator, about 35 miles.

A recently completed section from Streator north to Ottawa will connect the new line with the east and west line of the Chicago, Ottawa & Peoria Railway, which is being built to Morris, 20 miles distant from Joliet. The latter line is under the same management as the Illinois Traction System. From Joliet Chicago may be reached over three existing electric routes. Announcement recently has been made that the interests which control the Joliet & Southern Traction Company will build a high-speed electric line from Joliet to connect with the Metropolitan West Side Elevated Railway, which will furnish an entrance into Chicago for the interurban cars of the new line.

The Rock Island Southern Railway has just completed track laying for its 40-mile line between Rock Island and Monmouth, Ill. This new road does not parallel any steam railway for more than a short distance and will give transportation facilities to rich coal fields not yet fully developed. The road has been designed for handling heavy traffic and it is expected that electric passenger car operation will be begun early in 1910, while freight trains will be handled for a limited time by steam locomotives.

A new third-rail line has been built from Wheaton 11 miles directly west to Geneva, Ill. This road connects at the eastern end with the Elgin-Chicago division of the Aurora, Elgin & Chicago Railway, and at Geneva with the Fox River division of the same road. The construction standards of the Aurora, Elgin & Chicago third-rail line were followed and that company is operating the train service.

The Aurora, Rockford & DeKalb Electric Traction Company until recently has operated its 30-mile line between Aurora and DeKalb with gasoline motor cars. Trolley wire is now being strung along the route and two substations are under construction. These substations will receive power from the Batavia generating station of the Aurora, Elgin & Chicago Railway and electric service will shortly be inaugurated between Aurora and DeKalb.

RECEIVERSHIPS AND FORECLOSURE SALES

During 1909 a total of 22 electric railway properties went into the hands of receivers. They involved 558 miles of track and a total outstanding capitalization of $52,287,200, of which $22,325,000 was in bonds and $29,962,200 in capital stock. The Illinois Tunnel Company was omitted from the list for the reason that this subway road, although operated electrically, carries no passengers. A list of the receiverships follows:

RECEIVERSHIPS.

Company.	Miles of track.	Outstanding bonds.	Outstanding stock.
Albany & Hudson R. R.	47	$1,850,000	$1,750,000
Angelo Power & Traction Co.	2	.....	.....
Beaumont Traction Co.	12	500,000	600,000
Buffalo, Lockport & Rochester Ry.	60	3,685,000	4,000,000
Burlington County Ry.	15	475,000	484,000
Chicago & North Shore Street Ry.	..	675,000	650,000
Columbus, Delaware & Marion Ry.	58	915,000	3,000,000
Columbus, Marion & Bucyrus R. R.	20	500,000	500,000
Consolidated Railway & Power Co.	4	.....	60,000
Holmesburg, Tacony & Frankf'd Elec. Ry.	17	400,000	750,000
Indianapolis, Crawfordsville & Western Traction Co.	45	1,500,000	1,500,000
Manistee Light & Traction Co.	10	600,000	1,000,000
Meadville & Conneaut Lake Traction Co.	29	1,100,000	1,000,000
Montgomery County Rapd Transit Co.	8	400,000	300,000
North Shore Street Ry.	..	.....	.....
Norwich & Westerly Ry.	24	750,000	668,200
Ocean Shore Ry.	53	2,800,000	5,000,000
Philadelphia, Bristol & Trenton St. Ry.	21	650,000	1,000,000
St. François County Ry.	14	125,000	300,000
Southern Colorado Power & Ry.	21	1,000,000	1,000,000
Southwestern Street Ry.	16	400,000	400,000
Washington, Baltimore & Annapolis Electric Ry.	82	4,000,000	6,000,000
Totals	558	$22,325,000	$29,962,200

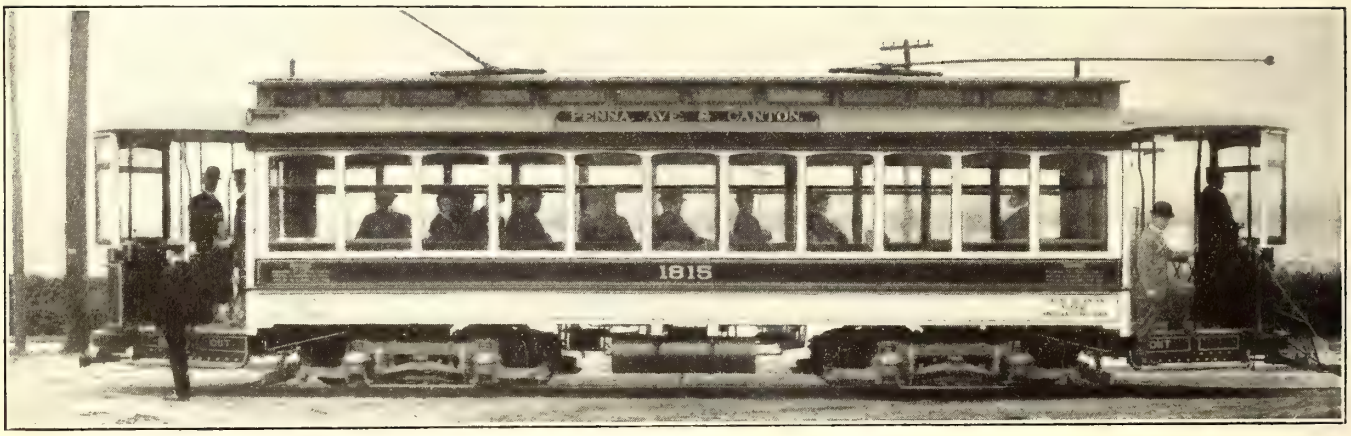
The foreclosure sales during 1909 involved 21 properties operating 488 miles of track. The outstanding securities on these properties aggregated $43,439,700, of which $21,174,000 represented bonded debt and $22,265,700 capital stock. The Norfolk & Southern Railway was not included in the returns, as it is primarily a steam property, although operating 48 miles of track by electricity. Some properties which have been in financial difficulties were reorganized without foreclosure proceedings. The foreclosure sales were as follows:

FORECLOSURE SALES.

Company.	Miles of track.	Outstanding bonds.	Outstanding stock.
Albany & Hudson R. R.	47	$1,850,000	$1,750,000
Anderson Traction Co.	18	.....	163,000
Angelo Power & Traction Co.	2	.....	.....
Auburn & Turner R. R.	13	125,000	100,000
Conneaut & Erie Traction Co.	30	1,087,500	800,000
Danbury & Harlem Traction Co.	16	319,500	320,000
Dayton & Xenia Traction Co.	51	800,000	800,000
Denton Interurban Railway & Power Plant Co.	3	.....	.....
Erie, Cambridge, Union & Corry Ry.	42	1,000,000	1,000,000
Gainesville Electric Ry.	8	250,000	300,000
Gettysburg Transit Co.	9	100,000	100,000
Las Vegas Railway & Power Co.	5	300,000	200,000
Meadville & Cambridge Springs St. Ry.	16	300,000	300,000
Miami Electric Co.	3	90,000	25,000
Mineral Wells Electric System	6	.....	.....
Missouri Water, Light & Traction Co.	5	.....	100,000
Philadelphia, Bristol & Trenton St. Ry.	21	650,000	1,000,000
Port Jervis Electric Light, Power, Gas & R. R. Co.	4	95,000	150,000
Tarrytown, White Plains & Mamaroneck Ry.	24	300,000	300,000
Toledo Urban & Interurban Ry.	71	810,000	761,700
Virginia Passenger & Power Co.	94	13,007,000	14,096,000
Totals	488	$21,174,000	$22,265,700

PAY-AS-YOU-ENTER CARS FOR BALTIMORE

Beginning with the first day of the new year, the United Railways & Electric Company, Baltimore, Md., is instituting a pay-as-you-enter service, with its Pennsylvania Avenue line as the pioneer. The company has provided for this purpose 32 Brill semi-convertible cars with 30-ft. 8-in. bodies, which have been altered under license of the Pay-As-You-Enter Car Corporation by A. T. Clark, superintendent of shops. Previous to the actual operation of the cars the Baltimore company has been conducting a vigorous advertising campaign under the direction of W. A. House, president, and T. A. Cross, general manager. The Baltimore newspapers have also lent their news columns for the same object. In one interview Mr. House is quoted as strongly indorsing the prepayment cars because of the greater comfort and safety which they will afford to the riding public. The Baltimore cars embody several special features, as will appear from the following description of the alterations and from the accompanying cuts.



Baltimore Pay-As-You-Enter Cars—Side View

Briefly, the alterations consist of lengthening the platforms from 5 ft. to 5 ft. 9½ in. and arranging the end walls of the cars with a pair of narrow sliding doors and a single swinging door. The cars lent themselves extremely well to these alterations, as none of the vital parts of the construction was weakened. On the contrary, the results would justify one in saying that the cars were materially strengthened. When the cars were brought to the shops they were stripped of controllers, circuit breakers and other electrical parts; also of the side panels, hoods, vestibules, dashers, brake shafts, platforms, outside platform knees and supporting angle iron for knees, double sliding doors, together with the inside end wall finish and longitudinal seats on the motorman's left-hand side. The first alteration consisted in replacing the outside platform knees with longer ones, the angle-iron supports formerly used being put back. The center platform knees were spliced out 9½ in. The former crown-pieces were put back and the flooring was laid and stripped. The dasher, dasher post and dasher rails were all used again, but the steps were lengthened to suit the altered platforms. The original malleable iron step hangers were retained, and a new wooden tread, with Universal safety treads, was substituted. The hoods were used again by splicing in a neat and substantial manner 7½ in. to each end of the hood bow, and the hood boards lengthened accordingly. When completed it is almost impossible to tell where the hood has been altered, and, in fact, its appearance is identical with that of the original hood in all except length. The brake shafts were moved 1 in. closer to the dasher.



Baltimore Pay-As-You-Enter Cars—Rear Platform



Baltimore Pay-As-You-Enter Cars—Door Arrangement in End Bulkheads

The platform was divided into two parts by vertical and horizontal railings, the horizontal railings being arranged as a

barrier to keep the entering and leaving passengers from coming into conflict and to make a suitable location for the conductor and the fare box. The box can be removed from the rail by unlocking the padlock and carrying to the other end of the car. On the motorman's platform the horizontal railing is raised out of the way by sliding it upward close to the hood. The company's standard lazy tongue gates are installed on both platforms as illustrated. It will be observed that passengers alighting from the motorman's platform leave on the near side of the vertical step rail, the other half of the platform being kept closed by a gate. This feature tends to prevent the motorman from being jostled by departing passengers.

The alterations to the end wall of the cars were entirely upon the motorman's left-hand side of the car. The headpiece and end sill were mortised to receive the posts forming the narrow center bulkhead between the double sliding doors and the swinging door. The narrow end lining was attached to this bulkhead, and both were braced by using a 1½-in. x 2¼-in. x 5/16-in. angle iron, which also forms a pocket for the sliding door. The narrow bulkhead has a narrow sash with double thick glass, and the inside lining also has the same kind of sash, arranged to swing. The swinging door,



Baltimore Pay-As-You-Enter Cars—Front Platform

which is arranged to swing inward from the corner post, to prevent passengers from falling into the street, was made by using the former sliding doors, but placing wider stiles upon them. For the double sliding doors new, narrow doors are made. As the swinging door was located in the corner of the car, the longitudinal seat on this side was cut on a line with the first side post, and that section of the car between the corner post and the first side post was furnished with a seat arranged to drop when this end of the car is at the rear. This change required special treatment of the cable, cable box and sand box. The last item is beneath the car, and is filled from an opening in the car floor. The location of the swinging door in the corner necessitated the removal of the semi-convertible feature between the corner post and the first side posts on this side. The whole appearance of the interior was made to conform to its original lines, so that the cars as completed present a finished appearance and do not show to the average eye where the alterations have been made. The cables and circuit-breaker heads were spliced out to suit the longer platforms, but otherwise there was no change to any of the car wiring.

The cars were carefully overhauled and painted, and the brass trimmings and other fittings were polished and lacquered. The painting, striping and lettering were made to accord with the railway company's standards.

The wording "Pay as you enter" and "Please have exact fare ready" occurs on the outside panels, upon each side of the car in the lower corner. The glass in the upper vestibule sash on the motorman's right-hand side has the wording "Pay as you enter" in black letters on ground glass. The cars were equipped with special Brill fare-boxes. The registration device is not contained in the fare-box, but is cared for by International registers. One register rod passes through the car from end to end, with an outside connection to enable the conductor to operate from the rear platform the register in the front of the car. As the cars are equipped for double-end operation, this arrangement is duplicated at the other end of the car.

The cars are mounted upon Brill 27 GE-1 trucks, have four Westinghouse No. 101-B motors, and are equipped with Westinghouse Traction Brake Company's S. M. E. brake equipments. Each car has 14 transverse rattan seats of Hale & Kilborn manufacture, besides the corner seats. The cars are also equipped with Hunter illuminated signs. The total weight of a car with its equipment is 54,500 lb.

RESULTS ON ENGLISH ELECTRIFIED STEAM ROADS

At a meeting of the Institution of Civic Engineers held in London, Nov. 9, papers were presented on three of the electrically equipped steam roads in England. The titles of these papers were: "The Single-Phase Electrification of the Haysham, Morecambe and Lancaster Branch of the Midland Railway," by J. Dalziel and J. Sayers; "The Equipment and Working Results of the Mersey Railway Under Steam and Under Electric Traction," by J. Shaw, M. Inst. C. E., and "The Effect of Electrical Operation on the Permanent-Way Maintenance of Railways, as Illustrated on the Tynemouth Branches of the North-Eastern Railway," by C. A. Harrison, D. Sc., M. Inst. C. E.

An article on the road described in the first paper was published in the ELECTRIC RAILWAY JOURNAL for July 4, 1908. The authors of the paper state that the choice of this particular section of the line for a more or less experimental electrification was partly due to the fact that it could be worked from an existing power-station at Haysham. Though the traffic is light it is long-hour throughout the year, and, consequently, is expensive to work by steam, so that there was scope for saving in working expenses; the summer traffic is heavy and liable to congestion, two of the stations being terminals, and there is a considerable local traffic between Morecombe and the third station, Lancaster, which tends to congest the main-line trains. The operation with electric cars is very similar to that with locomotives. The motor cars haul daily trains having a total weight of 190 tons, which is 125 per cent over the load originally specified to the contractors. The paper reviews the points in which single-phase apparatus is sometimes alleged to be unsuitable, namely, high-speed schedule, frequent stops, suburban and interurban traffic with high acceleration, etc., and then states that the apparatus is equally as capable for such service as direct-current apparatus, that the weight of the single-phase train is only a very small percentage greater than that of corresponding direct-current trains, and that the energy consumption is appreciably less. The paper concludes by giving details of the results in service of the equipments, an indication of the probable cost per train-mile of such service, detailed notes of the mileages accomplished and lost by defects, a note as to the development, cause, results and steps taken to remedy and obviate such defects, and detailed figures as to the amount of cleaning, repair and attention required; also, where possible, the mileage life of the various wearing parts, including bows, commutators, brushes, bearings, contactor contacts, wheel-tires, etc.

The Mersey Railway runs under the Mersey River and joins Liverpool with Birkenhead. It was described in the STREET RAILWAY JOURNAL for April 4, 1903. The electric service was inaugurated in May, 1903. The traffic conditions call for train service of 19½ hours per day, with a peak-load for a few hours in the morning to Liverpool, and another peak-load for a few

hours in the evening in the reverse direction. During steam working the peak was met by increasing the number of trains in service, and, under electric working, the peaks are met by increasing the number of cars per train, keeping the interval between the trains constant throughout the day. The road is operated by direct current with four-car or five-car trains with a motor car at each end during heavy traffic and with trains of one motor car and one trailer in light traffic. The electro-pneumatic system of control is used. Electricity is also employed for elevators, pumping and ventilation. The authors give some interesting statistics in regard to cost of operation. With electric traction 1 lb. of fuel, costing 8s. 9d. ($2.10) per ton, moves 1 ton of load 2.29 miles at an average speed of 22¼ m.p.h.; whereas, with steam, the same weight of fuel, costing 16s. ($3.84) per ton, moved the same load 2.21 miles at an average speed of 17¾ m.p.h. As regards the life of rails under the two systems, the average rolling load over the track before the rails require renewal has been increased from 32,000,000 tons to 47,500,000 tons. The average speed, including stops, has been increased from 15.6 to 19.9 m.p.h., and the number of ton-miles per annum from 43,000,000 to 67,000,000, while the total expenses per ton-mile, after allowing for the interest on the additional capital for electrical equipment, have been reduced from 0.344d. (0.688 cent) to 0.292d. (0.586 cent). In the half year ending June 30, 1908, the number of passengers carried was more than twice as many as in the last half-year of steam working (ending Dec. 31, 1902) and more than 2½ times as many season tickets were issued; the seat-miles run per passenger showed a decrease of 30 per cent, and the passenger receipts per seat-mile an increase of 26.5 per cent, while the ratio of expenses to receipts decreased from 95.3 per cent to 69.8 per cent. The following financial statistics were also given:

	Electric.		Steam.	
	Pence.	Cents.	Pence.	Cents.
Locomotives and carriage departments per ton-mile	0.089	0.178	0.117	0.234
Maintenance of track	0.0089	0.0198	0.0208	0.0416
Costs of hydraulic lifts per lift-mile	30.1	60.2	85.2	170.4
Total cost operation and maintenance	0.152	0.134	0.238	0.476
Total cost of operation including general expenses, but exclusive of interest on additional capital for electrification	0.24	0.48	0.344	0.688

The third paper relates to the equipment of certain branches of the Northeastern line which were put in service July 1, 1904. The total length of electrified line, including sidings, is 75 miles, and the average distance between the station stops is 1¼ miles. A third rail, at 600 volts, and a fourth rail for the return are used. The paper says that the wear on track, although greater under electric traction on frogs and crossings, is only slightly increased on tangents. The capacity of the passenger station at Newcastle has been greatly increased as the time for dispatching and reloading the train has been reduced to 2 minutes. With steam trains four platforms and eight signal operations were required, but with the electric trains only two platforms and four signal operations are needed. The running time has also been reduced. The paper gives an estimate of the annual cost of renewals, with a table, and concludes by stating that it would have been impossible to carry by the old steam service the number of passengers that are now being conveyed on the Tynemouth lines with the electric service.

At the September, 1909, convention of the German Street & Interurban Railway Association, Arthur Busse, chief engineer of way and structures, Grosse Berliner Strassenbahn, presented some figures on the costs of the proposed corrugation study. He estimated the total cost at $6,250, of which $1,250 to $1,500 will cover special steels; a like amount will cover extra expenses at the foundries, and the balance will be required for the chemical and physical analyses to be made by Dr. Puppe, who has been selected by the railway and rolling mill interests. The railway using the test rails will buy them at the regular prices. The test expenses will be borne as follows: $1,250 from the German Street & Interurban Railway Association; $1,500 from the foundries and rolling mill interests; $4,250 from several electric railways. The International Street & Interurban Railway Association will be asked to contribute $1,250.

HEARINGS ON OPERATION OF SIDE-DOOR CARS IN SUBWAY AND ON LIGHTING

Two hearings were held before John E. Eustis, of the Public Service Commission of the First District of New York, on Dec. 24, 1909, to consider the subjects of the operation of side-door cars in the subway and the lighting of the stations and track. Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, and Theodore L. Waugh, of counsel, represented the Interborough Rapid Transit Company. E. G. Connette, chief of the transportation bureau of the commission, and several engineers of the commission were called as witnesses for the commission. G. H. Backus represented the commission as counsel at the hearing on the operation of the side-door cars, and H. H. Whitman represented the commission as counsel at the hearing on lighting.

The hearing on the side-door trains and cars was held first. Mr. Connette, who was called as the first witness, said that 15 trains, each composed of eight side-door cars, were being operated by the company, and that 27 side-door trail cars were used to complete the equipment of the other express trains. The side doors of the trail cars of the mixed trains were not operated, however. Approximately half of the side-door trains were withdrawn from service during the middle of the day so as to start them on their runs together to handle the evening rush. Mr. Connette thought it unnecessary to withdraw the trains from service for more than an hour or two, and was of the opinion that the side-door trains should be alternated with others. He had found the average saving in time of stops at stations to be 12 seconds with the side-door trains.

Mr. Hedley said that fewer trains could be run past a given point during the half-hour rush when the side-door trains had been alternated with the others. The company was opposed to operating the side doors in the trains composed of side-door trail cars and end-door motor cars because it would increase the accident hazard. The expense of installing on the mixed trains the automatic signal system in use on the trains with all side doors would not be justified. The company had expected long before now to have the full complement of side-door cars in operation, but it had been unable to secure the equipment from the builders. Beginning about Feb. 1, 1910, the company expected to receive side-door motor cars at the rate of two a day, and by April 15 all the nondescript trail cars would be absorbed. The company should not be required to operate the side doors on the elevated portion of the line in the outlying sections where traffic is light. The hearing was then closed.

At the hearing on the lighting of the stations and track an expert witness was introduced who testified to the illumination of the Brooklyn Bridge station. Two members of the engineering staff of the commission testified that the roadway was lighted sufficiently well to make it possible to walk the track without danger, but that inspections could not well be made with the present lights.

Mr. Hedley suggested that a commission of three disinterested laymen be secured to consider the station lighting from the standpoint of the public and make recommendations in regard to specific stations which they deemed to be insufficiently lighted. Lamps of 10 cp each are spaced about 30 ft. apart along the track, and are so shaded with reflectors as to prevent the light from affecting the vision of the trainmen. The subject of lighting the roadway had been very carefully considered by Mr. Hedley and W. Barclay Parsons, engineer to the Rapid Transit Commission, and the present system was adopted as best fitted to the requirements. Any increase in the lighting would make it more difficult for motormen to distinguish signals and tail lights, and would thus decrease the efficiency of these safeguards. A bank or banks of lamps could be easily installed for making repairs and for inspections.

Mr. Connette agreed with Mr. Hedley about the lighting of the roadway, and said that nothing should be done that would in any way tend to decrease the efficiency of the signals and tail lights.

THE BRILL PRIZES FOR SENIOR THESES

The J. G. Brill Company has announced that it will repeat this year the offer of prizes for essays on car design. These prizes are offered to the senior students of the colleges, universities and technical schools of the United States, who will be graduated in 1910, and the subject selected this year is "The Design of an Electric Railway Car for City Service." The following is taken from the announcement of the company:

"The authors of the three theses which in the estimation of a jury shall be considered most meritorious of those submitted shall receive respectively in order of merit for their work: (1) The sum of $250 and the John A. Brill gold medal; (2) the sum of $150; (3) the sum of $100.

"Each thesis will be judged: (1) On its technical merit; (2) on the manner in which the subject is presented.

"A jury of three, consisting of a member of the American Street & Interurban Railway Association, the editor of the ELECTRIC RAILWAY JOURNAL and the vice-president of The J. G. Brill Company, will decide the relative merits of the theses.

"Three copies of each thesis must be submitted in order to be considered. Each copy shall be typewritten or printed on standard size, 8½ in. x 11-in. sheets. All accompanying tracings, black and white prints or blue prints shall be of corresponding size or of such shape as to be conveniently folded to that size.

"A thesis to be eligible for any one of the prizes need not be prepared especially for this contest. It may be the same thesis which is submitted in connection with senior graduating work; but it shall be the work of a duly accredited student of a college, university or technical school and shall conform to the requirements of the competition.

"All theses to be considered must reach the office of The J. G. Brill Company on or before July 15, 1910; shall be sent by registered mail flat (unrolled and not folded) and packed in such a manner as to insure their delivery in good condition. They shall be addressed to the Technical Department, The J. G. Brill Company, Philadelphia, Pa.

"No thesis shall bear on the text pages or other parts submitted to the jury any mark which might inform any member of the jury as to the name and address of the contestant. But each thesis shall be accompanied by a sealed envelope containing the name and address of the contestant and a certificate or statement from the authorities of the college, university or school at which he is a student to indicate that he is properly qualified as a regular student to enter the contest. The envelopes will be numbered consecutively in the order of the receipt of the theses, a corresponding number being attached to each thesis and the envelopes preserved for reference until after the jury has made its decision.

"The announcement of awards will be made at the time of the annual convention of the American Street & Interurban Railway Association in October. A copy of the announcement will be sent to the author of each thesis submitted.

"A copy of each thesis, after the completion of inspection by the jury and the announcement of awards, shall become the property of The J. G. Brill Company, and a copy shall also become the property of the American Street & Interurban Railway Association.

"Additional copies of this circular or any further information which may be necessary regarding the conditions of the contest or manner of awards may be had from Technical Department, The J. G. Brill Company, Philadelphia, Pa.

"Philadelphia, Pa., Dec. 15, 1909.

"The Brill thesis contest was inaugurated in 1908 and the award of prizes was made in 1909 to the following: First prize, Charles T. Ripley, University of Illinois; second prize, Victor D. Dressner, Brooklyn Polytechnic Institute; third prize, Robert T. Pollock, Worcester Polytechnic Institute. Mr. Ripley also won the John A. Brill medal given with the first prize.

"The contest is designed to interest the best class of students of the colleges of the United States in the attractive field for personal endeavor, scientific research and substantial reward which electric railway work offers.

"In addition to the intrinsic value of the prizes and the introduction which the winners of the prizes secure through the publication of their names in the technical journals of the country, the names of the winners are announced before the annual convention of the American Street & Interurban Railway Association and a copy of each of the winning theses becoms the property of the association, and is kept on file by the secretary.

"Contestants are at liberty to consult with their professors, electric railway officials and others, regarding the various phases of car construction and the factors which affect car design, and are invited to visit any of the Brill plants to study manufacturing methods. The actual preparation of the thesis, it is expected, will be the work of the contestant, and as far as possible the thesis should represent the ideas of the contestant."

PROGRAM OF 1910 CONVENTION OF INTERNATIONAL STREET & INTERURBAN RAILWAY ASSOCIATION

The program for the 1910 convention of the International Street & Interurban Railway Association has just been made public. This meeting will be held in Brussels on Sept. 7 to 10, inclusive, and this date will coincide with the twenty-fifth anniversary of the establishment of the association. A list of the topics to be considered and the committees which have been asked to report on them follow:

(1) Legislation on interurban and local railways in the principal countries of Europe. Committee—C. de Burlet, general manager of the Société Nationale des Chemins de fer Vicinaux.

(2) The proper system of city extension to obtain the best tramway transportation facilities. Committee—Mr. Wattmann, manager of the municipal tramways of Cologne and an associate member from France to be appointed later.

(3) Gas, oil and other internal combustion engines. Committee—Charles Thonet, general manager of the Société d'Enterprise Générale de Travaux, Liége.

(4) Construction and maintenance of overhead lines. Committee—Mr. Otto, chief engineer of the Grosse Berliner Strassenbahn.

(5) Recent improvements in rolling stock. Committee chairmen—Messrs. Spängler, manager of the Vienna Municipal Tramways on car bodies; Delmez, chief engineer of the Antwerp Tramways, on car construction and platforms; Julius, manager of the Haarlem Electric Tramways, on equipment. The other members of the committee are Messrs. Boulle, manager of the Compagnie Générale Française de Tramways, Paris; d'Hoop, manager of the engineering department of the Brussels Tramway Company; Giersch, chief engineer of the Hamburg Tramways Company, Hamburg; Lineff, consulting engineer to the Moscow Corporation Tramways; Passelecq and Peiser, chief engineers of the Grosse Berliner Strassenbahn, Berlin; Résal, general manager of the Compagnie Française des Tramways Electriques et Omnibus of Bordeaux; Rochat, general manager of the Geneva Electric Tramways; Schmidt-Eckert, manager of the Vienna Municipal Tramways; Stahl, manager of the Municipal Tramways of Düsseldorf; t'Serstevens, secretary of the International Street & Interurban Railway Association.

(6) Wattmeters and other current recorders for use on cars. Committee—Messrs. Bouton, general manager of the Compagnie des Tramways de l'Est Parisien, and Battés, manager of the Frankfort-a-Main Municipal Tramways.

(7) Construction and maintenance of city track construction. Committee—Charles Rochat, general manager of the Geneva Electric Tramways, and A. Busse, chief engineer of the Grosse Berliner Strassenbahn.

(8) Rail corrugation. Chairman—A. Busse, chief engineer of the Grosse Berliner Strassenbahn. The other members of the committee are Messrs. Boulvin, general manager of the Compagnie Générale de Railways et d'Electricité, Brussels; Professor Carus-Wilson, consulting engineer, London; Culin, chief engineer of the Hamburg Tramways; d'Hoop, manager

of the engineering department of "Les Tramways Bruxellois," Brussels; Dubs, manager of the Marseilles Tramways; Fischer, manager of Phönix Rolling Mills, Ruhrort; Mariage, chief engineer of the Compagnie Générale des Omnibus, Paris; Noirfalise, general manager of the Liége Tramways; Petersen, manager of the Dortmund Municipal Tramways, and t'Serstevens, secretary of the International Street & Interurban Railway Association.

(9) Ties. Committee—E. A. Ziffer, president of the Bukowina Railway, Vienna.

(10) Standard classification of accounts. Mr. Géron, manager of the Compagnie Générale des Chemins de fer secondaries, Brussels.

LOW-TENSION FEEDER CALCULATIONS FOR STREET RAILWAYS

At a joint meeting of the electrical section of the Western Society of Engineers and the Chicago section of the American Institute of Electrical Engineers held on Dec. 22, R. H. Rice, assistant engineer, division of electrical transmission and distribution of the Board of Supervising Engineers, Chicago Traction read a paper on "Low-Tension Feeder Systems for Street Railways." The paper was followed by interesting discussion, during which H. M. Wheeler, assistant chief engineer, Chicago Railways Company, presented curves and methods useful in studying the interrelation of headway, speed and time and distance spacing of cars.

Mr. Rice first called attention to the extent of the surface transportation facilities in Chicago. The Chicago surface railway companies operate 687 miles of track, the cars on which are fed with current from 15 distributing centers with a total rated capacity of 95,000 kw. Only two of these distributing centers are steam power plants. The calculation of the feeders for supplying current to the large railway systems was based on the operation of 2264 cars. The substations are fed with 9000-volt a.c. purchased from a central generating station, and at the present time direct current is distributed to the cars at a pressure a little below 600 volts. When the rolling stock has been rehabilitated and the old motors replaced by those of later design 600 volts will be carried on the distributing network. The trolley wires are all sectionalized and each section is fed through one or more independent cables from a generating or substation. Trunk tie lines between the substations are not used, but certain sections of the trolley wires are fed from two stations and the total capacity of these double-fed sections is sufficient to answer the needs for tying together two stations. In case of a breakdown one station can thus distribute current through the trolley sections jointly fed, and this current in turn be distributed from the busbars of the station which is inoperative.

Mr. Rice described very completely the methods followed in calculating the design of the overhead construction and dealt in particular with the system used in determining the proper location for substations and the size of feeders. The length of trolley sections is determined by operating conditions. The step in the work of designing the distribution system was to obtain a unit figure for the power consumption of a standard type car. Fifteen tests extending over three days' time were made for this purpose. The cars were equipped with meters and careful logs were kept. Typical trolley sections were chosen and arrangements were made to keep a careful count of the number of cars on the section and to measure the power fed to the section from the substation. As the maximum peak of the day in Chicago occurs in the afternoon the investigations described above were carried on from 12 m. to 8 p. m. Preliminary to the work of laying out the feeder system a careful study was made of the safe carrying capacity of paper, rubber-covered and weatherproof insulated cables.

To determine on what basis to design the feeders curves were plotted showing the railway load throughout the day. It was interesting to note that for one substation on the Chicago Railways Company the maximum swing is 15,600 kw. A two-hour average value was chosen as a basis for the maximum load to be fed out of a substation. Considering that a potential of 600 volts is carried on the d.c. busbars, a capacity of 40 kw per car was used to determine the required substation capacity. An average drop of 50 volts was allowable in the d.c. distribution system. Mr. Rice presented in this connection the values in current carrying capacity as allowed for the standard sizes of feeder cables protected with paper, rubber and weatherproof insulation.

In the work preliminary to laying out the distribution system a map of the railway is first drawn and the location of the cars during the afternoon rush hour is shown. With a demand of 75 amp from each car the concentrated load on each trolley section was next indicated on another map of the district to be served. With the concentrated loads thus exhibited the center of load was obtained in a way similar to the solution of a problem in moments. The number of amperes on each section and its relation to the center of load for the district determine the location of the substation and the capacity of the generating apparatus in that station. After the substation locations have been so chosen then a feeder-route diagram is made showing the location of the trolley feeders on the streets, their size and loads.

The city ordinances under which both the Chicago Railways Company and the Chicago City Railway Company are being rehabilitated specify a certain territory within which all feeders shall be carried underground. Mr. Rice exhibited drawings showing the typical feeder connections and stated that the underground work was built with a view to future increase in load. He showed labor-saving methods and curves used in calculating the drop and in locating load centers on trolley and feeder sections.

In discussing the paper of the evening, E. N. Lake, division engineer of electrical transmission and distribution, Board of Supervising Engineers, Chicago Traction, called attention to the lack of literature on the subject of feeder calculations for large street railway systems. It was interesting to note that based on the 1,000,000 circ. mil cable, which was taken as standard, an assumed load of 800 amp and an allowable drop of 50 volts, 6000 ft. was found to be the limiting economical distance for feeding. In other words, under these conditions the ideal street railway system would have its substations so located that the average length of cable would not exceed 6000 ft. Two of the largest street railway systems in Chicago now have an average length of d.c. feeder of 6700 ft.

REVISION OF INDIANA CODE OF INTERURBAN RULES

The Railroad Commission of Indiana has appointed a committee of interurban managers, consisting of C. D. Emmons, general manager, Ft. Wayne & Wabash Valley Traction Company; F. M. Durbin, general manager, Evansville & Southern Indiana Traction Company; Guy K. Jeffries, superintendent, Indianapolis & Eastern Traction Company, and H. A. Nicholl, general manager, Indiana Union Traction Company, to recommend any changes or improvements deemed necessary in the code of interurban rules approved last year by the commission for use within the State of Indiana. This committee now has the matter under consideration and will present a report to the commission very soon.

NO CONSOLIDATION OF PAPERS

Last week two or three of the daily newspapers in New York published an account of an alleged consolidation of a number of publishers of technical periodicals, among them The McGraw Publishing Company. The statement was completely without foundation. The McGraw Publishing Company has no present plans or intention of consolidating its business with any other single publisher or with a number of other publishers.

CONSOLIDATION OF CHICAGO SOUTH SIDE SURFACE RAILWAYS

An official statement announces that an agreement has been entered into whereby about 95 per cent of the shares of the Chicago City Railway Company, all of the shares of the Calumet & South Chicago Railway Company, all of the shares of the Southern Street Railway Company, and all of the shares of the Hammond, Whiting & East Chicago Railway Company have been taken over by Chicago interests. This marks the passing of the Chicago City Railway Company out of the hands of the Morgan interests. These shares, together with certain bonds heretofore placed upon the properties, will be deposited with trustees, who will issue securities based upon the stock and bonds deposited.

The doings and policies of the trustees will, by the terms of the trust agreement, be governed by a board of directors, the personnel of which is as follows: James B. Forgan, president First National Bank; John J. Mitchell, president Illinois Trust & Savings Bank; Samuel Insull, president Commonwealth Edison Company; John A. Spoor, president Union Stock Yards & Transit Company; Edward Morris, president Morris & Company, packers; Thomas E. Mitten, president Chicago City Railway Company; Emil K. Boisot, vice-president First Trust & Savings Bank; Ira M. Cobe, president Assets Realization Company. An additional director probably will be chosen later.

The separate corporate existence of the several properties will continue. T. E. Mitten will remain as president of the Chicago City Railway Company and will probably at an early date occupy the same position in the organization of all the roads.

By vesting the ownership of the shares heretofore mentioned in trustees under the proposed agreement, complete unity of management and operation of all the surface lines in the South Division of the city is accomplished. Whenever a feasible plan shall be worked out for a consolidation of all the surface lines operated in Chicago, then as to the South Division it can be dealt with from a practical standpoint, as there is one ownership instead of several, thus greatly lessening the difficulty of harmonizing a number of interests.

While no definite arrangements as yet have been entered into with other transportation companies, yet the joinder in interest of the South Division lines may fairly be considered as an important step in the direction of ultimate complete consolidation. The name of the new company will be "The Chicago City & Connecting Railways."

The proportionate amount of stocks and bonds included in this consolidation is as follows:

	Stock.	Bonds.	Total.
Chicago City Railway (quoted at 191)	$18,000,000	$20,000,000	$38,000,000
Southern Street Railway	800,000	775,000	1,575,000
Calumet & South Chicago St. Railway	5,000,000	5,650,000	10,650,000
Hammond, Whiting & East Chicago Electric Railway	510,000	.....	510,000
Grand total	$24,310,000	$26,425,000	$50,735,000

The following figures present the mileages (single track) of the four surface railway systems and the estimated number of passengers carried in the past year:

	Miles track.	Passengers carried.
Chicago City Railway	252.29	292,220,866
Southern Street Railway Company	18.28	4,004,760
Calumet & South Chicago Railway Company	114.00	19,513,000
Hammond, Whiting & East Chicago Electric Railway	25.94	2,500,000
Totals	410.51	318,238,626

It is stated that all of the shares indicated in the tabulation above, as well as the bonds of the companies concerned, will be deposited with trustees, who will thereupon issue the stocks of the Chicago City & Connecting Railways. The trustees have not as yet been chosen. It was expected at the time of the announcement to have the actual control of the properties involved pass preferably by Jan. 1.

In Chicago this consolidation is looked upon as a step toward the long-discussed unification of all surface and elevated railways and electric lighting properties. A Chicago morning paper sums up the probabilities of unification as follows:

"It is not doubted that the friendly influence which Mr Morgan has in the Chicago Railways Company will be operated harmoniously with any plan which may be evolved to put the Chicago Railways lines into the general combination. In the Railways company Henry A. Blair is one of the most important factors. The control of the Chicago Railways Company's certificates, or, rather, the capital stock against which the certificates are issued, is vested in a board of trustees. It will therefore be easy for these trustees to co-operate in the formation of a large general company. This is a matter, however, which it is thought will require careful handling.

"An important issue in the general scheme is the settlement of differences between the Chicago Railways Company and the Chicago Consolidated Traction Company and the legal absorption of the latter by the Railways Company. In the Consolidated company Charles G. Dawes has taken a leading part in straightening out its affairs, and he is one of the trustees of the Chicago Railways Company's capital stock. Barring, therefore, the personal equation, the stock holdings of all the corporations, omitting the elevateds, are in such shape as to facilitate a general consolidation."

THE ENTZ BOOSTER ABROAD

The instant reversibility of the "Entz" booster has rapidly brought it to the front in England, as appears from the fact that the Chloride Electrical Storage Company, Ltd., of Pendlebury, near Manchester, has installed a considerable number of plants for handling fluctuating loads in both electric railway and isolated plants. The results are said to show considerable economies in coal consumption and in the amount of running plant necessary to handle the load. At the power plant of the Greenock Corporation the booster plant effected a saving of 20 per cent in the amount of coal consumed, equal to 2000 tons a year. This amount, after deducting interest, sinking fund and upkeep, is sufficient to pay for the cost of the plant in four years. At the Maidstone Corporation power house, where the booster plant is handling a railway load, the percentage of coal saved was even higher, and, as in other stations where this booster has been installed, one steam unit now deals with a load which formerly required two units. A similar saving in running plant has been effected at the Halifax Corporation plant, where a 750-kw unit and one boiler have been shut down, while the load on the generating plant can be kept constant within such close limits that no alteration to the boiler dampers is required from one week end to another. Boosters of this type have also been supplied to the municipal electrical plants in Llandudno, Falkirk and Blackburn.

At the Motherwell Steel Works of David Colville & Sons, where there are about 4000 hp of motors, a booster battery plant has been installed capable of giving 1190 amp for one hour. This has brought about a considerable economy in steam consumption and a reduction at top load of 50 per cent in the amount of running plant required. One set is now free to act as a standby, while the battery acts as a further standby, besides being available as a source of supply for week-end repairs and lighting. The Hanshin Electric Railway, Japan, has installed two plants capable of dealing with 2000 amp peaks, while the Nankai Electric Railway, Japan, has also put down a plant. The Cape Town Corporation has recently set to work a battery and "Entz" booster to handle all the crane load at the docks, which are supplied from the lighting bus bars. All the peaks in this case are taken on the battery, and no fluctuation is apparent in the lighting pressure, because the booster maintains the feeder load at a definite fixed value. The Shanghai Municipal Council is now installing a booster for its street railway tramways, and the River Plate Electricity Company is putting one in for dealing with both its tramway and lighting loads at La Plata, South America.

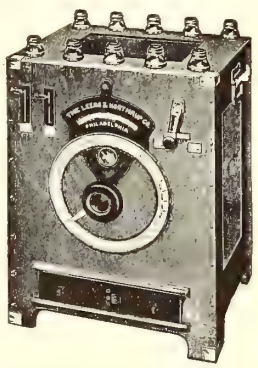
A NEW INSULATING TAPE

The Massachusetts Chemical Company, Walpole, Mass., is now manufacturing a new grade of insulating tape, known as "Walpole" tape. It is made on a strong fabric woven especially for the purpose in ¾-in. width. The fabric is thoroughly impregnated with a special compound having unusual qualities of insulation, adhesiveness and resistance to atmospheric action. This compound is rolled into the fabric under a pressure of many tons, filling every port, crowding between the fibers and providing an impervious coating on each side of the tape. The friction is noticeably smooth and the composition of the compound is such that its adhesiveness does not vary under extremes of temperature, but is ample for all requirements without interfering with easy handling. The compound contains nothing that will corrode copper or in any way affect materials with which it may come in contact. The round tin box in which Walpole tape is always packed in lengths of 80 ft. is distinctive. The box preserves any unused portion of the roll, and is an inducement to economy in the use of the tape.

PORTABLE INSPECTION TEST SET

Albert B. Herrick, New York, has redesigned his inspection test set to have a self-contained portable instrument for rapidly and accurately determining the condition of the electrical equipment of electric cars. Owing to the success which Mr. Herrick has had with this set in his own work of reporting on the electrical conditions of street and interurban railways, he has arranged to have the Leeds & Northrup Company, Philadelphia, make it for general sale.

One of the most useful tests of which the set is capable is the quick and thorough inspection of the equipment of a car at periodic intervals. This is known as the inspector's test, and is accomplished by measuring for each controller point the entire resistance of the circuits through the car. If these values correspond to a standard value, the car is passed as in good condition electrically. If the values so obtained do not correspond to standard values the car is taken out of service for a detail test to discover the exact locality of the trouble. In one instance where this inspection was applied, the cars were tested on a line with three-minute headway when they came to the end of their run, without interfering with the schedule.



Inspection Test Set

The set is arranged for seven tests, and connections for each test are made in the instrument simply by inserting a plug. An interlocking arrangement prevents the damaging of the instrument due to improper connections. The first test is the inspector's test already described above. The second is the detail test, whereby the resistance of any portion of the equipment may be determined separately, thus discovering the place where the trouble indicated by the first test originated.

In addition, the set may be arranged to measure resistance through a range of 1.5 ohms, or 150 ohms, thus allowing high or low resistance measurements. A setting is provided for the detection of grounds, and also one for the measurement of insulation resistance. The final test, known as the inductive balance test, enables the operator to detect a motor armature which is out of center, and also to detect reversed fields. Another very important feature of the set is the interlocking slide, which eliminates the possibility of the operator connecting the set up improperly for any test, and therefore serves as a safeguard against the burning out of the set.

The set is portable, and can be carried from place to place in the car house (or wherever else it may be employed) by two men. Convenient handles for this purpose are provided on the sides of the case. The testing current is 2 amp, the current being taken from the trolley circuit through lamp banks. The sockets for this purpose are shown in the illustration.

AN ODORLESS CAR DISINFECTANT

The Norman C. Hayner Company, Rochester, N. Y., is now placing before electric railway companies an odorless disinfectant, termed "Killitol." It is composed of a combination of chlorides in solution with oxygen, which kills all germ life. This disinfectant is stated to be equally effective in all kinds of car and station cleaning. Among the electric railways already using "Killitol" are the Indiana Union Traction Company, the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis Traction & Terminal Company.

OPERATING COSTS OF THE THIRD AVENUE GASOLINE ELECTRIC CAR

The Electric Railway Journal of Nov. 6, 1909, contained a description of the gasoline-electric car which the General Electric Company has recently furnished to the Third Avenue Railroad. As noted in that article, the car was placed in service on the 125th Street crosstown line, which has a 2½-minute headway, instead of being installed at once on one of the horse railways. This was done to try out the car under more severe accelerating conditions than will obtain in the service for which the car was specified. The railway company reports that thus far the gasoline-electric vehicle has given entire satisfaction, although it has been necessary to take it off the line for a few days because of the breaking of a crankshaft. An investigation of this failure showed that it was due to a blowhole. It was necessary to discontinue the service for the time being because the company had not yet received its supply of spare parts before the accident occurred. Aside from this, no parts have required replacement or maintenance since the service was begun.

The following running costs and other data on the gasoline-electric car, covering the week from Dec. 1 to Dec. 7, inclusive, are typical of the results now being secured: The car seats only 28 passengers, but its gross revenue is practically the same as the income on the other cars of the line, which seat 46 passengers. During the week reported it carried 3345 fare passengers and 890 transfer passengers. The revenue mileage was 540, while the daily runs varied from 63 miles to 90 miles. The number of gross car-miles operated was 554, for which number there were required 222 gal. of gasoline and 5.75 gal. of cylinder oil. The gasoline cost 4.83 cents and the cylinder oil 0.48 cent per revenue car-mile. The platform expenses were the same as for regular electric cars, and amounted to 7.7 cents per revenue car-mile. The miscellaneous expenses were 0.707 cent per revenue car-mile. The total expenses per revenue car-mile were 13.717 cents, and the earnings on the same basis were 30.97 cents. The total expenses per gross car-mile were 13.368 cents; total revenue per car-mile, 30.19 cents.

Henry F. Marx, librarian of the Easton (Pa.) Public Library, has suggested a traveling public library installed in a trolley car as a means of bringing the benefits of the public libraries in large cities to the laboring classes who live a long distance from the permanent distributing stations. He believes that with a small outlay a trolley car could be purchased and equipped with several thousand books and run in on sidings near large department stores or mills during the noon hour, thereby permitting working people to secure books suited to their tastes. Pennsylvania, with its 3644 miles of trolley lines, could easily afford to institute a traveling trolley car circulating library. To sustain such a library an hour and a half a day would cost, Mr. Marx estimates, $557 a year, including mileage of 66 miles a week, light, heat, wages and repairs.

LONDON LETTER

(From Our Regular Correspondent)

The experimental gyroscopic mono-rail carriage invented by Louis Brennan, Gillingham, Kent, was described and illustrated in the ELECTRIC RAILWAY JOURNAL of June 1, 1907, page 163. In November Mr. Brennan gave his first public demonstration with a full-sized gyroscope car mounted on two bogies of two wheels each. The car ran with the greatest ease on tangents and curves. The demonstration was attended by officials of the War Office and India Office. It is understood that Mr. Brennan has received subsidies for the cost of the experiments from the India Office and from an Indian official.

The London, Brighton & South Coast Railway has opened its electrified suburban line between Victoria and London Bridge, via Peckham Rye. Many references to this installation have been made in this letter, and the equipment has been described in the ELECTRIC RAILWAY JOURNAL. The electrified line is really a loop between Victoria Station, in the west end of London, and London Bridge Station, immediately south of the city portion of London. The distance is less than 9 miles and it took 36 minutes to make the run with steam as motive power. The electric trains cover the distance in 24 minutes, at an average speed, including stops, of 22 m.h.p. It is a single-phase alternating overhead installation, and while the Heysham system is the only other of the kind in England the Brighton Railway was the first to decide upon using single-phase in England; but the many delays encountered by the London, Brighton & South Coast Railway enabled the Midland Railway to place its line in operation first. Current purchased from the London Electric Supply Corporation is delivered at Queen's Road by a duplicate system of mains, the potential on the overhead trolley being 6,000 volts. The cars are of the side-door type, similar to the old railway carriages common in England, but with a corridor, and are much more quickly emptied and filled than the carriages of the tube railways in London. The seating capacity of each train is 218, and the cars are divided into first and third class. At Victoria Station there are seven lines equipped with overhead construction, which give access to five platforms, and at London Bridge Station five platforms similarly equipped. A 15-minute service is maintained at present, but a more frequent service will probably be adopted in an effort to recover traffic lost to the tramways. The new line will be called the South London Electric Elevated Railway. Credit for the change of motive power from steam to electricity is due William Forbes, general manager of the line. The details of the work have been in the hands of Philip Dawson, electrical adviser to the company.

The County Council and railways committee of the Isle of Wight is considering the electrification of the railways in the island. There is also under consideration an alternative proposal for constructing new light railways or electric tramways. It is somewhat doubtful, however, if much will come of this in the immediate future, as the Isle of Wight is to a large extent a pleasure resort, and it is difficult to see how the electrification of the existing railways would improve matters much.

The British Electrical Federation, which is the new name of the British Electric Traction Company, controlling a large number of the tramways in Great Britain, has devised a plan to increase earnings by adopting a farthing (one-half cent) fare. As is well known, tramway earnings have been decreasing steadily and dividends on the common shares have not been paid for some time. In addition, in many cases very little has been set aside for depreciation. The minimum fare will remain at one penny, but the fare thereafter will be, roughly, an additional farthing for each quarter of a mile. Instead of the routes being divided into distances recognized very often by public houses or road crossings, all routes will be measured and marked by posts, so that each passenger will secure the full distance value for his fare. It is understood that arrangements have been made with the mint by which about 2,225,000 farthings will be delivered to the Federation before the change is made. Passengers who object to farthings in change will receive farthing discount tickets good for future rides. By the adoption of farthing fares it is hoped to do away with the complaints when passengers ride a short distance over the arbitrary zone and are compelled to pay a half-penny more. Under the new plan each passenger will be charged for the distance he travels.

The Glasgow tramways have long suffered from the congestion of traffic on Jamaica Street Bridge, the most important structure crossing the Clyde, and a sub-committee of the Glasgow Town Council has recommended the erection of a wing at the west side of the bridge to carry one line of traffic southward. The estimated cost of this work is £8,000. Application has been made to the tramways committee to defray this cost, on the ground that the expense is due to tramway development. Two other schemes have also been proposed. One provides for a bracket annex on either side of the bridge for the exclusive use of pedestrians, thus setting free the existing 80 ft. for vehicular traffic. The other provides for a subway under the approach to the bridge, by which vehicles on Broomielaw and Great Clyde Street could pass east and west without interrupting traffic crossing the bridge. In connection with the Glasgow tramways, James McFarlane, late convener of the tramways committee, in a paper read before the Glasgow Royal Philosophical Institution, stated that the time would very soon come in Glasgow when a universal penny fare could be given within the municipal boundary. This would mean a loss at the present time of about £25,000 a year. The number of passengers carried inside the city was six times the number carried outside. At present 88 per cent of the traffic represented 1d. fares, and under 8 per cent 1½d. fares. A large saving would be effected in the checking and other clerical work, however, and the staff of inspectors could be reduced.

The London County Council is to seek Parliamentary powers during the next session for extensive new lines and the making of new streets, widening others and incidental work connected with a tramway along the Edgware Road, which will extend from the Marble Arch to Criklewood, by way of Maida Vale and Finchley Road. This route is now served by motor omnibuses which charge 3d., whereas the County Council says the fare between the Marble Arch and Criklewood on its lines would be only 2d., and that the line it proposes would relieve the housing problem in the vicinity of Oxford Street. When the bill was successfully opposed three years ago Paddington Borough Council pointed out that Edgware Road was not wide enough for tramways; that the advent of tramways would depreciate the value of property and that the scheme provided only a dead end at the Marble Arch, with no through communication. Other routes are also to be covered, such as from Chalk Farm to Child's Hill, which would connect with the Marble Arch route and give it greater value. Perhaps the most important of the schemes at present receiving the attention of the Council is for the through-running of cars between the Council's tramways from Aldgate to Bow and certain of the tramways of West Ham and East Ham Corporations and Leyton Urban District Council. Should the proposed agreement be effected, it would enable passengers to travel, without changing, from Aldgate to Epping Forest, via Bow Bridge, Stratford Broadway, Leytonstone and Whipps Cross. It is proposed that each authority shall (1) take all the fares on its own cars, (2) defray its own operating expenses, (3) supply electricity free in its own area, and (4) run cars according to the length of track in its own area. The reconstructed electric tramway between the Archway Tavern, Highgate and Euston Road, via Camden Town, has been opened. It runs along the important main thoroughfares of Junction Road, Fortress Road and Kentish Town Road, and forms an important link with the London County Council's tramways from Highgate to the city on one side and from Finsbury Park to Tottenham Court Road on the other side. By changing at Camden Town passengers can travel to King's Cross and Holborn.

At a meeting of Saltcoats Town Council a letter was read from the promoters of the Ardrossan & Saltcoats Tramways Order, stating that they had secured the cooperation of George Balfour, who was applying for lighting orders in the district, and he expected as soon as these orders were obtained that the construction of the tramways would be proceeded with.

A. C. S

News of Electric Railways

Chicago City Railway Rehabilitation Progress

Announcement that the Chicago City Railway Company has practically finished the rehabilitation of its property as required by the ordinance of Feb. 11, 1907, has just been made. The work is stated to have been 97 per cent completed on Dec. 1, 1909. A recapitulation of the rehabilitation work of the Chicago City Railway Company, with comparative ordinance requirements, is shown in the following table:

	Percentage completed.
1. To remove from the streets all (34.71 miles) cable track and to substitute therefor electric track	100
2. To rebuild at least 60 miles (single) of electric track	100
3. To construct and equip necessary system of power distribution and substations, as approved by board of supervising engineers, Chicago traction:	
(a) Renewal of trolley wire	98
(b) Underground conduit	99
(c) Underground feeders	98
(d) Return feeders	95
(e) Substations	99
4. To rebuild and re-equip its carhouses so as to enable it to properly clean and maintain its cars; four new carhouses required, capacity 1051 double-truck cars	100
5. To increase its rolling stock to at least 800 modern double-truck cars	100
Average completion of work required during three years' period of "immediate rehabilitation"	98
Period of "immediate rehabilitation" expires three years after acceptance of ordinance, or on April 15, 1910; percentage of time expired at Dec. 1, 1909	87.5
Original valuation as per ordinance	$21,000,000.00
Additional property, June, 1906, to Feb. 1, 1907	1,816,853.19
Rehabilitation expenditure to Nov. 1, 1909, as per certificates of board of supervising engineers	15,166,234.51
Total purchase price to city	$37,983,087.70

In amplification of the above schedule of rehabilitation it is stated that:

"1. The company has electrified all its old cable track and has reconstructed more than 60 miles of electric track.

"2. The company has laid 520,000 sq. yd. of paving, mostly granite block.

"3. The installation of underground feeders represents the taking down of an approximately equal mileage of overhead feeders in the 'underground district,' and as the underground cable is usually a larger cable, it represents an increase in the capacity of the power distribution system. The result is seen in the superior lighting of cars and their increased speed during 'rush hours.' New return feeders also are an important factor in power distribution.

"4. A storage battery at the Plymouth Court substation has sufficient capacity to handle the entire downtown load for a period of 15 to 20 minutes, thus providing against accident to the generating system and a tieup in the downtown traffic. A storage battery at Seventy-eighth Street and Vincennes Road can be similarly employed, although the principal function of both batteries is to regulate the load during rush hours. The company now purchases all its electrical energy from the Commonwealth Edison Company.

"5. For the proper housing, cleaning and maintenance of its passenger cars, the company has built four new car houses with a total capacity of 1076 double-truck cars. These buildings are equipped with the most modern facilities for the cleaning, repairing and inspection of cars. In construction they are fireproof and so arranged that a car may enter at one end after a day's service and be pulled out of the other cleaned and inspected ready for the next day's work. In addition to offices, these car houses are provided with clubrooms and toilet rooms for the exclusive use of trainmen. The company has taken special pains to provide for the comfort of its men, and the four car houses now in service are models of a most modern type.

"6. Practically all the company's double-truck cars have been converted for the 'pay-as-you-enter' service. Simultaneously with necessary alterations for this purpose, the older cars were completely overhauled and fitted with such improvements as the folding step and sliding vestibule doors, which are operated by the motormen.

"The premiums paid by the Chicago City Railway Company on fire insurance are, by the provisions of its ordinance, charged as an operating expense. The insurance now carried protects the company against 100 per cent loss on $10,235,000 worth of property at a premium of 48 cents per $100, this low rate being attributable in the main to fireproof construction of buildings and improved inspection of the company's property. In July, 1905, the company paid in premiums $51,060 on $2,300,000 of property insured, whereas in November, 1909, only $49,128 was paid on nearly five times that amount. The significance of the present low rate may be best shown by the following comparison with the premium rates for insurance upon the company's property for four years:

Year.	Insurable property.	Insurance carried.	Premium.
July, 1905	$5,300,000	$2,300,000	$51,060
January, 1906	6,441,869	6,441,869	64,418
January, 1907	7,442,500	7,442,500	60,864
October, 1907	9,660,000	9,660,000	65,688
June, 1908	9,775,000	9,755,000	58,650
April, 1909	10,300,000	10,300,000	51,500
November, 1909	10,235,000	10,235,000	49,128

Transit Affairs in New York

Proceedings have been instituted in the Supreme Court by Attorney-General O'Malley of New York against the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, Bleecker Street Railway, Fulton Street Railway, Twenty-third Street Railway, and Metropolitan Street Railway to forfeit the franchises covering certain routes on the ground that the companies no longer operate railways there in good faith; that the companies have not used these franchises as parts of any regularly operated routes for several years; that for long intervals they have abandoned the operation of cars, and at other times have operated but one horse-car or two a day; and that the cars of the companies have not been operated in accordance with public convenience, as required by the terms of the franchise. Mr. O'Malley acted upon a communication received from the Public Service Commission of the First District.

Judge Lacombe, of the United States Circuit Court, has authorized F. W. Whitridge, receiver of the Third Avenue Railroad, to issue $1,500,000 in certificates at 6 per cent interest and directed him to pay $1,000,000 to the city for back taxes and to compromise the remainder of the amount due. The city alleges the arrears to be $2,871,399.

Cleveland Traction Situation

At the meeting of the City Council of Cleveland on the evening of Dec. 20, 1909, a franchise was granted the Cleveland Railway to operate on Superior Avenue, St. Clair Avenue and all the other routes on which it is claimed grants expire in January, 1911. The fare is to be 3 cents and the grants are good until June 1, 1910. This grant was made in order to force the company to accept the rate of fare named, as all the lines have been operated at a 5-cent fare. The city legal department admits that the system operated under the orders of the Federal Court may continue to charge the original fare until the new grant becomes operative through a referendum vote. The company has not taken any action on this grant and probably will not do so. It is subject to a referendum vote, the same as the other grant.

Considerable discussion has taken place over the plan decided upon to make good the guarantee given to purchasers of stock of the Forest City Railway who obtained their holdings through the municipal stock exchange. According to the belief of Judge Tayler, the stock of the Cleveland Railway, held in the regular way, will be worth par and 1/12 per cent when the new grant becomes operative, while the guaranteed stock will have a value equal to par and 7½ per cent.

The signing of the grant made to the Cleveland Railway under Judge Tayler's plan by vice-Mayor Lapp, noted in the Electric Railway Journal of Dec. 25, 1909, page 1274, has resulted in considerable comment. Mayor Johnson has not intimated what stand he will take in the referendum campaign. Petitions prepared at the City Hall are being circulated and it was said on Dec. 23, 1909, that a sufficient number of names had been secured to make a referendum vote cer-

tain. It is the thought that haste was made in securing signatures so that the present administration could fix the date of the vote. Judge Tayler desires that the vote be taken in February, but the Mayor favors a later date.

The Low Fare Railway and the Municipal Traction Company have consented in writing to accept the Tayler ordinance. Late in the week ending Dec. 25, 1909, the Forest City Railway had not filed an acceptance, but it was said the company would accept the grant as soon as Fred C. Alber, secretary, returns to the city.

At a deposition hearing on the subway matter held a few days ago, attorneys for the petitioners in the injunction case against the Cleveland Underground Rapid Transit Company attempted to show that the vote in the City Council gave to the company a grant that was arranged in caucuses between the Mayor and the City Council.

Judge Vickery of the Common Pleas Court has refused to dissolve the temporary restraining order against the publication of the franchise ordinance recently granted the Cleveland Underground Rapid Transit Company. He held that the delay would make it possible to consider the question at length.

Association Meetings

Wisconsin Electric & Interurban Railway Association.—Milwaukee, Wis., Jan. 19 and 20.

Central Electric Traffic Association.—Columbus, Ohio, Jan. 26.

Central Electric Railway Association.—Columbus, Ohio, Jan. 27.

Street Railway Association of the State of New York.—Rochester, N. Y., March 1 and 2.

Central Electric Accounting Conference.—Fort Wayne, Ind., March 12.

Change in Motive Power of Lima-Defiance Division of Ohio Electric Railway.—The electrification of the Columbus & Lake Michigan Railroad, purchased by the Ohio Electric Railway two years ago, has been completed and a regular schedule established. The company will continue to operate freight trains over the line by steam.

Pennsylvania Railroad Commission.—It is expected that at the next meeting of the Pennsylvania State Railroad Commission a new secretary will be announced, inasmuch as H. S. Calvert's resignation took effect on Dec. 31, 1909. Marshal J. P. Dohony is now attending to the duties of the secretary. The annual report of the commission is being prepared for submission to the Governor in January. A complaint has been received by the commission about the condition of the roadbed of an unnamed electric railway near North East. Citizens of Wilkinsburg have complained about the service and equipment of the line which the Pittsburgh Railways operates between Wilkinsburg and Pittsburgh. Emil Swenson is expected to report on street railway service in Pittsburgh at the next meeting of the commission.

Boston Elevated Railway Expansion Discussed.—At a meeting of the Chamber of Commerce of Boston, held at the American House on Dec. 21, 1909, William A. Bancroft, president of the Boston Elevated Railway, favored a proposed bill to allow the company to purchase a controlling interest in suburban electric railways for the purpose of forming a centralized operating organization of high efficiency. Mr. Bancroft said that the charter of the Boston Elevated Railway restricts it to a 5-cent fare, and that this militates against expansion into the suburban field. He urged the removal of this restriction, and enumerated the benefits secured by Henry M. Whitney in combining the surface railways of Boston many years ago. Since Mr. Whitney's time, 250 miles of track have been built, and the investment increased from $17,000,000 to $70,000,000, with $34,000,000 required for improvements practically agreed to by the company. Among the advantages of consolidation were improved service, increased operating economy, increased pay and pensions to employees. The company must secure traffic to help pay the charges on the extensive subway and tunnel system of Boston. Frederic E. Snow, of Gaston, Snow & Saltonstall, counsel for the company, explained the bill which the company desires to have passed, and showed how the Railroad Commission would supervise all issues of securities.

Financial and Corporate

New York Stock and Money Markets

December 23, 1909.

For the few days previous to the holidays the Wall Street market was extremely dull, with prices inclined to sag. At the opening yesterday there occurred a 10-minute flurry in Rock Island common, and to-day the market was much more active and prices generally advanced. The copper stocks were especially strong. Traction shares have been steady and fairly active during the week.

The money market has been a trifle more irregular and rates have been somewhat higher. Rates to-day were: Call, 5 to 5¾ per cent; 90 days, 4½ to 4¾ per cent.

Other Markets

It has been a rather dull week for traction shares in the Philadelphia market, although every day has witnessed a few transactions in Rapid Transit and Union Traction. Prices have changed only fractionally during the week.

In the Boston market there continues to be considerable trading in the issues of Massachusetts Electric. The common stock has been particularly active, but neither this nor the preferred has advanced in price. There has been light trading in Boston Suburban and Boston Elevated.

In Chicago there has been quite liberal trading in Series 1 and 2 of the Chicago Railways Company. Series 1 has been particularly active and the price has advanced to 109. Series 2, at the same time, has declined about 2 points.

There have been few traction stocks in the Baltimore trading. The bonds of the United Railways Company, however continue to be active at prices that are unchanged.

At the weekly auction of securities in New York the only tractions sold were $2,000 South Shore Traction Company 5 per cent bonds, at 96¼.

Quotations of various traction securities as compared with last week follow:

American Railways Company	a47¼	a47¼
Aurora, Elgin & Chicago Railroad (common)	*57	*57
Aurora, Elgin & Chicago Railroad (preferred)	*92	*92
Boston Elevated Railway	a131½	132½
Boston & Suburban Electric Companies	a16	15
Boston & Suburban Electric Companies (preferred)	75	*75
Boston & Worcester Electric Companies (common)	a12	a12
Boston & Worcester Electric Companies (preferred)	a49	a48
Brooklyn Rapid Transit Company	80¾	79½
Brooklyn Rapid Transit Company, 1st pref., conv. 4s	86¾	86⅞
Capital Traction Company, Washington	a133	*133½
Chicago City Railway	a190	*190
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a110	a110
Chicago Railways, ptcptg., ctf. 2	a34	a33
Chicago Railways, ptcptg., ctf. 3	a16	a15
Chcago Railways, ptcptg., ctf. 4s	*10	*10
Cleveland Railways	*84	*84
Consolidated Traction of New Jersey	a76½	a77¼
Consolidated Traction of New Jersey, 5 per cent bonds	a106	*106
Detroit United Railway	*63	*65
General Electric Company	160½	159½
Georgia Railway & Electric Company (common)	a105	102½
Georgia Railway & Electric Company (preferred)	*87	87
Interborough-Metropolitan Company (common)	24½	24¾
Interborough-Metropolitan Company (preferred)	61⅝	62
Interborough-Metropolitan Company (4½s)	83¾	83¼
Kansas City Railway & Light Company (common)	a34	a33
Kansas City Railway & Light Company (preferred)	*79	*79
Manhattan Railway	139	*140
Massachusetts Electric Companies (common)	a16½	a16¼
Massachusetts Electric Companies (preferred)	a76½	a79
Metropolitan West Side, Chicago (common)	a19½	a19
Metropolitan West Side, Chicago (preferred)	a58	a57
Metropolitan Street Railway	*20	*23
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	85	*85
Northwestern Elevated Railroad (common)	a18	a18
Northwestern Elevated Railroad (preferred)	a68	a68
Philadelphia Company, Pittsburg (common)	a50¼	a50¾
Philadelphia Company, Pittsburg (preferred)	a45¼	a45¼
Philadelphia Rapid Transit Company	a27⅞	a27
Philadelphia Traction Company	a90	a89
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a100¼	*101½
Seattle Electric Company (common)	a115¼	a115½
Seattle Electric Company (preferred)	104	104
South Side Elevated Railroad (Chicago)	a55	a56
Third Avenue Railroad, New York	16⅝	16¼
Toledo Railways & Light Company	9⅝	*9⅝
Twin City Rapid Transit, Minneapolis (common)	114	116
Union Traction Company, Philadelphia	a52½	a52
United Rys. & Electric Company, Baltimore	a14½	a14¼
United Rys. Inv. Co. (common)	*42¼	42¾
United Rys. Inv. Co. (preferred)	*73¾	71⅞
Washington Ry. & Electric Company (common)	42	*43½
Washington Ry. & Electric Company (preferred)	a91¼	*91½
West End Street Railway, Boston (common)	a94	a95½
West End Street Railway, Boston (preferred)	a100	*106
Westinghouse Electric & Mfg. Company	81½	82¼
Westinghouse Elec. & Mfg. Company (1st pref.)	*135	130

a Asked. * Last Sale.

Brunswick Terminal & Railway Securities Company, Brunswick, Ga.—The New York Stock Exchange has authorized the substitution of $5,000,000 stock of the Brunswick Terminal & Railway Securities Company for a similar amount of stock of the Brunswick Dock & City Improvement Company, the former name of the company, with authority to list $2,000,000 of additional stock to acquire the capital stock of the Mutual Light & Water Company and the bonds of the Suburban Railway.

Boone (Ia.) Electric Company.—An announcement regarding the Iowa Light & Traction Company, over the signatures of H. S. Osborne, Andrew Stevenson and J. H. McBride, contains the following: "An agreement has been reached between John Reynolds, trustee, and Messrs. Hughes, McBride and Stevenson to cancel the option contract entered into between them on July 7, 1909, for the sale and transfer of the Boone Electric Street Railway & Light Company, the Boone Suburban Railway Company and the Central Heating plant. It would not serve any useful purpose to enter into a detailed statement of all the causes that have contributed to defeat the plans which were entered into in good faith by both parties."

Camden & Trenton Railway, Camden, N. J.—Bondholders of the Camden & Trenton Railway, the Trenton & New Brunswick Railway, and the New Jersey Short Line Railway for which the New York-Philadelphia Company is the holding company, held a meeting in Burlington, N. J., on Dec. 24, 1909, and formed plans for a reorganization of all the companies. The interests at this meeting distrusted the plan of reorganization proposed by a bondholders' committee of the Camden & Trenton Railway.

Coney Island & Brooklyn Railroad, Brooklyn, N. Y.—The hearing on the application of the Coney Island & Brooklyn Railroad to the Public Service Commission of the First District of New York for permission to issue $462,000 of bonds to pay for removing its tracks from the side to the center of Coney Island Avenue will be continued before Commissioner Bassett on Jan. 3, 1910.

Du Bois Electric & Traction Company, Du Bois, Pa.—Geo. B. Atlee, of Geo. B. Atlee & Company, Philadelphia, Pa., has been elected a director of the Du Bois Electric & Traction Company.

Indianapolis & Louisville Traction Company, Louisville, Ky.—The Indianapolis & Louisville Traction Company has filed in favor of the Colonial Trust Company, Pittsburgh, Pa., as trustee, a mortgagé to secure an issue of $600,000 of bonds of which at least $400,000 will be issued in lieu and in substitution for $400,000 of 6 per cent notes made in 1907 and now being called in. The remainder of the new bonds will be issued from time to time for other purchases.

Kansas City Railway & Light Company, Kansas City, Mo.—The Kansas City Railway & Light Company has called for redemption $49,000 of first mortgage 5 per cent bonds of the Corrigan Consolidated Street Railway, dated 1886. They were paid on Jan. 1, 1910, at 110 and interest at the office of The Central Trust Company, New York, N. Y., trustee.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Lee, Higginson & Company, Boston, Mass., New York, N. Y., and Chicago, Ill., and Blair & Company, New York, N. Y., offer for subscription at 97 and interest, yielding approximately 5⅝ per cent, the unsold portion of $3,800,000 of first consolidated refunding mortgage 5 per cent bonds of the Mahoning & Shenango Railway & Light Company dated Nov. 1, 1905, and due Jan. 1, 1916, but redeemable at 105 and interest on any interest date.

Metropolitan West Side Elevated Railway, Chicago, Ill.—Following the meeting of the directors of the Metropolitan West Side Elevated Railway, held on Dec. 21, 1909, a statement was authorized to the effect that "it is the opinion of the directors that the financial condition and the earnings of the company will warrant the resumption of dividends of the preferred stock in the next calendar year at the rate of 3 per cent in four quarterly payments, beginning March 1." The last disbursement of the preferred stock of the company was three-quarters of 1 per cent and was made on Dec. 30, 1907.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—The annual meeting of the stockholders of the Milwaukee Electric Railway & Light Company will be held in Milwaukee on Feb. 17, 1910.

New York, Westchester & Boston Railway, New York, N. Y.—The Public Service Commission of the Second District of New York has approved the proposed form of agreement of the consolidation of the New York, Westchester & Boston Railway and the New York & Port Chester Railroad, and the corporations are authorized to enter into and execute the agreement of consolidation.

Public Service Corporation of New Jersey, Newark, N. J.—The Public Service Corporation of New Jersey on Dec. 28, 1909, declared a quarterly dividend of 1¼ per cent on the stock, payable on Dec. 31, 1909, to stock of record on Dec. 28, 1909. The directors of the company at a meeting on Dec. 28, 1909, created the positions of third and fourth vice-presidents of the company. Randal Morgan, Philadelphia, Pa., was chosen third vice-president, and Anthony R. Kuser, Newark, N. J., fourth vice-president. Both Mr. Morgan and Mr. Kuser were formerly vice-presidents and have been members of the executive committee of the directors since the organization of the Public Service Corporation in 1903. The same positions were created in the Public Service Gas Company and the Public Service Railway and Mr. Morgan and Mr. Kuser were elected to fill them.

Toledo, Ann Arbor & Detroit Electric Railroad, Toledo, Ohio.—James A. Wallace, Des Moines, Ia., announced in Toledo recently that a syndicate of Chicago men and their associates had purchased the property of the Toledo, Ann Arbor & Detroit Electric Railway, from Andrew E. Lee, ex-Governor of South Dakota, and that arrangements had been made to complete the road. According to Mr. Wallace it is proposed to issue $200,000 of cumulative preferred stock for subscription in Toledo and along the line, the syndicate to furnish the $600,000, estimated as needed to complete the road, through a bond issue. The property is said to represent an expenditure of about $400,000.

Toledo & Indiana Railway, Toledo, Ohio.—The property of the Toledo & Indiana Railway will again be offered for sale by C. F. M. Niles at auction at Toledo on Jan. 18, 1910. The upset price has been fixed at two-thirds of the appraised value of the property, or about $614,000. The setting aside of the sale of this property held on Nov. 27, 1909, was noted in the Electric Railway Journal of Dec. 18, 1909, page 1247.

Twin City Rapid Transit Company, Minneapolis, Minn.—The Twin City Rapid Transit Company has called for redemption $21,000 bonds issued in 1880 by the Minneapolis Street Railway, which will be redeemed at 105 and interest on May 1, 1910, by the Farmers' Loan & Trust Company, New York, N. Y.

United Service Company, New York, N. Y.—The United Service Company has been incorporated under the laws of New York with an authorized capital of $100,000 of which $35,000 is paid in cash for the purpose of dealing in supplies of all kinds, especially equipment and supplies necessary for the operation of steam and electric railways, electric light companies, gas companies and water companies. It will do the purchasing for the subsidiary companies of the Susquehanna Railway, Light & Power Company, and on Jan. 1, 1910, took over the business of the Railway Equipment Company, which heretofore has done a similar business; and all contracts now existing with the Railways Equipment Company will be assigned to the United Service Company. The office of the United Service Company is at 40 Wall Street, New York, N. Y., and the officers are: S. J. Dill, president; Henry Morgan, vice-president; A. V. Wainwright, secretary; W. D. Martin, treasurer; F. G. Robinson, purchasing agent. The directors are: S. J. Dill, Henry Morgan, A. V. Wainwright, W. D. Martin, and George Bullock. All the stock of the United Service Company is owned by the Susquehanna Railway, Light & Power Company.

Whatcom County Railway & Light Company, Bellingham, Wash.—Stone & Webster, Boston, Mass., offer, subject to previous sale, $100,000 of 6 per cent cumulative preferred stock of the Whatcom County Railway & Light Company at 95 to yield more than 6.30 per cent. A statement of the company for the year ended Oct. 31, 1909, shows gross earnings of $401,186; net earnings of $175,546, and a surplus of $36,078, after deducting interest, taxes and dividends at 6 per cent on $650,000 of 6 per cent preferred stock.

Traffic and Transportation

Decision in Massachusetts Regarding Transportation of Intoxicated Persons

A brief extract was published in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, from the finding of the Railroad Commission of Massachusetts relative to the transportation of intoxicated persons on the street railways of the State in connection with a complaint originating in Worcester. The complete finding of the commission follows:

"This complaint is brought under the provisions of the acts of 1906, chapter 463, part 1, section 9, which provides that if the board is of opinion that a change 'in the mode of operating a railroad or a railway and conducting its business is reasonable and expedient in order to promote the security, convenience and accommodation of the public, it shall in writing inform the corporation or company of the improvements and changes which it recommends should be made.'

"The principal allegation of the complaint is of the presence of intoxicated persons, whose conduct is in many instances such as to cause a nuisance and a disturbance of the peace upon the cars of the Worcester Consolidated Street Railway. The statutes of the Commonwealth make adequate provision for the peace of its citizens, and declare drunkenness a misdemeanor. A statutory function of city and town authorities is, through the medium of their police officers, to preserve the peace of their several communities and the law contemplates that this shall be done without direction by the Railroad Commission.

"Special provisions of statute with respect to railroad and street railway police are found in acts of 1906, chapter 463, part 1, sections 49 and 55, inclusive, and define with particularity the method of appointment, the term of office and powers and duties of such officials. It is clear, from an examination of these statutes, that adequate provision has been made for the protection of passengers of common carriers, and that it was the intent of the general court to afford police protection, in addition to that furnished by the municipal authorities, for such common carriers.

"It remains, therefore, for the commission to determine whether the Worcester Consolidated Railway is sufficiently availing itself of these provisions of statute. Conditions similar to those in Worcester have been brought to the attention of the commission in Fall River. Both of these cities are no-license cities, and it appears that certain residents of each, for the purpose of obtaining liquor, ride upon street railways to adjacent towns where such liquor is sold. In some instances these persons become intoxicated and return in that condition in the electric cars. This state of affairs creates conditions which at times outrage all sense of delicacy or decency.

"In the cities the police are of sufficient number to preserve order and make arrests when occasion requires, but on long interurban rides a territory is covered where local officers are frequently beyond call of the employees of the companies. While local officers should be relied upon in town centers to co-operate with the employees of the company to prevent intoxicated persons from boarding the car, the management of the company ought at all times to afford protection to passengers. This does not appear to have been accomplished, and we therefore direct the attention of street railways to the provisions of the statute providing for street railway police, and recommend that seasonable and efficient measures be taken to secure to their patrons the protection to which they are entitled by law.

"We fully realize that complaints against intoxicated persons upon railroads and street railways are not new and, doubtless, as long as persons become intoxicated, conditions such as now complained of must to some degree exist. But we are clearly of opinion that these conditions can be minimized, and that managers of companies can, with cordial co-operation of public authority, secure this result. Whenever conditions lead to the presence of intoxicated persons upon cars, an active and energetic enforcement of the law will tend, in our opinion, to substantial improvement, and we are convinced that the traveling public can be freed in a large measure from the annoyance caused by their presence.

"Certain suggestions have been made to us with respect to partitions in cars, and extra cars at certain hours in the evening, as a means of segregating persons under the influence of liquor. We doubt the practicability of these suggestions, and if found feasible we should be extremely reluctant to make such recommendations. Street railways are engaged in the business of carrying passengers in such a manner as to promote their security, convenience and accommodation, and it is their plain duty to put into effect every known instrumentality of law in order to render such service to the public. The operation of partition cars or extras is but an invitation to a class the street railway is not intended to serve. Such persons should be, not upon the railway, but in the custody of the law."

Snow Storm Interferes with Traffic in East

The storm which visited New York, New England, New Jersey and Pennsylvania on Dec. 25 and 26, 1909, interfered seriously with the schedules and service of the electric railways. In Boston many of the surface lines of the Boston Elevated Railway were tied up for the first time in more than 12 years. The lines which suffered most were those on the north side of the city leading into the Sullivan Square station. Throughout Boston proper, the car service was, on the whole, well maintained, and the principal routes on the south and west to the suburban districts of South Boston, Dorchester, Roxbury, Brookline, Newton and Cambridge were kept reasonably free from blockades. About 3000 men were employed in removing snow from the tracks and streets, and the company's snow plough brigade performed effective service beginning on Dec. 25, when the fall reached a depth of 1 in. The company was somewhat handicapped by a shortage of men for its shovel service, on account of the recent holiday. Fifteen crews of linemen were at work on the overhead system repairing breaks, and by 7:25 p. m., Dec. 26, the lines were in normal condition. On the elevated division not a trip was lost by a train and the delays were less in number and extent than on a busy day in the holiday season. An extra force was maintained at switches and signals for the removal of snow and ice, and the normal schedule was maintained with only trifling variations in the service.

The reports from New York State, New Jersey and Pennsylvania indicate that where schedules were maintained at all it was only with the greatest difficulty. The wind was very high during the entire period of the storm and in the open country the snow piled up in drifts which could only be removed by shovels. In New York City the subway naturally was used, even for short rides, with the result that considerable difficulty was encountered in handling the traffic, the lines all operating on a holiday schedule. Early in the morning of Dec. 26 there were five blocks on the elevated in New York, the longest 20 minutes. Very few surface cars were running around 2 a. m. The Metropolitan Street Railway had 48 sweepers and 20 scrapers going before daylight, and the only block after 9 a. m. came from a clogged switch in Vanderbilt Avenue, which stalled the uptown Madison Avenue line, the Forty-second Street crosstown line and the Park Avenue uptown line for 45 minutes. The Brooklyn Rapid Transit Company early abandoned operation on several of its unimportant suburban lines, concentrating its attention and equipment on such city trunk lines as Fulton Street, Gates Avenue, Nostrand Avenue, Putnam Avenue, etc. Service within the city proper was entirely abandoned on the Park Avenue, Graham Avenue and Grand Street lines. An elevated train operating on the surface between Ulmer Park and Coney Island became stalled, and many of the passengers passed the night in the cars rather than brave the storm to reach their destination by another route.

Basis of Inquiry Into Increase in Fare by Puget Sound Electric Railway

Complaint having been made to the Railroad Commission of Washington about the increase on Oct. 17, 1909, in the regular rates on the Puget Sound Electric Railway, Tacoma, Wash., to practically 2 cents per mile with an increase in the through rate between Seattle and Tacoma from $1 to $1.25 and changes in the commutation rates, as published in the ELECTRIC RAILWAY JOURNAL of Nov. 6, 1909, page 1000, the

commission has decided to hold a series of public hearings beginning Jan. 3, 1910, to determine whether the company is justified in exacting the increase from patrons. The commission has issued a statement in which it says:

"Immediately upon the company advancing the rates, anticipating that complaint would be made, necessitating a hearing, we had our engineer enter upon an investigation of the accounting and engineering records of the defendant company, with a view to ascertaining:

"First.—The amount of money actually expended in the construction of the road and the particular item for which the moneys were paid, ascertaining the unit quantities of labor performed, material moved and furnished, with unit prices paid, so that we would be enabled at that time to check up and ascertain fully, not only the amount of money which the record shows has been expended, but whether the same had been properly, economically and in good faith expended.

"Second.—To ascertain these several units, so that, by applying prevailing unit prices, we would be able to ascertain the cost of reproducing the property in its present condition.

"Third.—To ascertain the depreciation that has accrued to the bridges, structures, improvements and equipments, so as to ascertain the present value of the road.

"Fourth.—To ascertain from the accounting records the gross receipts, operating expenses and an analysis of their operating expenses for the purpose of ascertaining whether the same had been reasonable and normal, with a view of introducing in evidence this testimony so as to give a complete financial and operating history of the road down to date."

Hearing on Service in Fairhaven, Mass.—A petition has been addressed to the Railroad Commission of Massachusetts by the selectmen of Fairhaven, requesting a hearing in reference to the frequency of service and the type of cars in use in Fairhaven by the Union Street Railway, New Bedford, Mass.

California Company Modifies Transfers to Curtail Abuses.—The San Diego (Cal.) Electric Railway has recently modified its transfer system so as to curtail abuses in looping and disregard of the time limit. Transfers are now punched for the month, day, issuing line, line issued to, and time to the nearest 15 minutes.

Scope of Illinois Traction Benefit Association Increased.—It has been decided by the employees of the Illinois Traction System, most of whom belong to the system's hospital association, to add a death benefit to the accident insurance which was arranged when the association was organized. A sliding scale of assessments has been agreed upon, ranging from 25 cents to $4, according to the salary of the employee. It is estimated that this will provide an average death benefit of $1,000 for each employee.

Date of Hearing Before Railway Commissioners of Canada on Brakes.—The hearing before the Board of Railway Commissioners of Canada to consider the subject of equipping electric cars with automatic air brakes as well as hand brakes which was to have been held on Dec. 7, 1909, and the postponement of which was noted in the Electric Railway Journal of Dec. 18, 1909, will be held at Ottawa, Feb. 4, 1910, Col. H. H. McLean, K. C., counsel for the Canadian Street Railway Association, having requested that the companies be given more time in which to prepare their case.

Non-Compliance with Order of Commission Results in Suit.—The Public Service Commission of the Second District of New York has instructed its counsel to begin an action against the Black River Traction Company, Watertown, N. Y., to recover the penalty prescribed by law for failure and neglect by the company to observe and obey an order of the commission requiring it to install derailers at all steam railroad crossings upon its road extending along High Street, Watertown. The commission has also instructed counsel to commence a mandamus proceeding by reason of the violation of the order of the commission.

Decision in Indiana Regarding Construction of a Second Track.—The Supreme Court of Indiana has decided that neither the State nor the city can surrender the police power to guard the lives, health and safety of citizens in a decision which applies to steam railroads and electric railways. The Grand Trunk Railroad attempted to build a second track in Division Street, South Bend, but the city authorities stopped the work. The railroad then asked for an injunction to restrain the city from interfering with its plans. The Supreme Court held that a single track having been built and operated for 30 years without any attempt to lay a double track in accordance with the terms of the original grant, the City Council has power to repeal the privilege of laying another track in the street.

Increase in Wages in New Jersey.—The directors of the Public Service Railway at a meeting on Dec. 28, 1909, decided to increase the wages of motormen and conductors in accordance with the following scale, effective on Jan. 1, 1910: First year, 21 cents an hour; second year, 22 cents an hour; third year, 23 cents an hour; tenth year men, 24 cents an hour. In 1911 the first year men are to receive a further increase to 22 cents an hour; second year men, 23 cents an hour; third year men, 24 cents an hour; ten h year men, 24½ cents an hour. In 1912 the first year men are to receive 23 cents an hour; second year men, 24 cents an hour, and third year men and upward, 25 cents an hour. The present scale of wages is 20 cents for first year men, 21 cents for from second to fifth year, 22 cents for from fifth to tenth year, and 23 cents for 10-year men and over.

Prizes for Accident Essays in Philadelphia.—Motormen and conductors in the employ of the Philadelphia (Pa.) Rapid Transit Company have been asked to write essays on subjects dealt with in the bulletins of the bureau for the prevention of accidents of the company. Heretofore the company gave cash prizes for suggestions, but it is announced that awards amounting to $200 would now be given for the best papers on that subject. The essays are limited to 400 words, and must be submitted between Jan. 1, 1910, and Feb. 1, 1910. The men are advised that the papers will be judged upon the thoughts, ideas and suggestions. For the best of these essays the company offers 20 $5 prizes, 25 prizes of $2 and 50 awards at $1 each. The plan, now suspended, of giving an unlimited number of $2 prizes for suggestions from motormen and conductors, has brought the company scores of useful ideas, and stimulated the interest and observation of the men.

Change of Rates on New York Line.—Effective on Jan. 15, 1910, the Western New York & Pennsylvania Traction Company, Olean, N. Y., will make several changes in its passenger rates. The round-trip fare in either direction between Olean and Allegany will be reduced from 20 cents to 15 cents; 46-trip monthly scholar's ticket fares between any two local points within the State of New York where the regular one-way fare is 10 cents or more will be made one-half the regular one-way fare; ticket books containing 52 coupons each good for passage in either direction between Portville and Olean, will be sold for $3.25 per book, but will be good only during the month in which they are issued and on cars leaving Portville or Olean between 6 a. m. and 7:30 a. m., and 5 p. m. and 7 p. m.; ticket books containing 110 coupons of a face value of 5 cents each between all local points within the State of New York will be sold for $5 per book.

Bill to Require Interchange of Transfers in Washington.—The bill introduced at the last session of Congress to require the free interchange of transfers between the Capital Traction Company and the Washington Railway & Electric Company has been referred to the District committees. In transmitting the bill the District Commissioners said: "The Commissioners have in the past given their approval to this proposition and have met all objections of the railways as to matters of finance and administrative difficulty with the statement of their belief that the financial burden which would be imposed by the passage of such a bill would not be a heavy one and the administrative difficulty would be easily surmountable. The proposition of the interchange of transfers between the competing railways is one involving distinct and very great convenience to the railway traveling public. The incidental financial loss to the railways would be very slight, and should be required of them in view of the fact that the franchises of these companies are valuable, practically perpetual and certainly not more than moderately taxed. The Commissioners recommend favorable action on this bill with the addition of a penalty clause."

Personal Mention

Mr. W. H. Seip has been appointed superintendent of the west division of the Denver (Col.) City Tramway, to succeed Mr. W. M. Casey.

Mr. W. M. Casey, superintendent of the west division of Denver (Col.) City Tramway, has been appointed trainmaster of the company, in charge of the division superintendents, dispatchers and trainmen.

Mr. F. W. Laurence has resigned as general superintendent of the Chattanooga Railway & Light Company, Chattanooga, Tenn., to become engineer of the Electrical Securities Corporation, New York, N. Y., to succeed Mr. F. L. Dame.

Mr. B. J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, and consulting engineer of the Public Service Commission of the First District of New York, was married on Dec. 22, 1909, to Mrs. Margaret Latimer Fonda, New York.

Mr. F. L. Stockberger, whose resignation as purchasing agent for the receiver of the Municipal Traction Company, Cleveland, Ohio, was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, has become connected with the Champion Range Company, Cleveland, Ohio.

Mr. F. E. Reidhead has retired as manager of the Paducah (Ky.) Traction Company to return to the home office of the Stone & Webster Management Association, Boston, Mass. He is succeeded as manager of the Paducah Traction Company by Mr. H. B. Sewall.

Mr. George R. Williams, trainmaster of the Eastern Pennsylvania Railways, Pottsville, Pa., has been appointed division superintendent of the company with offices in Lansford, to succeed Mr. J. C. Bell, who has been appointed superintendent of railways of the company.

Mr. Robert E. Ligon, who for a year and a half has been managing receiver of the Anderson (S. C.) Traction Company, retired from the company on Dec. 15, 1909, on which date the receivership was terminated. Mr. Ligon will devote himself to his manufacturing interests.

Mr. J. C. Bell, division superintendent of the Eastern Pennsylvania Railways, Pottsville, Pa., has been appointed superintendent of railways of the company, with offices in Palo Alto, in charge of the transportation and roadway departments, to succeed Mr. Clinton E. Palmer, whose resignation to become general superintendent of the Chicago, Lake Shore & South Bend Railway, Michigan City., Ind., was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909.

Mr. Henry Branson has been appointed to succeed Mr. Fred H. Lincoln as assistant general manager of the Philadelphia (Pa.) Rapid Transit Company, with the title of superintendent of rolling stock and equipment. For the last four years Mr. Branson has been in charge of the shops of the company at Fifth and Sixth Streets, Philadelphia. He was a car-house foreman of the company for six years. His total service with the company covers a period of 16 years.

Mr. Charles B. Wells, assistant superintendent of the Denver (Col.) City Tramway, has been appointed superintendent of transportation of the company to succeed S. W. Cantril, deceased. Mr. Wells has been a resident of Denver for 22 years. He entered the employ of the Denver City Tramway as stenographer and clerk under Mr. C. K. Durbin. Subsequently he was appointed chief clerk. Later he was advanced to the position of assistant superintendent of the company.

Mr. L. E. Holderman has resigned the position of assistant general manager of the Terre Haute division, Terre Haute, Indianapolis & Eastern Traction Company, and has been appointed general manager of the Central States Tie & Gravel Company of Terre Haute. Previous to his service of two and a half years with the Terre Haute railway and lighting property Mr. Holderman was employed in various capacities on the property of the Eastern Wisconsin Railway & Light Company at Fond du Lac, Wis. At different times his duties included the superintendency of track, overhead and the light and power departments.

Mr. Arthur W. Dean, State engineer of New Hampshire since 1904, and formerly engineer of the New Hampshire Traction Company, which company is the predecessor of the New Hampshire Electric Railways, Haverhill, Mass., has been appointed secretary of the Massachusetts Highway Commission, succeeding Mr. Austin B. Fletcher, resigned. Mr. Dean was born in Taunton, Mass., and was graduated from the Massachusetts Institute of Technology in 1892. He was city engineer of Nashua, and was connected with the New Hampshire Traction Company from 1902 to 1904, assisting in the construction of 130 miles of electric railway.

Mr. J. H. Hamilton has resigned as superintendent of the Templeton Street Railway, East Templeton, Mass. Mr. Hamilton entered railway work as a car inspector with the Taunton (Mass.) Street Railway in 1899. When the Old Colony Street Railway was formed in 1901, Mr. Hamilton was transferred to Brockton as foreman of the operating car house and of air brakes. He resigned from the Old Colony Street Railway to become master mechanic of the Claremont Railway & Lighting Company, Claremont, N. H., in the employ of which company he continued from June 1, 1903, until May 1, 1904. when he accepted the position of superintendent of the Templeton Street Railway.

Mr. J. M. Goodwin, whose appointment as superintendent of the Sherbrooke (Que.) Street Railway to succeed Mr. P. J. Slattery, resigned, as announced in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1909, was graduated from the Bliss Electrical School, Washington, D. C., in the summer of 1906. For the first six months after being graduated he was connected with the Western Electric Company as an apprentice in the company's factory in New York. From Dec. 1, 1906, until May 1, 1909, he was connected with the Canadian Westinghouse Company, Hamilton, Ont., pursuing the company's engineering apprenticeship course. For the last six months Mr. Goodwin has been engaged in the electrical contracting business in Chicago in his own interest.

Mr. H. B. Sewall has assumed the duties of manager of the Paducah (Ky.) Traction Company and the Paducah Light & Power Company as the successor to Mr. F. E. Reidhead, who has returned to the home office of the Stone & Webster Management Association, Boston, Mass. Mr. Sewall was previously connected with the Minneapolis General Electric Company, the employ of which he entered in June, 1906. Since October, 1908, he has acted as local treasurer of the company in Minneapolis. Previous to becoming connected with the Minneapolis General Electric Company, Mr. Sewall was with the Dallas (Tex.) Electric Corporation. He also acted for three years as assistant treasurer of the Lowell (Mass.) Electric Light Corporation.

Mr. A. C. Kennedy, whose appointment as purchasing agent for the receivers of the Municipal Traction Company, Cleveland, Ohio, was announced in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, was born in Cleveland in 1880, and was educated in the public schools and at the city high school in Cleveland. Mr. Kennedy began his electric railway career in the office of Mr. Charles W. Wason, purchasing agent of the Cleveland, Painesville & Eastern Railway, in 1898, and entered the office of purchasing agent of the Cleveland Electric Railway with Mr. Wason in 1899. Mr. George A. Stanley subsequently became purchasing agent of the company, and Mr. Kennedy remained with the company as chief clerk to Mr. Stanley until the Municipal Traction Company took over the property.

Mr. E. F. Schneider, secretary of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, has been appointed general manager of the company to succeed Mr. C. N. Wilcoxon, who resigned in August, 1909, to become general manager of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind. Mr. Schneider has been interested in interurban electric railways since 1894, when the Cleveland & Berea Railway was constructed. He has been connected with the Cleveland, Southwestern & Columbus Railway for 11 years and has been secretary of the company for the last 10 years. In addition, he has acted as purchasing agent and head of the claim department of the company. Mr. Schneider began his business career as commercial representative for a drug house in Cleveland.

OBITUARY

C. E. Somers, master mechanic of the Fairmont & Clarksburg Traction Company, Fairmont, W. Va., met with an accident recently in performing his duties for the company which resulted in his death on Dec. 22, 1909.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

*Idaho Falls (Idaho) Electric Railroad.—Incorporated to build a 34-mile electric railway in the vicinity of Idaho Falls. E. Beugler, New York, N. Y., is closing the final details for the right-of-way and franchises. Capital stock, $1,000,000. Officers: J. L. Miller, Idaho Falls, president; A. V. Scott, Idaho Falls, secretary. Among those interested are H. S. Sewell, New York, N. Y.; F. S. Cleveland and Ray K. Kramer, Pittsburgh, Pa.

Kokomo Western Traction Company, Kokomo, Ind.—Incorporated in Indiana to build an electric railway between Kokomo and Young America. Headquarters, Kokomo. Capital stock, $10,000. Directors: C. C. McFann, Anderson Johnson, George W. Charles, M. R. Doyson, all of Kokomo, and O. C. Gard, Young America. [E. R. J., Aug. 21, '09.]

*Toledo, Napoleon & Lima Railway, Toledo, Ohio.—Incorporated in Ohio for the purpose of constructing an electric railway from Toledo to Lima, passing through Lucas, Henry, Defiance, Putnam and Allen Counties. Capital stock, $100,000. Headquarters, Toledo. Incorporators: M. M. Dailey, W. D. Bishoff, M. E. Donaldson, N. W. Gillette and T. E. Gillette.

Union Traction & Terminal Company, Marshfield, Ore.—Incorporated in Oregon to build an electric railway in North Bend and Marshfield, also connecting the two cities. Principal office, Marshfield. Capital stock, $100,000. Incorporators: J. M. Blake, G. W. Kaufman and R. O. Graves. [E. R. J., Dec. 18, '09.]

Grays Harbor Interurban Company, Hoquiam, Wash.—Incorporated for the purpose of building an electric railway from Hoquiam to Tacoma, via Olympia. Capital stock, $500,000. Incorporators: R. F. Lytle, A. L. Paine and E. O. McGlauflin, all of Hoquiam; W. H. Abel and Eldredge Wheeler, Montesano; A. M. Abel and P. S. Locke, Aberdeen. [E. R. J., Dec. 25, '09.]

FRANCHISES

Los Angeles, Cal.—The Los Angeles Railway has purchased for $100 a franchise from the City Council for new lines on Alpine Street, from Main Street to Buena Vista Street, and on Ann Street from Main Street to San Fernando Street.

Oakland, Cal.—Application has been made to the City Council by the Peninsular Railroad for a franchise for a street railway starting at Fourteenth Street and Franklin Street, to the Sixteenth Street depot, forming a loop at the depot to Eighteenth Street, back on Eighteenth Street to Brush Street, up Brush to Twenty-first Street and thence back to Fourteenth Street and Franklin Street.

Ontario, Cal.—The City Council has sold to W. G. Kerhoff, representing the Pacific Electric Railway, a franchise for an electric railway to enter the northern part of Ontario.

*San Bernardino, Cal.—W. W. Poole has petitioned the Board of Supervisors for a franchise for an electric railway from the Riverside-San Bernardino County line toward Rialto.

Athens, Ga.—The City Council has granted a franchise to the Athens Electric Railway, covering the extension of a number of lines in Athens. Under the terms of the franchise, the company is required to pay over to the city a percentage of the gross receipts, this percentage increasing by periods of ten and twenty years.

Maple Park, Ill.—The Town Council has granted a franchise to the Chicago, Aurora & De Kalb Railroad for an electric railway through Maple Park. The company proposes to build an electric railway from Aurora to DeKalb. J. H. Bliss, Sugar Grove, is interested. [E. R. J., July 3, '09.]

Springfield, Ill.—The Sangamon County Board of Supervisors has granted a franchise to the Springfield & Jacksonville Interurban Railway to construct an interurban railway along the public highway between Springfield and the western boundary of the county. The company plans to build an electric railway from Springfield to Jacksonville, via Berlin, a distance of 33 miles. John Melick, Springfield, chief engineer. [E. R. J., May 29, '09.]

*Brandon, Man.—E. J. Gifford and H. J. Skynner have applied to the City Council for a franchise to build a street railway and power plant in Brandon.

Clovis, New Mex.—The City Council has granted to E. J. Howard, J. D. Hammett and A. R. Hammett, Moberly, Mo., capitalists, a franchise for a street railway in Clovis. [E. R. J., July 17, '09.]

New York, N. Y.—The Board of Estimate and Apportionment has granted a franchise to the South Shore Traction Company to cross the Queensboro Bridge to the Manhattan terminus, and in Queens continuing by various streets to Jamaica.

Zanesville, Ohio.—The County Commissioners have granted a 25-year franchise to the Zanesville & Meigs Valley Traction for an electric railway through Morgan County. The company proposes to build a line from Zanesville to Beverly, via McConnellsville. H. D. Blodgett, Zanesville, general manager. [E. R. J., Sept. 4, '09.]

*Brantford, Ont.—T. R. Varding, Buffalo, N. Y., has applied to the Municipal Council for a franchise for an electric railway within the township.

*Grants Pass, Ore.—The City Council has granted to J. R. Allen a 50-year franchise for an electric railway in Grants Pass. The franchise stipulates that the company begin work within a year and pave and repair such streets as may be used within the track and 18 in. abutting thereon.

Sayre, Pa.—The Waverly, Sayre & Athens Traction Company, Waverly, N. Y., has applied to the Borough Council for an extension of its franchise to lay tracks on Desmond Street and Chemung Street.

Montreal, Que.—The Montreal Street Railway has been given a franchise to construct and operate street railways upon certain streets in St. Louis, adjoining Montreal. The by-law granting the franchise was adopted at a meeting of the Council on Dec. 21.

Houston, Tex.—The County Commissioners of Harris County have approved a contract granting the Galveston-Houston Electric Railway the privilege of crossing all roads in the county. [E. R. J., April 24, '09.]

Centralia, Wash.—The Twin City Light & Traction Company, Chehalis, which proposes to build an electric railway between Centralia and Chehalis, has applied to the City Council for a six-months' extension of its franchise in which to complete its railway. [E. R. J., Oct. 30, '09.]

TRACK AND ROADWAY

Birmingham & Edgewood Electric Railway, Birmingham, Ala.—This company advises that it expects to complete its 4-mile line between Birmingham and Edgewood during 1910. [E. R. J., Nov. 6, '09.]

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company will build 2 miles of new track within the city limits during 1910. W. H. Hazlitt, purchasing agent.

United Railroads, San Francisco, Cal.—This company advises that it plans to add 7 miles of new track to its lines in 1910. Thomas Finigan, purchasing agent.

Washington, Spa Springs & Gretta Railroad, Washington, D. C.—This company has begun grading on the Bladensburg Road for its electric railway which is to extend a distance of about 7 miles from Branchville, Md., to the intersection of Fifteenth Street and H Street, Northeast, in Washington, where its passengers will be able to take the H Street line into the heart of the city. The Washington terminus will be in front of the present Washington terminus of the Washington, Baltimore & Annapolis Electric Railway. The Cranford Paving Company, Washington, has been awarded a subcontract for the construction of the first section of the line. [E. R. J., Dec. 4, '09.]

*Marion, Ill.—It is stated John Murphy, Eldorado, Ill., is promoting a company to build an electric railway from Marion to Mount Vernon, Ind., thus connecting the lines between Evansville and St. Louis.

Murphysboro Electric Railway, Light, Heat & Power Company, Murphysboro, Ill.—During 1910 this company will

build 7 miles of new track between Murphysboro and Carbondale. A. B. Newton, general manager.

Kokomo Western Traction Company, Kokomo, Ind.—A petition has been filed by this company with the Howard County Commissioners asking that a special election be called in Center Township for the purpose of voting a subsidy of $35,000 in aid of the proposed electric railway to connect Kokomo and Young America, 20 miles. This action was taken by Kokomo business men who desire that the line shall be built. The company has just been incorporated with a capital stock of $10,000. C. C. McFann, president. [E. R. J., Aug. 21, '09.]

Ottumwa, Ia.—T. D. Foster, president of the Ottumwa Interurban Construction Company, Ottumwa, writes that matters have not advanced beyond the preliminary stage in the building of the proposed electric railway between Ottumwa and Oskaloosa. The promoters are working on the right of way, and no definite route has as yet been decided upon. [E. R. J., Dec. 4, '09.]

***Central Kansas Interurban Railway, Abilene, Kan.**—This company has been organized in Abilene to build a railway from Newton through Canton, Spring Valley, Roxbury and Gypsum to the south side of the river, with a branch to Abilene and one to Salina. Gasoline motor cars will be operated over the road. C. B. Kirkland, Salina, treasurer. Among those interested are J. C. Nicholson, Newton, and J. E. Brewer, Abilene.

Connecticut Valley Street Railway, Greenfield, Mass.—This company has petitioned the Legislature for authority to locate a street railway in the Mount Sugar Loaf reservation in South Deerfield. It is stated that the company plans to construct an electric railway to the summit of Mount Sugar Loaf.

***Chapala Hydro Electric & Irrigation Company, Guadalajara, Mex.**—This company is preparing plans for the construction of an electric railway from Guadalajara to Lake Chapala, a distance of 23 miles. The maximum grade will not exceed 2 per cent. According to present plans, the company will have its terminals at San Pedro, Guadalajara, where connection will be made with the street railway of that city. E. Pinson, general manager. L. Matty has charge of the preliminary work.

Twin City General Electric Company, Ironwood, Mich.—During 1910 this company expects to complete a 6-mile extension between Ironwood and Bessemer. F. H. Pearce, purchasing agent.

Twin City & Lake Superior Railway, Minneapolis, Minn.—It is stated that this company will soon issue $2,500,000 in bonds for the completion of its proposed 130-mile electric railway which is to extend from Minneapolis to Duluth and Superior. About 60 miles of the route have been graded. L. N. Loomis, Minneapolis, president.

Albany, N. Y.—The United Traction Company has been granted an extension of one year, until Jan. 1, 1911, to complete the construction of its street railway across Arbor Hill from Clinton Avenue and Ten Broeck Street.

Hornell-Bath Interurban Railway, Hornell, N. Y.—The Public Service Commission of the Second District has granted a certificate of public convenience and necessity to this company, which proposes to build an electric street railway between Hornell and Bath, passing through Howard, Fremont and Avoca, a distance of 24 miles. [E. R. J., Dec. 4, '09.]

Interborough Rapid Transit Company, New York, N. Y.—This company has contracted with the American Bridge Company for 500 tons of structural steel for elevated and station work.

Cincinnati (Ohio) Traction Company.—This company will add 2 miles of new track to its line during 1910. C. Burckmyer, purchasing agent.

***Salem, Ohio.**—Press reports state that Peter McCave, Greenford, is interested in a proposition to build an electric railway from Salem to Youngstown by way of New Albany, Greenford, Calla, Canfield and Lanterman's Falls. It is the intention to build a branch from near Gettysburg south to Washingtonville, Leetonia, Franklin Square and Shelton's Grove to Lisbon. The project also includes a belt line for Salem.

Zanesville & Meigs Valley Traction Company, Zanesville, Ohio.—This company announces that it will place the contract for the construction of its projected railway from Zanesville to Beverly on May 1, 1910, and work will be commenced on the new line within 15 days thereafter. The preliminary survey has been completed. In addition to the route as at first proposed, the company will build an 8-mile branch to McConnelsville. The main line will begin at Eighth and Marietta Streets in Zanesville and run direct to Beverly, a distance of 41 miles. The principal towns on the run are: Duncan Falls, Museville, Rowland, Cloud, Unionville and Mill Grove. The maximum grade is but 1½ per cent, while the maximum curve is 7 deg. The company proposes to build a 24-mile extension from Beverly to Parkersburg, but this has not yet been surveyed and will be a matter for later consideration. H. D. Blodgett, general manager. [E. R. J., Sept. 4, '09.]

Lawton & Fort Sill Electric Railway, Lawton, Okla.—It is stated that this company has decided to issue bonds to the amount of $150,000 in order to meet the expenditures, both in the construction of the proposed electric railway through Lawton and connecting Lawton with Fort Sill and Medicine Park. [E. R. J., Dec. 11, '09.]

Oklahoma, Kansas & Missouri Interurban Railway, Miami, Okla.—This company contemplates the construction of 105 miles of new line during 1910 to extend from Joplin to Bartlesville. The railway will also touch Hattenville, Miami, Spring City, Peoria, Grapaw, Blue Jacket and Welsch. Franklin M. Smith, president. [E. R. J., April 17, '09.]

London & Lake Erie Railway & Transportation Company, London, Ont.—It is announced that this company, which is the successor to the Southwestern Traction Company, will expend $150,000 for improvements to the system, the nature of which has not been disclosed. [E. R. J., Nov. 13, '09.]

***Arnprior & Pontiac Electric Railway, Ottawa, Ont.**—This company has been organized for the purpose of building an electric railway from Campbells Bay, Que., via Chats Falls and Graham's Bay, near Ottawa, Ont., to High Falls, 75 miles. Arthur H. Brice, Ottawa, chief engineer.

Port Arthur & Fort William Electric Railway, Port Arthur, Ont.—An extension 4 miles in length will be built during 1910 by this company. N. C. Pilcher, purchasing agent.

***Waterloo, Ont.**—J. S. Clarke recently submitted a proposal to the County Council of Waterloo for the building of an electric railway from Port Dover to Brantford, passing through Ayr and Roseville to Berlin and Waterloo, with branches to other municipalities in the county.

***Johnstown & Greensburg Electric Railway, Latrobe, Pa.**—This company, which proposes to build a 45-mile electric railway between Johnstown and Greensburg, announces that it has secured nearly all the rights of way over the section of the route between Greensburg and Derry and more than half obtained between Derry and Johnstown. It is stated that the Fetterman Engineering Company, Johnstown, will begin work shortly on the location of the route through Sang Hollow, from Morrellville to Seward. The promoters of the new line are said to be identified with the Indiana County Railways. It is to be a high-speed line, and is to carry both passengers and freight. The line will serve a population of about 131,000. The grades will not exceed 4 per cent and the curvatures 5 deg. Officers: Warner Utts, Derry, president; W. E. Hildebrand, Seward, vice-president; R. G. Lohr, Latrobe, secretary; H. H. Smith, Latrobe, treasurer.

Slippery Rock & Grove City Railway, Slippery Rock, Pa.—This company announces that it will receive bids on Jan. 10 for the construction of its proposed 9-mile street railway between Slippery Rock and Grove City. Gasoline motor cars will be operated. [E. R. J., Dec. 4, '09.]

Chambersburg, Greencastle & Waynesboro Electric Railway, Waynesboro, Pa.—The directors of this company have decided to issue bonds to the amount of $400,000, and among the improvements projected is an extension of about 4 miles from Pen-Mar via Highfield to Blue Ridge Summit, and possibly to Monterey Springs.

Nashville & Adairville Railway, Nashville, Tenn.—S. C. Robb, Nashville, one of the incorporators of this company, has announced that if the people along the line of the proposed railway would subscribe stock to the amount of $100,000 the line would be immediately located and contracts for its construction awarded. It will be standard gage, with 70-lb. steel rails, the ultimate purpose being to convert it into a steam road and extend it from Adairville, by way of Morgantown, to Leitchfield, thus by a connection with the Illinois Central Railroad making a second line from Nashville to Louisville. The line from Nashville to Adairville will be by way of Goodlettsville, White House, Cross Plains and Orlinda. [E. R. J., Dec. 8, '09.]

City & Elm Grove Railroad, Wheeling, W. Va.—This company expects to build 1½ miles of new track, using 7-in. 70-lb. and A. S. C. E. 85-lb. T-rails. Contracts for this work will be placed during the next four weeks. J. W. Smith, general manager.

Seattle-Everett Interurban Railway, Seattle, Wash.—During 1910 about 4 miles of new track will be constructed by this company between Seattle and Everett. George Newell, purchasing agent.

SHOPS AND BUILDINGS

Nelson (B. C.) Electric Tramway.—This company will erect a new car house at Nelson to be 28 ft. x 80 ft. in size. Alex. Carrie, architect.

Pacific Electric Railway, Los Angeles, Cal.—Plans are being prepared by this company for the construction of a reinforced concrete station in Long Beach to cost $135,000.

Augusta-Aiken Railway & Electric Company, Augusta, Ga.—This company has purchased a site, 175 ft. x 90 ft., on which to erect freight and passenger terminals. The building will be two stories high and will be 165 ft. x 90 ft. The structure will be built of brick and will cost $20,000.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company is considering plans for the construction of a terminal station to cost $250,000 on the corner of Eighth Street and Cherry Street, Terre Haute.

Corsicana (Tex.) Traction Company.—This company is building a reinforced concrete car house in Corsicana. J. W. Carpenter, president.

Port Arthur (Tex.) Traction Company.—This company will begin work at once on a new car house to be located at Houston Avenue and Seventh Street, Port Arthur. The building will be built of brick, with a concrete roof, and will be 80 ft. x 120 ft. in size. It will have a storage capacity of 12 cars and will contain a repair shop, the general offices of the company, together with a room for its employees, which will be fitted with all conveniences. The contract has been let.

POWER HOUSES AND SUBSTATIONS

Nelson (B. C.) Electric Tramway.—This company will erect a new substation in Nelson.

Denver City Tramway, Denver, Col.—This company has begun work on the extension to its Platte Street power plant. The addition will be 140 ft. x 110 ft. in size. When completed the whole building will be 429 ft. x 100 ft. The boiler room will contain six 750-hp boilers.

Cedar Rapids & Marion City Railway, Cedar Rapids, Ia.—This company has recently placed a contract with the Allis-Chalmers Company for a 22-46-48 cross-compound engine and 800-kw railway generator, also with the Erie City Iron Works for a 500-hp water-tube boiler.

People's Railway, Dayton, Ohio.—It is stated that this company is considering plans for the erection of a power plant in Dayton, 250 ft. x 180 ft., to cost $125,000.

Winchester & Washington Railway, Winchester, Va.—This company is said to have engaged P. O. Keilholtz, Baltimore, Md., to prepare plans and specifications and superintend the construction of a steam power plant at Millville as auxiliary to its water power plant. The company proposes to install a 1500-kw plant, 2200 volts, three phase, 60 cycles, for electric light and power purposes; also for distribution through Jefferson and Berkeley Counties, West Virginia, and through Clarke and Frederick Counties of Virginia. It is stated that contracts will be awarded on Jan. 15. The new plant is estimated to cost $100,000.

Manufactures & Supplies

ROLLING STOCK

Capital Beach & Milford Railroad, Lincoln, Neb., will buy 10 double-truck summer cars for park service.

Montreal (Que.) Street Railway will have 25 all-steel cars built by the Ottawa Car Company delivered at once.

Belton & Temple Traction Company, Temple, Tex., will place an order for one semi-convertible passenger car during 1910.

Morgantown & Dunkard Valley Railroad, Morgantown, W. Va., contemplates ordering four passenger and two freight cars during 1910.

Connecticut Valley Street Railway, Greenfield, Mass., will order in 1910 one double-truck flat car, 40 ft. long, with vestibuled ends, to be equipped with four motors.

Kansas City-Western Railway, Leavenworth, Kan., will buy two large interurban cars early in 1910 to seat 60 people. The cars are to be equipped with G.E. multiple type in control and G.E.-73 motors.

New York & Long Island Traction Company, Hempstead, N. Y., has bought 10 sets quadruple motor equipment from Westinghouse Electric & Manufacturing Company and 10 sets of trucks from The J. G. Brill Company.

Wabash & Northern Indiana Traction Company, Warsaw, Ind., mentioned in the Electric Railway Journal of Nov. 20, 1909, as having ordered seven cars from Jewett Car Company, has drawn the following specifications for these combination passenger, smoking and baggage cars:

Seating capacity.....60	Car trimmings.....bronze
Weight.....30,000 lb.	Curtain fix....Curtain S. Co.
Wheel base..... 6 ft. 6 in.	Curtain material...Pantasote
Length of body....47 ft. 7 in.	Fenders ..... Pilot
Length over vestibule .....52 ft. 5 in.	Gongs .....12 in.
Length over all....53 ft. 9 in.	Heaters.....Peter Smith
Width inside..... 8 ft. 6 in.	Headlights.....G.E. Form B
Width over all..... 9 ft. 3 in.	Roofs.....steam type
Height inside..... 8 ft. 2 in.	Sanders .....Nichols-Lintern
Height sill to trolley base .....10 ft.	Seats.....Hale & Kilburn
Height rail to sills.. 3 ft. 4 in.	Step treads.....Am. Safety
Body .....wood	Trolley retrievers, Knutson No. 2
Underframe..wood and steel	Trucks.....Am. Loco. MCB
Air brakes.....West.	Varnish .....Hildreth
Brakes .....Peacock	Vestibule.....rear only
	Fire extinguisher...Eastman

TRADE NOTES

Hale & Kilburn Manufacturing Company, Philadelphia, Pa., will move its New York office from 33 Union Square to 39 Union Square on Feb. 1, 1910.

G. E. Watts, Atlanta, Ga., well known among electric railway men throughout the South, has been appointed southern representative of the R. D. Nuttall Company, Pittsburgh, Pa.

Elliott Brothers, Lewisham, London, S. E., England., have issued a pamphlet describing the Wimpenis accelerometer and grade measurer. This instrument measures acceleration, retardation as in braking, retardation due to frictional resistance when coasting, braking efficiency, tractive effort at different speeds, grades, etc.

Central States Tie & Gravel Company, Terre Haute, Ind., has been incorporated to engage in business of furnishing ties and gravel for railway track construction. The officers are: President, F. C. Meredith; treasurer, W. H. Harris; secretary and manager, L. E. Holderman. The active conduct of the business will be in the hands of Mr. Holderman, who has had a wide experience in electric railway work.

Jewett Car Company, Newark, Ohio, advises that the fire which occurred at its plant on Dec. 27, 1909, did not prove as serious as first reported in the newspapers. One mill and a lumber shed were destroyed but the company's manufacturing work has not been delayed in the least. In fact, the capacity of the shops will be doubled in a few weeks when the company receives some new motor-driven machines.

A. Origet & Company, 27-29 West Twenty-third Street, New York, N. Y., desire export prices on the following classes of steel rails delivered F. O. B. Havre or Boulogne,

France: T-rails weighing 12, 15, 18, 20 kg per meter (24, 30, 36, 40 lb. per yd.); grooved or girder rails weighing 38, 40, 45 kg per meter (76, 80, 90 lb. per yd.). The bids should include prices for all metal appurtenances such as spikes, bolts and fish-plates.

Frederic H. Keyes, Boston, Mass., formerly general manager of the Robb-Mumford Boiler Company, has associated himself with Messrs. Timothy W. Sprague, Henry Docker Jackson, and others, to carry on a general consulting engineering business under the name of Timothy W. Sprague, Frederic H. Keys, Henry D. Jackson & Associates, 88 Broad Street, Boston, Mass. The new firm proposes to make complete reports, investigations, and furnish designs and supervision for power plants for lighting, railway or industrial purposes; also mining reports, investigations and power plants.

Willans & Robinson, Rugby, Eng., have been awarded the contract for the turbines for the extension of the Sydney (N. S. W.) Tramway, and Dick, Kerr & Company have been awarded the contract for the alternators. Two units of 4000 kw each, running at 750 r.p.m., are to be installed. The prices originally submitted included a 400-kw unit in addition to the two 4000-kw units. They follow: British Thomson-Houston turbines, $161,770; British Westinghouse turbines, $170.035; Oerlikon turbines, $179,435; Willans & Robinson turbines, $203,450; Escher-Wyss turbines, $210,-875; Willans & Robinson turbines, Dick, Kerr alternators, accepted at $222,735.

Eppinger & Russell Company, New York, N. Y., in addition to its creosoting works now in operation at Long Island City, N. Y., has completed its new plant in Jacksonville, Fla. The new works are said to be the largest creosoting plant on the Atlantic Coast and are fully equipped with the most modern and best appliances and machinery, thus enabling work to be done at a minimum cost. In addition the plant is so located that rail or vessel shipments can be made to all points, and material can be obtained at the lowest figures. The company is prepared to accept orders for creosote paving blocks, piling, lumber and ties. Its experience in creosoting covers a period of 32 years.

P. O. Keilholtz, who has been consulting engineer for the railway and lighting properties of Baltimore, Md., for more than 20 years, has opened an office as consulting engineer in the Continental Building of that city. Mr. Keilholtz has been closely identified with most of the important electrical work planned and constructed in Baltimore during the last 20 years. He is a graduate of the Engineering Corps of the United States Naval Academy, and after resigning from the navy he took a post-graduate course at the John Hopkins University. Besides having an intimate knowledge of the construction of steam and hydraulic apparatus, he is eminently qualified to take the products of different manufacturers and combine them into a complete and efficient operating plant. Mr. Keilholtz has just been commissioned to prepare the plans and supervise the construction of a $100,000 power plant at Milville, Va., for the Winchester & Washington City Railway.

Ohio Brass Company, Mansfield, Ohio, has appointed the Holabird-Reynolds Company, San Francisco; Holabird-Reynolds Electric Company, Los Angeles, and Holabird Electric Company, Seattle, exclusive sales agents for its O-B Hi-Tension porcelain insulators in the States of California, Oregon and Washington. Pierson, Roeding & Company, with offices at San Francisco, Los Angeles and Seattle, will continue to be the Ohio Brass Company's exclusive sales agents for overhead material, rail bonds, car equipment specialties and catenary material, including such special porcelain insulators as are used in catenary construction. The Hendrie & Bolthoff Manufacturing & Supply Company, Denver, Col, has been appointed as special sales agents for the mining trade in Colorado, Wyoming, Utah, Arizona and New Mexico, as well as from certain railway properties located in the mining districts of this territory. The business of railway and mining companies located at Salt Lake City, Denver, Cheyenne, Colorado Springs, Pueblo and Telluride, will be, as heretofore, handled by its regular salesman, F. V. Cook, who will also give special attention to the sale of Hi-Tension insulators in all five of the States mentioned. J. C. Barr, 84 State Street, Boston, Mass., has been appointed Boston sales agent for the Ohio Brass Company and will solicit business in all of the New England States with the exception of Connecticut. R. G. Campbell, of the New York office, will continue to visit the trade in Connecticut in addition to his other territory.

Railway Business Association, New York, N. Y., announces the appointment by George A. Post, president of the association, of the following executive members, all of whom have accepted: E. L. Adreon, vice-president, American Brake Company, St. Louis, Mo.; W. E. Clow, president, James B. Clow & Son, Chicago, Ill.; J. S. Coffin, president, Franklin Railway Supply Company, New York City; Oliver Crosby, president, American Hoist & Derrick Company, St. Paul, Minn.; John F. Dickson, president, Dickson Car Wheel Company, Houston, Tex.; W. C. Dodd, president, National Lock Washer Company, Newark, N. J.; Henry Elliot, president, Elliot Frog & Switch Company, East St. Louis, Ill.; Alba B. Johnson, vice-president and treasurer, Baldwin Locomotive Works, Philadelphia, Pa.; A. M. Kittredge, president, Barney & Smith Car Company, Dayton, Ohio; W. B. Leach, general manager and treasurer, Hunt-Spiller Manufacturing Corporation, Boston, Mass.; E. B. Leigh, president, Chicago Railway Equipment Company, Chicago, Ill.; W. H. Miner, president, W. H. Miner Company, Chicago, Ill.; Alfred A. Pope, president, National Malleable Castings Company, Cleveland, Ohio; Col. H. G. Prout, vice-president, Union Switch & Signal Company, Swissvale, Pa.; James Viles, treasurer, Buda Company, Chicago, Ill.; W. H. Whiteside, president, Allis-Chalmers Company, Milwaukee, Wis.; W. P. Worth, treasurer, Worth Brothers Company, Coatesville, Pa.; J. H. Schwacke, manager and secretary, William Sellers & Company, Philadelphia, Pa.

ADVERTISING LITERATURE

Wheel Truing Brake Shoe Company, Detroit, Mich., has issued a decorated folding postal, conveying the compliments of the season. There is, of course, a reminder of the efficiency of the company's brake shoes at all seasons of the year.

Western Electric Company, New York, N. Y., has published a new issue of Bulletin No. 5131, which describes in detail type IL motors and generators. A new issue of Bulletin No. 5132 has been published, describing type ELC interpole motors.

The J. G. Brill Company, Philadelphia, Pa., in *Brill's Magazine* for December, 1909, prints the twelfth of the series of articles describing the conditions which govern the type of car for city service. Portland, Ore., is the city considered. Other descriptions of special interest are one-man, pay-as-you-enter cars for Brunswick, Ga., and the tramway system of Shanghai, China.

Joseph Dixon Crucible Company, Jersey City, N. J., has published the eleventh edition of "Graphite as a Lubricant." Every two or three years the company republishes "Graphite as a Lubricant." The present edition is more compact than its predecessor, despite the fact that large type with liberal margins obtains throughout the 64 pages of the book. A copy of "Graphite as a Lubricant" will be sent free on request.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued the Westinghouse diary for 1910. This well-arranged book has been published annually for six years. The edition for 1910 has been enlarged, however, and the scope of its contents increased. An alphabetical index to the contents is printed on the fifth and sixth pages. The cover is of brown, flexible leather and bears the Westinghouse imprint.

Goldschmidt-Thermit Company, New York, N. Y., in the contents of *Reactions* for the fourth quarter of 1909, has included the following articles: "Thermit Repairs Sanctioned by British Corporation for the Survey and Registry of Shipping," "Tests of Thermit Welds," "Australian-Thermit Company, Ltd.," "Pulley Repaired in Wilds of North Carolina," "Chromium: Its History and Application," "Welding Special Work in Los Angeles." The text is accompanied by many excellent illustrations, one of which, a full page, shows a fly-wheel being hauled into position for welding a break in the rim. This issue of *Reactions* contains the index to Volume II.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit. ‡ Includes Ferry earnings up to Apr. 1, 1909.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Nov. '09	175,743	99,973	75,770	43,400	32,370
	1 " " '08	151,934	87,976	63,958	44,012	19,947
	11 " " '09	1,994,729	1,088,502	906,227	480,856	425,371
	11 " " '08	1,730,019	1,000,276	729,743	482,533	247,210
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Oct. '09	35,672	19,608	16,064	8,469	7,595
	1 " " '08	31,758	17,766	13,991	9,026	4,965
	12 " " '09	401,186	225,640	175,546	100,468	75,078
	12 " " '08	358,466	205,398	153,067	97,139	55,928
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Sept. '09	29,531	18,094	11,437	9,037	2,400
	1 " " '08	27,662	15,392	12,270	9,024	3,246
	9 " " '09	260,252	148,101	112,151	81,466	30,685
	9 " " '08	238,796	140,394	98,402	74,827	23,575
CHARLESTON, S. C. Charleston Con.Ry., Gas & Elec. Co.	1m., Nov. '09	65,368	40,807	24,561	13,917	10,645
	1 " " '08	63,912	40,559	23,353	13,817	9,536
	9 " " '09	580,557	370,715	209,842	125,250	84,592
	9 " " '08	569,663	368,223	201,440	124,175	77,265
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m. Oct. '09	137,563	73,772	63,791	29,413	34,377
	1 " " '08	121,525	67,047	54,484	27,731	26,752
	4 " " '09	618,016	302,383	315,433	117,077	198,357
	4 " " '08	561,555	281,229	280,326	110,758	169,568
Chicago Railways.	1m., Oct. '09	1,109,640	776,748	332,892	.....	.....
	11 " " '08	968,543	677,979	290,564	.....	.....
	10 " " '09	10,244,248	6,755,675	3,488,573	.....	.....
	10 " " '08	9,003,164	.....	.....	.....	.....
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Nov. '09	25,900	15,020	10,880	8,457	2,423
	1 " " '08	22,525	13,483	9,042	8,088	954
	11 " " '09	297,573	151,480	146,093	92,855	53,237
	11 " " '08	272,976	155,787	117,189	88,459	28,730
Lake Shore El. Ry.	1m., Nov. '09	90,705	48,984	41,721	35,393	6,325
	1 " " '08	80,476	47,440	33,036	34,292	†1,206
	11 " " '09	1,020,022	538,429	481,592	379,939	101,653
	11 " " '08	955,364	534,355	421,009	356,252	64,757
DALLAS, TEX. Dallas Electric Corporation.	1m., Oct. '09	147,838	80,397	67,441	27,471	39,970
	1 " " '08	134 140	73,767	60,373	27,554	32,819
	12 " " '09	1,291,164	809,900	481,264	338,780	142,484
	12 " " '08	1,160,604	778,414	382,189	352,151	30,039
DETROIT, MICH. Detroit United Railway.	1m., Nov. '09	676,482	440,750	235,732	*157,919	88,424
	1 " " '08	570,711	*374,685	196,026	132,819	69,704
	11 " " '09	7,351,390	4,614,783	2,736,607	*1,723,399	1,145,342
	11 " " '08	6,508,894	*4,182,788	2,326,106	1,485,058	898,966
DULUTH, MINN. Duluth-Superior Trac. Co.	1m., Nov. '09	85,509	47,403	38,106	20,757	17,349
	1 " " '08	76,835	47,999	28,836	16,701	12,135
	11 " " '09	896,346	525,383	370,963	209,603	161,360
	11 " " '08	810,836	494,510	316,326	202,368	113,958
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Nov. '09	177,712	89,840	87,872	49,942	37,930
	1 " " '08	170,739	88,122	82,617	48,800	33,817
	11 " " '09	1,850,565	1,001,050	849,515	544,544	304,971
	11 " " '08	1,837,239	960,163	877,076	534,274	342,802
EL PASO, TEX. El Paso Elec. Co.	1m., Oct. '09	58,347	35,712	22,635	8,421	14,215
	1 " " '08	44,913	33,544	11,369	7,107	4,262
	12 " " '09	588,012	368,245	219,767	95,691	124,076
	12 " " '08	528,654	377,808	150,846	83,920	66,916
FAIRMONT, W. VA. Fairmont & Clarksburg Trac. Co.	1m., Nov. '09	37,032	15,749	21,283	.....	.....
	1 " " '08	30,924	12,373	18,551	.....	.....
	11 " " '09	388,690	149,413	239,277	.....	.....
	11 " " '08	353,311	132,971	220,340	.....	.....
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Oct. '09	122,806	70,386	52,420	.....	.....
	1 " " '08	113,391	59,931	53,459	.....	.....
	10 " " '09	1,161,156	678,925	482,231	.....	.....
	10 " " '08	1,092,090	613,400	478,690	.....	.....
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Oct. '09	135,697	64,595	71,102	16,190	54,913
	1 " " '08	119,299	56,103	63,195	15,187	48,008
	12 " " '09	1,236,545	684,563	551,982	200,973	351,009
	12 " " '08	1,057,761	614,110	443,651	185,862	257,788
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Oct. '09	102,014	64,652	37,362	22,486	14,877
	1 " " '08	94,348	52,842	41,506	20,192	21,314
	12 " " '09	1,198,064	703,830	494,234	259,492	234,743
	12 " " '08	1,064,411	619,700	444,711	241,760	202,950
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Nov. '09	60,227	46,325	13,902	.....	.....
	1 " " '08	56,000	44,951	11,049	.....	.....
	11 " " '09	687,747	509,519	178,228	.....	.....
	11 " " '08	647,214	511,853	135,361	.....	.....
HOUGHTON, MICH. Houghton County Tr. Co.	1m., Oct. '09	26,543	13,070	13,473	6,216	7,258
	1 " " '08	21,654	10,941	10,712	5,380	5,333
	12 " " '09	315,393	170,131	145,262	71,645	73,617
	12 " " '08	258,708	146,599	112,110	57,598	54,512
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Oct. '09	41,567	22,136	19,430	9,452	9,978
	1 " " '08	38,509	21,144	17,365	9,124	8,240
	12 " " '09	468,002	265,784	202,219	112,187	90,031
	12 " " '08	419,405	250,706	168,699	109,214	59,484
MILWAUKEE, WIS. Milwaukee Elec.Ry. & Lt. Co.	1m., Nov. '09	383,156	188,486	194,670	112,913	81,75
	1 " " '08	341,602	160,909	180,693	101,056	79,63
	11 " " '09	3,919,653	1,914,554	2,005,098	1,178,518	826,58
	11 " " '08	3,589,995	1,813,479	1,776,515	1,095,286	681,23
Milwaukee Lt., Ht. & Trac. Co.	1m., Nov. '09	118,001	32,607	85,394	65,476	19,91
	1 " " '08	108,378	29,629	78,750	59,057	19,69
	11 " " '09	1,353,010	357,509	995,501	711,712	283,78
	11 " " '08	1,289,118	340,647	948,471	656,210	292,26
MINNEAPOLIS, MINN. Twin City Rapid Transit Co.	1m., Oct. '09	596,963	277,175	319,788	140,251	179,53
	1 " " '08	554,166	265,893	288,273	138,667	149,60
	10 " " '09	5,773,383	2,709,742	3,063,640	1,388,761	1,674,87
	10 " " '08	5,319,968	2,637,918	2,682,050	1,283,789	1,398,26
MONTREAL, CAN. Montreal St. Ry.	1m., Nov. '09	334,871	200,138	134,784	30,785	103,94
	1 " " '08	301,578	180.682	120,896	29,662	91,23
	11 " " '09	688,878	374,873	314,006	61,864	252,14
	11 " " '08	630,186	346,106	284,080	59,842	224,23
NASHVILLE, TENN. Nashville Railway & Light Co.	1m., Nov. '09	149,426	83,181	66,245	33,023	33,22
	1 " " '08	138,598	79,271	59,327	32,507	26,82
	11 " " '09	1,565,101	919,503	645,598	361,329	284,26
	11 " " '08	1,447,946	865,550	582,396	352,127	230,26
NORFOLK, VA. Norfolk & Portsmouth Trac. Co.	1m., Oct. '09	156,540	87,974	68,566	62,416	6,1
	1 " " '08	‡156,796	88,317	68,479	65,376	3,1
	10 " " '09	‡1,592,739	921,337	671,402	645,690	25,7
	10 " " '08	‡1,552,029	923,587	628,442	657,959	†29,5
OKLAHOMA, OKLA. Oklahoma City Ry.	1m., Oct. '09	49,683	27,363	22,320	.....	.....
	1 " " '08	31,199	19,166	12,033	.....	.....
PADUCAH, KY. Paducah Traction & Light Co.	1m., Oct. '09	18,924	11,764	7,160	6,625	5
	1 " " '08	16,706	10,269	6,437	6,690	†2
	12 " " '09	225,608	132,238	93,370	81,726	11,6
	12 " " '08	228,513	136,200	92,313	83,182	9,1
PENSACOLA, FLA. Pensacola Electric Co.	1m., Oct. '09	21,027	12,379	8,648	4,474	4,1
	1 " " '08	18,346	10,432	7,913	4,262	3,6
	12 " " '09	242,539	139,127	103,412	52,077	51,3
	12 " " '08	209,587	148,853	60,734	51,453	9,2
PHILADELPHIA, PA. American Rys. Co.	1m., Nov. '09	235,700	.....	.....	.....	.....
	1 " " '08	219.511	.....	.....	.....	.....
	5 " " '09	1,311,175	.....	.....	.....	.....
	5 " " '08	1,235,732	.....	.....	.....	.....
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Oct. '09	10,253	7,592	2,661	1,75	9
	1 " " '08	9,767	6,216	3,551	2,151	1,4
	10 " " '09	114,156	79,648	34,508	18,102	16,4
	10 " " '08	105,973	75,777	30,196	22,482	7,7
PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Nov. '09	411,001	174,270	236,731	125,019	111,7
	1 " " '08	370,378	165,331	205,047	116,039	89,0
	11 " " '09	4,385,356	2,014,219	2,371,137	1,363,227	1,007,9
	11 " " '08	3,964,880	1,944,563	2,020,317	1,267,936	752,3
ST. JOSEPH, MO. St. Joseph Ry., Lt., Heat & Pwr. Co.	1m., Nov. '09	82,296	42,335	39,961	21,608	18,3
	1 " " '08	75,963	36,777	39,186	20,992	18,1
	11 " " '09	887,467	460,032	427,435	235,209	192,2
	11 " " '08	826,706	419,058	407,648	226,294	181,3
ST. LOUIS, MO. United Rys. Co. of St. Louis.	1m., Nov. '09	927,450	*581,014	346,436	232,107	114,3
	1 " " '08	872,339	*536,636	335,703	233,694	102,0
	11 " " '09	10,193,103	*6,426,687	3,766,416	2,566,006	1,200,4
	11 " " '08	9,682,878	*6,182,030	3,500,848	2,564,872	935,9
SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Oct. '09	733,766	361,636	372,130	.....	.....
	1 " " '08	609,042	336,815	272,227	.....	.....
	10 " " '09	6,190,805	3,709,875	2,680,930	.....	.....
	10 " " '08	5,688,378	3,583,346	2,105,032	.....	.....
SAVANNAH, GA. Savannah Elec. Co.	1m., Oct. '09	50,618	32,973	17,646	17,621	
	1 " " '08	51,071	30,303	20,767	17,578	3,1
	12 " " '09	611,387	394,081	217,306	209,181	8,1
	12 " " '08	591,556	391,942	199,614	206,979	†7,3
SEATTLE, WASH. Seattle Elec. Co.	1m., Oct. '09	544,077	326,201	217,877	102,169	115,7
	1 " " '08	401,935	233,624	168,310	97,084	71,2
	12 " " '09	5,734,623	3,330,894	2,403,729	1,225,881	1,177,8
	12 " " '08	4,453,076	2,631,972	1,821,104	1,067,350	753,7
SYDNEY, N. S. Cape Breton Elec. Co., Ltd.	1m., Oct. '09	23,228	12,237	10,991	5,066	5,9
	1 " " '08	22,166	12,750	9,416	4,955	4,4
	12 " " '09	237,173	141,870	95,303	60,188	35,1
	12 " " '08	252,178	144,874	107,304	59,354	47,9
TAMPA, FLA. Tampa Elec. Co.	1m., Oct. '09	50,759	26,791	23,968	4,623	19,3
	1 " " '08	47,354	30,170	17,184	4,381	12,8
	12 " " '09	586,253	349,110	237,143	56,182	180,9
	12 " " '08	544,966	360,826	184,140	32,151	151,9
TOLEDO, O. Toledo Rys. & Lt. Co.	1m., Oct. '09	239,619	129,719	109,900	75,615	34,2
	1 " " '08	218,261	119,982	98,279	71,953	26,3
	10 " " '09	2,253,254	1,263,769	959,485	727,818	231,6
	10 " " '08	2,086,156	1,139,806	946,350	707,696	238,6

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The Latest Stage of the Cleveland Controversy

With the passage of the ordinance embodying the decisions of Judge Tayler as arbitrator, preparatory to submission to the voters of the city, the Cleveland controversy reaches another stage. Until the referendum is taken the actual settlement of the negotiations between the city and the company remains in abeyance. The proceedings conducted in the presence of Judge Tayler have presaged some such terms of settlement as those that were actually announced so that the final details contain no surprising developments. In brief, the arrangement is based on a recent arbitrary valuation of the property, which did not differ materially in amount from that reported by Messrs. Goff and Johnson, and it allows a fixed dividend return of 6 per cent on the stock and prescribes a maximum and a minimum rate of fare. As it stands before the public for final acceptance or rejection, the plan appears to be based on a determined effort to achieve a low rate of fare, to make the valuation such as will tend to that end and to inject an apparent spirit of fairness into the experiment by permitting a return of 6 per cent on the stock. If the ordinance is accepted by the people of Cleveland there will be a peculiar demonstration of an arbitrary low rate of fare, a predetermined rate of dividend, and a service that must meet the requirements of the fare and dividend conditions prescribed by franchise.

Higher Trolley Voltage

When the poor load factor of the average railway is taken into consideration, power in the great majority of cases is being generated at very fair economy. In some stations there is, of course, great opportunity for improvement, but in many others little reduction in generating cost is to be expected unless some radical change takes place in the art of power generation. This same statement, however, cannot be made in regard to the current after it leaves the power station switchboard. It is here, in a large proportion of the cases, that there is great opportunity for effective savings.

It would be a revelation in many cases to measure and valuate the kw-hours delivered to the cars, and then to compare these figures with those obtained at the generator. To the power station cost must be added not only the losses in transmission from the power station to the substations, but the cost of substation conversion and of low-tension d.c. distribution. This in many cases more than doubles the cost at the switchboard. For instance, in a railway system operating 300 miles of interurban track and serving a territory within a radius of 75 miles from the power station, the cost at the latter point is 4 mills, while at the d.c. feeder panels in the substation the cost is more than 9 mills. It is not difficult to see how this increase in cost occurs. The load factor of an interurban railway substation is nearly always poor, so that with substations of 300 kw capacity there may be a labor charge

of $80 a month to be set against an average output of less than 100 kw.

The solution of this problem for the interurban road is not necessarily single-phase operation, but fewer substations to be made possible by using a higher trolley voltage. Single-phase railways have proved definitely that an overhead construction can be built to handle economically and practically a high trolley potential. Whether the single-phase system or direct current should be adopted in any particular case depends upon a careful study of all the circumstances, including the distribution conditions at the terminals. Even a doubling of the trolley voltage would greatly reduce the number of substations on the average road, and would correspondingly increase the capacity of the substations and improve their load factors.

Oxidized Aluminum for Motor Fields

The use of aluminum wire for transmission purposes is no longer a novelty, but until very lately no advantage had been taken of the great affinity which this conductor has for combining with oxygen to form an insulating film. In the United States the only practical application apparently has been confined to the construction of magnets and induction coils. During the past two years, however, several German railway companies have been testing the availability of oxidized aluminum as a substitute for fiber-insulated copper in making field coils. According to the report of Mr. Paulsmeier to the German Street & Interurban Railway Association as published in this number, the experiments along this line have been successful enough to make the permanent use of oxidized aluminum more than a possibility. In fact, the Hamburg company alone is now using over 150 coils in regular service.

This striking departure in railway motor construction brings up several interesting points. While the impulse to undertake these trials two or three years ago was given by the then high price of copper and the comparative cheapness of aluminum, experience with the new wire has shown that it has other advantages than those of price. Thus the overload ability of a motor with the new coils is limited only by the commutator because there is no cotton insulation to be charred from overheating. A motor with oxidized bare aluminum and with insulating layers between the coils constituting a field, as described by Mr. Paulsmeier, should therefore have no difficulty in operating above the 75 deg. C. hour rating fixed by the A. I. E. E. rules for railway motors with cotton or similar insulation. Short-circuits appear to have been greatly reduced in the new motors for the very reason that they had no wire insulation which could become carbonized by heating. As a railway motor is a piece of apparatus most limited in its dimensions, it was essential also that the aluminum coils should not take up more space than copper coils having the same magnetic flux and internal resistance. The experiments made by the different railway companies showed that this object could be accomplished despite the larger mass of aluminum required, because no other covering than the oxide film was required between adjoining turns of a coil. The most remarkable feature of the aluminum wire construction, however, is the great saving in weight. In the case of the 27-hp to 40-hp motors commonly used in German city railway service the saving amounts to 80 lb. to 100 lb. per motor, as the new coils weigh only one-half as much as the old ones. In this country, where much larger motors are common, the proportionate reduction in weight per motor would be 110 lb. and 172 lb., respectively, for the GE-80 and GE-64 types, and 124 lb. and 150 lb., respectively, for the Westinghouse 93 and 81 types. In any event it is certain that the aluminum field coil deserves serious consideration aside from the question of price, because it promises important improvements in maintenance and weight without involving serious changes in the other parts of the motor.

The Functions of the Purchasing Agent

One of the difficult problems in the organization of a large electric railway is to define the powers which should be exerted by the purchasing agent and engineer respectively in buying supplies. The former, staggered perhaps by the sum total of the requisitions received by him from every department, is inclined to buy in the cheapest market and to keep the stock on hand to a minimum; the latter may be unduly impressed by the commanding importance of his own department and feel that he should have his requisitions filled promptly and on the basis of quality alone.

Most purchasing agents have neither the time nor the training to decide on their own responsibility whether the higher price of an article is justified by its superior quality. The items which they can buy intelligently without instructions from the engineer include mainly such staples as wires and cables, but in these articles the prices of each grade are quite definitely fixed so that the choice resolves itself as to which of half a dozen reliable firms can make the best delivery. In other cases, the purchasing agent, through his superior knowledge of market conditions, can buy specified material from jobbers who sell at less than manufacturers' prices. On the whole, however, the great majority of the apparatus used by a railway cannot be bought on the basis of first cost alone without tempting bidders to a deterioration in quality proportionate to the cutting down of their prices. The engineer who orders a certain grade of line material because he has found it more reliable than any other is justified in rejecting inferior goods even if the patterns are the same, because he is the man who is held responsible for the maintenance of the line. Experience has taught him that the first cost of the equipment is a minor consideration when compared with the expense of repairing break-downs. It is unjust for the engineer, however, to expect that when large quantities of a given article are ordered for the first time the purchasing agent should put the requisition through without calling for competition. In such cases the latter should be furnished with specifications so rigidly drawn that the bidders will have to compete on the basis of both quality and price. Furthermore, if the railway company itself is not equipped to carry out tests on samples of the material submitted, arrangements should be made with some testing laboratory for that purpose. When the same items are called for on re-orders either for stock or emergency purposes, the requisition should be transmitted at once to the successful manufacturer without going again through the expensive and time-consuming process of calling for bids from everybody in the business. The street railway company's buyer should not be like the overzealous purchasing agent of a certain manufacturing company who asks for prices from every foundry in the city whenever a half dozen 6-in. wheels are wanted for the coal conveyor or who circularizes all the hardware dealers when a new wheelbarrow is needed for handling ashes in the boiler room.

Another point about which particular care should be exercised is in buying unfinished parts. Where the finished part varies from the maker's standard, it may be worth while to do the finishing in the railway company's shops, but as a general rule it is not profitable. One purchasing agent, for example, insists on buying square-end bars for the track department and then has them pointed in his shops, although he had been advised several times that the expense of doing this at home is about three times the difference in the manufacturer's price between the square and the pointed bars. It is easy to lose a good deal of money through such wrong-ended economy and it would be well always to get an estimate from the shop superintendent for finishing the journal box or other parts which can be bought in the rough at a lower first cost.

In conclusion, it may be pointed out that the duty of the purchasing agent does not end with the placing of the requisition. It is also his business to follow up the requisition to see that the articles are shipped on the dates promised and delivered to the proper department as soon as they arrive. There is no reason why the department which needs the material should be kept in ignorance of the progress made on its requisitions.

Arbitration Boards in London

Much interest has been aroused abroad in the new plan of the London County Council Tramways for dealing with disputes with employees over questions relating to wages, hours of labor and general conditions of labor, including matters of discipline or management. Reference was made in these columns recently to the employees' committee of the Hudson & Manhattan Railroad which acts as a medium of intercourse between the men and the officers over them, through which suggestions for improvement of the service as well as complaints are presented for consideration. The London plan of so-called conciliation boards is based on somewhat similar principles. It has been approved by the Board of Trade and ratified by an almost unanimous vote of the employees.

Four sectional conciliation boards and one central board have been created. The sectional boards are made up of an even number of employees and representatives of the County Council elected for a term of three years. The central board is made up of an even number of representatives from each party on each of the sectional boards. Sectional board No. 1 is composed of representatives of the motormen and conductors, together with the chief officer of tramways, who sits on each of the sectional boards, and the tramways traffic manager. Sectional board No. 2 is drawn from the shop men and depot inspectors and repairmen, and the rolling stock superintendent represents the Council on it. The power house, substation and line employees are represented on board No. 3, which also includes the tramways electrical engineer. The fourth sectional board is made up of representatives from the track and roadway department and includes also the engineer of permanent way.

Each sectional board considers only questions affecting employees in the departments represented thereon. Before a sectional board can consider any proposal from the employees for a change in wages, hours of labor or other conditions an application for such change must be made to the chief officer of tramways and by him referred to the proper sectional board if he is not willing to grant the request voluntarily. When the Council proposes to make any change involving a reduction in wages or increase in hours a notice is to be posted for a reasonable time where it can be seen by all employees affected. If there is any objection to the change the employees may request that the matter be referred to the proper sectional board.

The sectional boards are to meet not oftener than every two months. Their decisions are subject to appeal to the central board either by the Council or by the employees, or if any board is unable to agree, the question under consideration must be referred to the central board for a decision. Any decision by a sectional board from which there is no appeal to the central board is binding and no decision which has been accepted can be reopened within a year. This will prevent any unnecessary repetition in the work of the board, which otherwise might be kept busy considering the same complaints over and over again.

The decisions of the central board likewise are open to an appeal to a single arbitrator either by the Council or the employees, or if the central board fails to agree an arbitrator may be appointed by mutual consent of both sides. If an arbitrator cannot be selected by mutual agreement of the central board, the Board of Trade, representing the British Government, is authorized to make the appointment. The arbitrator's decision is final and binding on both sides and the expense of the arbitration proceedings is to be borne by the Council and the employees in such proportion as the arbitrator may determine.

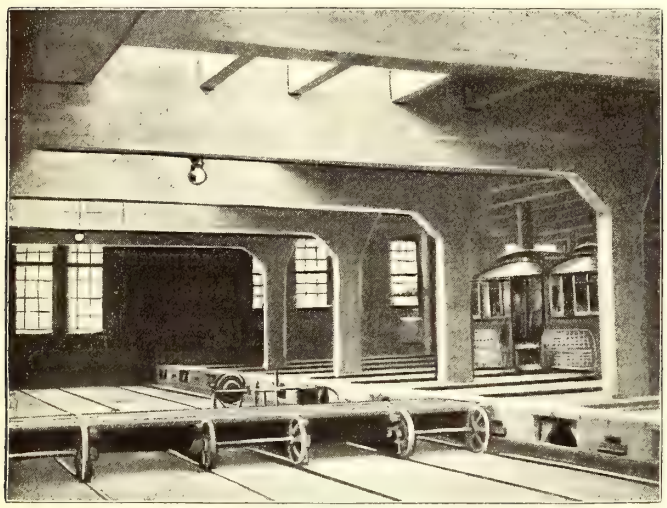
The plan bears a close resemblance to the modern judiciary system of trial and appellate courts, including even the apportionment of the costs of bring the causes to trial. Just as the lower branches of the courts of law are divided into criminal, civil and probate divisions so the sectional boards are composed of representatives from the different departments, each familiar with the special conditions which prevail. Motormen and conductors do not pass upon the merits of questions affecting men in the track department or vice versa. The court of last appeal is the authorized representative of the Board of Trade, or, in other words, the British Government, and in England the respect for authority is profound. Of course the plan is designed especially for a municipal railway and its success depends on the integrity of both the employees and the Council in living up in good faith to the spirit of the agreement and submitting gracefully to adverse decisions when given. No power except that of public opinion can compel obedience to the provisions of such a voluntary arbitration agreement.

The plan is particularly interesting for two reasons. One is the appeal provided to the general government, as represented by the Board of Trade. This is perhaps a logical result of the municipal control of public and semi-public utilities, now so general in Great Britain, and in this respect conditions differ from those in this country where the ideas of individual activity and responsibility are predominant.

The other principal point in the proposed arrangement is that the provisions of the agreement expressly exclude from consideration in the manner described questions of discipline and management. But to prevent the very disagreements which brought the plan into existence, we believe this line must be sharply drawn and closely guarded against trespass. Matters of discipline and conditions of labor are often very closely allied, but all will agree that the management of a street railway, which is entrusted with the responsibility of its operation, must be the sole judge of the acts of the employees. Discipline implies supreme authority and power to punish for cause. If this power is weakened by the possibility of reversal of judgment by some outside arbitrator, discipline would soon cease to exist.

NEW CAR HOUSE OF THE CAPITAL TRACTION COMPANY, WASHINGTON, D. C.

The Capital Traction Company, Washington, D. C., now has in use a new car house built last summer at Eighth and M Streets S. E., opposite the entrance to the Navy Yard. Three lines, including the Navy Yard-Georgetown line, terminate at this car house, and facilities have been provided for making light repairs and inspections, as well as trainmen's quarters, receivers' cages and superintendent's office. The building is unique in that it is designed to ultimately have two floors over



Washington Car House—Transfer Table in New Section

the entire area, the second floor to be used for storing cars out of service. It occupies an entire block, and is 251 ft. x 289 ft. 10 in. in dimensions. Reinforced concrete construction on the Johnson system has been used throughout for the pit walls, columns, roof girders and slabs. The walls are of red clay brick outside and white sand lime brick inside. A wooden-frame, brick-walled car house, 97 ft. wide and containing nine storage tracks formerly occupied part of the block, and the walls of this old structure have been retained in the enlarged building, as they were high enough originally to accommodate two floors. The concrete pits, second floor and roof, however, are new, and were designed to be uniform with those in the new section of the house adjoining.

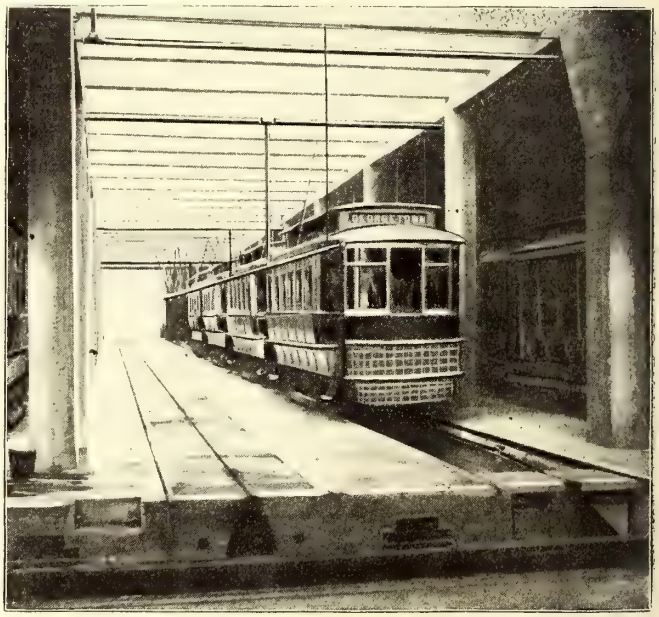
The house is of the transfer table entrance type, which is well adapted to underground conduit operation because of the saving over the cost of complicated slotted special work. The streets surrounding the car house on three sides are narrow and a track entrance would have required the sacrifice of as much or more storage space within the building lines as the single transfer table pit. A loop running track around the entire block allows unrestricted movement of through cars, which turn at this point, and on three sides of the building a second loop track has been built inside of the running track. The two entrance tracks at each end of the building turn out from this inside loop track. The inside loop track serves to hold cars awaiting their turn to be run into the car house, and also removes all entrance track switches from the outside loop or running track.

Two conduit entrance tracks run through the house just west of the partition wall. All the other tracks on the ground floor of both sections of the house have open pits below them with the exception of the tracks next to the partition wall on each side and the two tracks next to the old east wall, which have concrete flush floors, and are used for storage of trailer cars. Between the transfer table pit and the north wall of the house all the tracks are on a 2 per cent grade, descending toward the transfer table. Cars are run in on the transfer table, which is spotted opposite the desired track, and are then started from the table under their own power for a run up the 2 per cent grade. It is seldom necessary to attach the pit leads to the plows in order to run the cars even to the extreme end of the house. The light trailers are pushed off the table by hand. In getting cars out of the house they are allowed to drop down to the transfer table by gravity. Along the south wall of the house are two short pit repair tracks in the old house and nine pit tracks and two surface tracks in the new section. These short tracks are all on level grade. The total storage space in both sections is sufficient to accommodate 142 of the company's new standard double-truck cars, 43 ft. long over all. The first floor of the old section will hold 34 cars, and the second floor 40 cars. The first floor of the new section will hold 68 cars, and when the second floor is added at some future time 70 cars can be stored there. A larger number of the old single-truck motor and trail cars, of course, can be stored in the building, as long as they are kept in service.

The second floor of the old section contains eight long surface storage tracks and seven short tracks, all on a level grade. It is served with a transfer table running in a pit, which will ultimately be extended across the present roof of the new section when a second floor is added. The transfer table is reached by an incline track along the east wall, entering the building from the street at the north end, and rising on a 6.4 per cent grade. The entrance track conduit is continued for a distance of 32 ft. into the building, and terminates in a plow pit, beyond which the incline track has a flush reinforced concrete floor between and outside of the rails. Motor cars will be run up the grade under their own power by making jumper connections, the same as when on the pit tracks. The incline is supported by reinforced concrete columns on the inside and by the outside wall, into which the ends of the cross-girders are gained.

REPAIR BAY

The repair bay, for making running repairs, is located in the south end of the old section adjoining the superintendent's



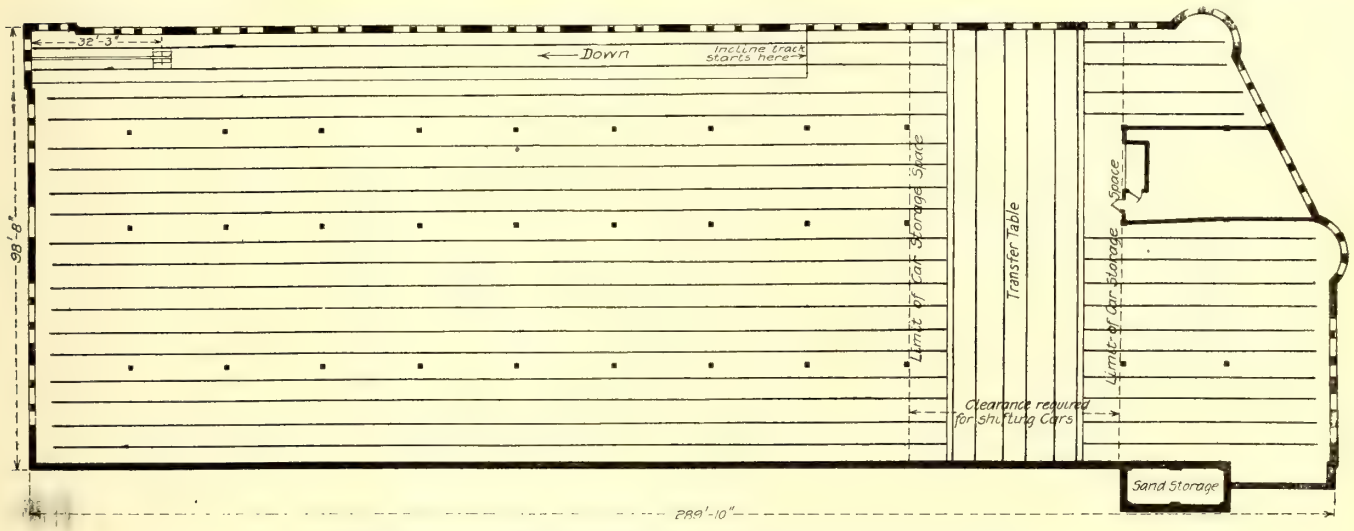
Washington Car House—One Bay in New Section, Showing Aisle Sprinklers

office and trainmen's quarters. It contains two tracks 40 ft. long and spaced 12 ft. center to center, which are supported in an open pit 5 ft. deep on reinforced concrete pillars 10 in. x 12 in. at the top. The shop floor is level with the top of the rails. Adjoining the shop, but separated from it by fire walls, is an oil room 13 ft. 6 in. x 21 ft. 6 in. Above the oil room, on a mezzanine floor, is a sand-drying and dry-sand storage room. On the second floor, immediately above the dry-sand storage room, is a wet-sand storage space, and on the roof above this is a 35,000-gal. water tank connected to the sprinkler system. The dry sand is drawn by gravity through a spout leading down to

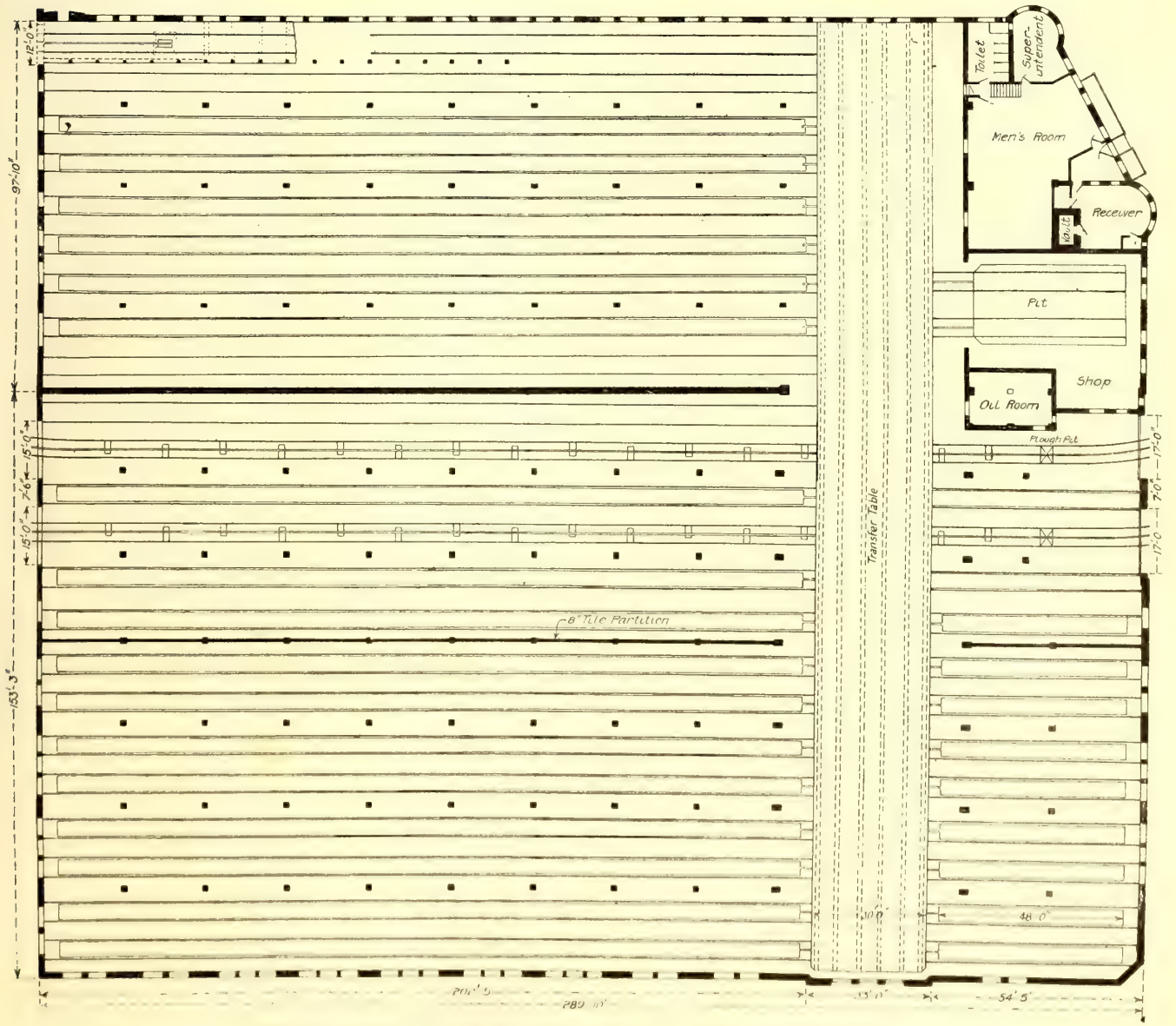
the ground floor alongside the easterly entrance track. The sand boxes on outgoing cars can be filled from this spout with the minimum of labor.

OFFICES AND TRAINMEN'S QUARTERS

The offices are located on the ground floor in the southeast corner of the old section. The entrance is through a vestibule, opening off of which is the receiver's office. Beyond the vestibule is a large men's room. The superintendent's office is in the corner of the building and has a projecting bow window, from which a view north on Eighth Street can be had. A well-appointed toilet room adjoins the superintendent's office. From the men's room a stairway leads up to the second floor, and



Washington Car House—Plan of Second Floor of Old Section



Washington Car House—First Floor Plan of Old and New Sections

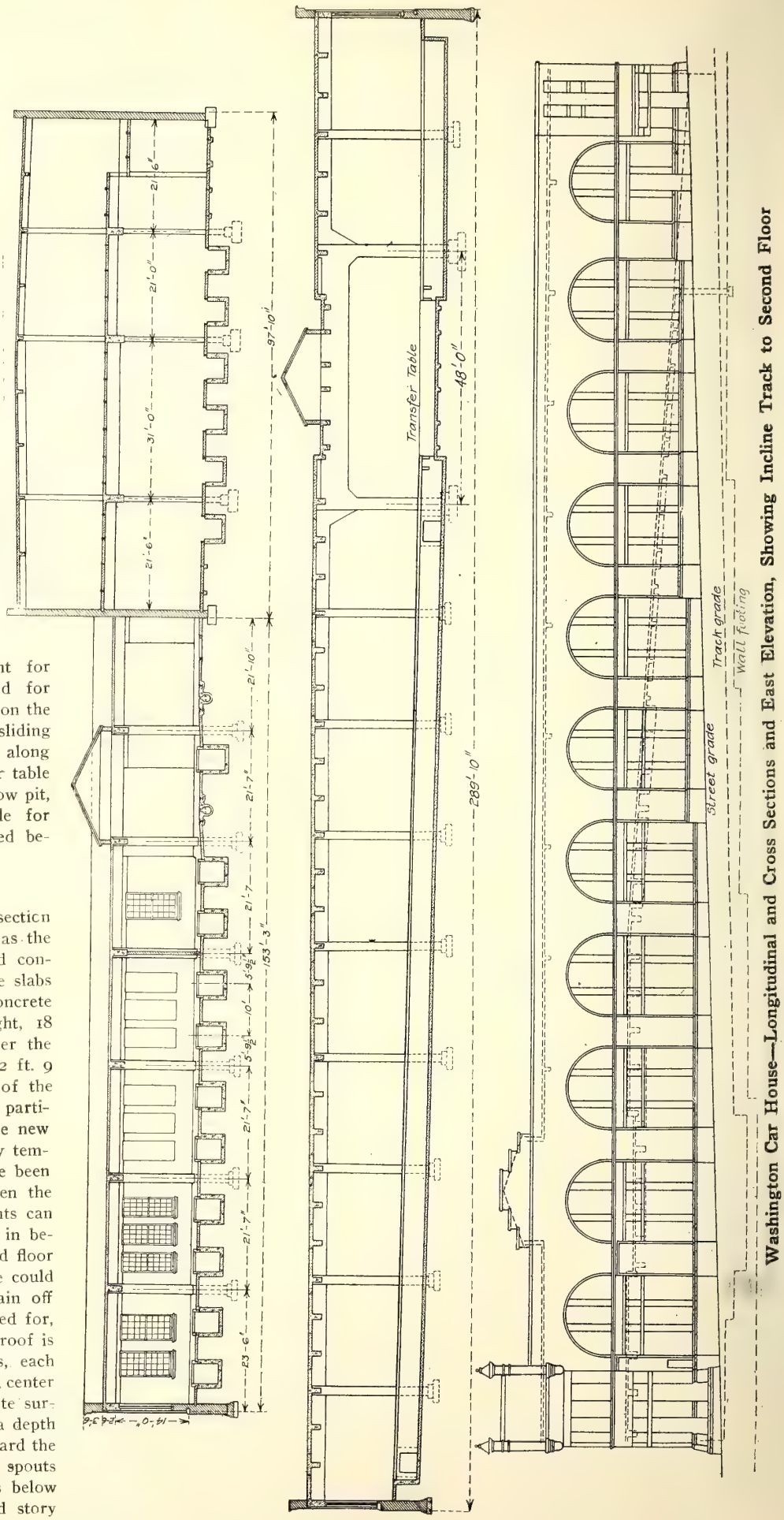
another leads down to the basement under the offices, in which a heating furnace has been installed.

TRANSFER TABLES

One transfer table serves both sections of the first floor of the house, and another serves the second floor. The first floor table runs in a pit 30 ft. wide and 2 ft. 10¼ in. deep. It was built in the company's shops, and is a duplicate of the tables installed in the Fourteenth Street car house of the Capital Traction Company, which were illustrated and described in the Street Railway Journal of Dec. 21, 1907, page 1164. The table runs on three pairs of rails laid to 4-ft. 8½-in. gage, and is driven by a GE-1000 motor, which is geared to a shaft corresponding to a car axle. This shaft, in turn, is geared to the three axles on the motor side of the table. A friction wheel on the driving shaft and a band tightened on the wheel with a lever and ratchet holding device serve as a powerful and easily controlled brake. Current for operating the driving motor and for energizing the conduit conductors on the table is obtained through shoes sliding on a protected third-rail mounted along the walls of the pit. The transfer table on the second floor runs in a shallow pit, as no provision has to be made for conduit plows, which are removed before ascending the incline.

ROOF CONSTRUCTION

The present roof of the new section was designed to ultimately serve as the second floor of the building, and consists of reinforced cinder concrete slabs 4½ in. thick, supported by concrete cross-girders. A monitor skylight, 18 ft. 2 in. wide, has been built over the transfer table pit, and another, 22 ft. 9 in. wide, over the entire length of the second longitudinal bay from the partition wall dividing the old and the new sections. These skylights are only temporary, and the cross-girders have been built in below them, so that when the second story is added the skylights can be removed and floor slabs built in between the girders. As the second floor will be on a level grade no slope could be given to the flat roof to drain off water. Drainage has been provided for, however, by a unique plan. The roof is divided into rectangular sections, each of which is drained toward the center by banking up lean cinder concrete surfaced with tar at the corners to a depth of 14 in. The water draining toward the center is drawn off through down spouts emptying into sewer connections below the pit floors. When the second story



Washington Car House—Longitudinal and Cross Sections and East Elevation, Showing Incline Track to Second Floor

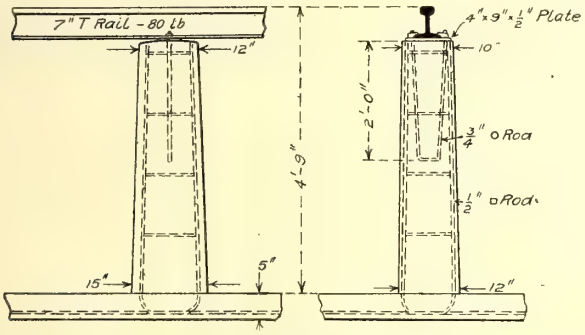
is added the cinder concrete banking can be scraped off of the slabs, leaving a level floor.

SPRINKLERS

The car house has been completely equipped with automatic aisle sprinklers in the longitudinal bays and curtain sprinklers along the transfer table pits. The aisle sprinkler heads are attached at intervals of 7 ft. to pipe lines suspended from the ceiling girders at about the height of the tops of the car windows. One line of sprinklers extends down the center of each bay, but no heads are installed in the aisles between tracks from which the concrete roof columns rise. Three curtain sprinkler heads protect the end of each bay at the transfer table pit. The sprinkler system which was installed by the International Sprinkler Company, Philadelphia, Pa., is supplied with water from a 35,000-gal. tank on the roof over the oil and sand storage. As an additional precaution against the spread of a fire in the new section, an 8-in. hollow tile fire wall has been put in between the fourth and fifth bays.

LIGHTING

Liberal window space has been provided in all the outside walls of the building, and the temporary skylights in the roof of the new section provide additional daylight. The addition of a second floor at a later time, however, will cut off the daylight from the inside bays and require the use of lamps both day and night. Incandescent lamps of 16 cp are used for general illumination, but enclosed arc lamps are also hung from the ceiling over the transfer table pits. The lighting circuits are arranged on the three-wire system and throughout



Washington Car House—Details of Pit Columns in Shop Bay

the building are run in iron conduit. For lighting the aisles the conduit is tied underneath the sprinkler pipes and the lamps are mounted in condulet sockets spaced about 25 ft. apart. This arrangement is the same as that used in the Fourteenth Street car house of the company, where it has proved very satisfactory from the standpoint of both illumination and maintenance. The pit lamps are also mounted in condulet sockets and are set in recesses spaced 50 ft. apart and staggered on opposite walls of the pits.

The buildings were designed and erected under the supervision of J. H. Hanna, chief engineer, Capital Traction Company, to whom this paper is indebted for the drawings and information from which this description was prepared.

A CORRECTION

In the article entitled "The Sign of the Times," by Thomas N. McCarter, president, Public Service Corporation of New Jersey, published last week, a typographical error occurred on page 16. The author is quoted as saying: But I do not have enduring faith in the ultimate common-sense of the American people," etc. Actually the sentence should have read: "Did I not have enduring faith in the ultimate common-sense of the American people, and in the resultant attitude of their law-making representatives, I would unhesitatingly recommend allowing one's money to remain in a savings bank, drawing 4 per cent interest, rather than in an investment of the character of which I have spoken."

OXIDIZED ALUMINUM WIRE FOR RAILWAY MOTOR FIELD COILS

An interesting paper was presented at the September, 1909, meeting of the Vereins Deutscher Strassenbahn-und-Kleinbahn-Verwaltungen (German Street & Interurban Railway Association) by Mr. Paulsmeier, a Hamburg engineer, on experiments recently made in Germany with oxidized aluminum wire for railway motor field coils. The author pointed out that hitherto the electrical uses of aluminum had been limited because its conductivity is only 59 per cent that of copper. Hence the aluminum wire must have 1.7 times the cross-section of copper wire for the same resistance and length. This would make it impracticable to use aluminum in apparatus where space is a factor if it were essential to employ some form of fiber insulation as with copper coils. It has been found possible, however, to take advantage of the property of aluminum to take an oxide film known as alumina. The resistance of this oxide film is sufficient to prevent short circuits between parallel adjoining wires in the same winding, where the differences of potential do not exceed 0.5 volt. Some other form of insulation is required, however, between successive windings owing to their greater difference of potential. When oxidized coils are made in this way they can be used to replace fiber-insulated copper coils of like strength within the old dimensions. It is also possible to save space and secure a better distribution of mechanical strains by using square wire instead of the round copper wires customary in small railway motors. A successful aluminum-wound motor means lighter weight, lower first cost and absence of short-circuits as caused by the charring of cotton insulation. The decrease in maintenance cost applies particularly in the case of railway motors because their insulation is most likely to be disintegrated by shock.

At the time of Mr. Paulsmeier's report 11 railways were using aluminum field coils and others were preparing to experiment with them. Some of the pioneers used round wire and others employed square wire. Some had fiber insulation on the wires throughout while others used plain oxidized wires with layers of paper, asbestos, fiber or linen between successive coils. Several made no change in the internal resistance and the number of turns while others sought only to have the internal resistance as before. Eight companies stated that the aluminum coils developed no defects whatever. In one case a company installed on March 17, 1907, four bare-wire field coils of which two proved defective. Here one failure was due to a short-circuit between two coils separated by linen and the other to a similar occurrence between adjoining turns. The other two coils have never given any trouble. A second company reported that there were superficial short-circuits, but only when the fields were first placed in operation, and a third stated that there had been short-circuits between adjoining windings.

The Hamburg street railway system began to try aluminum field coils in June, 1908. The coils were furnished by two companies and were installed in their respective motors without preliminary tests. It was soon discovered that the motors fitted out by one company had greatly decreased in their tractive effort and hence the coils were removed. The other company's coils, however, did not cause any important change in the motor performances although their internal resistance exceeded that of the replaced copper. After 10 months' service an examination disclosed the fact that the second company had supplied fiber-insulated aluminum. The insulation was badly carbonized, but as there was no evidence of short-circuits, the coils were continued in service. Apparently both manufacturers had used fiber over the oxide film merely as a precaution.

In 1909 the Hamburg railway purchased a number of square wire coils for use in GE-800 motors. Two of them had short-circuits, but investigation showed that the trouble arose from the distortion and shifting of the coils in the formers. This was easily remedied and after successfully using 100 of such coils in 30 motors the Hamburg company ordered 52 coils more. To determine whether these oxidized-wire windings undergo any changes in operation, each coil was given a number before

installation and carefully tested, especially as to resistance. When these tests were repeated several months later the coils showed no deterioration and in fact some of them had improved, presumably because they had not been thoroughly dried out at the time of installation.

The advantages asserted for the aluminum wire, whether bare or fibre insulated, are particularly those of lower first cost and reduced weight. As for the item of cost, the real difference between aluminum and copper is not considerable if due allowance be made for the high scrap value of the latter metal. With regard to weight, however, it has been found that even in the moderate-sized street railway motors used abroad it is possible to save 80 lb. to 100 lb. per motor, as the coils weigh only about one-half as much as those of copper. Mr. Paulsmeier believes that the troubles incidental to the introduction of any new method had been overcome. He states that even if the life of the aluminum coil did not exceed that of copper it would pay to use the former.

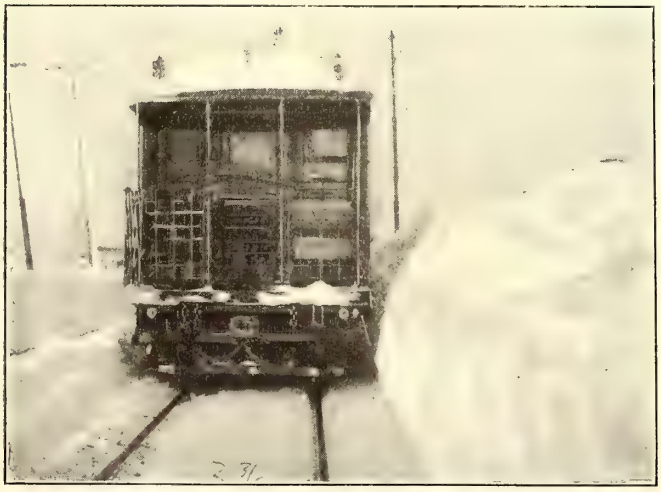
The presence of short-circuits in aluminum coils is indicated in service by decreased tractive effort, fuse blow-outs and poorer operation of the short-circuiting brakes. Most companies try out their coils through current, voltage and resistance measurements. The Hamburg company has devised a simple apparatus to test the comparative magnetic strength of new and defective coils. The principal element is an iron core which is excited by the coil under test. The magnetized core attracts an armature attached to a spring scale. Thus the pointer on the scale will show the effect of connecting into the railway circuit a coil carrying a load of, say, 40 amp. It has been found unnecessary to test the field coils under mechanical pressures corresponding to service conditions. The only objection to the present apparatus is its inability to test the coils unless they are first removed from the motor case. The company, however, is now perfecting a means of testing the coils in the case.



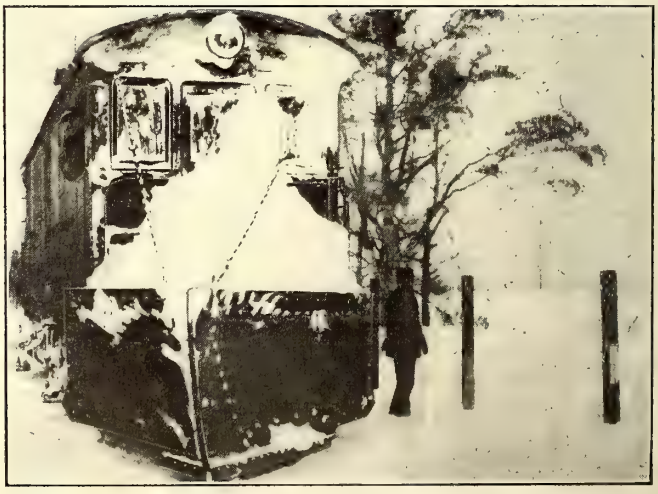
Bucking a Drift on the West End Route to Coney Island



View Along West End Line After Opening for Service



Following in the Wake of the Locomotive Plow



Electric Freight Locomotive Fitted for Snow Fighting

FIGHTING SNOW IN BROOKLYN

On Dec. 25 and 26 New York was visited by an unusually severe snowstorm. The first flakes appeared about noon on Dec. 25, but the snowfall did not begin in earnest until 5 p. m. According to the officials of the weather bureau, the total precipitation was 10.1 in., but unfortunately the snow was accompanied by a gale from the northwest which reached a maximum of 58 m.p.h. at midnight on Dec 25 and remained at about 45 m.p.h. on Dec. 26. One of the worst sufferers from the storm was the Brooklyn Rapid Transit Company, which has a considerable part of its mileage in the thinly settled territory between Brooklyn and the beaches. The unexpectedness of the storm and the fact that it occurred on Christmas day when many men were on holiday leave made it exceptionally difficult to keep the lines open even in the settled portions of the city. As soon as the storm gave the first indications of severity, the transportation department sent out hurry calls for the plow and sweeper crews and the mechanical department bent every effort to get hold of the men assigned to care for the snow-fighting machinery. There were available from a total of 17 surface distributing depots 40 sweepers and 26 plows. The latter apparatus included two rotary plows and four pneumatic plows.

The actual snow-fighting operations were directed by the management, including the superintendents of the elevated and

surface lines while the superintendent of the mechanical department was on hand to furnish at least one mechanic for each machine and to direct emergency repairs. Provision had been made also for an emergency repair gang at the Fifty-second Street surface shops so that crews reporting breakages could have spare parts supplied and forwarded without delay. In fact, only one plow was permanently disabled and this occurred because of a broken steel side-sill. The wrecking cars were also kept busy as quite a few passenger cars were derailed through being lifted bodily by the masses of snow packed between the rails. Naturally, these accidents seriously delayed the progress of the snow-fighting machinery. The worst blockades occurred in the open country where the wind piled the snow on the tracks in immense drifts. It was impossible to restore full service on some of these outlying roads until Dec. 29.

The conditions which were encountered between Brooklyn and Coney Island by the trains of the elevated division may be conceived from the accompanying illustrations. In past winters even heavy snowstorms were successfully fought simply by running trains of empty motor cars up and down the line without using any plows or sweepers. In this case, however, the heavy cross-wind piled up the snow so fast on the open sections that the cars were helpless until the wind had greatly diminished in velocity. Very effective work was rendered by the company's electric freight locomotive No. 4 which had been fitted with a nose composed of two wings of No. 6 steel plate 4 ft. high and 9 ft. 1 in. long. These wings were long enough to extend over the exposed current rail on either side but could not come into direct contact with the latter owing to the interposition of wooden blocks set in angle irons. The locomotive weighs 7 tons and is equipped with four 150-hp motors.

The foremen of the different snow-fighting gangs had full authority to provide their men with all necessary food and drink from the most accessible restaurants without charge. The men were paid from the time they were called for duty until they were relieved. As an example of the difficulties encountered on Dec. 25, it may be mentioned that four girl telephone operators at the company's main switchboard remained at their posts for 18 to 20 hours before members of the relieving staff could reach headquarters.

POWER CONSUMPTION TESTS OF CARS IN CLEVELAND

Through the courtesy of F. W. Coen, vice-president and general manager of the Lake Shore Electric Railway, additional information is available in regard to the method of conducting the tests in Cleveland to determine the power consumption of interurban and city cars within the city limits, the results of which were published on page 1020 of the issue of this paper for Nov. 13. The test of the power consumption of the city cars, shown in Table II, was made over the entire routes used by the interurban cars while on the city tracks, and the results as given in the table were an average of 2.8516 kw-hours per car-mile and 126.6454 watt-hours per ton-mile. The test of the power consumption of the interurban cars, shown in Table I, was for a portion of this mileage only, or that within the city limits, and the results were 2.8982 kw-hours per car-mile and 91.5207 watts per ton-mile. A second test was then made to determine the consumption of the interurban cars over the routes for which the city cars had been tested, and the results were about 3 per cent lower than those for the tests of the city cars; that is, they showed for the interurban cars 2.7854 kw-hours per car-mile and 88.2093 watt-hours per ton-mile.

Preliminary surveys have been made for a projected electric railway between St. Petersburg, Russia, and Imatra.

A proposal has been made to convert to electric operation all of the railways on the Isle of Wight. The plan has met with the approval of the municipal authorities on the island

STATIC DISCHARGE SETS AT CHICAGO SUBSTATIONS

At several of the substations of the Chicago City Railway, in which 1000-kw and 2000-kw rotary converters are used, a unique form of trouble with static electricity has been experienced and corrected during the past two years. The static discharges caused severe arcing from the a.c. collector rings and the d.c. bus rings to the boltheads and other grounded parts of the rotary-converter frames. In some instances the sparks from these discharges broke down the insulation on the bus rings and jumped an air space of 1¾ in. to ground. As a remedy

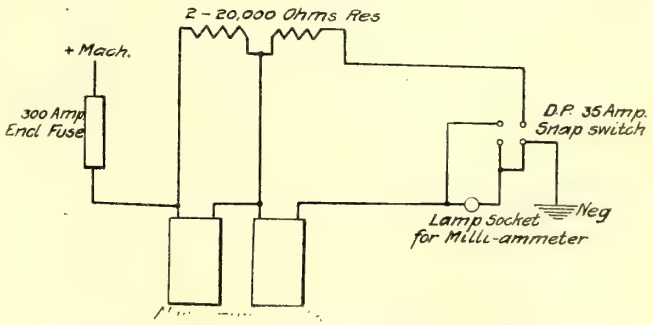
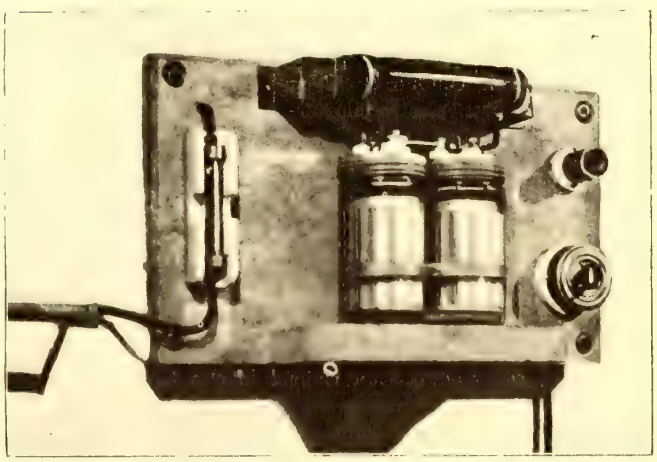


Diagram of Connections of Static Discharge Set

electrolytic arresters were installed for each machine, and so far they have apparently stopped the disturbances.

When the trouble first appeared it was thought that the high voltage might be due to surges on the a.c. cable lines which feed the substations. Attention was given first to the conditions at the Sixty-third Street and Wentworth Avenue substation where there are three 2000-kw and three 1000-kw General Electric rotary converters. Current is received through five three-conductor, lead-covered underground cables having an average length of about 7 miles. Tests were made with spark gaps and with voltmeters to see whether or not the flashing might be due to line disturbances, but no unduly high potentials were thus found, so the engineers in charge of the investigation concluded that the flashings about the rotary commutators were due to static disturbances. A condition in opposition to this view was that the outgoing lines distributing the current taken from the rotary commutators were fully protected with lightning arresters inside the station. On the d.c. switchboard



Static Discharge Set of Chicago City Railway

at the Sixty-third Street substation there are nearly 40 feeder sections and each outgoing trolley feeder is protected with a GE M.D. lightning arrester, and the station busbars are similarly protected. The spark gap points are set less than ⅛ in apart. At first thought, therefore, it seemed reasonable that if the revolving parts of the rotary converters were heavily charged with static electricity the large number of lightning arresters on the outgoing feeders should serve to carry the static charge to ground. As they did not do so, though known to be in good condition, the following conclusion was reached:

The surface of the armature of a 2000-kw rotary is enormous compared with the surface of the positive connection between the d.c. bus rings and the switchboard buses, and the feeders to which the lightning arresters are connected. Hence, the accumulated static charge on the machine is throttled in its passage to the switchboard by the small area of this positive connection and finds a more direct path to ground by puncturing the tape insulation on the bus rings and jumping across nearly 2 in. of air space to the grounded frame of the rotary.

This explanation of conditions seemed sound to the investigating engineers and they next looked for some means which would serve to offer a continuous discharge path for the accumulation of static charge from the positive bus ring direct to ground. Representatives of the General Electric Company suggested the use of aluminum-cell, electrolytic lightning arresters, and the installation of one pair of these arresters for each rotary converter at the substation has been the means of preventing the recurrence of the static discharges between bus rings and grounded parts of the machine. Two 250-volt cells are connected in series between the bus ring and ground. Each cell has a balancing resistance of 20,000 ohms connected around it. The cells were first tried without this resistance, but it was found that the continuous discharge between the elements would unbalance the resistance of the cells so that one might have an apparent drop of, say, 220 volts and the other 330 volts, thus bringing about a heating of the cell with the higher drop. By the addition of the 20,000-ohm resistance in shunt with each cell the drop across the two cells is balanced, and with the cells at 250 volts no heating occurs due to the continuous passage of the dynamic current of less than 1/30 of an ampere. The condition of each cell is tested about once a month to see if the current being discharged is normal. A lamp socket has been installed to provide an easy way for inserting a plug carrying ammeter terminals and obtaining a reading of the amount of current passing through the cells to ground. A check is also kept on the temperature of the cells, as this gives a good indication of their condition.

When the first electrolytic arresters were installed at the Sixty-third Street substation, special care was taken to make the connections as direct as possible and to use as large conductors as though a lightning arrester was being installed. These precautions have since been found unnecessary and now the cells are connected with the bus rings by No. 6 wire enclosed in iron conduit.

A 30-amp capacity non-arcing enclosed fuse forms a part of this circuit, and as this fuse is held in clip terminals it also serves as a switch for cutting the electrolytic cells out of circuit. The fuse, resistance coils, the two cells, the lamp socket for the ammeter connection and a double-pole snap switch for cutting the socket in series with the cells are all mounted on a panel and shelf built of gray slate, 1½ in. thick, 13 in. high and 22 in. wide. One such static discharger set is installed in the machine pit under each rotary converter. In placing the sets care was taken to mount them at one side under the edge of the floor so that should any undue disturbances take place no damage would be done to the rotary converter.

Until these static discharger sets were installed the troublesome sparking occurred rather frequently at the Sixty-third Street substation. It is now just a year since this substation was equipped with the sets here described and there has not been a single recurrence of the trouble.

USEFUL CHART FOR HEADWAY CALCULATIONS

H. M. Wheeler, assistant chief engineer, Chicago Railways Company, has developed a chart which he has found useful in studying schedules and determining feeder capacities. The chart is a valuable aid in any railway engineering or transportation office. For example, if the schedule speed on a line is known and any one of the following quantities—headway in seconds, headway in feet, cars per mile—is given, all the others of these quantities may be obtained quickly by reference to chart. This chart also is useful in showing the absurdity of some assumed schedule conditions.

The accompanying reproduction of the chart as used in the engineering office of the Chicago Railways Company shows the principal curves and some auxiliary lines used for demonstration. In the use of the chart the variable quantities are headway in seconds, headway in feet, or distance the cars are apart, and the number of cars per mile. The chart is drawn with rectangular co-ordinates and the abscissas represent either headway in seconds or cars per mile. The ordinates represent feet. The derivation of the curves and their practical use follow:

DERIVATION OF CURVES

The hyperbola is first located on the co-ordinate paper. This

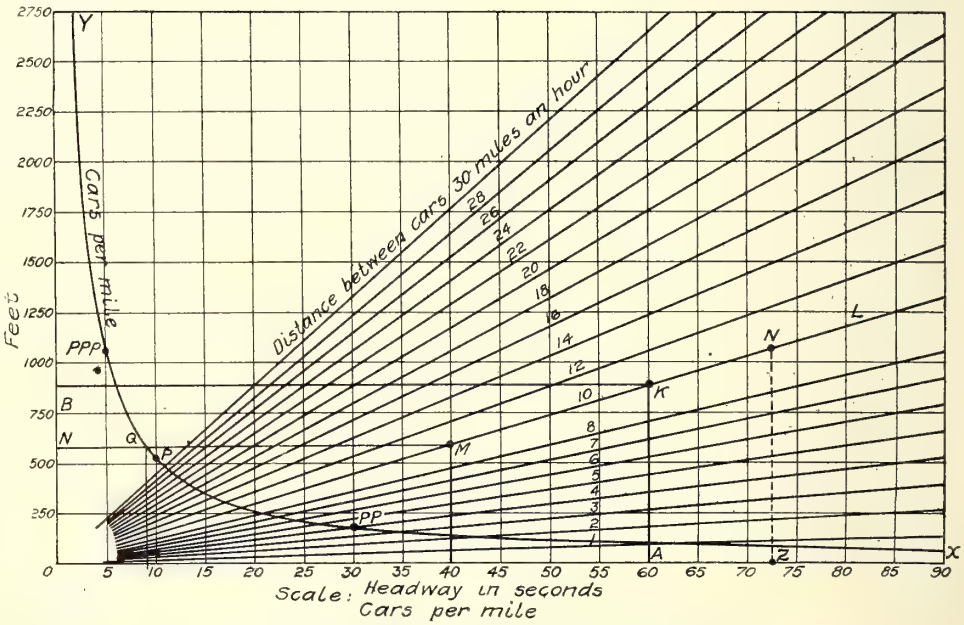


Chart for Making Headway Calculations

hyperbola is known as the cars-per-mile curve and by definition the product of the abscissa and ordinate for any point on such a curve equals a constant. The equation for this curve is $XY = 5280$, where $X =$ cars per mile and $Y =$ distance apart in feet. The method of plotting is to assume, say, $X = 10$ cars per mile; then, $Y = \frac{5280}{10} = 528$ ft. = the distance between cars. By erecting perpendiculars at $X = 10$ and $Y = 528$, one point (P) of the curve is located. Similarly if 30 cars per mile are operated $Y = \frac{5280}{30} = 176$, and plotting as before, PP is found as another point on the equilateral hyperbola, or cars-per-mile curve. In practice the curve is constructed graphically by laying off multiples and submultiples, after the point P has first been determined.

With this curve and knowing either the distance between cars in feet or the number of cars per mile, the other quantity is easily found by projection. If, for example, it is known that there are five cars on a certain mile of track, the distance between those cars is found on the chart by erecting a perpendicular from the point 5 on the horizontal scale to the point of

intersection with the hyperbola, *PPP*, and extending a horizontal to intersect the vertical scale where the distance between cars is shown to be 1056 ft.

With the cars-per-mile curve plotted, the next step is to establish on the chart other lines, the location of which will include the element of time (headway in seconds) for the horizontal scale, and the element of distance (feet) for the vertical scale. These additional lines will then show graphically the headway between cars at known speeds per hour. The same scale is employed, so that the headway between cars, reckoned either in time (seconds) or in distance (feet), may be used jointly with the curve showing the relation between the number of cars per mile and the distance between these cars. In establishing the cars-per-mile curve the horizontal scale is divided to indicate cars per mile. In establishing the headway lines the same subdivision of the horizontal scale is used to indicate time (headway in seconds). To reduce miles per hour to feet per minute we have $\frac{5280}{60} M = 88\ M =$ ft. per minute when $M =$ m.p.h. Assume that it is desired to establish the headway line for cars traveling at 10 m.p.h. Then the distance apart of these cars on a one-minute headway is $88 \times 10 = 880$ ft. Thus, for 10 m.p.h., 880 ft. is the distance headway corresponding to the time headway of 60 seconds. Erecting perpendiculars from the 60 second mark (*A*) on the horizontal scale and from the 880-ft. point (*B*) on the vertical scale, the intersection is found at *K*. By derivation then, *K* is one point on a 10-m.p.h. headway line. Next draw the line *OKL* and assume that this is the 10-m.p.h. headway line and that if perpendiculars are let fall to the base line from any point on *OKL*, the length of these perpendiculars, according to the scale of co-ordinates used, will indicate the relation between the headway in feet and the headway in seconds for cars traveling at 10 m.p.h. It is apparent that so long as the speed of the cars is constant, changes in the headway in seconds bring about changes in the headway in distance.

To prove that the line *OKL* truly represents the relations between headway in seconds and headway in feet, take any other headway in seconds, such as *OZ*, laid out on the same horizontal scale. Next, draw the line *ZN*. Now the triangles *OAK* and *OZN* are similar; whence $OA:OZ = AK:ZN$. Thus, with the fixed miles per hour line (*OKL*), it is seen that the headways in seconds or in feet represented by perpendiculars dropped from any point on this line are proportionate to the headways represented by the perpendiculars dropped from any other point on the line; and as the ratio between the headways represented by the lengths of the perpendiculars is constant, 10 m.p.h., this is the 10-m.p.h. line.

Lines to represent other headways are laid off with the dividers by using multiples and submultiples on any vertical. In practice they are laid off at the extreme right of the diagram so that the error may be kept at a minimum.

METHOD OF USING CHART

The practical use of this chart will next be considered. Suppose a schedule of 10 m.p.h. is to be established and knowing the headway to be 40 seconds it is desired to learn the number of cars per mile and the distances that these cars are apart. The unknown quantities are found by reference to the chart in the following manner: A perpendicular is erected from the point 40 to intersect the 10-m.p.h. line at *M*. A horizontal is projected from *M* to the vertical axis *N*. Reading the vertical scale it is found that the distance between cars will be 587 ft. Next, from the point *Q* where the line *MN* intersects the hyperbola, a perpendicular is dropped to intersect the horizontal scale and it is found that approximately nine cars will be operated in a one-mile section.

The load on a trolley section may then be found by multiplying by the length of the trolley section the number of cars per mile. This gives the total number of cars operating on the section. Then by multiplying by the load per car the total load on the feeder is found.

This chart also is useful in quickly determining how close to each other cars may be operated and what the headway in seconds will be. The process of using the chart will be the same for the latter problem, except that the headway in feet will be assumed rather than the headway in seconds

FEEDER DROP

Mr. Wheeler has devised another chart which is used for quickly reading cable drops. In general but two sizes of trolley feeder cable are used by the Chicago Railways Company. These are the 1,000,000 circ. mil and the 500,000 circ. mil sizes. A load of 75 amp per car is used in calculating drops. First the drop through each of the two sizes of feeder is found for the convenient distance of 8000 ft. A chart is then laid out with rectangular co-ordinates. The abscissas are feet, from zero to 8000, and the ordinates are drop in volts for the load of one car. The calculated drop in each size of cable is plotted on the 8000-ft. ordinate and a line is drawn from each point so located to the origin. Since the drop is proportional to the distance the drop for any distance less than 8000 ft. may be obtained quickly with the dividers.

In determining the drop between a cable tap and two substations (A and B) feeding a trolley section over unlike distances and through cables of different capacities the following method is used: The load is assumed to be concentrated at the point where the two feeders join the trolley. In practice the connecting cable from this point to either substation is made large enough to carry the entire load with one of the substations out of service. Assuming that substation A is inoperative, then *V* will represent the drop from substation B to the feeding point. Similarly with substation B cutoff *v* will represent the drop from substation A; then if the two substations are operated in parallel the drop to the common feeding-in point will be $\frac{V\ v}{V + v}$. This formula, it is noted, is similar to and may be proved in the same way as the formula for the combined resistances of two conductors in parallel. Where two lines of track intersect, the car headway resulting from the combination of the headways on the two originating lines can be determined by the same method. In other words, if *H* equals the headway on one car line and *h* equals the headway on another line and these two lines merge, the resulting headway will be $\frac{H\ h}{H + h}$.

PUBLICITY DISCUSSED AT THE NEW ENGLAND STREET RAILWAY CLUB

The December meeting of the New England Street Railway Club was held at the American House, Boston, on the evening of Dec. 30. The paper of the evening was on "Educating the Public in Relation to Electric Railways" by James H. McGraw, president of the McGraw Publishing Company. An abstract of the paper will be found elsewhere in this issue. As Mr. McGraw was prevented by illness from attending the meeting, the paper was presented by Henry W. Blake.

DISCUSSION

Lee H. Parker, Stone & Webster, Boston, opened the discussion by inquiring what the results had been in the way of increased traffic upon the London Underground Railway, following the advertising campaign described by the paper and illustrated in the posters.

George Sabin Brush, Boston Elevated Railway Company, said that he had recently heard from General Manager Albert H. Stanley, who had written him, that an increase of 15 per cent to 20 per cent in the tariff is attributed to the advertising conducted by that company.

M. V. Ayres, Boston & Worcester Street Railway Company, commented upon the completeness of the paper and its interest at this time. Ever since the panic the question of stimulating traffic had been of more than ordinary importance. Public-service corporation officials stand in a different relation to the public than the heads of departments in other lines of business. It is most important that the public be educated to

maintain a sentiment favorable to the companies. Human beings are largely creatures of habit, and in recent years the public in some cities have acquired an unfortunate habit of picking flaws in the transportation service. One can pick flaws in anything, for that matter, but this is not an attitude to encourage. It is not uncommon for people away from home to boast about the high buildings, broad streets, parks, rivers, etc., in their city. If they have a good electric railway system they should be equally proud of it, and it is an excellent plan to educate them to know when they are getting good service. This means lower verdicts from juries in accident cases, better co-operation from the local police authorities and their subordinates, help from the newspapers, fewer adverse bills introduced into the Legislatures, and less obstruction of desired improvements from municipal authorities. Mr. Ayres closed with the recommendation that electric railway men give the newspaper representatives a cordial welcome and acquire their friendship. In this way much can be done to eliminate the "featuring" of accidents in staring headlines on the front page, while good points about the system are relegated to a remote corner of the paper and printed in small type, as well.

A vote of thanks was then passed to Messrs. McGraw and Blake for the presentation of the paper, and the meeting adjourned.

PAY-AS-YOU-ENTER SERVICE STARTED IN BALTIMORE

On Saturday, Jan. 1, the United Railways & Electric Company, Baltimore, Md., successfully inaugurated service with the pay-as-you-enter cars described in the Jan. 1 issue of the Electric Railway Journal. The introduction of the cars was preceded by a brief but vigorous publicity campaign in the cars of the company and in the daily newspapers.

The two large posters reproduced were prepared for dasher and inside use, respectively, and placed on all lines. The first poster gives directions for boarding the car, depositing the fare, entering the car and leaving by the front exit. There is also a rear exit, but the passengers are being educated to use it only in emergencies. The second poster announced the date of opening of the service on the Pennsylvania Avenue line, and



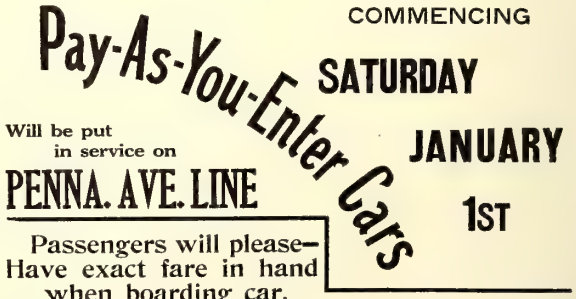
Poster Displayed on Dashboards of Cars

also gave boarding and alighting directions. Besides this, the company distributed a folder which contained a floor plan of the pay-as-you-enter cars, together with a half-tone illustration of one of the cars and views showing the proper use of the rear and front platforms. The text of the folder was printed in English, German, Jewish and Italian, since Baltimore has become quite as cosmopolitan as New York. To insure reliable translations, W. A. House, president of the company had these polyglot folders printed in New York. Most of the English portion of this novel folder was arranged to explain the benefits and principles of the pay-as-you-enter cars in parallel columns, as follows:

BENEFITS OF P-A-Y-E CARS	PRINCIPLES OF P-A-Y-E CARS
Conductors are not permitted to leave their compartment on rear platform; as a consequence jostling of passengers by conductors when collecting fares is eliminated and the danger of premature starting of cars is overcome.	Board car only at rear platform by step marked "In."
	Have exact fare in hand and deposit in fare-box; have ticket or transfer (unfolded) and hand to conductor.
	Ask for transfer on paying fare. Persons desiring information or money changed should step to extreme rear of platform, so as to allow other passengers with exact fare to pass into car.
Since passengers are not allowed to ride on rear platform, the crowding of the doorway by smokers—a particularly objectionable feature to ladies—is corrected.	Passengers will leave car by front exit, getting off at step marked "Out." The small right-hand rear doorway is an emergency exit; when necessary to use it, leave car through conductor's compartment and get off rear step marked "Out."
By separating the avenue for boarding cars from those for leaving it, ingress and egress are orderly and without confusion, while the stopping time at corners is reduced by nearly one-half.	As it is necessary to keep both platforms clear for entrance and exit of passengers, smoking is not permitted. Packages are not to be left on rear platform.
Through restricting passengers to interior of car, the carrying capacity is reduced; consequently the company will be required to operate more cars, thereby insuring a larger proportion of seats to the patrons.	By the intelligent co-operation of the public, the company will be able to raise the standard of service on this line to the highest excellence yet attained in street railway operation.

United Railways & Electric Company

The company also printed a booklet containing special rules and instructions for the government of dispatchers, receivers and carmen in applying the pay-as-you-enter system of fare collection with cash boxes. In the sections addressed to the motormen and conductors, particular stress is laid on the pre-



Car Poster on Pay-as-you-Enter Service.

vention of accidents made possible by the better control of the platforms. This booklet was also illustrated with a plan and platform views of the cars.

Engineers of the Chilean Government are making preliminary plans for the electrification of the first section of the Government Railways from Valparaiso to Santiago, 115 miles.

EDUCATING THE PUBLIC IN RELATION TO ELECTRIC RAILWAYS*

BY JAMES H. MCGRAW, PRESIDENT, MCGRAW PUBLISHING COMPANY

Public sentiment is a power. How to enlist that power in our cause is a subject that may well occupy our careful attention this evening.

President Shaw in his admirable address at the Denver Convention referred, among other things, to the magnitude of the electric railway industry as well as to the vast army of men who are directly affected by the prosperity or lack of prosperity existing in the electric railway industry. The six States represented by this club possess 17 per cent of the aggregate number of cars and 13 per cent of the miles of track in the United States. If we also include, as Mr. Shaw did, those who are engaged in the manufacture of electric railway apparatus and the investors in any or all of these various undertakings, the number of men in New England who are interested in the material development of the systems and in the proper direction of public opinion as regards their real conditions of operation, the percentage is undoubtedly vastly larger than in either of the two comparisons made above.

Publicity appears, on analysis, to mean "all things to all men." There is a dictionary definition, but the strict meaning of the word is not so good for our purpose as a consideration of the subject from the practical commercial standpoint; that standpoint is the one which concerns us directly. My definitions will be, if you please, business definitions, based upon the results of application of the policy of publicity to the affairs of electric railways. It seems to me that from this point of view there are three definite lines of action, the adoption of any one of which may affect the revenues and therefore the prosperity of a street railway property.

First: The publicity which aims simply to advertise the service; that is, to increase the business.

Second: The publicity which aims to make the public familiar with operating problems and with certain aspects of questions bearing on taxation, fares and transfers.

Third: The complete publicity through commissions which prevails in some States, notably in Massachusetts, New York and Wisconsin.

Of course, it is impossible to give publicity in any one of these distinctive forms without approaching the other forms at some points, but on the whole the three separate types of publicity stated indicate tolerably well the present practice of our railways.

PUBLICITY DESIGNED TO ADVERTISE THE SERVICE

The earliest form of publicity is the first, that which is designed to advertise the service. In the early days of electric propulsion the facilities available did not justify extensive advertising, although almost any kind of a safe, dependable conveyance was something of a public convenience and necessity. Since that was a fact 20 or 25 years ago, it must be plain that companies of the present day, having infinitely more to give in service and equipment, have so much more to promise patrons in return for the still small fare, and it becomes a business error to overlook the opportunity.

Good advertising assures publicity. Whether a street railway has anything to offer which it can advertise with profit to itself is not a debatable question. The only argument rests on the extent of the advertising campaign and on the time and manner by which the utmost results can be attained through a fair expenditure of energy, money and brains.

The reasons which control the answer to this question must be many and varied. They relate to the mileage of the railway system, the natural attractions reached, the proximity of the business and residence sections, the character and habits of the population and many other features. Other questions are involved than those which relate to the financial expenditure required for an advertising campaign. Anyone can see that a system operating 450 miles of track has an advertising problem radically different from that which confronts the 12-mile road. But it requires a little more thought to differentiate in advertising between an industrial population and a community in which there is a large proportion of property holders. The large system may do its mere advertising of service so effectively that it will greatly increase the long-haul travel and thereby make a possible loss, when its facilities might otherwise have been employed in handling a smaller amount of very profitable short-haul traffic. During his brief control of the Cleveland Railway, Mayor Johnson made many mistakes from an operating standpoint, and one of them was that when he experimented with a low rate of fare, thinking that it would attract short-haul traffic, he failed to give sufficient service to accommodate short-haul passengers.

In planning an advertising campaign designed to increase the patronage, it may safely be assumed that some of the residents of the one or more communities reached have little knowledge of the ways in which the service can add to their convenience or pleasure. The questions then to consider are these: What particular part of the service, what line, what facilities, what advantages can be advertised in order to develop the increase in the patronage which shall be the most profitable to the company? Each branch of the service should be taken up, one after the other, to determine whether the full measure of public patronage is being secured. Is the company getting all that it should of summer pleasure travel? Do the schedules enable substantially all the passengers who reach or leave the city on the steam railroads to find cars at convenient times and places? Can any improvement be made in the existing service between steam railroad terminals and hotels, as well as outlying sections of the city, so that more travel will be secured? How many fares are lost every day because the people who would take short trips can save time by walking instead of waiting for a car? Local conditions govern the attendance at parks, but it has been found in some instances that unless a satisfactory attendance develops early in the season no large volume of amusement travel of this character will be realized. If that is the general experience, the best time to advertise the park is early in the season.

The real question which we want to consider seriously, however, is the art of directing public attention to the everyday facilities offered by the railway company. I believe that the best foundation for an advertisement lies in the quality of the service. Let the people know that the service is good; and let the advertising be so timed and displayed as to impress the greatest possible number of riders or prospective patrons. Successful advertising of street railway service, like that of a manufacturing commodity, must be alive and interesting. But the performance must always square with the product.

A great many companies have gone extensively into the business of publishing circulars to encourage traffic, and some of these circulars are as elaborate as those issued by steam railroad companies. While there may be some doubt as to the best character of advertising literature and the method of its distribution, there can be none as to the general principles involved. The electric road is always up against the fact, however, that its average fare is 5 cents against the very much larger sum per passenger of the steam railroads.

ADVERTISING IN LONDON

Comparatively little has been done in this country in the way of poster advertising. This fact is my excuse for referring somewhat at length this evening to the advertising poster campaign recently carried on in London by the Underground Electric Railways Company, Ltd., which has undoubtedly done more in this direction than any other electric railway company. The paper then presented an account of the methods of advertising followed in London. About 25 large posters and a collection of circulars used in that city were exhibited. The latter included a 54 page pamphlet sold for 2 pence containing a map of London in sections, a colored map of the underground lines and connecting street railways and

*Abstract of paper presented at meeting of the New England Street Railway Club, Boston, Dec. 30, 1909.

an index of the underground railway stations, public buildings, amusement places, hotels, etc. There was also a penny pamphlet with a map of the system and its suburban connection, brief illustrated descriptions of the sight-seeing points in and about London, and a list of the principal theaters, clubs and steam railroad terminals in connection with the nearest subway station. The free pamphlets included one of the pleasure resorts in and about London with information on fares; a book folder on places of interest in the city, giving the conditions of admission when open and to what points tickets should be bought; book folders containing season ticket rates showing map and list of excursion fares, including admission to Earl's Court; map with list of principal places of interest and subway interchange stations; guide to the schools and colleges; guide to the churches and chapels; time table with list of the railway terminals; individual pocket cards giving time-table of late theater trains with map of theater districts; monthly diary of events in and around London with rates of fare schedules of non-stop service; schedule of bus service connections at suburban terminals, and a colored book map of the London tubes printed on linen backing.]

PUBLICITY TO MAKE THE PUBLIC FAMILIAR WITH OPERATING PROBLEMS

The second aspect of the phases of publicity which we are considering is a development of recent times. It is a result of the onslaught against corporate management which has been so serious a feature of our business life lately. What was the position of the corporation in the years that preceded these attacks? Its voice was never heard in defense or explanation. Now the time has come to talk. A campaign against corporations finds support because the public does not understand the operating and financial problems with which the managers of these properties have to deal. It is easy to say that all the properties are over-capitalized and pay excessive profits and that fares are too high. This and more has been said and believed by a large element of the public in more than one community. Any politician with a grievance who wanted a following could secure it with ease by talking against public service corporations. Now, these corporations, standing on their legal rights, can refuse to answer such attacks. But wiser policies are prevailing and to the recognition of publicity as a means for education of the public is due, in part, the progress in the understanding regarding corporate affairs which has taken place.

The misunderstandings between the public and the street railway are almost wholly due to ignorance on the part of the public as to the details and difficulties of traction operation and management. If the public is educated through publicity, and its confidence is gained, half of the troubles of a public utility company are over. The public knows nothing about the troubles of the public utility company. It only sees a stream of nickels pouring into the company's treasury, and it often believes that some desired or objectionable feature of service is either refused or maintained out of indifference to the public desires. In almost every case of this kind the demand or opposition could be satisfied by explanation. This applies with equal force to such problems as taxation and transfers, details of service, and to labor problems. Publicity can secure public support in a labor controversy, or it can prejudice the whole community against the company.

Some of the deeply rooted notions and prejudices which have been developed in relation to the profitableness of great railway enterprises would be ludicrous if they were not serious. People assume that street railway companies pay taxes, but generally have no knowledge of the large sums extracted from these properties not only in direct taxation, but indirectly in the kindred nature of public benefits. The ignorance of the public has not been confined to these questions alone. Transfers have been distributed with so free a hand that the public has never considered their value. The man who rides 2 miles to his office every morning does not realize the large number of people who ride several times this distance. If a car is accidentally delayed, the neglect of the company in allowing such accidents to occur is regarded as a wilful offense. If cars are not operated on a headway calculated to meet the personal convenience of each passenger, there are many who cherish ill feeling.

This condition arises partly from a natural tendency on the part of many to exaggerate every evil, apparent or real, and to ignore or belittle the good that is being done. I doubt whether any of those present has ever seen a news story to the effect that there has not been a single accident on his lines for 30 days. But if one of his cars bumps a wheel off a wagon to-morrow the occurrence will be chronicled on the front page of the newspapers. This illustrates the necessity for systematic publicity that will tell the good news along with the bad news.

There are two points of contact between the company and the public, so far as this branch of publicity is concerned, of which I will speak briefly to-night. One is the newspapers, the other is the employees themselves.

The subject of the relations of public utility companies with the newspapers is a very broad one, and I do not mean to go fully into it. But it is undeniable that newspapers make public opinion, and it therefore follows that some steps are necessary to secure a fair presentation of public corporation affairs in the newspapers. This is a condition; not a theory. I need not discuss the desirability of this condition of affairs. It exists and is to be dealt with just as any other situation, desirable or undesirable, is to be met and handled. In some cases this educational work can be accomplished by no greater expense than the salary of the publicity man. In other situations the company must pay for advertising space in which to tell its side of the story.

The secret of this kind of advertising is first to emphasize the fact that the company has nothing to conceal from the public in the way of its earnings or details of operation, and second, that in return the company expects to receive from the public its necessary co-operation, as well as equal fairness in its judgment upon matters connected with the company.

In this, as in all general publicity work, the company must act as though the public was in utter ignorance of its service. If it does this the assumption will not be far wrong. The average manager is too close to his work, and knows too much about it to realize how little outsiders know.

The choice of a man for carrying on this kind of publicity work is all important. Daily newspaper men have the best equipment for the job, but not every newspaper man can do it. It requires a "news sense," plus a knowledge of how public opinion is formed, plus the capacity to grasp the corporation viewpoint. The duties of such a man, however, will not be confined to preparing announcements of this kind. Indeed, on most roads and at most times his immediate work would be that of supplying the public, press and others with information and facts in regard to the company and its facilities as may be required.

One would suppose, for instance, that everybody in Philadelphia knew how to reach the Wissahickon district, the northern section of Fairmont Park. But the publicity man of the Philadelphia Rapid Transit Company discovered that the Park Department received frequent telephone requests for information as to means of reaching various points. He had a postcard map made showing the line to the Wissahickon district and advertised that the map could be had for the asking. The next day there were hundreds of requests by mail and in person for the map, and these applications have kept up steadily for two months.

Of course, the principal desideratum in work of this kind is not necessarily that there should be a special man with the title of publicity agent or manager, but that there should be an orderly and systematic manner of taking care of legitimate requests for information, for anticipating these requests when possible and for seeing that the company's side of any public question is properly presented. Sometimes this work can be

undertaken by the manager, but on many roads he is too busy to attend to it. Whoever has it in charge should necessarily be in touch with the policy of the company in regard to matters of publicity and be easily accessible by the newspapers.

The president or general manager who does not take a long reach, so to speak, and utilize to its fullest extent the kind of publicity of which I have just been speaking, and does not know what others are doing in this respect, is not fair to himself, or to his company, or to the industry at large.

The second point of contact between the company and the public is through the employees. The officers of an electric railway company see and meet a few only of the patrons of the company, but the conductors meet them all, and the impression which they convey to the public as regards fairness, intelligence and politeness is usually that which the public attributes to the company as a whole. It is somewhat disquieting for any person to feel that his reputation for these qualities has been entrusted into the hands of another, and still more when given into the hands of several hundreds or thousands of others. But this, to a large extent, is inevitable on every electric railway system. It is a condition which we cannot avoid, but which we can control and improve.

PUBLICITY REQUIRED BY COMMISSIONS

The third form of publicity to which I have referred is that required by law in regard to access to the company's records by commissions representing the public. In Massachusetts the commission has in addition broad recommendatory and mandatory powers, while in New York and Wisconsin the commissions are acting under laws which, according to their interpretation, confer the most important mandatory powers respecting all vital questions of management, finance and operation. The question which I am to discuss in this connection, as I understand my topic, is not to differentiate between the powers conferred by law upon these respective commissions, or to take up the character of their work, but to consider the extent to which this kind of publicity is in the public interest.

Let us look back a few years. The construction of street railway properties in the early stages of development of these enterprises was a rich field for the promotor. But as time passed these properties became more and more monopolistic in character until, to-day, in most communities it is regarded as in the public interest to have one corporation in control of all of the urban railway facilities. The program of construction, development and sale of railway properties in the future must, therefore, be confined largely to properties in new, or comparatively new, districts which are now without adequate railway facilities. I do not mean that there is no longer a place for the promoter of street railways. Without the promoter, many electric railways which provide indisputable facilities would never have been constructed. Every project of this nature involves elements of business risk which only promoters and the capitalists whom they are able to enlist appear to be willing to assume at the initial stage. While the promoter therefore will find opportunity for construction as new sections of the country are opened to settlement and as population increases in existing districts, which were now without urban and interurban facilities, it will be found that for the great majority of existing properties safety and conservatism point the way to operation as differentiated from promotion. It is better for all concerned that street railways should be considered as going properties with a fixed investment without excessive overcapitalization and that no community should have the right to destroy capital investment. A reasonable return should be allowed on the investment in the business with compensation for unusual efficiency of management. These conditions are more likely to prevail where the public knows the truth about the property than where the essential points are buried in mystery.

Taken by itself, publicity of all the intimate details of the accounts and records of properties of this character will not, cannot, create ideal conditions. The mere passage of a law, the mere creation of a commission, the making public of records pertaining to financial and operating questions will not create ideal conditions, but the careful use of opportunities vested by law in a conservative commission may be made to redound to the benefit and protection of the public interest. This public interest of which I speak cannot be confined to the interest of the traveling public in the common acceptance of the term, but must include also the equal interest of the investing public and of that class of the public which constitutes the officials and employees of the corporation.

Until this new development became a feature of our government, in some States many of the advocates of commission rule believed that public utility rates generally were too high and that the consuming element of the community needed protection from excessive rates. The real fact of the matter is that inquiries into the cost of operation have led to discoveries which have been astounding to many and in more cases have led to increases rather than to decreases in rates. In a number of instances the public has been getting its transportation for years at less than a fair cost, plus a reasonable return. Since our interest lies in the perpetuation of these railways as solvent properties, we can but admit that wise commission rule may tend to that end.

Electric railways have been fortunate in having had a fair investigation of some of these problems. So long as governmental inquiry is conducted carefully and a wise control is exercised over properties which have been subject to many vicissitudes in the past, the ultimate outcome should be beneficial. It should lead inevitably to a final swing of public sentiment toward a far better understanding of corporate relations than previously existed. And public sentiment, once gained, is a controlling element in the success or failure of any business enterprise, corporate or individual.

CONCLUDING REMARKS

Finally, I do not advocate publicity as a royal road to public favor and support. Every electric road has lubrication troubles, no matter how much oil and grease it buys. But no road would think of trying to operate without any lubricant. Publicity work is much the same way. When properly directed it will increase the receipts; it will bring about a better understanding between the company and the public; it will assist the company to gain a fair hearing in cases of conflict, public, private and political, and it will help to secure unprejudiced juries in accident cases. The life of a street railway man will never be an easy one. But publicity of the kind I am talking about will make his work much easier than it can ever be in an atmosphere of criticism and hostility.

PROPOSED BERLIN EXPOSITION OF AMERICAN ART AND INDUSTRY

Plans are now under way to hold an exposition of American products in Berlin, Germany, during the months of June, July and August, 1910. The projectors are receiving the encouragement of the highest officials and prominent citizens of both Germany and the United States. The American committee which has been organized, with headquarters at 50 Church Street, New York, has already issued a prospectus outlining the scope and practical advantages of the exposition. It is pointed out that the cost of exhibiting will be reduced to a minimum, as the German Government will waive the customs duty on all goods not sold eventually, and the Hamburg-American and North German Lloyd steamship lines will grant a freight reduction of 30 per cent on exhibits both ways. Furthermore, each exhibitor will have to pay only one fee, which will cover space, lighting, decorations, packing, policing, insurance, advertising in the official catalog, etc. This absence of extras will save the exhibitors considerable expense and annoyance, besides enabling them to calculate their costs accurately in advance.

B. S. Josselyn, as president of the Portland Railway, Light & Power Company, has contributed $7,500 toward the expense of the Rose Festival to be held in Portland from June 6 to 10, 1910.

VALUATION OF PUBLIC SERVICE CORPORATIONS*

BY W. H. WILLIAMS, THIRD VICE-PRESIDENT, DELAWARE & HUDSON COMPANY

The value of a railway lies not in its physical property, but in the use of that property. Value begins with use and increases as use increases.

The things that secure a broad, extensive and profitable use are, therefore, the things which give value to a railway. Among these are:

1. The location of the railway with reference to natural resources producing traffic.

2. The location of the routes selected with reference to economical construction and service.

3. Suitable construction and equipment.

4. Such combination of capital and labor, and efficiency of management as will secure the maximum traffic per dollar of expenditure.

Unless there be a profit beyond the investment return, there is no reward for the conception of the undertaking, its economical construction, the subsequent additions of improved machinery and appliances, the introduction of economies of operation, nor the maintenance of harmonious relations with the public and connecting lines, all of which are necessary to secure the greatest amount of traffic per dollar expended.

The following questions present themselves: Can a "fair valuation" be made? By what method should it be reached? For what practical purposes can it be used? By whom should it be undertaken?

"Valuation" seems to relate to "value" and a "railway valuation" would seem to be a process of ascertaining "railway value." Value, however, is a ratio in exchange; that is to say, in commerce. Value, then, is an incident of commerce, and cannot exist without it, and to qualify the term "value" by the word "commercial" is superfluous, for all value must be commercial. When it is proposed, therefore, to undertake something which is not to be a "commercial valuation," it is plain that the thing to be ascertained, whatever it may be, cannot be "value." The thing now proposed is not new, although its advocates have been pleased to give it a new name. What they are really proposing is to ascertain "cost of reproduction less depreciation."

Through laying undue stress upon the present value of material in place, much confusion has arisen regarding the elements entering into value. This is caused largely by using the term "physical valuation" instead of "present cost of reproduction." This confusion has become so great that many regard the present value of material in place as constituting the only element in such value. Little attention has been given to value derived from use. It is unfortunate that so well known a phrase as "cost of reproduction" should give place to one which is little understood and has already proved misleading.

Nothing is clearer than that the present agitation does not contemplate an ascertainment of the actual value of the property.

It would seem only wise and prudent to determine, before incurring the enormous expense incident to ascertaining the cost of reproduction, what relation, if any, it will have to the valuation of the railway; that is, to determine how such cost will be used in arriving at value. If it can be used (and I do not to-day say it can), then consideration must be given to the elements that enter into the cost of reproduction. The plan now most generally advocated is that which has been followed by the several States that have undertaken a valuation of railways. Such valuations were undertaken originally for taxation purposes. There are differences not only in the methods followed by the several States, but there are many items which, as yet, have not entered into the valuation by any of the States and which should receive proper consideration. Among the items that have been ignored or inadequately treated are:

1. Cost of surveys. 2. Rate of interest during construction. 3. Discount on securities sold. 4. Cost of material. 5. Cost of labor. 6. Excavation and embankments. 7. Contingencies and contractors' profit. 8. Effect of machinery on cost of construction. 9. Carrying charges. 10. Impact and adaptation. 11. Special conditions affecting cost. 12. The cost of progress.

The cost of reproduction is a matter of individual opinion. No engineer in estimating on the several important items of construction work for the year will come within 10 per cent of the total aggregate cost. Many of the more important items are frequently underestimated from 25 to 50 per cent. If experienced engineers, knowing the local conditions, cannot estimate the exact cost, how can those without special knowledge be expected to do so. An especially good illustration is that of the Panama Canal. The original estimate of the cost of engineering and construction work was $139,705,200, but the present estimate is $297,766,000 (page 18, President's message to 61st Congress), and it is probable this cost will be greatly exceeded.

RATES.

The Interstate Commerce Commission, even while advocating valuation, does not contend that after it has been accomplished, the regulating authority can proceed generally to utilize the results as a basis for rate-making.

We see that even in the suggestions of Prof. H. C. Adams and of the commission, the question of cost of reproduction occupies but a very small place in the process of determining the reasonableness of a rate.

Bearing in mind that the power to regulate railway charges rests wholly upon the fact that the railway is a common carrier, and extends no further than the power to control the charges of any common carrier, let it be supposed that an individual operating an express wagon upon a public highway, as a common carrier, has invested in his business the sum of $5,000, and that he performs, within a particular period, 500 services at a uniform rate of $1 per service, and at an operating expense of 50 per cent of his gross receipts, thus leaving $250, or 5 per cent for the return to capital. Assuming the rate of $1 to be reasonable under these conditions, let us inquire:

(*a*) Does the rate become unreasonable if the introduction of operating economies reduces the operating ratio to 25 per cent, leaving 7½ per cent for return to capital?

(*b*) Does the rate become unreasonable if, with no increase in capital, the number of services and the operating expenses are both doubled, with the result that capital earns 10 per cent?

(*c*) Upon the additional assumption that one-half of the capital was originally borrowed at 5 per cent, does the rate become unreasonable if the loan is renewed at 3 per cent, leaving 7 per cent upon the portion of capital actually supplied by the individual conducting the business?

If anyone is disposed to answer the foregoing questions, or any of them, in the affirmative, he should do so with a full understanding that his answer commits him to the principle that those who engage in public service industries are not entitled to the rewards that naturally spring from superior management. If this doctrine should be established, there would be little basis for the hope of further improvement in the methods of public transportation.

The truth is that neither the industries of the country aside from the railways, nor the railways themselves, could exist under rates calculated from a "valuation" upon any such basis as that proposed. It is not meant by this that there is no case in which such a method could be applied without complete disaster, but it is asserted that the general adoption of such a method of rate-making is impracticable. The retail merchant may endeavor to add a uniform percentage to the wholesale price of the goods which he sells, but this desire always yields in the face of competitive conditions, for the price must always be one at which the goods will sell. Under some conditions rates must be made which do not produce what on every other consideration would amount to a "fair return upon the fair value of the property."

*Abstract of paper presented at a joint session of the American Economic Association and American Political Science Association, New York, Dec. 30, 1909.

The phrase "what the traffic will bear" is generally misconstrued to mean "all that the traffic will bear." What it does mean is: "All that some of the traffic will bear." It can be safely stated that "all the traffic will bear" is charged only in cases where it is found necessary to make reductions from the normal rate in order to permit the traffic to move at all, and that the charge of "all the traffic will bear" is not made for the purpose of securing an excessive rate for the service performed.

CAPITALIZATION.

The system of accounts promulgated by the Interstate Commerce Commission makes it impossible that cost of property and par of outstanding securities should be equal. They expressly forbid the capitalization of many construction items amounting to $200 or less.

That system establishes *depreciation* accounts but makes no provision for *appreciation*. It provides for the arbitrary withdrawal from the accounts of the cost of property prematurely withdrawn from service through additions and betterments, undertaken for purposes of improving the service or more economical operation, and does this without regard to whether capital has been reimbursed for its investment. It does not encourage economical operation, but does offer a premium to any road which increases the cost of property per dollar of revenue received; that is, it encourages a result directly contrary to all economical principles. It does not encourage competition, but does make the strong roads stronger and the weak roads weaker.

It requires the carriers to pay out of earnings many items which should be capitalized. For such of the items as represent property "abandoned to make way for providing the public with better facilities," the statistician of the commission admits that there is merit in the argument of the stockholder that the cost of progress should be capitalized. Notwithstanding this, the commission ignored the claims of the stockholder and did so against the unanimous recommendation of the Railway Accounting Officers, and without granting any formal public hearing.

A good illustration is the question of increasing the tonnage capacity of the track. This can be done by either reducing the grades or building additional main tracks. If the grades are reduced, a large percentage of the cost must be charged to operating expenses. If additional main tracks are constructed, all the cost must be capitalized. By reducing the grades, the capacity of the line can be doubled and the business handled with fewer locomotives and fewer engine and train crews. No such reductions can be obtained through the construction of additional main tracks.

The suggested future use of the present cost of reproduction without a reinventory, but by a process of addition and subtraction, is equivalent to saying that the present cost of reproduction can be ascertained by applying a similar process of addition and subtraction to the original cost of the property. Neither that plan, nor the system of accounts promulgated by the commission, gives due consideration to the effect on capital caused by the premature withdrawal of facilities in the installation of betterments for increasing the productive capacity of the plant. They provide for the systematic taking away from the investor of a portion of the capital which he has invested, without in any way securing to him a commensurate return. In no instance do they provide for appreciation in either the selling price of real estate or in other elements entering into the value of the railway as a going concern. What could make the risk to capital more extensive?

Actual figures will not be continued on the asset side of the balance sheet, but some theoretical prices and figures determined by a "rule of thumb." The only actual cost figures to be continued on the asset side will relate to non-physical property. Thus we see that, although the Interstate Commerce Act authorized the commission to prescribe a system of accounts that only contemplated a *record of the acts of the carrier*, they have attempted *a system of control*, which would permit them to substitute fictitious for actual transactions.

The commission has had no duty to perform which has been or is likely to become more important than the preparation of a system of accounts for the carriers. This work was delegated to others. While some carriers were consulted by the statistician, those to whom the work was delegated made a number of recommendations to the commission which the carriers believed would seriously affect their ability to interest capital or improve their property to meet the increasing demands of commerce. These recommendations were adopted by the commission against the protest of the carriers, and they most emphatically denied the request of the carriers that a public hearing be had before the promulgation of any system of accounts.

EFFECT ON CAPITAL, LABOR AND THE USERS OF TRANSPORTATION.

While asserting "that the public is in partnership in the public service industries," the scheme of valuation fails to recognize that all partners are expected to bring something of value and share proportionately in both the losses and the profits. Professor Adams' scheme, if carried out, would not only cause the investor in railways to stand the loss from any possible reduction in the estimated cost of replacement or in the operation of his plant, but would give to the public any profits that might arise over and above an investment return. It does not, however, contemplate that the users of transportation shall share with the railway investors, any profits that may arise in their business over and above an investment return.

Has capital assumed no risk, and has its reward been unduly high? The processes of liquidation through which many roads have passed, answer the first part of this question. The average return to-day on securities outstanding (which members of the Interstate Commerce Commission, the President of the United States and other persons of authority have publicly stated undoubtedly represent approximately the present value of the properties) is not over 4 per cent.

It should not be inferred that the railways object to having a valuation placed upon their properties. In effect such valuations are daily attempted with greater or less success by subscribers to new issues of securities and even by those who invest largely in securities heretofore issued. There is, however, serious objection to an incomplete and misleading valuation bearing the stamp and carrying the weight of Governmental sanction, which can be of no practical advantage to the Government, the public, or the railways; but may easily injure the public and the railways by disturbing the confidence of the former and hampering the activities of the latter. It seems very clear that such a valuation as is proposed would be wholly useless to the Government for any practical purpose, because it would omit so many factors essential to any fair appraisement of the worth of the enterprises as going concerns. The only purposes suggested are for:

a Rate-making.
b Control of security issues.
c Taxation.

(*a*) For rate-making.—Unless the Supreme Court overrules its well-considered decisions, such partial valuation cannot possibly form the basis of determination of any rate or rates, general or special.

(*b*) Control of security issues.—No such control is as yet vested in the commission, nor can it be under the Federal Constitution. There can, therefore, be no advantage in securing such a valuation to facilitate the performance of a function which does not now and probably never will exist.

(*c*) It is assumed that the taxation referred to is Federal taxation, with regard to which it may be briefly said: (1) A partial and unequal valuation could not be the basis of a fair tax. (2) The Congress has already elected to tax all corporations, including railways, upon their net profits; to which a physical valuation can have no conceivable relation. (3) If in future other methods of taxation should be proposed, to which any valuation is relevant, it will then be soon enough to provide for a valuation which will harmonize with the system under consideration.

CALCULATION OF TIE LINES BETWEEN STREET RAILWAY POWER STATIONS

BY RALPH H. RICE, E. E., CHICAGO.

In a street railway system of a large city reliability of service is of prime necessity. Such a system is usually served by a number of power houses or substations, and the question of connections between stations is of considerable importance. The object of interconnecting the stations is to reduce the liability of a complete shutdown on those trolley sections fed from a given station if the station should be disabled. By installing tie lines current may be fed into the disabled station from others to which it is connected. The simplest way to accomplish this would be to have between stations several cables or "trunk tie lines" of such total carrying capacity that the current fed into the disabled station from the adjacent ones would be any desired fraction of the total station capacity. Under normal operating conditions these ties would serve as equalizers between the various stations.

The investment for such ties would be quite large and essentially the same results may be secured by selecting a number of the more important trolley sections and feeding them from two stations. The feeders to these chosen sections should be designed so liberally that on the whole system, in case of the shutdown of one or two stations, a considerable proportion of the load could be carried on the remaining stations through these tie lines. The sections to be chosen for ties depend entirely upon local conditions, but in general those upon which the continuity of service is most important should be selected, for if one station is shut down or one feeder is disabled the cars on the section could still be operated from the other station by means of the second feeder. No general figure can be given which will indicate the per cent of station loads which should be provided for in the capacity of the tie lines, for the addition of these lines to the feeder system should be looked upon as an added investment in the nature of insurance against interruption of service, and a decision as to the proper amount to spend would depend upon the importance attached to the continuity of service.

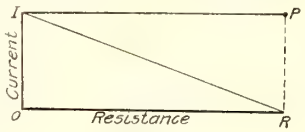


Fig. 1

The calculations of all feeders are, of course, based fundamentally upon Ohm's law, but the writer has found it very convenient, especially in calculating tie lines, to utilize two corollaries which are derived from this fundamental relation. The first of these is that the maximum drop, measured from one end of a uniformly loaded conductor, is one-half the drop produced by an equal total load concentrated at the distant end of the conductor. Or, stated in another way, the maximum drop on a uniformly loaded conductor is equal to the drop produced by the total load concentrated at the center of the conductor. This may be proved readily by reference to Fig. 1, in which OR represents the resistance of the conductor and OI the total current in the conductor. If the current at one end is I and the load diminishes uniformly to zero at the other end of the conductor, then the line IR is the current curve for a uniformly distributed load. For the same total load concentrated at the distant end P, the current curve is IP. The areas included between the current curve and the axes represent in each case the drop over the conductor. For the uniformly distributed load this area is $\frac{IR}{2}$, and for the concentrated load it is IR.

The second corollary has to do with the similarity between moments in a mechanical system and drops in an electrical system. For example, a beam supported at both ends and having on it a certain distribution of load will be in equilibrium when the sum of the moments about any point is zero. Similarly if a conductor has current fed into it from both ends to supply any distribution of load upon it there will be for every distribution some point of division on the conductor through which no current flows. This is the point of maximum drop and of equal drop from both ends. The system may then be said to be in equilibrium.

In an electrical system we have current, resistance and drop corresponding, respectively, with load, distance and moment of the mechanical system. If the conductor is of uniform size throughout its length, as is usually the case in tie lines, we may use length of conductor instead of resistance.

Based upon these principles we may calculate in detail some typical sections. In the illustrations given, the two sections are assumed to be operating at the same voltage, and the trolley sections are considered to be uniformly loaded and the feeders of uniform size. If these assumptions should not be true in any case, simple modifications in the method would properly provide for the difference.

In the case of an isolated section which is fed from one station only, such as is shown in Fig. 2, the calculation is very simple. The section AB of length L feet has a uniformly distributed load of I amperes, which is considered as concentrated at the center of the section. If r is the resistance per foot of feeder, the drop from the power station to the nearer end of the section is rDI. The added drop to the end of the section is $\frac{1}{2} rLI$ if the feeder is continued undiminished in size to the end of the section, and the total drop is given by the equation

$$E = r\left(D + \frac{L}{2}\right) I$$

If the feeder is reduced in size as the load decreases the maximum drop at the end of the section will be somewhat greater than that given. As an illustration we have:

Load on section is $I = 750$ amp.

Length of section $L = 4000$ ft.

Distance from station to section is $D = 1000$ ft.

Size of cable used is 1,000,000 circ. mil, whose resistance per foot is $r = 0.00001056$ ohm.

Hence the drop to the end A of the section is

$$E = r\left(D + \frac{L}{2}\right) I \qquad (1)$$

$$= 0.00001056\left(1000 + \frac{4000}{2}\right) 750$$

$$= 23.7 \text{ volts}$$

The calculation of a tie section is a little more complex. Take, for example, the simplest case, illustrated in Fig. 3, in which the main feeder beteewn stations is assumed to extend the entire length of the section and to be uniform in size. The section AB has a uniformly distributed load of total value I amp, of which I_1 amp are assumed to come from station S_1 and I_2 amp from S_2. P is the point of division of load between the stations and is the point of maximum drop on the feeder. We are usually concerned in knowing the load on each station and the maximum drop on the section.

To determine the load I_1 on station S_1 take moments about S_2. These moments must be so chosen that they will involve only the one unknown, the value of which is sought; otherwise the solution of simultaneous equations becomes necessary and much needless labor is introduced. In this case assume the total load to be concentrated at the center of the section. Then its moment about S_2 would be

$$\left(D_2 + \frac{L}{2}\right) I$$

The moment of the load I_1 at S_1 which would just balance this moment, about S_2, is

$$(D_1 + L + D_2) I_1$$

Equating and solving we get the load on S_1 equal to

$$I_1 = \left(\frac{D_2 + \frac{L}{2}}{D_1 + L + D_2}\right) I \qquad (2)$$

which shows that the load on one station is equal to the total section load multiplied by a fraction whose numerator is the distance from the second station to the center of the trolley section, and whose denominator is the distance between the stations.

The following data are from an actual case:

Load on section is $I = 1050$ amp.
Length of section is $L = 4670$ ft.
Distance to station S_1 is $D_1 = 5170$ ft.
Distance to station S_2 is $D_2 = 4320$ ft.
Size of cable, 1,000,000 circ. mil.
The current on station S_1 is then, by equation (2)

$$I_1 = \frac{4320 + \frac{4670}{2}}{5170 + 4670 + 4320} 1050 + 494 \text{ amp.}$$

Load on station S_2 is then

$$I_2 = I - I_1 = 1050 - 494 = 556 \text{ amp.}$$

The location of the point P of division of load is readily determined. Since the load is uniformly distributed along AB we get

$$L_1 = \frac{I_1}{I} L \qquad (3)$$

We then have numerically

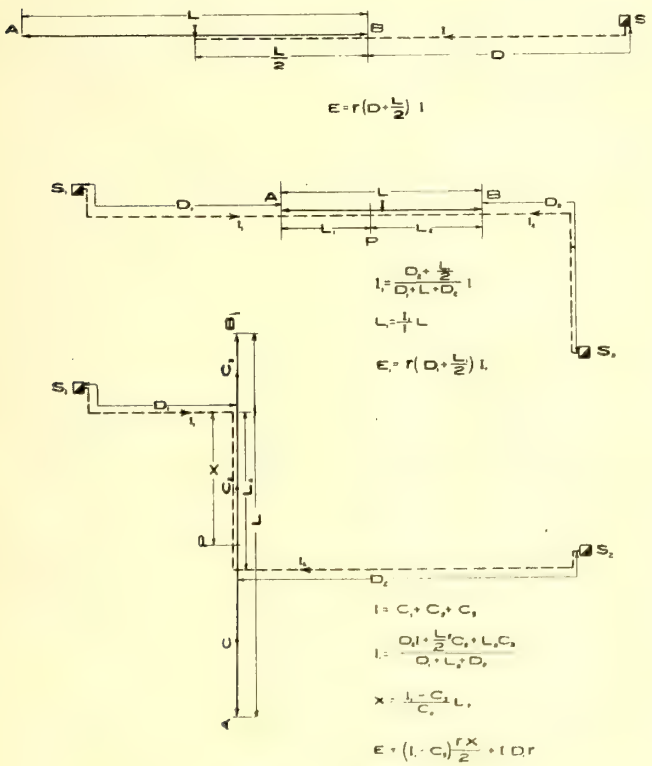
$$L_1 = \frac{494}{1050} \times 4670 = 2185 \text{ ft.}$$

that is, at 2185 ft. from the end A of the section each power station, delivers current. If the load distribution changes, then this point of division shifts, and may be determined for each distribution.

The maximum drop on the section occurs at P, and it is the same from both stations. We have its value as in equation (1)

$$E_1 = r\left(D_1 + \frac{L_1}{2}\right) I_1 \qquad (4)$$
$$= 0.00001056 \left(5170 + \frac{2185}{2}\right) 494$$
$$= 32.6 \text{ volts.}$$

A second type of tie section is one in which the main feeder between stations does not parallel the trolley section, through-



Figs. 2, 3 and 4

out its length, as shown in Fig. 4. The loads on the three parts of the trolley section are C_1, C_2, and C_3. We then have the total load

$$I = C_1 + C_2 + C_3 \qquad (5)$$

To find the load on S_1 we take moments as before, about S_2, which gives

$$C_1 D_2 + C_2\left(D_2 + \frac{L_2}{2}\right) + C_3 (D_2 + L_2) = I_1 (D_1 + L_2 + D_2)$$

Multiplying out and factoring we get

$$(C_1 + C_2 + C_3) D_2 + C_2 \frac{L_2}{2} + C_3 L_2 = I_1 (D_1 + L_2 + D_2)$$

which by substituting from (5) gives

$$I D_2 + C_2 \frac{L_2}{2} + C_3 L_2 = I_1 (D_1 + L_2 + D_2)$$

and hence

$$I_1 = \frac{I D_2 + C_2 \frac{L_2}{2} + C_3 L_2}{D_1 + L_2 + D_2} \qquad (6)$$

The load distributed over the distance x is $I_1 - C_3$, and since the distribution is uniform, we have

$$x = \frac{I_1 - C_3}{C_2} L_2 \qquad (7)$$

The drop from S_1 to the point of division P is then as shown in equation (1)

$$E_1 = (I_1 - C_3)\frac{rx}{2} + I_1 D_1 r \qquad (8)$$

which is the maximum drop on the feeder, but which may be exceeded at the ends A and B of the trolley section.

For a particular case we have:

Load on section is $I = 750$ amp.

Length of section is $L = 6740$ ft. divided into lengths of 3400 ft., 1970 ft. and 1370 ft.

$$\text{The load per foot of section} = \frac{750}{6740} = 0.1114 \text{ amp.}$$

Hence $C_1 = 3400 \times 0.1114 = 378$ amp.
$C_2 = 1970 \times 0.1114 = 220$ amp.
$C_3 = 1370 \times 0.1114 = 152$ amp.

Length of section parallel to feeder is $L_2 = 1970$ ft.
Distance from section to S_1 is $D_1 = 5170$ ft.
Distance from section to S_2 is $D_2 = 7440$ ft.
Substituting these values in equation (6) gives

$$I_1 = \frac{750 \times 7440 + 220 \times \frac{1970}{2} + 152 \times 1970}{5170 + 1970 + 7440} = 418 \text{ amp}$$

$$I_2 = I - I_1 = 750 - 418 = 332 \text{ amp.}$$

The point of division between stations is located from equation (7)

$$x = \frac{418 - 152}{220} \times 1970 = 2380 \text{ ft.}$$

Since this distance is greater than the length L_2, and since the load C_1 is greater than the load on station S_2, it will be seen that C_1 is divided between S_1 and S_2. Hence the point of maximum drop on the feeder is at the end of L_2, where the cable leaves the section. In this case the drop is simply

$$E_1 = E_2 = I_2 D_2 r$$
$$= 332 \times 7440 \times 0.00001056$$
$$= 26.1 \text{ volts.}$$

If the point P should fall within the length L_2, then the drop to P is determined from equation (8).

The method as given here has been found to be very satisfactory in practice. The results are obtained without any "cut-and-try" process and by a little familiarity with the method it is possible to work quite rapidly. The final results show those facts which it is usually necessary to know—viz., the division of load between stations and the maximum drop on the cable.

An electric locomotive has been built in Germany which is propelled by two 35-hp motors supplied with current from 408 Edison storage-battery cells. The battery has a capacity of 280 amp-hours and a discharge pressure of 502 volts. Each cell weighs about 30 lb. and consists of nickel iron electrodes immersed in a solution of caustic potash. The locomotive has been tested with a 36 ton train as a trailing load and has run 132.5 miles before the battery voltage dropped to 468 volts. The life of the battery is estimated at 18,750 miles.

COMMUNICATION

HEATING AND VENTILATION

New York, Dec. 21, 1909.

To the Editors:

With a large part of the letter of W. R. McKeen, Jr., on the ventilation and heating of cars, in your issue of Dec. 18, no one can disagree, but in regard to one point there must certainly be a difference of opinion. Why should fresh air be taken in near the floor, there to pass over and come in contact with shoes, rubbers, wet skirts, and the general accumulation of dirt on the floor; become laden with germs and foul odors, and then rise to the breathing level, ready to deliver whatever of a disease-breeding nature it may have gathered, to the delicate membrane of the nose and throat and the lungs?

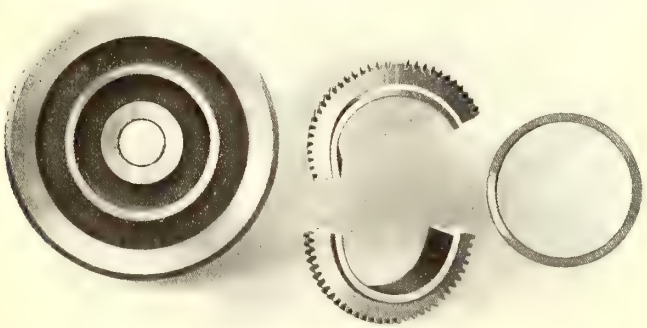
The more reasonable method seems to be to take in the fresh air near the roof and exhaust the foul air near the floor. To do this the old-fashioned and practically worse-than-useless deck should be done away with and the roof made air tight except for the openings where air is to be admitted. From these openings it should be passed over the heaters, from which it must, of course, rise, at least a short distance, into the body of the car.

In the case of street cars it might be found advisable to place the heaters under the seats and allow the warm air to escape from the window pockets back of the seats, where most of the complaints of low temperature arise. The fresh air could then be taken in on a level with the heaters through either the side or end panels. The only difficulty in such a system would be that many passengers will not be satisfied that a car is properly ventilated unless they can see an opening direct to the outer air.

William C. Whiston.

NEW METHOD OF GEAR MOUNTING

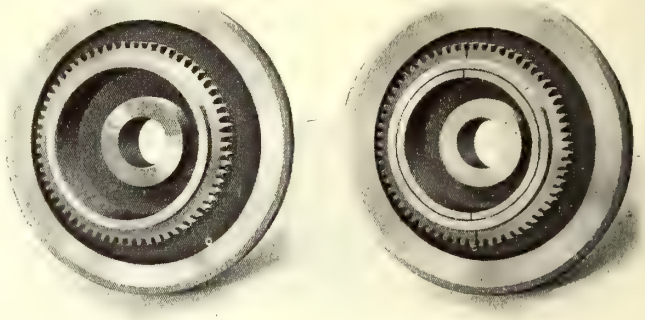
J. E. Osmer, master mechanic, Northwestern Elevated Railroad, Chicago, has recently obtained patents on a new method for mounting gears used in electric railway car propulsion. The noteworthy feature of the new method is the supplanting of the ordinary solid or split gear wheel with a pressed circular rack which is supported on an annular ring projecting inwardly from the web of one of the car wheels, as illustrated. This form of construction will permit the motor-axle bearing on the pinion end to extend inside of the gear, where it will be in direct line with the gear and pinion. Placing the



New Gear Mounting—Parts of Sectional Rack

motor-axle bearing in direct line with the transmission of the torque makes possible a more rigid form of construction, which should afford longer life for the gears and bearings.

Two methods of gear mounting are proposed; one with a solid rack and the other with a segmental rack. The circular rack used in both constructions is hydraulically pressed, then machined and treated, with a view to increasing the life over that which can be obtained from a cast-steel gear. In either type of construction the rack is carried on an annular extension welded to the web of the car wheel. This method of attachment is stated to be equally efficient with iron and cast-steel wheel centers, if tires are used, or with the pressed and rolled wheels now in use on many electric roads. The Oxy-acetyline or Oxy-hydric welding processes are both available for mounting the annular extension on wheels, and it is stated that arrangements shortly will be made with wheel manufacturers so that wheels may be purchased with the annular extension welded on. In the type of construction using the solid rack the interior of the rack is machined to the proper size for shrinking solidly upon the annular extension after the rack



New Gear Mounting—Application of Solid and Sectional Cut Racks

has been heated sufficiently. This shrinking fit is all the fastening necessary. With the solid rack type of construction the car wheel must be removed from the axle when the rack is to be renewed. In the type of construction using the sectional rack the interior of the rack is machined to a slip fit with the annular extension. The sections of the rack are bolted to the annular extension, and, if desired, an outer end ring may be shrunk on a flange formed on the motor side of the rack. This double method of securing the rack is recommended for use only with very heavy duty motors, such as might be required in locomotive use. Keys are not required in either type of construction. With the divided rack, it is neither necessary to remove the axle from the truck nor the wheel from the axle when renewing the gear.

An important feature of this method of mounting the circular rack is that the torque from the motor is transmitted first entirely to one wheel and then half through the axle to the opposite wheel. With the usual gear mounting the entire torque is transmitted from the gear direct to the axle and then divided. This practice requires a larger axle to transmit the stress and to provide metal for a key way. Motors of the present type can be used with gears constructed and mounted in the new way. It will be preferable with new motor equipments to have an extended axle-bearing lining cap with an extended lining housing made integral with the magnet frame; thus furnishing a longer bearing at the pinion end of the armature where the torque is applied. With motors having axle bearings designed for the ordinary mounting the new method of gear mounting can be used with the present axle-bearing lining by bolting a split cast-iron sleeve around the axle to arrest the lateral thrust between the motor-axle bearing and the wheel hub.

This new type of construction requires a much smaller gearcase, and the amount of gear compound required is thus reduced. The gearcase designed for this mounting is a U-shaped band enclosing the teeth of the circular rack and pinion.

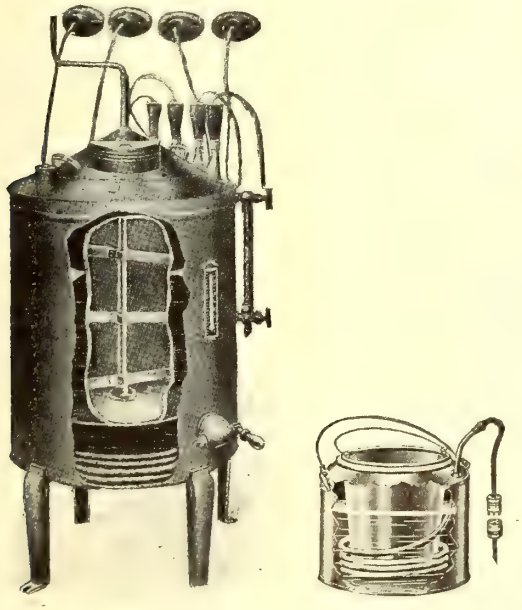
Mr. Osmer states that the new type of gear mounting will effect a saving in weight and will cost less than the ordinary gear wheel pressed or keyed to the axle. The saving will result from a reduction in material and the time required for application of gears. Additional saving will be brought about in the cost of material for axles and gearcases, because they can be made smaller; in the cost of gears, because they will wear longer, and in gear compound, because less will be required. A reduction in current should follow the lessening of the weight of the parts and the placing of the motor-axle bearing

in the direct line of the applied torque. The chief feature of economy is, of course, brought about by the reduction in the first and renewal cost of the circular rack as compared with a gear wheel.

ELECTRIC GLUE HEATER

The Advance Machinery Company, Toledo, Ohio, has recently brought out the electric glue heater illustrated, which is intended to provide a neat, quick and economical method for dissolving glue. The maker asserts that it is possible to dissolve the glue in 30 minutes, and that the current may be switched off after 45 minutes or reduced, as the operator may desire.

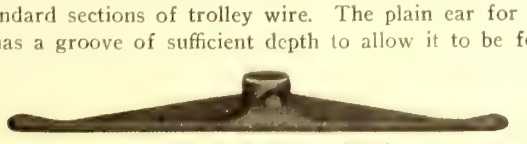
The heater is made entirely of copper and brass, and the construction is such that when the glue is brought to the proper temperature in the morning the heater may be switched out of circuit, as the heat-retaining jacket serves to maintain a temperature of about 150 deg. for from four to five hours. The glue is first put in soaking buckets, and after it has absorbed all the water necessary and acquired a jelly-like consistency it is put into the glue receptacle. The latter is cylindrical in form, and is surrounded by a jacket filled with water. This water jacket is within an additional copper jacket. The wall between the outside jacket and the water jacket is filled with mineral wool. The water in the jacket is heated by electric coils provided with three-way switches or several sockets, according to the size of the heater. The heaters are made as small as 1 pint or as large as 100 gal.



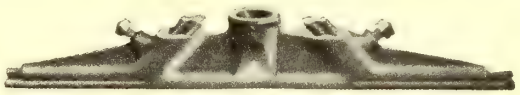
Electric Glue Heater

CLINCH TROLLEY WIRE EARS

The accompanying engravings illustrate two types of trolley wire ears made by the Indianapolis Brass Company, Indianapolis, Ind. They are typical of a complete line of ears for all standard sections of trolley wire. The plain ear for round wire has a groove of sufficient depth to allow it to be formed nearly around the wire so as to support it rigidly while leaving the under side of the wire unobstructed as a running surface for the trolley wheel. These ears are made in 12-in. and 15-in. lengths with 5/8-in. or 3/4-in. stud bolts to take from 0 to 0000 round wire. They can be tinned for soldering if desired. The splicing ear illustrated is intended to be used where splices are to be made at a hanger and it is made to take either a 5/8-in. or 3/4-in. stud bolt. The trolley wire is securely fastened in the ear by set screws and the under or running surface of the wire and ear is perfectly smooth. These splicing ears are made to take the same size and section of wire at both ends or in any combination of sizes and sections. The ear illustrated is designed to take Fig. 8 section wire at both ends. The metal of which these ears are made is claimed to have excellent wearing qualities and high tensile strength.



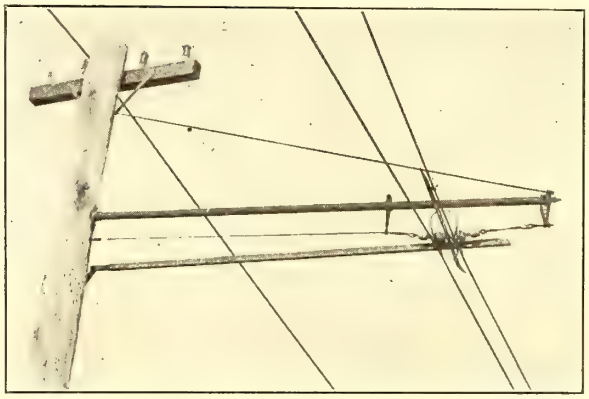
Clinch Ear for Round Wire



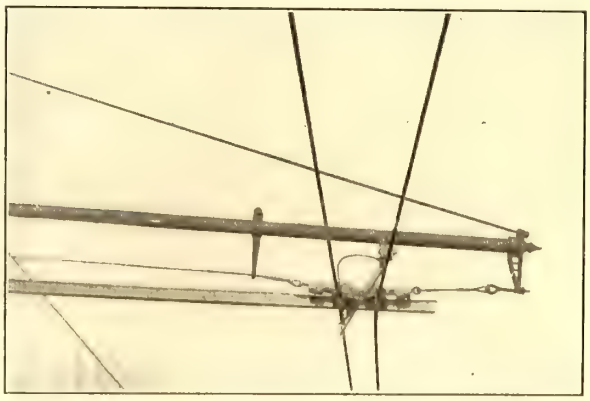
Clinch Splicing Ear

AUTOMATIC OVERHEAD SWITCH

The Indianapolis & Louisville Traction Company, which operates the first 1200-volt d.c. railway in this country, has recently equipped its line with a novel automatic trolley switch. The purpose of this switch is to change the trolley from the main wire to the siding wire when the track switch is thrown for the siding. It consists essentially of a switch blade about 4 ft. long tapered at both ends. One end is pivoted to the siding trolley wire and works under the wire. The free end is moved to and from the main line trolley wire by a simple system of bell cranks and rods. When the track switch is set for the main line, the trolley is absolutely free from any extra attachments or obstructions and the highest speed can be maintained in passing it without any damage to the trolley wheel or liability of throwing the wheel from the wire. Although much sleet has fallen during the last few weeks, it had no effect on the switch operation. This switch was designed by H. D. Murdock, superintendent of the company.



Overhead Switch Open for Main Line Track



Overhead Switch Closed for Siding Track

ORGANIZATION OF THE ACKLEY BRAKE COMPANY

Griffin S. Ackley, formerly president and general manager of the National Brake Company, Inc., Buffalo, N. Y., retired from the management of that company on Jan. 1. He has sold his entire holdings of stock, constituting a controlling interest, to a syndicate of capitalists. Mr. Ackley organized the National Brake Company over six years ago and was its president and general manager until the date of his retirement. Under his able management the company built up a very large business with Peacock & Ackley adjustable brakes throughout the world. The Ackley adjustable brake was put on the market less than a year ago. It is Mr. Ackley's own invention, and has been patented in more than 20 countries. It has already been introduced on over 200 street railways, many of which are in Europe, where sales agencies have been established in London, Berlin, Brussels, Paris and Zurich. The National Brake Company has purchased from Mr. Ackley all the United States, Canadian and Mexican patents on the Ackley adjustable brake and will continue to have the exclusive right to sell these brakes on the North American Continent. Mr. Ackley in turn has acquired from the National Brake Company all of the export business and good will in the Peacock and Tiger brakes in addition to the Ackley brake. He is still the sole owner of the patents on the last-named brake for all countries except the United States, Canada and Mexico. He will, however, have the sole right to sell all of the different types named throughout the world outside of the North American countries noted under the name of the Ackley Brake Company. The new company's headquarters will be in the Hudson Terminal Buildings, New York City, and additional foreign agencies will be established by it in countries where the company has no representatives. Mr. Ackley is now preparing his itinerary for a trip around the world in the interest of the new company. For the present the National Brake Company will manufacture the brakes for Mr. Ackley under contract for export, and has already received one order for 1270 Ackley brakes from the new company.

QUESTIONS AND ANSWERS UNDER STEAM ROAD INTERSTATE CLASSIFICATION

Circular No. 12c in the Accounting Series issued by the Bureau of Statistics and Accounts of the Interstate Commerce Commission contains answers to important questions relative to the several classifications for steam roads, issued by the commission. Several of the cases, although pertaining to the steam railroad classifications, are of interest to electric lines. These cases are as follows:

Case 433. Query. We have a power house furnishing current for propulsion of electric locomotives and cars, and also for heating, lighting and other purposes in connection with the operation of a steam railroad. It is now proposed to sell current generated in the same power house to a local street railway company. To what account should the revenue derived from the sale of power be credited? Should not a proportion of the expenses of operating the power plant be charged to the appropriate accounts; and, if so, through what clearing account should the charges be handled? In connection with the power plant we desire permission to use the account "operating power plants" solely as a clearing account, and to charge originally all expenditures into that account and then clear the account by charging the various accounts benefited, setting up an account to be called "electric traction" to represent the current furnished for moving trains.

Answer. Authority cannot be given for the opening of an account to be called "electric traction," for the reason that there is an account for that purpose entitled "operating power plants" already prescribed in the classification of operating expenses. In view of the statement that "It is now proposed to sell current generated in the same power house to a local street railway company," the operation clearly becomes an outside operation, and the entire revenues and expenses of such operations should be set up in full in the outside operations accounts, as provided in the classification of such accounts. The cost of current used by the railroad company should be cleared through the outside operating account, 'other operations Cr.' and the amount so cleared should be distributed to appropriate accounts in the classification of operating expenses for steam roads. The revenue derived from the sale of power to outside parties will, of course, remain credited to the revenue account of the outside operation, the net revenue of which will be carried direct to income accounts as provided for under "electric light and power plants" in the classification of revenues and expenses for outside operations.

Case 495. Query. A contract with an electric line permits it to operate its cars over our track, for which privilege it pays us 10 cents per car. We are to bear all the expense of maintaining the track. What account should be credited with the amount received from the electric company?

Answer. If the electric line is part of a steam road, or is a carrier using the classifications for steam roads, the revenue should be apportioned to the proper joint-facility rent account under income. If, however, the electric line is not a common carrier reporting to the commission, or is a common carrier using the classifications provided for electric railways, the amount received should be credited to revenue account No. 18, "rent of buildings and other property."

THE MID-WINTER CONVENTION

Arrangements are being completed at the office of the American Street & Interurban Railway Association for the mid-winter convention of the association to be held Jan. 28. The preliminary announcement of the convention and the notices in regard to it which were sent to member companies have received a most favorable reception, and it is the general verdict that the meeting will be most profitable both to the association and to those who attend. The formal notices in regard to the convention will be sent out from the office of the association this week and will contain a list of the speakers with the titles of the subjects which they will discuss. The meetings will be held in one of the assembly rooms at the headquarters of the railway association, 29 West Thirty-ninth Street, New York City.

The mid-winter meetings of the various committees, as announced, will be held on Jan. 27 and the conference proper on Jan 28. The meetings will conclude with a dinner which will be extended to the association by the Manufacturers' Association. This dinner will be held at the Knickerbocker Hotel on the evening of Monday, Jan. 28, at 7 o'clock. All street railway officials who are present at the conference will be invited to be present at the banquet.

MEETING OF THE COMMITTEE ON THE TRANSPORTATION OF UNITED STATES MAIL

A meeting of the committee on the transportation of United States mail of the American Street & Interurban Railway Association was held at the office of the association on Jan. 5. Those present included Robert S. Goff, vice-president and general manager of the Boston & Northern Street Railway, Boston, Mass; C. H. Hile, assistant to the vice-president, Boston Elevated Railway, Boston, Mass., and Col. A. R. Piper, general freight agent of the Brooklyn Rapid Transit Company, Brooklyn, N. Y. Upon invitation, John H. Pardee, secretary of the Street Railway Association of the State of New York, and Edgar S. Fassett, general manager of the United Traction Company of Albany, N. Y., were present.

Mr. Fassett was appointed a committee of one to draw up a form of inquiry to be sent to different railway companies throughout the country to learn the conditions on each road so far as this matter was concerned.

News of Electric Railways

Meeting of Central Electric Railway Association

The annual meeting of the Central Electric Railway Association will be held on Jan. 27, 1910, in the assembly room of the Great Southern Hotel, Columbus, Ohio. The program of the meeting follows:

MORNING SESSION, JAN. 27, 1910

9:30 a. m.—Business session and reports of special committees.

10:00 a. m.—"Notes on Street Paving," by Thomas B. McMath, Indianapolis Traction & Terminal Company, Indianapolis, Ind.

10:45 a. m.—"The Daily Inspection and Up-Keep of Rolling Stock," by H. H. Buckman, master mechanic of the Louisville & Northern Railway & Lighting Company, New Albany, Ind.

11:30 a. m.—Adjournment for lunch.

AFTERNOON SESSION

1:00 p. m.—"The Railroad Commission and Its Relation to Interurban Roads," by O. P. Gothlin, of the Railroad Commission of Ohio.

1:45 p. m.—"The Method of Procedure When a Person Refuses to Pay Fare for Self or Child," by C. C. Williams, ex-Judge of the Common Pleas Court of Columbus, Ohio.

2:30 p. m.—Reports of standing committees: Insurance, Henry N. Staats, chairman; lightning arresters, W. E. Rolston, chairman; publicity, George S. Davis, chairman; standardization, T. W. Shelton, chairman; supply men, John F. Ohmer, chairman; traffic, W. S. Whitney, chairman; personal injury claims, E. C. Carpenter, chairman; transportation, T. F. Grover, chairman; vigilance and membership, C. D. Emmons, chairman.

3:30 p. m.—Annual report of secretary.

3:45 p. m.—Annual address of the president.

4:15 p. m.—Election of officers.

Cleveland Traction Situation

Charles S. Horner, who has been mentioned as president pro tem of the new City Council at Cleveland, stated a few days ago that if Mayor Baehr did not object, the date of the referendum vote on the street railway franchise would be fixed for April 1, 1910.

The retiring Council, always loyal to Mayor Johnson, took no action at its last meeting regarding the date for the vote. Traction matters were barely mentioned at the meeting, barring the adoption of a resolution to the effect that all communications received by city officials from the street railway should be made matters of record. These communications have been in the hands of Newton D. Baker, city solicitor, but will now become official papers.

On Dec. 29, 1909, the stockholders of the Forest City Railway were notified that an effort would be made to centralize the stock of the Cleveland Railway to protect their interests at the annual meeting on Jan. 26, 1910, and proxies were asked in favor of D. C. Westenhaver, Fred C. Alber or a third party to be designated by each shareholder. The letter sent these stockholders called attention to the provision Judge Tayler made for the guarantee made on their stock by Mayor Johnson and the Municipal Traction Company, and was signed by Fred C. Alber. A year ago animus was shown at the annual meeting of the stockholders of the Cleveland Railway, the former holders of stock of the Forest City Railway feeling that they would not receive fair treatment. All opposition was withdrawn, however, on the appointment of S. T. Everett to represent them on the board.

Mayor Johnson has announced that he will leave the city for five weeks immediately following the close of his term of office for the purpose of taking a vacation in some place where he will be free to enjoy himself untrammeled, and has said that he has no intention of retiring from public life in Cleveland. He advised that those retiring from office aid their successors in every way possible.

United States Supreme Court Holds Minneapolis Reduced Fare Ordinance Invalid

In an opinion by Justice Day, the Supreme Court of the United States on Jan. 3, 1910, held invalid the ordinance adopted by the City Council of Minneapolis in 1907, requiring the Minneapolis Street Railway Company to sell six tickets for 25 cents. The company contended that the ordinance was a violation of the contract implied in its charter, which, issued in 1873, was to run for 50 years and authorized a charge of 5 cents for each ride. The United States Circuit Court for the District of Minnesota declared against the ordinance, and Justice Day's decision sustained that finding, but with modifications. In the course of his opinion Justice Day said:

"We think that the requirement of the ordinance that the company should operate its roads by the sale of six tickets for a quarter, as required by the ordinance, was an enactment by legislative authority which impaired the obligation of the contract thus held, and owned by the complainant company. We therefore reach the conclusion that the decree of the Circuit Court enjoining the execution of the ordinance should be affirmed."

Wheel-Guard Order in Brooklyn

The Public Service Commission of the First District of New York has issued an order to the street railways operating in Brooklyn regarding the use of wheel guards which it has concluded as follows:

"1. That Coney Island & Gravesend Railway, Sea Beach Railway and South Brooklyn Railway, on or before Feb. 1, 1910, equip all cars with wheel guards of a type or types to be approved by the commission, and shall not thereafter operate any cars unless equipped with such wheel guards in a good operating condition.

"2. That Coney Island & Brooklyn Railroad and Brooklyn, Queens County & Suburban Railroad equip all cars with wheel guards, of a type or types to be approved by the commission, at the rate of not fewer than 20 cars a month, beginning Feb. 1, 1910, until all of their cars shall have been so equipped and shall not thereafter operate any cars unless equipped with such wheel guards in a good operating condition.

"3. That Nassau Electric Railroad equip all cars operated by it with wheel guards of a type or types to be approved by the commission at the rate of not fewer than 60 cars a month, beginning Feb. 1, 1910, until all of its cars shall have been so equipped and shall not thereafter operate any cars unless equipped with such wheel guards in a good operating condition.

"4. That the Brooklyn Heights Railroad equip all cars operated by it with wheel guards of a type or types to be approved by the commission at the rate of not fewer than 120 cars a month, beginning Feb. 1, 1910, until all of its cars shall have been so equipped and shall not thereafter operate any cars unless equipped with such wheel guards in a good operating condition.

"5. That as soon as Brooklyn Heights Railroad, or any other companies, shall have equipped cars operated exclusively over the Brooklyn Bridge, or exclusively over the Williamsburg Bridge, with such wheel guards, said company or companies shall be relieved from equipping said cars with fenders.

"6. That as soon as Brooklyn, Queens County & Suburban Railroad, or any of said companies above mentioned, shall have equipped the cars operated exclusively on what is known as the Broadway Shuttle Line, on Broadway between Havemeyer Street and Broadway Ferry, with such wheel guards, they shall be relieved hereby from equipping said cars with fenders.

"7. That as soon as the companies shall have equipped with such wheel guards the cars operated by them on Fulton Street (from Greene Avenue to Tillary Street), Flatbush Avenue (from Fifth Avenue to Fulton Street), Broadway (west of Ralph Avenue), Livingston Street (from Flat-

bush Avenue to Court Street), Washington Street and Adams Street, then said companies shall have the right hereby to fold up fenders on cars when passing over said streets within the limits mentioned and be relieved from equipping with fenders cars operated exclusively over said streets within said limits.

"8. That, except as hereinbefore expressly provided, all cars owned or operated by any of the companies hereinbefore mentioned, when equipped with such wheel guards, shall so carry the fenders that no part thereof shall be less than 10 in. clear above the rails, and that the front edge of the apron shall not be more than 14 in. clear above the rails.

"9. That all of said companies hereinabove mentioned, on or before Jan. 10, 1910, submit to the commission for its approval complete drawings and specifications showing among other things all measurements and the method of attachment to the car of the type or types of wheel guards desired to be used by them in compliance with this order; and it is further

"Ordered, that except as expressly amended by this order, which applies to said companies hereinabove mentioned exclusively, said order of April 28, 1909, as amended by said order of May 14, 1909, shall be and remain in full force and effect; and it is further

"Ordered, that this order shall take effect on Dec. 24, 1909, and shall remain in force until revoked or modified."

Transit Affairs in New York

The Public Service Commission has voted to grant the New York Central & Hudson River Railroad an extension of 18 months from Jan. 1, 1910, for depressing the tracks leading to the Grand Central Station and the building of a new terminal.

The Manhattan Bridge Three-Cent Line was incorporated at Albany on Dec. 30, 1909, with a capital stock of $50,000, to build a railroad from Flatbush Avenue and Fulton Street, Brooklyn, over the Manhattan Bridge and through Canal Street, New York, to the Hudson River. The length of the route is about four miles. The engineering details are all in the hands of John C. Brackenridge. The officers of the company are Frederick W. Rowe, president; John C. Brackenridge, vice-president; Walter Hammit, secretary, and Edward T. Horwill, treasurer.

Mexican Views.—The Mexican Tramways Company, Ltd., Mexico City, Mex., has published a handsome album containing 49 views of the buildings and other property of the company and scenes in Mexico City. The album is published in London and a copy has been sent to each stockholder.

City Superintendent of Street Railways Favored in St. Louis.—The special joint committee of the Municipal Assembly which has the matter under consideration is said to favor the proposal to create the position of superintendent of street railways under an act of the Municipal Assembly of 1903, the official appointed to that office to supervise street railway service in the interest of the city.

Bonds Voted for Municipal Line in San Francisco.—At the election held in San Francisco on Dec. 30, 1909, it was voted to issue $2,020,000 of bonds to provide funds for equipping the Geary Street, Ocean & Park Railroad with electricity and operating it as a municipal enterprise. This is the third time within five years that the question has been submitted to the voters.

Public Utility Commissioners Named in Los Angeles.—In accordance with the decision of the voters of Los Angeles at the recent election that a public utilities commission be created to supervise the operation of the public service corporations doing business in Los Angeles, Mayor Alexander has sent to the City Council for confirmation the names of Meyer Lissner, Frank J. Hart and Paul Haupt as members of the new commission.

Electrification of Canadian Pacific Railroad at Montreal Denied.—In reply to a letter addressed by the Electric Railway Journal to the Canadian Pacific Railroad at Montreal recently in regard to the report that the company contemplated electrifying its lines in and about Montreal, D. McNicoll, vice-president of the company, replied under date of Dec. 28, 1909, as follows: "There is nothing in the reports to which you refer in connection with the proposed electrification of our lines in this vicinity."

Proceedings of the Arkansas Association.—The report of the second annual convention of the Arkansas Association of Public Utility Operators held at Hot Springs, Ark., on May 12, 13 and 14, 1909, has been published. It comprises a volume of 104 pages, 6 in. x 9 in., and includes the papers presented at the convention and a verbatim report of the discussion. The papers presented at the meeting which were of interest to electric railway circles and the discussions thereon were published in the Electric Railway Journal of May 22, 1909, page 940.

Philadelphia Transit Talks.—Transit Talk No. 39 of the Philadelphia (Pa.) Rapid Transit Company was dated Dec. 16, 1909. The subject was "Courtesy," and an invitation was extended to the public to co-operate with the company in making for efficiency by reporting all cases of negligence on the part of employees to perform their duties properly and courteously. Talk No. 40 was headed with the question, "Lost Anything?" It contained some facts about the lost-and-found department, and suggested that people who had lost articles write or telephone the lost-and-found department of the company.

State and County Cannot Both Exact Tax Based on Earnings.—The claim of the Terre Haute, Indianapolis & Eastern Traction Company, filed some time ago against Wayne County, Ind., has been allowed and certain back taxes, paid to the county in 1907 and 1908, based on the "cash on hand" of the company, have been ordered refunded. The claim was based on a decision of the Supreme Court to the effect that the State Board of Tax Commissioners, in valuing the property of railroads, considered among other things the net earnings of the companies. It was held therefore that any cash that the company might have on hand could not be taxed in addition to the valuation placed by the State on the property as a whole, as this cash represented a part of the net earnings.

Meeting of Central Railway Club.—The annual meeting of the Central Railway Club will be held at the Hotel Iroquois, Buffalo, N. Y., on Jan. 13, 1910, at 2 p. m. The feature of the business session will be the annual reports and a paper by W. O. Thompson, master car builder of the Western Division of the New York Central & Hudson River Railroad, his subject being "Car Interchange: Its Past, Present and Future." The annual dinner of the club will be held at 7:30 p. m. It will be preceded by a reception in the main parlor of the Hotel Iroquois. A musical program will be followed by addresses by Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, New York, and second vice-president of the New York Railroad Club, and others. E. M. Tewkesbury, general superintendent of the South Buffalo Railway, and second vice-president of the club, will be toastmaster. The price of dinner tickets has been fixed at $2 per plate for members and for ladies and $3 for non-members. Harry D. Vought, 95 Liberty Street, New York, N. Y., is secretary of the club.

January Meeting of the A. S. M. E. in Boston.—The meeting of the American Society of Mechanical Engineers, to be held in Boston on Jan. 21, 1910, will take the form of a banquet at the Hotel Somerset to be tendered jointly by the American Society of Mechanical Engineers, the Boston Society of Civil Engineers and the Boston branch of the American Institute of Electrical Engineers, to the presidents of the three societies, George Westinghouse, Geo. B. Francis and L. B. Stillwell, respectively, and other guests, including John Anderson Bensel, the incoming president of the American Society of Civil Engineers. Following the banquet there will be addresses by several of the guests and a paper will be presented on the main and auxiliary machinery of the battleship *North Dakota*, illustrated by lantern slides. The president of the Boston Society of Civil Engineers will also outline what that society has accomplished toward a project that has been under discussion at Boston for a united engineering building to be occupied by the several professional engineering organizations located in Boston and vicinity.

Financial and Corporate

New York Stock and Money Market

January 4, 1910.

The stock market to-day was more active than for any day within the past two months and prices showed a distinct disposition to advance, in spite of the fact that call money rates were high. Traction shares, especially Interborough-Metropolitan issues, are strong and active. Third Avenue has advanced to more than 18.

Call money touched 14 per cent yesterday and to-day ranged 6 to 9 per cent. Ninety-day loans were 4½ to 4¾ per cent.

Other Markets

Philadelphia Rapid Transit Stock has advanced and the majority of the transactions to-day were in the neighborhood of 28. Union Traction has been moderately active.

In the Boston market, the Massachusetts Electric issues have been quite active and the common stock has advanced 2 points during the past week. The preferred is also a trifle stronger. Boston Elevated has advanced.

In Chicago, the various series of the Chicago Railways Company have been active during the week. Series 1 has remained about stationary in price, while Series 2 has advanced several points during the week. There has been some trading in Series 3 and 4.

Bonds of the United Railways, Baltimore City Passenger Railway and of the Fairmont & Clarksburg Traction Company are the only traction securities being traded in Baltimore.

At the weekly auction of securities in New York, $10,000 5 per cent bonds of the Second Avenue Railroad sold at 65.

Quotations of various traction securities as compared with last week follow:

	Dec. 28.	Jan. 4.
American Railways Company	a47¼	a48¼
Aurora, Elgin & Chicago Railroad (common)	*57	*57
Aurora, Elgin & Chicago Railroad (preferred)	*92	*92
Boston Elevated Railway	132½	136½
Boston & Suburban Electric Companies	15	a16
Boston & Suburban Electric Companies (preferred)	*75	74
Boston & Worcester Electric Companies (common)	a12	a11
Boston & Worcester Electric Companies (preferred)	a48	a48
Brooklyn Rapid Transit Company	79½	79½
Brooklyn Rapid Transit Company, 1st pref., conv. 4s	86⅞	86¾
Capital Traction Company, Washington	*133½	a135¼
Chicago City Railway	*190	185
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a110	a109
Chicago Railways, ptcptg., ctf. 2	a33	a35½
Chicago Railways, ptcptg., ctf. 3	a15	a20
Chicago Railways, ptcptg., ctf. 4s	*10	a10
Cleveland Railways	*84	*84
Consolidated Traction of New Jersey	a77¼	a77
Consolidated Traction of New Jersey, 5 per cent bonds	*106	a106
Detroit United Railway	*65	*65
General Electric Company	159½	159⅞
Georgia Railway & Electric Company (common)	102½	a104½
Georgia Railway & Electric Company (preferred)	87	87½
Interborough-Metropolitan Company (common)	24¾	24¼
Interborough-Metropolitan Company (preferred)	62	61
Interborough-Metropolitan Company (4½s)	83¾	83
Kansas City Railway & Light Company (common)	a33	a35
Kansas City Railway & Light Company (preferred)	*79	*75
Manhattan Railway	*140	*138
Massachusetts Electric Companies (common)	a16¼	a19
Massachusetts Electric Companies (preferred)	a79	a80½
Metropolitan West Side, Chicago (common)	a19	a19
Metropolitan West Side, Chicago (preferred)	a57	a57
Metropolitan Street Railway	*23	*20
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*85	83⅝
Northwestern Elevated Railroad (common)	a18	a17½
Northwestern Elevated Railroad (preferred)	a68	a70
Philadelphia Company, Pittsburg (common)	a50¾	a51¼
Philadelphia Company, Pittsburg (preferred)	a45¼	a45¼
Philadelphia Rapid Transit Company	a27	a28¾
Philadelphia Traction Company	a80	a89
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	*101½	a104
Seattle Electric Company (common)	a115½	a115
Seattle Electric Company (preferred)	104	a105
South Side Elevated Railroad (Chicago)	a56	a56
Third Avenue Railroad, New York	16¼	18⅞
Toledo Railways & Light Company	*95⅝	12½
Twin City Rapid Transit, Minneapolis (common)	116	117
Union Traction Company, Philadelphia	a52	a52¾
United Rys. & Electric Company, Baltimore	a11½	a11
United Rys. Inv. Co. (common)	42¼	41¼
United Rys. Inv. Co. (preferred)	71⅞	*71⅞
Washington Ry. & Electric Company (common)	*11½	a11¼
Washington Ry. & Electric Company (preferred)	*91½	a91¼
West End Street Railway, Boston (common)	a95½	a95
West End Street Railway, Boston (preferred)	*106	*106
Westinghouse Electric & Mfg. Company	84¼	82
Westinghouse Elec. & Mfg. Company (1st pref.)	130	*130

a Asked. * Last Sale.

Annual Report of Boston Elevated Railway

Earnings from operation of the Boston Elevated Railway in the year ended Sept. 30, 1909, were $14,493,853, as compared with $14,074,697 in the previous year, indicating a gain of 3 per cent. Of the total gross revenue, $14,024,768 was received from the transportation of passengers. The statement of earnings for the year is as follows:

Earnings from operation		$14,493,853.13
From passengers carried	$14,024,768.39	
From carriage of mails	37,977.46	
From tolls for use of tracks by other companes	41,736.60	
From rentals of real estate	134,401.49	
From advertising	108,075.00	
From interest on deposits, etc	138,041.47	
From miscellaneous income	8,852.72	
Total		$14,493,853.13
Operating expenses		$9,488,483.83
For general expenses	$999,284.70	
For maintenance of roadway and buildings	1,415,477.61	
For maintenance of equipment	1,042,855.35	
For transportation expenses	6,030,866.17	
Taxes		1,063,774.87
West End St. Ry. tax on capital stock and property	631,116.26	
Boston Elevated Ry. tax on capital stock and property	293,487.57	
Boston Elevated Ry. compensation tax and tax on income	139,171.04	
Coupon interest on West End St. Ry. bonds		680,180.00
Coupon interest on Boston Elevated Ry. bonds	556,000.00	
Less interest accrued this year charged to construction account	177,091.34	
		378,908.06
Rentals of leased railways		1,346,157.04
Rental of East Boston tunnel		53,216.16
Rental of subway	$211,746.17	
Less amount collected of Boston & Northern St. Ry	24,954.61	186,791.56
Rental of Washington Street tunnel		254,923.69
Depreciation fund		200,000.00
Dividends paid on capital stock		802,503.00
Balance carried to surplus account		$38,914.32

William A. Bancroft, the president, says in his report:

"The various extensions and additions to the company's service mentioned in the last report are being rapidly provided.

"Besides its ordinary taxes the company's contribution to the public during the last fiscal year amounted to at least $430,573.27, made up as follows:

Compensation tax for the use of streets under the Acts of 1897	$124,171.04
Interest at 4 per cent on $4,361,025, cost of paving laid in streets by company	174,441.00
Cost of maintaining street paving by company	63,446.61
Amount of subway rental devoted to sinking fund	63,514.62
Moving snow removed from sidewalks and roofs (estimated) not less than	5,000.00
Total extraordinary payments to the public	$430,573.27
Add taxes assessed on real estate	310,007.90
Add taxes assessed on capital stock and income	629,595.93
Total	$1,370,177.10
To the above may be added the balance of subway rental	123,276.94
Also the rental of the East Boston tunnel	53,216.16
Also the rental of the Washington Street tunnel	254,923.69
Grand total, which is about 12.4 per cent of the gross revenue of the company for the year	$1,801,593.89

"Concerning the capitalization of the properties owned and leased by this company, your directors wish you to know that the capital stock of the West End Street Railway on Sept. 30, 1909, was as follows:

Preferred	$6,400,000
Common	11,120,150
Total	$17,520,150

"Of this capitalization the preferred stock was the amount authorized by the Legislature (Chapter 413, Acts of 1887) for the purchase of the horse railroads which made up the West End system, and was considered only the value of these properties.

"Of the common stock $7,150,000 was paid in in cash at par, and the balance was sold under orders of the Railroad Commissioners for cash at prices ranging from 40 to 80 per cent in excess of the par value, realizing a premium of $2,177,237.75.

"Of the $13,450,100 par value of the stock of the Boston Elevated Railway the first $10,000,000 was paid in in cash at par, and the balance was sold under orders of the Railroad Commissioners for cash at a price of from 10 to 55 per cent in excess of the par value, realizing a premium of $1,860,968.13 above the par value. The present capitaliza-

tion of the two companies, therefore, represents an actual payment in cash of $3,978,017.26 above the par value of the outstanding stock. The amount of this cash premium has been invested in the properties now owned by the companies. So there is not only no capital inflation of these properties, but much more has been paid in than is represented by the par value of the stocks. The dividends paid on the stocks and the interest paid on the bonds of the two companies make an average return to the capital invested of something less than 5.13 per cent per annum. It is not true, therefore, of these properties that 'excessive dividends are paid on watered stock.'

"From the summary of stockholders of record Oct. 1, 1909, it appears that the total number is 3972, holding 134,501 shares of stock. Of these 3505, holding 116,818 shares, live in Massachusetts. In other words, 87 per cent of the stock is held in Massachusetts.

"The total length of surface tracks controlled by the company is now 460.039 miles. This, with the elevated mileage of 24.087 miles, makes a total mileage of 484.126.

"Traffic statistics compare as follows:

	Year ending Sept. 30—		
	1909.	1908.	1907.
Round trips	5,549,774	5,571,459	5,606,616
Revenue car-miles, surface	43,599,806	43,818,640	44,027,731
Revenue car-miles, elevated	7,295,450	7,806,503	7,802,457
Revenue car-miles, U. S. mail cars	232,425	232,746	231,381
Revenue car-miles, total	51,127,681	.....	52,061,569
Total revenue passengers carried	281,008,471	273,132,584	271,084,815
Average receipts per passenger	$.04991	$.04989	$.04997

Consolidation of Michigan Companies

Holdenpyl, Walbridge & Company, New York, N. Y., E. W. Clark & Company, Philadelphia, Pa., and W. A. Foote, Jackson, Mich., announce the organization of the Commonwealth Power, Railway & Light Company, to take over the Commonwealth Power Company, Grand Rapids-Muskegon Power Company, Saginaw-Bay City Railway & Light Company, Grand Rapids Railway, Michigan Light Company, Flint Electric Company, Flint Gas Company, Cadillac Water & Light Company, Charlotte Electric Company, Shiawassee Light & Power Company and the Au Sable River Property and Rights. These companies own the electric light and power properties in Grand Rapids, Saginaw, Bay City, Kalamazoo, Battle Creek, Jackson, Flint, Pontiac, Cadillac and a number of intermediate towns, the electric railways in Grand Rapids, Saginaw and Bay City and between Saginaw and Bay City, the gas properties in Kalamazoo, Jackson, Pontiac, Saginaw, Bay City and Flint and developed and undeveloped powers on the Muskegon, Kalamazoo, Grand and Au Sable Rivers. The Commonwealth Power, Railway & Light Company is to be capitalized at $18,000,000, of which $6,000,000 is to be preferred stock and $12,000,000 common stock. No bonds are to be issued. The combined earnings of the consolidated companies for the calendar year ended Dec. 31, 1909, November and December being estimated, follow:

Gross earnings	$4,487,177
Operating expenses	2,317,561
Net earnings from operation	$2,169,616
Less taxes and interest on $16,677,000 outstanding bonds of constituent companies	1,049,373
Surplus earnings	$1,120,243
Less dividends on $6,894,000 preferred stock of constituent companies in the hands of the public	398,640
Balance available to the Commonwealth Power, Railway & Light Company	$721,603
Dividend on $6,000,000 Commonwealth Power, Railway & Light Company 8 per cent preferred stock	360,000
Balance	$361,603

Consolidation of Chicago South Side Surface Railways

An official statement regarding the Chicago City & Connecting Railways says that the property of the Chicago City Railway, Southern Street Railway, Calumet & South Chicago Railway and the Hammond, Whiting & East Chicago Electric Railway as a whole is to be taken over on a 4 per cent basis—that is, after payment of interest upon rehabilitation bonds and the city's percentage of earnings, the net earnings for 1910 upon the bonds and shares of stock deposited will be approximately $2,550,000, which is 4 per cent upon $62,000,000. This capitalization will consist of $22,000,000 5 per cent first lien bonds, which are the only securities that will be offered to the public at this time. Instead of issuing the $25,000,000 preferred and $15,000,000 common stock at first proposed, there will be issued participation certificates, which, while without any face value, will be entitled to certain percentages of the earnings over and above the fixed charges. The plan for the issuance of these certificates is only partially matured, but it is practically agreed that they will be two classes, and the division of the earnings will be 4½ per cent for the first class, after which the second class will receive 4 per cent. After this the two classes divide the earnings up to 6 per cent, which is the limit allowed for the first class. It is presumed, but not so stated, that the division of these certificates will be in the same proportion as the first plan proposed to divide the stock issue between preferred and common.

The bonds will be dated Jan. 1, 1910, and will mature Jan. 1, 1927. They will be secured by deposit with trustees of the following securities: $16,971,900 of stock of the Chicago City Railway, valued at 200; $5,000,000 of bonds of the Calumet & South Chicago Railway; $1,635,000 of 5 per cent bonds and $800,000 of stock of the Southern Street Railway; $1,000,000 of first mortgage 5 per cent bonds of the Hammond, Whiting & East Chicago Electric Railway not yet issued, and $1,000,000 common stock of this company not yet issued. The securities comprise all the bonds and stocks of the Southern Street Railway and of the Hammond, Whiting & East Chicago Electric Railway. The provision of deposit will include caring for the debts of the underlying properties, other than those incurred for completion and rehabilitation. A sinking fund is provided after the third year which will result in the retirement of $3,000,000 of the bonds before maturity. The earnings of the combined properties are about 2 1/3 times the interest requirements of the bonds. It is stated that the bonds are underwritten and partly sold. The unsold portion will be offered by J. P. Morgan & Company, the Illinois Trust Company and the First Trust & Savings Bank.

Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, New York, N. Y.—The sale of the property of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway under foreclosure of the $1,600,000 second mortgage has been postponed until March 1, 1910. The amount found to be due for principal and interest is $1,676,933.

Lake Shore Electric Railway, Cleveland, Ohio.—The annual meeting of the Lake Shore Electric Railway will be held on Jan. 25, 1910. The company has outstanding $3,000,000 of 5 per cent cumulative preferred stock on which no dividends have been paid, the accumulations on which aggregate $1,626,000, and, with the outstanding capital, make a total capitalization of about $4,626,000. A plan for refinancing will be considered at the meeting. It has been roughly estimated that a holder of 100 shares of the present preferred stock should receive 33⅓ shares of new 6 per cent cumulative stock and 66⅔ shares of non-cumulative preferred stock. The holders of the preferred stock issued in October, 1901, will probably be given some advantage over the holders of stock issued in 1903, however, as the accumulations on the stock issued in 1901 are greater than those on the stock issued in 1903.

Public Service Corporation, Newark, N. J.—In a letter addressed recently to J. P. Morgan & Company, of New York, N. Y., in connection with the sale of $8,000,000 of general mortgage 5 per cent bonds, President Thomas N. McCarter stated the gross earnings of the system controlled by the corporation, including miscellaneous income, as follows: Year 1905, $19,909,843; 1906, $21,498,826; 1907, $23,628,044; 1908, $24,267,687; nine months ended Sept. 30, 1909, $19,286,261. The increase in gross revenue for the first nine months of 1909 over the corresponding period of 1908 was $1,654,204. During the 12 months ended Sept. 30, 1909, gross earnings, including miscellaneous income, were $25,921,892 and operating expenses, taxes, rentals and fixed charges of leased and controlled properties were $23,235,533.

Tacoma Railway & Power Company, Tacoma, Wash.—Stone & Webster, Boston, Mass., say that they know of no foundation for the report that the Union Pacific Railroad is negotiating for the purchase of the property of the Tacoma Railway & Power Company.

Traffic and Transportation

Increase in Fares in Wisconsin

The Wisconsin Electric Railway, Oshkosh, Wis., and the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., have announced a general increase in the fares on the electric railways which they control, effective on Jan. 15, 1910. Briefly, the new schedule increases the fare on the Oshkosh-Neenah line 5 cents, the Oshkosh-Omro line 5 cents and the Oshkosh-Fond du Lac line 10 cents, making the new Oshkosh-Neenah fare 25 cents, the Oshkosh-Omro fare 20 cents and the Oshkosh-Fond du Lac fare 35 cents. On Jan. 15 a straight 5-cent fare will be charged on all city lines, except between 6 a. m. and 7 a. m. and 6 p. m. and 7 p. m., when workingmen's tickets will be honored. The statement of the company to the public, dated on Dec. 16, 1909, was signed by J. P. Pulliam, manager of the railway department, and approved by Clement C. Smith, president, and R. T. Gunn, general manager. It follows:

"We are this day giving public notice to the patrons of our lines that on Jan. 15, 1910, a new schedule of fares will be put into effect. While the fares to certain points on the interurban lines will be lowered, the fares in general will be raised. We have reached the determination to raise these fares with great reluctance, because it is our purpose to furnish transportation as cheaply as it can be furnished; but we would find it impossible to operate the lines on the present basis.

"The fare from Oshkosh to Neenah is now at an average rate of 1.28 cents per mile; the fare from Oshkosh to Fond du Lac at an average of 1.37 cents per mile, and the fare from Oshkosh to Omro at an average of 1.35 cents per mile. Our records show that all of these fares were entirely too low, even at the time they were first put into effect. It was then hoped by the management in putting these low fares into effect that travel might be stimulated to such an extent that the low fares would be justified. Such has not been the case, although every effort has been made to increase the earnings and decrease the operating expenses.

"The necessity for increasing the fares became evident to the management of the Winnebago Traction Company in the spring of 1905, and the company at that time raised the fares from Oshkosh to Neenah from 20 cents to 25 cents, and from Oshkosh to Omro from 15 cents to 20 cents. The company's records show there was a considerable increase in earnings, and they also show the number of passengers carried did not decrease.

"In March, 1908, following the panic of 1907, which reduced all travel materially, the receiver of the Winnebago Traction Company sought to build up earnings again by reducing the interurban fares to the rates charged formerly. There was an immediate decrease in gross earnings, and this decrease has continued to the present time. From this experience, it appears the public was satisfied with the increase of rates in 1905, and it was shown conclusively that increasing the rates did not decrease the number of passengers carried and lowering the rates did not increase the number of passengers carried.

"The former bondholders of the Winnebago Traction Company still own the greater part of the bonds of the Wisconsin Electric Railway. They have suffered a heavy loss through the reduction in the amount of bonds on the property. The present management represents these old interests as well as the interest of those who made new investments.

"The present management of the two properties was therefore fully aware of former conditions when it took charge of the properties. It was hoped, however, by reducing the bonded debt, by bringing the two properties under the same management, by centralizing the work of repairs and maintenance of cars, by through operation of interurban cars from Fond du Lac through Oshkosh to Neenah, and by other economies due to one management, the increase in rates might possibly be avoided. The management of the two companies was combined in August, 1908, and every effort has been made to take advantage of the economies of joint operation. This joint operation has been in force for nearly a year and a half, and since Jan. 1, 1909, all of the books, accounts and records of the companies have been kept in accordance with the new accounting system prescribed by law. The results of operation have now been so clearly shown that there is no excuse for the management to postpone an effort to obtain sufficient revenue to give good service and maintain the property as it should be maintained.

"The United States Supreme Court in the Knoxville Water Works case, decided Jan. 4, 1909 (see page 13, United States Supreme Court Reports, Volume 212), held:

" 'Before coming to the question of profit at all the company is entitled to earn a sufficient sum annually to provide not only for current repairs, but for making good the depreciation and replacing the parts of the property when they come to the end of their life. The company is not bound to see its property gradually waste, without making provision out of the earnings for its replacement. It is entitled to see that from earnings the value of the property invested is kept unimpaired, so that at the end of any given term of years the original investment remains as it was at the beginning. It is not only the right of the company to make such provision, but it is its duty to its bond- and stockholders, and in case of a public service corporation at least, its plain duty to the public. If a different course were pursued the only method of providing for replacement of property which has ceased to be useful would be the investment of new capital and the issue of new bonds or stocks. This course would lead to a constantly increasing variance between present value and bond and stock capitalization—a tendency which would inevitably lead to disaster either to the stockholders or to the public, or to both.'

"The earnings of the companies have so far been entirely inadequate to provide for depreciation, and the management cannot longer neglect what has been prescribed by the Supreme Court of the United States to be 'its plain duty.'

"During the last few years there has been a steady increase in the price of everything going into railway construction and operation. Our taxes have been doubled, and other public burdens have fallen heavily on the companies.

"The wages of the conductors and motormen have not been increased for several years. The cost of living has increased, and, while our trainmen have been patient and have not made any request for increase in wages, we feel it is only due them to give them such advance as the companies can afford on account of increased rates, and we are putting this increase in wages into effect beginning Dec. 1, 1909.

"It is common thought among persons not familiar with the operation of electric railways that electric railways ought to carry passengers for less fare than steam railroads. This idea originated in the early days of electric interurban railways, when the managements of the companies were unable to forecast the future and expected that lower rates would stimulate business to such an extent that low rates would be justified, but they have been disappointed. At that time steam railroads were receiving 3 cents per mile. The fare permitted by law is now 2 cents per mile. The greater part of the earnings of steam railways comes from freight traffic, while the freight traffic of electric railways in Wisconsin is so small that it is a question whether or not the expense of carrying it does not consume the earnings from that source.

"While the laws of Wisconsin permit railroad fare of 2 cents per mile, our new schedule does not reach that average fare. On a 2-cent basis the fare from Fond du Lac to Oshkosh would be 40 cents instead of 35 cents; the fare from Oshkosh to Neenah would be 30 cents instead of 25 cents, and the fare from Oshkosh to Omro would be 25 cents instead of 20 cents, as established by the new schedule. The management is striving to obtain the necessary income without raising the rates to the limit fixed by law.

"No one has a deeper interest in the growth and prosperity of the communities served by the Wisconsin Electric Railway and the Eastern Wisconsin Railway & Light Company than the companies themselves. Individuals and

manufacturing plants may move from one community to another, but a public service company must continue to furnish the best service in its power. We earnestly desire and solicit the goodwill and friendship of all who do business with us, and we feel the public will respect us more if we establish our properties on a sound financial basis than if we allow them to run down and depreciate and plainly neglect what the highest court in the land has declared a duty to the public.

"In conclusion, we desire to say that the rates established by the new schedules are fully justified by the valuation of the property made by the Wisconsin Tax Commission for taxation purposes, and do not depend upon nor are they made necessary by any unfortunate financial operations or litigation in the past. The books of the companies will be open to the public for inspection at any seasonable time, and their examination will convince any of our patrons who care to see them that not only is the increase in rate well warranted now, but should have been made long ago."

Promotions from City to Interurban Service and Increase in Wages by Ft. Wayne & Wabash Valley Company

The following bulletin announcing the plans of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., to advance its employees from city to interurban service, signed by F. Hardy, superintendent of transportation, and approved by C. D. Emmons, general manager, was issued under date of Dec. 24, 1909:

"Beginning Jan. 1, 1910, and until further notice, interurban trainmen as far as possible will be taken from the ranks of employees on city lines under the following rules and regulations:

"1. Only men between the ages of 25 and 40 will be promoted.

"2. City men between the ages of 25 and 40 desiring opportunity on interurban line will apply to F. I. Hardy, superintendent of transportation; until and including Jan. 10, 1910, applications will be considered according to seniority of men in city service. After Jan. 10, 1910, applications will be considered in order of time application is made.

"3. Men promoted must learn interurban work on their own time.

"4. City men before being permitted to work on interurban cars must pass a physical examination for which a fee of $1 is charged, and before being turned in as extra men must pass examination on interurban rules.

"5. City men working extra on interurban line will retain their positions on city lines until they have a regular run on the interurban.

"6. City men working extra on the interurban will be expected to move to another city for regular interurban run if open run is not out of the city in which he lives.

"7. City divisions will carry the following number of extra interurban men: Ft. Wayne, 8; Wabash, 1; Peru, 1; Logansport, 3; Lafayette, 4.

"8. City men promoted to interurban will begin on interurban at same rate of pay that city standing entitles them to, and will then be increased according to interurban wage scale. A man promoted to interurban drawing 19 cents per hour will draw 19 cents until the completion of 19-cent year, after which he will draw 20 cents for the next year's service, etc., until he draws maximum scale.

"9. Merit and demerit records of city men transferred to the interurban will be kept on the city division until such time as men are promoted to interurban for regular run, when their records will be transferred to interurban division with exact standing as on city line.

"10. Beginning Jan. 1, 1910, freight, local, work train and limited runs will be classed at same rate of pay.

"11. Beginning Jan. 1, 1910, new men employed on interurban line or men taken from cities where no employees' deposit is required will be required to make a deposit of $20."

At the time of the posting of the bulletin regarding conditions of service on the interurban and the city lines, the company also announced the following scale of wages for motormen and conductors, effective on Jan. 1, 1910:

Lafayette city division: First year, 17 cents per hour; second year, 18 cents per hour; third year, 19 cents per hour; fourth year, 19 cents per hour; fifth year and thereafter, 20 cents per hour.

Logansport city division: First year, 17 cents per hour; second year, 18 cents per hour; third year, 19 cents per hour; fourth year, 19 cents per hour; fifth year and thereafter, 20 cents per hour.

Peru city division: First year, 17 cents per hour; second year, 18 cents per hour; third year and thereafter, 19 cents per hour.

Wabash city division: First year, 17 cents per hour; second year, 18 cents per hour; third year and thereafter, 19 cents per hour.

Ft. Wayne city division: First year, 18 cents per hour; second year, 19 cents per hour; third year, 20 cents per hour; fourth year, 20 cents per hour; fifth year and thereafter, 21 cents per hour.

Interurban division: First year, 18 cents per hour; second year, 19 cents per hour; third year, 20 cents per hour; fourth year, 21 cents per hour; fifth year, 22 cents per hour; sixth year, 23 cents per hour; seventh year, 24 cents per hour; eighth year and thereafter, 25 cents per hour.

Increase in Wages in New Jersey

The announcement of the increase in the wages of the employees of the Public Service Railway, made on Dec. 28, 1909, was addressed to the motormen and conductors, and was signed by Thomas N. McCarter, president of the company. It follows:

"It is a genuine pleasure for me to be able to announce to you at this Christmas season that the company, after long deliberation, has settled upon a new scale of wages, effective Jan. 1, 1910, which will be of great benefit to you all. The new scale is as follows: First-year men, 21 cents per hour; second-year men, 22 cents per hour; third-year men, 23 cents per hour; tenth-year men, 24 cents per hour.

"1911. First-year men, 22 cents per hour; second-year men, 23 cents per hour; third-year men, 24 cents per hour; tenth-year men, 24½ cents per hour.

"1912. First-year men, 23 cents per hour; second-year men, 24 cents per hour; third-year men and upward, 25 cents per hour.

"In addition to the foregoing, the company has also decided upon the two following additional propositions:

"First: An extra time allowance will be made to such men as volunteer for an additional trip after their day's work is finished.

"Second: All men on the extra list who answer all roll calls, and perform the work assigned to them, for a period of a week, will be guaranteed a minimum wage of $10.50 per week.

"I believe that this places the wage scale of this company upon the most satisfactory basis of any similarly situated corporation in this part of the country, and I rejoice that the company's increased prosperity, to which you have all contributed, makes this action possible.

"The company also has under consideration the adoption of a benevolent plan for the benefit of its employees, which we hope to perfect during the coming year.

"Of course, it is manifest that the consummation of this benevolent plan, and the carrying into effect of the raises outlined for future years, can only take place if we continue to have the same loyalty and co-operation on the part of employees which we have had in the past."

Pension Plan and New Terms of Service in Philadelphia

On Jan. 1, 1910, the Philadelphia (Pa.) Rapid Transit Company announced in a Transit Talk in the daily press new conditions to govern the service of employees with the company. The greeting to the employees follows:

"At a special meeting of the directors of the Philadelphia Rapid Transit Company, held on Dec. 31, 1909, to consider the welfare of the employees of the company, it was determined:

I. INSURANCE

"To provide for an insurance of $500 for each employee in the transportation (motormen and conductors), shop, power house and lines and cables departments—not including officers or clerks. This provision is to take effect im-

mediately with respect to men now in the employ of the company; but with respect to men employed after Jan. 1, 1910, it is not to take effect until they have been in the continuous employ of the company for two years.

II. PENSIONS

"To provide for pensions of $20 a month to all employees who have arrived at 65 years of age and have been continuously in the service of the company and its subsidiary companies for 25 years.

III. INCREASED WAGES, JULY 1, 1910

"The motormen and conductors now in the employ of the company, and who remain continuously therein, will receive an increase of 1 cent an hour on July 1, 1910; another cent an hour on July 1, 1912, and another cent an hour on July 1, 1914, making a maximum rate at that date of 25 cents per hour.

"Motormen and conductors entering the service after Jan. 1, 1910, will receive the present rate of wages, namely, 22 cents an hour, until they have served the company continuously for two years, and if they remain in the service of the company, they will then receive the increase of 1 cent an hour each two years thereafter, until the maximum of 25 cents an hour is reached.

IV. FOR ELEVATED EMPLOYEES

"Motormen and conductors in the elevated service will likewise receive an increase of 1 cent an hour on July 1, 1910, and further increases of 1 cent an hour at the end of each 2-year period, until the maximums of 28 cents an hour for motormen and 25 cents an hour for conductors are reached.

"New men entering the elevated service will be likewise increased after each two years of continuous service.

"Station and train men now in the elevated service will receive 19 cents an hour after July 1, 1910, with a further increase to 20 cents at the expiration of two years.

"New employees entering this branch of the service will receive 18½ cents an hour until they complete two years of service, when they will be paid 19 cents, and after two years' further service, 20 cents.

"Arrangements will be made to give the benefit of the above insurance and pension features to certain employees of the roadway department.

"A committee of the officials of the company has been instructed by the board of directors to work out the details of the insurance and pension plans."

Limited Cars Collide in Indiana.—The eastbound Dayton limited and the westbound Newcastle limited of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., were telescoped in a head-on collision at Willett's Switch, 3 miles west of Greenfield, at 3:30 p. m. on Jan. 1, 1910. Five passengers were seriously injured and several were slightly hurt.

The Question of Car Temperature in Cincinnati.—An indictment has been returned by the Hamilton County Grand Jury against W. Kesley Schoepf, president of the Cincinnati Traction Company, on the charge of failure to keep the temperature in certain street cars up to the required 60 deg. Fahr. The indictment states that on Dec. 20, 1909, the temperature in cars on four lines was found to be insufficient.

New Los Angeles-Pacific Timetable.—The Los Angeles-Pacific Company, Los Angeles, Cal., has published a new timetable of its suburban and interurban service, a feature of which is a condensed statement of the running time between various points over the several routes. Special attention is called to the "Balloon Route Excursion," a trip of 100 miles for $1 through picturesque lower California, which includes a ride of 36 miles along the ocean shore.

Long-Distance Service in Ohio.—The Ohio Electric Railway has established service between Columbus and Toledo, with a change of cars at Lima. The trains run by way of Springfield and Lima, 187 miles distant, and the schedule time is 5 hr. 15 min. Two trains each way are operated daily. The service was established primarily for the accommodation of members of the General Assembly. The company operates a similar service between Columbus and Indianapolis and Cincinnati and Indianapolis.

Conductors Traffic in Car Tickets in Columbus, Ohio.—Two conductors in the employ of the Columbus Railway & Light Company, Columbus, Ohio, were fined $50 each on Dec. 31, 1909, for illegally retaining and selling used tickets of the company. They sold tickets which they had failed to punch and ring up at the rate of 40 for $1. One of the men convicted had been in the employ of the company for 16 years. He is said to have confessed that he had been stealing tickets for the last five or six years. The other conductor had been with the company only a year.

Boston Elevated Railway Distributes Rewards.—The Boston (Mass.) Elevated Railway made its seventh annual distribution of rewards to employees on Dec. 31, 1909, about $75,000 in gold being given to 3500 men in the transportation service whose records were satisfactory for the year. Between 80 per cent and 90 per cent of the employees in each of the company's 10 divisions were eligible for the reward, which varied from a minimum of $20 to a maximum of $25. Last year the minimum was $15. Since inaugurating the custom of giving a bonus in gold to employees with exemplary records at New Year's the company has distributed $403,785 to men in various branches of its service.

Toledo, Bowling Green & Southern Traction Company Accepts Tariffs.—The Toledo, Bowling Green & Southern Traction Company has issued the following notice: "The Toledo, Bowling Green & Southern Traction Company hereby adopts, ratifies and makes its own, in every respect as if the same had been originally filed and posted by it, all tariffs, rules, notices, concurrences, traffic agreements, divisions, authorities, power of attorney, or other instruments whatsoever filed with the Interstate Commerce Commission or Railroad Commission of Ohio, by the Toledo Urban & Interurban Railway, Harry W. Lloyd, receiver, prior to Jan. 1, 1910, the beginning of its possession. By this tariff it also adopts and ratifies all supplements or amendments to any of the above tariffs, etc., which it has heretofore filed with the commission."

Conference on Weymouth Trolley Freight Situation.—The members of the Railroad Commission of Massachusetts conferred with the officers of the Old Colony Street Railway and the Selectmen of Weymouth on Dec. 21, 1909, relative to the franchise offered by the town to the company in connection with the carrying of freight and express matter. Bentley W. Warren, of Boston, represented the company, and Town Solicitor Worthen the selectmen. Mr. Warren stated that the Old Colony Street Railway had secured franchises to carry freight in 26 municipalities and was now operating such a service in 22 cities and towns. The company objected to the franchise offered in Weymouth on account of its being limited to 20 years, and contended that the commission should grant it an unlimited franchise. Chairman Hall of the commission informed the Selectmen that under the laws the commission possessed the right to change the regulations at any time, but that it was doubtful if the commission had authority to approve such a franchise with a time limit. He felt that if the Weymouth charter was allowed it would enable a municipality to grant or withhold franchise rights independently of the State authorities.

Injunction to Increase in Fare Denied.—Judge Swearingen has handed down an opinion in the suit brought in the Borough of Turtle Creek against the Electric Avenue Street Railway, the Ardmore Street Railway, the Consolidated Traction and the Pittsburgh Railways, refusing to grant an injunction to prevent the latter, as lessee, from operating cars over the borough streets or to charge a fare of 10 cents from the east line of Turtle Creek to Pittsburgh. It was alleged by borough officials that the original franchise provided that the Ardmore Street Railway should haul passengers over its own lines, those of the Electric Avenue Street Railway and the Consolidated Traction Company from Turtle Creek to Pittsburgh for a maximum fare of 10 cents. The Pittsburgh Railway afterward leased the lines and raised the fare to 15 cents between the points, and it was alleged it had no right to charge this rate nor to use the tracks of the company running into Turtle Creek without the consent of the borough officials. An injunction was asked. Judge Swearingen held that the company was under no obligations to carry passengers from Wilkinsburg for 5 cents, and thence to Pittsburgh for another 5 cents. The court further held that the fare of 15 cents for the trip was not proved excessive.

Personal Mention

Mr. H. M. Dowling has resigned as a member of the Railroad Commission of Indiana.

Mr. J. C. Forester has resigned as general freight agent of the Ohio Electric Railway, Cincinnati, Ohio.

Mr. Frank E. Payne has been appointed a member of the Railroad Commission of Indiana to succeed Mr. H. M. Dowling, resigned.

Mr. J. R. Harrigan, superintendent of the Columbus, Delaware & Marion Railway, Columbus, Ohio, has been appointed general manager of the company.

Mr. C. O. Sullivan, traffic manager of the Winona Interurban Railway, Winona Lake, Ind., has been appointed general freight and passenger agent of the company.

Mr. R. T. Gunn has resigned as vice-president and general manager of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and of the Wisconson Electric Railway, Oshkosh, Wis., on account of ill health.

Mr. O. S. Newton has resigned as chief engineer of the Mansfield Railway, Light & Power Company, Mansfield, Ohio, to become electrical engineer of the Buckeye Mining & Smelting Company, with properties at Big Pine, Col.

Mr. G. A. Harvey has resigned as electrical engineer of the International Traction Company, Buffalo, N. Y., after serving six years in that capacity and has gone to Colorado Springs, Cal., for a short respite before taking up work in the Central West.

Mr. John F. Lahrmer, chief train despatcher of the Columbus, Delaware & Marion Railway, Columbus, Ohio, has been appointed superintendent of the company, to succeed Mr. J. R. Harrigan, who has been appointed general manager of the company.

Mr. E. G. Howard has resigned as general superintendent of the Pensacola (Fla.) Electric Company, which furnishes power for lighting in Pensacola and operates 20.5 miles of electric railway in that city. Mr. Howard has not yet announced his plans for the future.

Mr. Clement C. Smith, president of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and the Wisconsin Electric Railway, Oshkosh, Wis., has assumed the duties of manager of the companies, relinquished by Mr. R. T. Gunn, whose resignation is announced elsewhere in this column.

Mr. W. S. Bourlier has been appointed electrical engineer of the Washington, Baltimore & Annapolis Electric Railway, with headquarters at Odenton, Md., in charge of rolling stock and the power department of the company. Mr. Bourlier was formerly with the construction department of the General Electric Company.

Mr. J. P. Pulliam, general superintendent of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and the Wisconsin Electric Railway, Oshkosh, Wis., has been appointed manager of the railway department and assistant general manager of the companies in charge in the absence of Mr. Clement C. Smith.

Mr. W. J. Kelsh, master mechanic of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and the Wisconsin Electric Railway, Oshkosh, Wis., has been appointed superintendent of rolling stock of both companies and assistant manager of the railway department of the Eastern Wisconsin Railway & Light Company, with headquarters in Oshkosh, Wis.

Mr. M. B. Osborne has recently been appointed master mechanic of the Galveston (Tex.) Electric Company. Mr. Osborne has been a shop employee of the company for several years, and his appointment as master mechanic is in recognition of his seniority, attention to the interests of the company and his capabilities, in accordance with the policy of the company to advance men in its service.

Mr. J. H. Brinkerhoff has resigned as superintendent of the Rio Grande Junction Railway, Grand Junction, Col., to become general superintendent of the Grand Junction & Grand River Valley Railway, Grand Junction, Col. Mr. Brinkerhoff has been in steam railroad service continuously since 1891. For 15 years he was connected with the Union Pacific Railway and for the last 3½ years he has been connected with the Rio Grande Junction Railway as superintendent.

Mr. John C. Brackenridge, formerly chief engineer of the Brooklyn (N. Y.) Rapid Transit Company, has been elected vice-president of the Manhattan Bridge Three-Cent Line, which has been incorporated with the intended purpose of building a 4-mile railway from Brooklyn across the Manhattan Bridge, which is soon to be opened, into New York. Mr. Brackenridge served as commissioner of public works under Mr. Martin W. Littleton, president of the Borough of Brooklyn, several years ago, and has recently been acting in an independent consulting capacity with offices in New York.

Mr. John A. Jones, city engineer of Lewiston, Maine, has been appointed a member of the Railroad Commission of Maine to succeed Mr. Parker A. Spofford, Bucksport, whose term of office expired on Nov. 24, 1909. Mr. Jones is a native of Lewiston and was graduated from Bates College in 1872. While in college, he was engaged in the Bangor and Piscataquis survey and has been in railroad work practically ever since. In 1874, Mr. Jones was elected city engineer of Lewiston, a position he has held under different administrations. Mr. Jones helped to build the horse railway in Lewiston and has laid out more than 400 miles of electric railway, including the Lewiston, Bath & Brunswick Street Railway and the Lewiston, Augusta & Waterville Street Railway.

Mr. E. Keller, for the last three years foreman of inspection of the eastern division of the elevated lines of the Brooklyn (N. Y.) Rapid Transit Company, has resigned from that company to become connected with the engineering department of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. Mr. Keller entered the employ of the Brooklyn Rapid Transit Company in May, 1897, as a stock clerk and was advanced rapidly through the mechanical department. In June, 1899, he was appointed wireman's helper and continued in this capacity until January, 1900, when he was appointed road inspector. In February, 1903, Mr. Keller was appointed wireman and on Feb. 22, 1905, he was appointed controller man. On Nov. 23, 1906, he was appointed assistant foreman of the eastern division of the elevated lines and was advanced from this position to that of foreman on May 31, 1907. During his connection with the Brooklyn Rapid Transit Company, Mr. Keller took the evening course in applied electricity at Pratt Institute, Brooklyn.

Mr. F. E. Reidhead, whose retirement as manager of the Paducah (Ky.) Traction Company to return to the home office of the Stone & Webster Management Association in Boston was announced in the Electric Railway Journal of Jan. 1, 1910, is a graduate engineer and has been in the employ of Stone & Webster since 1897. During his connection with Stone & Webster Mr. Reidhead has served as general superintendent of the Minneapolis (Minn.) General Electric Company, manager of the Columbus Railroad, Columbus Power Company and Gas Light Company of Columbus, Columbus, Ga., and for two years as manager of the Paducah Traction Company and the Paducah Light & Power Company. Mr. Reidhead made many friends in Paducah, and the *News-Democrat* of that city upon learning that Mr. Reidhead was to leave Paducah published an editorial complimenting him on the results he achieved which it concluded as follows: "Under Mr. Reidhead's management we understand the company's interests in Paducah have arrived at a very satisfactory degree of development and this should in itself be a measure of great satisfaction to both the retiring manager as well as those interested in the company."

Mr. A. B. Wells has been appointed superintendent of the local lines of the Pacific Electric Railway, Los Angeles, Cal., in Pasadena and vicinity and the Mt. Lowe division of the company, with offices in Pasadena. Mr. Wells began his railway career with the Brooklyn (N. Y.) Rapid Transit Company in 1896 as a clerk. His service with this company continued until 1904, during which time he acted as chief clerk to the dockmaster in charge of track supplies, general timekeeper of the maintenance of way department, chief clerk to the chief engineer, assistant chief clerk to the

general manager and payroll accountant in charge of the time of the whole system. Mr. Wells resigned from the Brooklyn Rapid Transit Company to accept a position as operating superintendent with the Mexico City Tramway, Mexico City, Mex., and remained with the company two years, during which he had charge of all the divisions of the company at different times. Shortly after leaving Mexico Mr. Wells became chief clerk to Mr. Joseph McMillan, general manager of the Pacific Electric Railway, and continued in this position until his appointment as superintendent of the lines of the company in Pasadena and the Mt. Lowe division on Dec. 15, 1909.

Mr. W. F. Towne, who, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, page 1284, has been given the title of general freight agent of the Pacific Electric Railway, Los Angeles, Cal., has been engaged in railroad work for 20 years. Mr. Towne started as a telegrapher and stenographer in Massachusetts. Subsequently he filled several representative traffic positions with steam railroads in the East and later served as commercial agent of the Colorado & Southern Railroad and the Denver & Rio Grande Railroad in Colorado. Mr. Towne next became foreign freight agent of the Southern Pacific Company, San Francisco, and later accepted the position of auditor of the Tonopah (Nev.) Railroad. He has been connected with the Pacific Electric Railway, Los Angeles, Cal., which operates more than 550 miles of line, since Jan 1, 1908.



W. F. Towne

Mr. M. W. Glover has been appointed auditor of the Mobile Light & Railroad Company, Mobile, Ala., to succeed Mr. Lloyd Lyon, who as announced in the ELECTRIC RAILWAY JOURNAL of Dec. 11, 1909, has been appointed treasurer of the Mexico Tramways and the Mexican Light & Power Company, Ltd., Mexico City, Mex. Mr. Glover relinquished the position of assistant to the traffic manager of the Illinois Traction System to accept the appointment to the Mobile Light & Railroad Company. He was formerly auditor of the Ohio Electric Railway, in which capacity he served from July 1, 1906, until Oct. 31, 1909. Mr. Glover began his railroad career on Dec. 1, 1889, in the local freight office of the Southern Carolina Railway, which at that time was in the hands of a receiver. He was subsequently transferred to the auditor's office where he handled freight, passenger and other accounts. The Southern Carolina & Georgia Railroad succeeded to the property of the Southern Carolina Railway and the receivership was terminated prior to July, 1895, when Mr. Glover was appointed traveling auditor of the Southern Carolina & Georgia Railroad. In May, 1899, the Southern Carolina & Georgia Railroad was absorbed by the Southern Railway. Mr. Glover was retained as traveling auditor by the Southern Railway and continued in that capacity until June, 1901, when he was advanced to chief traveling auditor of the Southern Railway. In June, 1903, he resigned from the Southern Railway to become chief clerk to the auditor of the Atlanta & West Point Railroad and the Western Railway of Alabama and continued with that company until July 1, 1906, when he accepted the position of auditor of the lines comprising the Ohio Electric Railway. Mr. Glover has been president of the Central Electric Accounting Conference since the formation of the organization in 1907.

OBITUARY

James W. Friend, Pittsburgh, Pa., died on Dec. 26, 1909, after a lingering illness. He was 64 years old. Mr. Friend was vice-president of the Pressed Steel Car Company, the Western Steel Car & Foundry Company, one of the owners of the Clinton Iron & Steel Company, vice president of the German National Bank, Allegheny, and a director in the Farmers Deposit National Bank, Pittsburgh. The funeral took place on Dec. 29, 1909.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

San José (Cal.) Railroads.—Incorporated for the purpose of taking over the San José & Los Gatos Interurban Railway and the San José (Cal.) Railway. It is the intention to construct other lines within the corporate limits of San José, East San José and Santa Clara, as well as in the immediate outskirts of San José. The total length of the system, when extensions are completed, will be 23 miles. Capital stock, $5,000,000. Incorporators: L. E. Hanchett, W. R. Lawson, E. M. Rea and F. E. Fitzpatrick.

***Beech Grove Traction Company, Indianapolis, Ind.**—Incorporated in Indiana for the purpose of building an electric railway from Indianapolis to Beech Grove, also to build and operate power plants. Capital stock, $10,000. Directors: W. H. Ogan, M. T. Hawkins and S. E. Hamlin.

***Somer, Polson & Missoula Electric Railway, Kalispell, Mont.**—Incorporated for the purpose of building an electric railway between Kalispell and Polson, and eventually to make a connection with the Northern Pacific Railroad on the south and with Whitefish and Columbia Falls on the north. Capital stock, $50,000. Incorporators: J. A. Coram, F. H. Nash, T. D. Long, E. R. Gay and A. L. Jacquit, all of Kalispell; James A. Talbott, Columbia Falls.

***Whitefish & Polson Electric Railway, Kalispell, Mont.**—Incorporated to build an electric railway from Kalispell northward to Whitefish and southward through Somers to Polson, on the west shore of Flathead Lake. Headquarters, Kalispell. Capital stock, $200,000. Incorporators: G. H. Adams, J. H. Stevens, Joseph Edge, D. Ledgerwood, O. P. Mosby and Peter Nilson.

***Manhattan Bridge Three-Cent Line, Brooklyn, N. Y.**—Incorporated for the purpose of building a 4-mile street railway from the junction of Flatbush Avenue and Fulton Street, Brooklyn, over the Manhattan Bridge and through Canal Street, Manhattan, to the Hudson River. The engineering details are all in the hands of John C. Brackenridge. The company proposes to charge a 3-cent fare. Principal office, Brooklyn. Capital stock, $50,000. Officers: Frederick W. Rowe, president; John C. Brackenridge, vice-president; Walter Hammit, secretary; Edward T. Horwill, treasurer.

***Niagara Falls, Welland & Dunnville Electric Railway, Welland, Ont.**—Application has been made by this company, through its solicitor Hugh A. Rose, Welland, for a charter to build an electric railway from Niagara Falls to Allenburg, then along the east side of the Welland Canal to Port Robinson, then west by the Forks road to Dunnville. It will be about 50 miles long. Capital stock, $1,000,000. Directors: J. Cralton Gardner, Niagara Falls, N. Y.; William Maxwell and George H. Burgar, Welland; F. S. Buell, Buffalo, N. Y.; F. R. Lalor, M. P., Dunville, and George Arnold, Ridgeville.

***Sunbury & Freeburg Street Railway, Sunbury, Pa.**—Chartered to build a 15-mile electric railway from Selinsgrove to Freeburg via Kantz. A section of the line in Selinsgrove will be over the right-of-way of the Sunbury & Selinsgrove Electric Railway. Capital stock, $30,000. Directors: W. H. Lyons, Sunbury, president; Guy Webster, Boyd A. Musser, C. M. Clement and W. H. Greenough.

Mill Mountain Incline, Inc., Roanoke, Va.—Chartered to build an electric railway from Roanoke to the summit of Mill Mountain. Preliminary capital stock, $5,000 to $20,000. Officers: A. B. Hammond, president; C. Markley, vice president; O. L. Bottomley, secretary and treasurer, all of Roanoke.

Oregon & Washington Traction Company, Walla Walla, Wash.—Incorporated in Oregon to build an electric railway from Walla Walla to Pendleton, Ore., a distance of 53 miles. Principal office, Walla Walla. Capital stock $500,000. Incorporators: Max Baumeister, E. S. Isaacs, A. H. Reynolds, John Smith, W. A. Ritz, S. L. Sharpstein, Samuel Drumheller and C. K. Holloway. [E. R. J., Nov. 20, '09.]

FRANCHISES

Alameda, Cal.—The Southern Pacific Company, San Francisco, has applied to the City Council for a franchise for about 400 ft. of track to extend from the east end loop of the new electric system to the south end of High Street Bridge across the Tidal Canal. It is stated that the company plans to extend its Alameda system to connect with the suburban line projected east of Fruitvale and on to San José.

Los Angeles, Cal.—The City Council has granted a franchise to Fred W. Forrester for a street railway on Vermont Avenue from Muth Street to Eighth Street. Property owners have already raised $12,000 as a bonus to the Los Angeles Railway for the construction of the line. The City Council has also sold a franchise to the Edwards & Wildey Company for a line on Melrose Avenue from Heliotrope Drive to Normandie.

Cœur d'Alene, Idaho.—It is stated that the Spokane, Wallace & Interstate Electric Railway will apply for an electric railway franchise at the next meeting of the City Council. Surveys have been completed and options have been obtained on much of the right of way between Cœur d'Alene and Wallace. F. F. Johnson, president. [E. R. J., Jan. 30, '08.]

***Twin Falls, Idaho.**—A franchise has been granted to the Twin Falls Electric Railroad, Light & Power Company to establish a street railway in Twin Falls. The company is represented in Twin Falls by George F. Sprague and W. P. Guthrie.

Auburn, Ill.—The City Council has granted a franchise to the Illinois Traction Company to construct its system through that city. Service to Springfield in the future will be through Auburn.

East St. Louis, Ill.—The City Council has granted an extension of time to the Southern Traction Company of Illinois in which to complete its electric railway between Belleville and East St. Louis. W. E. Trautman, president. [E. R. J., Aug. 21, '09.]

***Indianapolis, Ind.**—The Beech Grove Traction Company has applied to the County Commissioners for an electric railway franchise over Churchman Pike between Indianapolis and Beech Grove. A similar franchise has been applied for by the Shore Line Traction Company which proposes to build over the same route.

St. Joseph, Mo.—The City Council has passed two ordinances granting franchises to the St. Joseph Railway, Light, Heat & Power Company. One grants a 30-year franchise for an extension of the Frederick Avenue line from Twenty-sixth Street to a point several hundred yards east of State Hospital No. 2. The other ordinance grants a 35-year franchise for a line into Northwest St. Joseph.

Baker City, Ore.—The City Council has granted to the Baker Interurban Railway a six-months' extension of its franchise in which to begin work on its street railway in Baker City. The company also plans to build an interurban railway from Baker City to North Powder and Rock Creek. Anthony Mohr, Baker City, treasurer and purchasing agent. [E. R. J., Sept. 11, '09.]

Donora, Pa.—The Borough Council has annulled the franchise of the Donora & Eldora Street Railway and has given a contract to put streets in same condition as when the company entered upon them. The railway was recently taken over by the Pittsburgh, McKeesport & Westmoreland Railway.

Austin, Tex.—The Austin Electric Railway has made a proposition to the County Commissioners for a 20-year franchise to operate three cars over the Colorado Bridge to serve the people of South Austin, offering to pay an annual rental of $1,150 for the use of the tracks over the bridge.

TRACK AND ROADWAY.

***Bridgeport Electric & Railway Company, Bridgeport, Ala.**—This company has been organized to build a 5½-mile street railway in Bridgeport. A 250-hp power plant will also be built. Officers: W. D. Scarbrough, president; L. W. Rorer, vice-president; A. L. Atwood, secretary; J. P. Scarbrough, treasurer and manager, all of Bridgeport.

Troy, Ala.—Surveys are being made under the direction of W. W. Lotspeich, Atlanta, Ga., for the route for the proposed street railway in Troy. W. R. White is the holder of the franchise. [E. R. J., Aug. 14, '09.]

California Midland Railroad, San Francisco, Cal.—John Martin, president of this company, is said to have announced that the line would be completed to Mamonton by spring and Grass Valley in the fall, connecting Grass Valley and Marysville. The route will be changed somewhat from the original plan by taking in Spenceville, Iron Mountain and the Penn Valley country west of Grass Valley. The line as planned will reach Marysville, Grass Valley, Nevada City and Auburn, a distance of 70 miles.

Atlanta, Ga.—Louis B. Magid, president of the Piedmont Power Company, Atlanta, denies the report that he is interested in a street railway project at Tullulah Falls. Mr. Magid states, however, that the Piedmont Power Company is about to develop a large water power of 20,000-hp capacity. [E. R. J., Dec. 25, '09.]

Macon Railway & Light Company, Macon, Ga.—This company expects to place contracts during the next two months for the construction of 4 miles of new track and overhead work. About 8 miles of track and overhead construction will be rebuilt. J. T. Nyhan, general manager.

East St. Louis, Columbia & Waterloo Railway, East St. Louis, Ill.—This company expects to start work during the spring on its proposed railway, which is to connect East St. Louis, Dupo, Bixby, Columbia and Waterloo, a distance of 24 miles. Nearly all the rights-of-way have been secured, and steel and other material has been ordered for two overhead crossings near Columbia. Capital stock, authorized and issued $750,000. Headquarters, Metropolitan Building, East St. Louis. H. Reichenbach, Columbia, secretary and treasurer. [E. R. J., Aug. 7, '09.]

Belleville & Pinckneyville Traction Company, Pinckneyville, Ill.—This company has completed the preliminary work and secured all the franchises in connection with its proposed electric railway between Belleville and Pinckneyville, 46.5 miles. Financial matters, however, have not as yet been closed up. The projected line will pass through Freeburg, New Athens, Lenzburg, Marissa, Tilden, Coulterville, Swanwick, and Winkel. Locations for the power plant and repair shop have not as yet been definitely decided upon by the company. Capital stock, authorized, $100,000, to be increased to $2,500,000. Bonds, authorized, $2,500,000. Officers: L. D. Turner, Belleville, president; E. R. Hincke, Pinckneyville, vice-president; George F. Mead, Pinckneyville, secretary; J. A. Hamilton, Marissa, treasurer; Harper Bros., East St. Louis, chief engineers. [S. R. J., May 2, '08.]

Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Ind.—This company will reballast its track from Brownsburg, Ind., to Crawfordsville, Ind., 31 miles, beginning work early this spring. C. E. Morgan, general manager.

Tippecanoe & Monticello Interurban Company, Monticello, Ind.—W. R. White, secretary, announces that this company expects to have construction under way on its projected railway in the early spring. The line will connect Monticello, Idaville, Sitka, Buffalo, Hedley, Pulaskiville and Winamac, a distance of 36 miles. The motive power will be either gasoline or electricity. It is planned to operate four cars. Capital stock, authorized, $100,000. Officers: Wm. R. Felker, president; Thos. W. O'Connor, vice-president and treasurer; W. R. White, secretary and general manager, all of Monticello. [E. R. J., Sept. 11, '09.]

Des Moines & Sioux City Railroad, Des Moines, Ia.—A meeting of the directors of this company was recently held to consider a new proposition for financing the proposed electric railway to Sioux City. The board passed a resolution to issue its debentures in the denomination of $50 to the amount of $100,000, payable in three years, at 6 per cent interest. This amount is required in the preliminary work of financing the line. [E. R. J., Nov. 20, '09.]

Marengo & Midland Railway, Marengo, Ia.—It is reported that the project of building an electric railway from Marengo to Cedar Rapids is being revived by this company. Meetings have been held between representatives of the towns along the route, and the matter is again being taken

up by the Commercial Clubs of the two cities. D. C. Mott and C. M. Breen, Marengo, are interested. [S. R. J., Jan. 16, '07.]

Kansas Union Traction Company, Altamont, Kan.—At an election held on Dec. 28, three townships of Labette County voted bonds to aid the Kansas Union Traction Company, making a total of $31,500 for the three townships. The company proposes to build a 90-mile railway from Coffeyville to Cherryvale. Barney McDaniel, secretary. [E. R. J., Dec. 18, '09.]

Twin City & Lake Superior Railway, Minneapolis, Minn.—This company has filed a mortgage in favor of the American Trust & Savings Bank, Chicago, Ill., as trustee, to secure an issue of $4,000,000 of bonds. Of this amount $250,000 of bonds is to be issued at once. The company is building a 130-mile electric railway from Minneapolis to Duluth and Superior. About one-half of the route has been graded. [E. R. J., Jan. 1, '10.]

Interstate Railway, Kansas City, Mo.—The Electric Traction Construction Company, Commerce Building, Kansas City, Mo., is in the market for electrical machinery, sewer pipe, cement, cars, bridge material, etc., for the Interstate Railway which is now building an electric railway from Kansas City to St. Joseph, Mo., a distance of 48½ miles. [E. R. J., Nov. 20, '09.]

Kansas Traction Company, Kansas City, Mo.—This company advises that it has not decided upon a definite date for beginning work on its projected railway. Financial arrangements are pending. The line will be about 200 miles in length and will extend from Kansas City, Mo., to Coffeyville, Kan., via Lawrence, Topeka, Ottawa, Garnett, Iola and Cherryvale, Kan. The third-rail system will be used. Capital stock, authorized, $25,000. Headquarters, 1631 Penn Avenue, Kansas City, Mo. Officers: F. B. Shirley, Kansas City, Mo., president and general manager; Charles Roszie, Liberty, Kan., vice-president; George W. Boyd, Coffeyville, Kan., secretary; W. C. Hall, Coffeyville, Kan., treasurer; Paul Julien, Indianapolis, Ind., chief engineer. [S. R. J., May 9, '08.]

Hornell-Bath Interurban Railway, Hornell, N. Y.—The Public Service Commission of the Second District has authorized this company to issue $250,000 capital stock and $450,000 of 40-year 5 per cent gold bonds for the construction of its proposed railway between Hornell and Bath, 24 miles. [E. R. J., Jan. 1, '10.]

***Hudson, Center & New Salem Electric Railway, Schafer, N. D.**—Press reports state that this company has been formed at Schafer for the purpose of building an electric railway to connect the three points. It is planned to build a power plant at Center. The proposed line is to parallel at some distance the extension the Northern Pacific Railroad is building north from Mandan.

Ottawa & St. Lawrence Electric Railway, Ottawa, Ont.—J. McFarlane, a director of this company, is quoted as saying that arrangements would be made with the New York Central & Hudson River Railroad for a direct connection with its system. Options had been secured on several falls on the Ottawa River, west of the city, from which the necessary power would be developed for the operation of the company's lines. The location surveys had been completed for 18 miles, and estimates were in preparation, so that the grading could be started at an early date. The preliminary surveys showed the line would be almost straight from Ottawa to Morrisburg. [E. R. J., Oct. 9, '09.]

***Toronto, Ont.**—W. H. Price, Toronto, is said to be considering a proposition to organize a company to build an electric railway from Toronto to Barrie, with branches to Orillia and Owen Sound via Meaford, a distance of over 150 miles. Application will be made at the next session of the Legislature for a charter.

Pittsburgh (Pa.) Railways.—This company will build about 12½ miles of new track during 1910. C. W. Lepper, purchasing agent.

Clarksville Railway & Light Company, Clarksville, Tenn.—It is stated that this company, which is reported to have been purchased by interests represented by E. L. Fischer, Danville, Ill., will extend its lines to New Providence and Dunbar's Cave.

Lakeview Traction Company, Memphis, Tenn.—This company has applied for an amendment to its charter to enable it to run four lines through Memphis, namely, two north and two south, crosstown. The company is now building its line to Lakeview, Miss. W. W. Hayden, chief engineer.

San Antonio (Tex.) Traction Company.—This company is now building a 3½-mile extension to Lakeview, a suburb. All material is on the ground. J. J. King, general superintendent.

El Paso & Fort Hancock Railway, El Paso, Tex.—This company advises that it has done considerable grading work on its projected railway between El Paso and Ysleta, 10 miles. It is the intention to complete preliminary arrangements so as to begin work Feb. 1. Three small culverts will be built along the route. The motive power has not yet been decided upon. Capital stock, authorized, $100,000. Officers: C. N. Bassett, president; Felix Martinez, vice-president; Thos. O'Keeffe, Chamber of Commerce, secretary; Winchester Cooley, treasurer, all of El Paso. [E. R. J., Oct. 2, '09.]

Rutland Railway, Light & Power Company, Rutland, Vt.—This company is said to be making surveys for an extension to be built during the summer to Lake St. Catherine, about 23 miles distant from Rutland and southwest of Fair Haven.

Seattle-Tacoma Short Line Electric Railway, Tacoma, Wash.—This company has filed for record at Tacoma a mortgage in favor of the Fidelity Trust Company, Tacoma, as trustee, to secure an issue of $3,500,000 of 6 per cent bonds, dated July 1, 1909. The company has projected an electric railway from Seattle to Tacoma, 65 miles. [E. R. J., Dec. 25, '09.]

***Middlebourne, W. Va.**—I. M. Underwood, Middlebourne, is reported to be interested in a plan to build an electric railway to connect Middlebourne and Sistersville.

Cincinnati Construction Company, Janesville, Wis.—The Rate Commission has granted this company a certificate of public convenience and necessity permitting it to proceed with the construction of its electric railway between Madison and Janesville. Joseph Ellis, chief engineer. [E. R. J. Dec. 5, '08.]

SHOPS AND BUILDINGS

Bowling Green (Ky.) Railway.—This company will build a new concrete car house and repair shop. Work will be started early in the spring. H. D. Fitch, president.

Tidewater Power Company, Wilmington, N. C.—This company expects to begin work within the next 30 days on a new repair shop to be 50 ft. x 110 ft. The building will be of corrugated iron and heavy mill construction.

Grand Forks (N. D.) Street Railway.—This company is building a new brick car house in Grand Forks to be 50 ft x 100 ft. in size.

POWER HOUSES AND SUBSTATIONS

Bridgeport Electric & Railway Company, Bridgeport, Ala.—This company, which has just been organized to construct a street railway in Bridgeport, also plans to contract, during the next few weeks, for apparatus for a 250-hp power plant.

Pensacola Electric Company, Pensacola, Fla.—This company has purchased a 300-kw motor generator set and a 500-kw turbine and auxiliaries.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill.—This company advises that it expects to build two substations.

Maysville Street Railroad & Transfer Company, Maysville, Ky.—This company has purchased one 3-panel switchboard from Westinghouse Electric & Manufacturing Company.

St. Louis & Kansas City Electric Railroad, St. Louis, Mo.—This company is said to have completed negotiations for a power plant situated one-half way between its terminals, Kansas City and St. Louis. The company contemplates building an electric railway between the two points.

Tidewater Power Company, Wilmington, N. C.—This company is considering the purchase of a 500-kw rotary converter and two 125-kw, 375-1000-volt transformers. A. B. Skelding, Wilmington, purchasing agent.

Manufactures & Supplies

ROLLING STOCK

Rome Railway & Light Company, Rome, Ga., it is reported, will soon order two cars.

Quincy Horse Railway & Carrying Company, Quincy, Ill., will be in the market for eight single-truck cars this year.

Grand Forks (N. D.) Street Railway will buy two new double-truck cars and four second-hand, single-truck cars in the near future.

Little Rock Railway & Electric Company, Little Rock, Ark., expects to buy 10 double-truck, semi-convertible cars some time this year.

Compania Electrica y de Ferrocarriles de Chihuahua, Chihuahua, Mex., will buy four semi-convertible pay-as-you-enter cars within the next two weeks.

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb., has ordered 16 rolled-steel wheels and eight axles, assembled, from the Standard Steel Works Company.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill., is in the market for four interurban cars, one motor express car, one 60,000-lb capacity box car and one 80,000-lb capacity gondola.

Laredo Electric & Railway Company, Laredo, Tex., will buy two closed cars equipped with single motors and controllers within the next two weeks. The company will also buy one extra truck and motor for a work car.

Illinois Traction System, Peoria, Ill., has ordered four new eight-wheel caboose cars mounted on 50,000-lb capacity freight trucks from Hicks Locomotive & Car Works, Chicago, Ill. The cars are to be of the standard railway type; 34 ft. over end sills; 40 ft. over platforms; 9 ft. wide over side sills; 8 ft. 4 in. wide inside; 13 ft. 8 in. high over all.

TRADE NOTES

Hess-Bright Manufacturing Company, Philadelphia, Pa., will open a Chicago branch at 1800 Michigan Avenue, about Jan. 20, 1910.

Mount Vernon Car Manufacturing Company, Mount Vernon, Ill., has let the contract for its new steel car plant to the McClintic-Marshall Construction Company.

Q M S Company, Plainfield, N. J., has removed its Chicago office from 1775 Old Colony Building to 737 First National Bank Building. John C. Hoof is the company's representative in the Western territory.

George L. Kippenberger, who for the last seven years has been purchasing agent of the St. Louis Car Company, entered the service of Forsyth Brothers Company, Chicago, Ill., on Jan. 1.

Roberts & Abbott Company, Inc., Cleveland, Ohio, announce that Walter Loring Webb has become associated with it and will represent the company in Philadelphia and vicinity. Mr. Webb's office will be in 1026 Real Estate Trust Building.

McKeen Motor Car Company, Omaha, Neb., received orders during 1909 from 17 steam railroads for a total of 31 gasoline-motor combination passenger cars. The company also received orders for one gasoline-motor switching engine and two weed burners.

Chicago Bearing Metal Company, Chicago, Ill., has opened offices at 400 Od Colony Building, where it is prepared to take orders for manganese bronze castings, electric brass castings, steam metal castings and locomotive bearings. The company's factory is located at the Union Stock Yards, Chicago.

Wesco Supply Company, St. Louis, Mo., announces that R. C. Mellor, who has been connected with the company for a long time, has been appointed manager of the advertising department of the company to succeed Edward J. Jeep, who has resigned after 2½ years' service to become business manager of the Classified Ad. Company, St. Louis, Mo.

American Creosote Works, Inc., New Orleans, La., has elected E. L. Powell vice-president and W. Scott Bryan secretary. A new plant will be completed at Bossier, La., by Jan. 15, 1910. The new plant, which will occupy 35 acres of ground, will have a capacity of about 30,000,000 ft. per year and will have direct track connections with the railroads.

Milliken Brothers, Milliken, S. I., New York, N. Y., the affairs of which were placed temporarily under the protection of the Federal Courts on June 11, 1907, have had the receivership terminated and the entire plant and all its assets having been restored new officers and directors have taken control as follows: Edward C. Wallace, president; Gilbert G. Thorne, Gates W. McGarrah, E. C. Wallace, A. A. Fowler, Clarence M. Lewis, Wm. Barclay Parsons, C. H. Zehnder, directors; Francis Dykes, general manager. Milliken Brothers announce that the structural steel business established 50 years ago will be continued in all its branches, including ornamental iron work and galvanized steel towers for electric transmission, in the most active and efficient manner and the company's foreign business will be carried on and extended.

Nachod Signal Company, Philadelphia, Pa., exhibited its type C signal for single-track trolley roads at the Denver convention, and since that time has delivered signals to a number of roads in various parts of the United States, among which are: Mahoning & Shenango Railway & Light Company, Youngstown, Ohio; Public Service Railway, Newark, N. J.; Chicago & Milwaukee Electric Railroad, Highwood, Ill.; Spokane & Inland Empire Railroad, Spokane, Wash.; Fort Smith Light & Traction Company, Fort Smith, Ark.; Little Rock Railway & Electric Company, Little Rock, Ark.; Chattanooga Railway & Light Company, Chattanooga, Tenn.; Los Angeles Pacific Company, Los Angeles, Cal. The type C signal is an automatic signal, as distinguished from a dispatcher's signal system, and is operated by a trolley contact switch. But one line wire is required, and the system of signalling is what is known as permissive or car counting, indications being given by both lamps and semaphores simultaneously.

United States Electric Signal Company, West Newton, Mass., installed a large number of its automatic block signals on electric railways during 1909. The roads equipped and the number of blocks installed were as follows: Boston (Mass.) Elevated Railway, 4; Mattoon (Ill.) City Railway, 3; Boston (Mass.) Suburban Railways, 16; Aurora, Elgin & Chicago Railway, Wheaton, Ill., 2; New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J., 19; Northampton (Mass.) Street Railway, 15; Joliet & Southern Traction Company, Joliet, Ill., 3; Holyoke (Mass.) Street Railway, 7; Tampa (Fla.) Electric Co., 2; Charlestown (S. C.) Railway, Gas & Electric Company, 5; Savannah (Ga.) Electric Company, 2; Rio de Janeiro Light & Tramway Company, 6; Worcester (Mass.) Consolidated Street Railway, 6; Chicago & Joliet Electric Railway, Joliet, Ill., 1; Birmingham (Ala.) Railway, Light & Power Company, 2; Fairmont & Clarksburg Traction Company, Fairmont, W. Va., 2; United Traction Company, Albany, N. Y., 1; Elmira, Corning & Waverly Railroad, Waverly, N. Y., 8; Knoxville (Tenn.) Railway & Light Company, 1.

ADVERTISING LITERATURE

Western Electric Company, New York, N. Y., has published a pamphlet in which are illustrated and described a number of types of portable telephone sets for railway service.

Kilby Frog & Switch Company, Birmingham, Ala., has issued Catalog No. 5 for 1910, in which is listed the company's complete line of frogs, switches, crossings and special work for steam and electric railways.

American Wood Working Machinery Company, Rochester, N. Y., has issued a wall calendar 15 in. high x 16½ in. wide. The calendar proper is 5¼ in. high x 9 in. wide. The same views of the company's works appear at the top of each sheet, but views of different machines made by the company serve to decorate the sides and bottom of each sheet.

Calendars for 1910 have been received from the Buda Company, Chicago, Ill.; Ohmer Fare Register Company, Dayton, Ohio; H. B. Underwood & Company, Philadelphia, Pa.; Duff Manufacturing Company, Pittsburgh, Pa.; Samson Cordage Works, Boston, Mass.; American Wood Working Machinery Company, Rochester, N. Y.

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Annual Reports of Commissions

Reports of two of the principal commissions of the country having jurisdiction over electric railways are presented in abstract in this issue. The most important feature of the report of the New York Public Service Commission, First District, is the recommendation as to legislation concerning the railroad law and the public service commissions law. Concerning the existing railroad law the commission would evidently like an amendment that would give it clear authority over the subject of transfers on surface lines. The commission appears to believe that amendments of the Public Service Commission's law are necessary in order to accomplish the original intent of the law. It states that the phraseology employed in several important respects has nullified the general purposes of the enactment. The completion of 40 years of service by the present Massachusetts Board of Railroad Commissioners is made the occasion for a brief review of the increase of mileage, capitalization, etc., of the properties over which jurisdiction is exercised. It is suggested by the board that power be given to order the installation of safety devices or other changes that promise increased safety in operation. This would substitute mandatory for recommendatory powers in respect to the questions of operation involved.

The Proper Type of Car for Short Interurban Roads

In theory, the type of car chosen by an interurban line is supposed to be the outcome of a long study of speeds, stops per mile, power equipment, schedules, seating capacity, etc. In practice the problem often is solved summarily by taking a group of well-worn cars from some allied system or going to the other extreme of purchasing a lot of luxurious overpowered cars, the chief merit of which is their advertising value. At this time there are quite a number of interurban lines ranging in length from 20 miles to 40 miles which give a similar service, yet the rolling stock embraces everything from the ordinary city car to the 60-ft. interurban. Usually if the interurban railway is built as a branch of the city system, the management naturally will give the larger city cars a trial on the new road before investing in strictly interurban coaches. Experience has shown in many of these cases that a well-built city car is perfectly capable of running 30 to 40 m.p.h. on good track and is certainly more economical than the large cars in current consumption per passenger carried. No good is to be gained in running big cars unless they are really needed, and in any event heavy travel could be handled by operating more cars, either singly or in trains.

The folly of using big cars for many short interurban railways is illustrated by the case of a certain Eastern line which is about 25 miles long. The road was opened as a cut-off between two large towns and the management hoped to secure all the commercial travelers then using the more expensive and

roundabout steam line. The great reduction in distance and cost via the new route would have attracted this class of riders in any event, but the promoters thought it necessary to buy the finest type of interurban rolling stock. Under these conditions the company bought only enough cars to maintain an hourly schedule which has easily sufficed to carry all the through business offered. On the other hand, the company could have worked up a fine suburban development within the first 10 miles of its line if it has bought smaller cars and given a 15-minute service on that section alone. With the present large, high-powered cars it cannot afford to encourage a short-haul, frequent-stop service and hence will be obliged to change its rolling stock standards entirely if it desires to get the full earning value of the line.

Trespassing on Private Right-of-Way

Special efforts are made occasionally by various railways, both electric and steam, to overcome the extensive and dangerous use of their private rights-of-way by trespassers. The practice of trespassing is so liable to result in death or serious injury that the action of the railways, designed to lessen the unwarranted use of their tracks, is laudable, not only from the standpoint of their own interest, but from those of the community. Efforts of this nature, however, represent the expenditure of considerable time and money on the part of the companies, and it is therefore discouraging to find that when an attempt is made to measure the results of such movements, it is difficult, and sometimes impossible, to trace them satisfactorily. One interurban company tried recently the experiment of having its motormen throw circular letters of warning to trespassers on private right-of-way, but subsequent inquiries among the trainmen made it uncertain whether sufficient notice was taken by the trespassers to compensate for the effort. It may be stated that if the movements of this nature deter any number of people, no matter how small, from following the dangerous habit of walking on private rights-of-way, some good will have been done, but it is evident that steps of this character, when initiated by railways, deserve the cordial support of newspapers and influential organizations. The Railroad Commission of Indiana has not lessened the activity of its campaign to eliminate this source of trouble and its work has been effective in directing wide-spread attention in that State to an evil which should be abolished.

Sectionalizing Distribution Lines

We discussed in these columns recently the question of the practical value of insurance against breakdown by duplication in substation switchboard and machinery, and expressed doubt as to whether the costly methods frequently employed were warranted from an economic or engineering standpoint. The same question arises with duplication to insure against breakdown in the case of the distribution system and has a present application because of a suggested arrangement for sectionalizing the trolley and high potential transmission lines of a proposed long interurban single-phase road. On this road the trolley wire is divided into eight sections which are connected in series by time limit relay circuit-breakers. The trolley sections, grouped in four pairs, will be fed at the common points by duplicate stepdown transforming and switching apparatus. Each station will in turn be connected with the power house by an independent single-phase transmission line. The separate transmission lines for feeding the four stepdown transformer stations will probably be equipped at suitable points with line switches so that in event of breakage or leakage on one circuit its load may be transferred to a neighbor and thus it will rarely be necessary to cut the current off the line when making repairs to the high-tension transmission system. It should be stated that the road is designed for 24-hour traffic and these elaborate precautions may be necessary in the opinion of the consulting engineers for this reason, but we believe local conditions must be more than usually imperative to make such a plan as that outlined justifiable.

The plan emphasizes the fact, however, that engineers can well give greater attention to the efficient performance of the distribution systems of their railways than is often the case. While we are somewhat sceptical of the value of great refinements in sectionalization, we have no doubts as to the importance of careful design in laying out a distribution system, or of the economy of having plenty of feeder capacity. A reenforcement or a reorganization of the distribution system is one of the first matters to be undertaken after a revival of traffic, such as many roads are now enjoying, but too often it is the last. The necessity for it is perhaps not quite so apparent as in the case of overloaded generators and cars or worn-out track, or perhaps it would be more correct to say that improvement to the distribution system can be more easily postponed without immediately disastrous results. But an overloaded feeder, or an inadequate return system, constitutes a continuous drain upon the power station and throws a burden upon the motors, which they ought not to be called upon to bear, besides dissipating energy in the final form into which it has been transformed in the power station.

Loose Ends in Maintenance Work

In the maintenance of apparatus having a multitude of detail parts constant vigilance is necessary to avoid the occurrence of operating troubles arising from defects in minor features of the equipment. This is forcibly emphasized in the case of electric railway rolling stock. One particular "loose end" in maintenance work which often causes repeated trouble is the failure of car-house employees, inspectors and others in close touch with the causes of car defects on the tracks to make sufficiently detailed reports of the conditions surrounding each trouble observed. For instance, a simple report "coil grounded" is an inadequate one in a case where the insulation of such a coil shows that the covering is injured more at the middle than at the ends. The natural inference in such a case would be that trouble existed between the core and the motor pole pieces, and if an armature rubs and is then grounded, a proper report should state the cause of the faulty clearance. The tendency is always for a busy maintenance man to make his report as brief as possible, but unless all the important facts are supplied, the repair work done may have to be repeated and the company may find it difficult to study in close detail the fitness of specific apparatus for its service.

Another small matter which is often the source of trouble is the detachment of traveling records from armatures, car bodies or other equipment. In some companies whenever an armature is removed from a motor for repairs and sent from a car house to a shop, a card is also sent with the armature giving the history of it with reference to repairs and defects for a period of many months. Wheel mileage may be tab-

ulated in the same manner. Unless cards so used are kept in close association with the equipment which they cover, judgment on the qualities of apparatus becomes inaccurate through the lack of quantitative data, and the determination of costs suffers.

Two other points may be mentioned in illustrating the importance of the little things in operation. Before gears are bored out and finished they are put together with small pieces of tin between the halves, later being bored out to the axle size with as close a fit as possible. If the pieces of tin are left between the halves through oversight in the shop or on account of haste it is impossible to get a proper clamping fit when the gear goes upon the shaft, and the resulting looseness is most objectionable. In boring out a gear, a feathery edge is usually left between the halves as a result of the action of the tool, and unless this edge is cleaned off it militates against the halves coming properly together and may lead to misadjustment and troubles in service. The second point relates to the inspection of sign lights on single-color cars. When in the interests of economy and interchangeability a company decides to paint all its cars alike the sign question becomes of even more importance than in cases where different colors indicate destinations and routes. Whenever a single color car leaves a car house, therefore, it is of paramount importance to ascertain that the sign lights are clean and free from burned-out filaments; that their working is not interefered with by the handling of the trolley cord and that the destination indication is in every way unobscured. These points are obviously unrelated, but they suggest the importance of perpetual vigilance in keeping car equipment up to the highest pitch of efficient service.

Membership in the Association

The personnel of the members of the different committees of the American Street & Interurban Railway Association are announced in this issue, and the names themselves are a surety that valuable work will be accomplished by the association during the coming year. We could discuss at length the importance of the topics to be considered by the different committees and the ability of those to whom their investigation has been intrusted, but mean in this issue to refer only to the work of the two largest committees and the facts which their appointment indicate. We refer to the committee on active and associate membership.

The number of members on both of the committees on membership is much larger than that on any committee previously appointed by the association, and in their selection a geographical plan has been followed. This will facilitate the work of each member, because he will know in advance just the field for which he is responsible, and all companies and individuals in that territory will understand to whom they can apply for information as to the benefits which they will derive from membership in the association. No such comprehensive plan has ever before been adopted by the association for increasing its membership and good results should be expected.

A plan of this kind would not be warranted if the association was not giving value received for membership, but a record of the past four years since the association was reorganized is ample warrant that the benefits of both company and individual membership are worth the membership fee, whether the member is a large company and is paying large annual dues or is a smaller company or an individual and the dues paid are nominal. It is true that it is also desirable for the association to increase its membership, partly because of the dues received, but still more because of the larger number of individuals which it thereby enlists in the general work. A vigorous campaign for membership, therefore, indicates not weakness, but strength in the merit of the proposition made to those who are not associated with the association. In the first place it shows that at least the members of the committee believe they have a good proposition to submit to others, and from their standing in the industry their opinion is well worth consideration. They have no ulterior object to gain; their only purpose is the good of those to whom they suggest membership and the betterment of the industry at large. In the second place, the fact that a considerable number will undoubtedly join the association this year is in itself an argument for others to join now, because the larger the association and its revenues, the greater its value to its members.

A novel feature of the organization of the committee on associate membership is that a similar committee with the same number and same territorial distribution is being organized by the Manufacturers' Association, so that there will be a representative in each territorial subdivision to whom members of railway companies or outside firms and corporations can apply if they wish to join the association as associate members.

The question is sometimes raised, and it is a legitimate one, as to the advantages which officials of a member-company secure by joining as associate members. It might appear at first sight that because they already have the privilege of attending the conventions of the various associations and because their company receives one or more copies of the proceedings of the association there is not the same reason for their joining the association as if their company was not a member. In a sense this is true, but it does not tell the whole story. There is a satisfaction in the individual recognition of each associate member by the association, which does not come from company membership, and there are also more substantial benefits which, in the opinion of a great many officials, are worth more than the fee of $5 per year required for associate membership. One of these, of course, is the receipt and individual possession of the bound copy of the proceedings of the association with which the associate member has allied himself. The second is the privilege of wearing the pin of the association. This is confined to associate members of the association. The pin not only is a badge of personal loyalty to the members of the association, but, like the pin of any fraternal body, gives a sense of comradeship with others who wear it. It also shows to the outsiders who know the significance of the badge the fact that the wearer is allied with the electric railway industry, and to those who are not acquainted with it, gives the person who possesses it an opportunity of discussing the objects and purposes of the association.

We have purposely confined these remarks to a discussion of the benefits to be derived by officials of member-companies in joining the association as associate members. Undoubtedly still others could be given than those mentioned above, but the question is raised so often on this point that it is worth while to speak of it at the time of the announcement of the committee on associate membership. To those who are interested in the industry, but are not connected with member-companies, there are many other advantages.

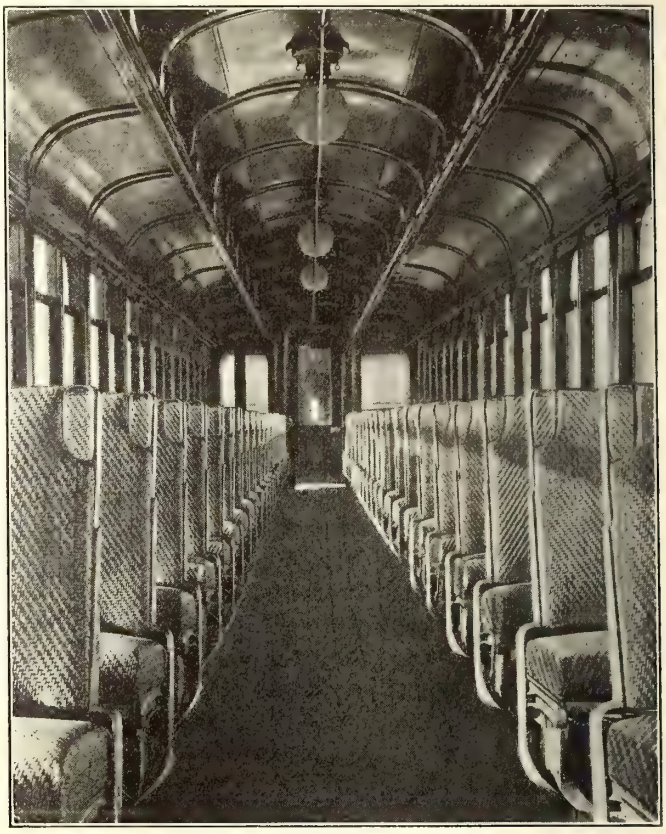
LARGE CARS BUILT BY THE KEY ROUTE, OAKLAND, CAL.

A brief account of 16 unusually long cars being built by the San Francisco, Oakland & San José Consolidated Railway, popularly known as the "Key Route," was presented in the twenty-fifth anniversary issue of the Electric Railway Journal, dated Oct. 2, 1909. At the time this article appeared these cars were in process of construction in the railway company's shops. The new cars have been completed recently, and are now operating very satisfactorily. Probably the most interesting feature of these new cars is their extreme length of 70 ft. over couplers. The service of this road is operated with trains of from 5 to 10 cars, each running on short headway between Oakland and several nearby cities located on the east side of San Francisco Bay and a ferry terminal at the west end of a pier extending 3 miles from Oakland into the bay toward San Francisco. At morning and night it is necessary to handle especially heavy peak loads, and therefore long cars with generous standing room space are desirable. The standard motor car operated in the suburban service of the Key Route is 60 ft. long, built largely according to steam-railroad coach design. At first the new cars will be operated as trailers mixed in trains with motor cars handled with type M control. The trains are made up so that there is never less than the capacity of one GE-66 motor per car.

The new cars, including the trucks and all castings, were designed and built in the Oakland shops of the Key Route. As shown in the accompanying plan and elevation, the body length of these cars is 55 ft. 10 in. over bulkheads. The vestibules are 6 ft. long and built practically as a part of the main body structure. End doors are provided for passage from car to car, and the platforms are equipped with Gould steel buffers and standard M. C. B. couplers. The underframing of the car body comprises 7-in. channel-iron side sills filled and reinforced with 8 in. of wood; 7-in. 20-lb. I-beam center sills blocked 6 in. between flanges and 4½-in. x 5¾-in. wooden intermediate sills reinforced with steel plates. The underframing is tied together with cross-ties spaced 3 ft. 2 in. on centers. The width over sills is 8 ft. 8½ in.

Platforms with step openings 4 ft. 4⅜ in. wide in the clear are provided at both ends of all cars. The platforms are supported by the center and intermediate sills, and the principal members are substantially reinforced with plates at the points of maximum stress. The platform floors are on a level with the car floor, and are reached by three steps of 11 in. rise each and a rise of 15 in. from the level of the top of the rail to the top of the first step. The top of the bumper is 3 ft. 11⅛ in. above the rails, and the curved headblocks are formed of 3-in. plank sheathed with ½-in iron.

The means of coupling and the arrangement of the buffers used on this road are worthy of mention. In practice the cars are coupled so that they operate very satisfactorily, running steadily at high speeds without undue shocks at starting and stopping. The close coupling of the cars does away with the usual discomfort experienced by passengers on loosely coupled trains, and passage from car to car is rendered safe. An accompanying illustration shows the ends of two car platforms as coupled. In addition to the spring buffer platforms and the M. C. B. couplers, the other coupling connections include two safety chains, motor control cables, bus cable and hose for the brake reservoir, air-brake, train and air signal line.

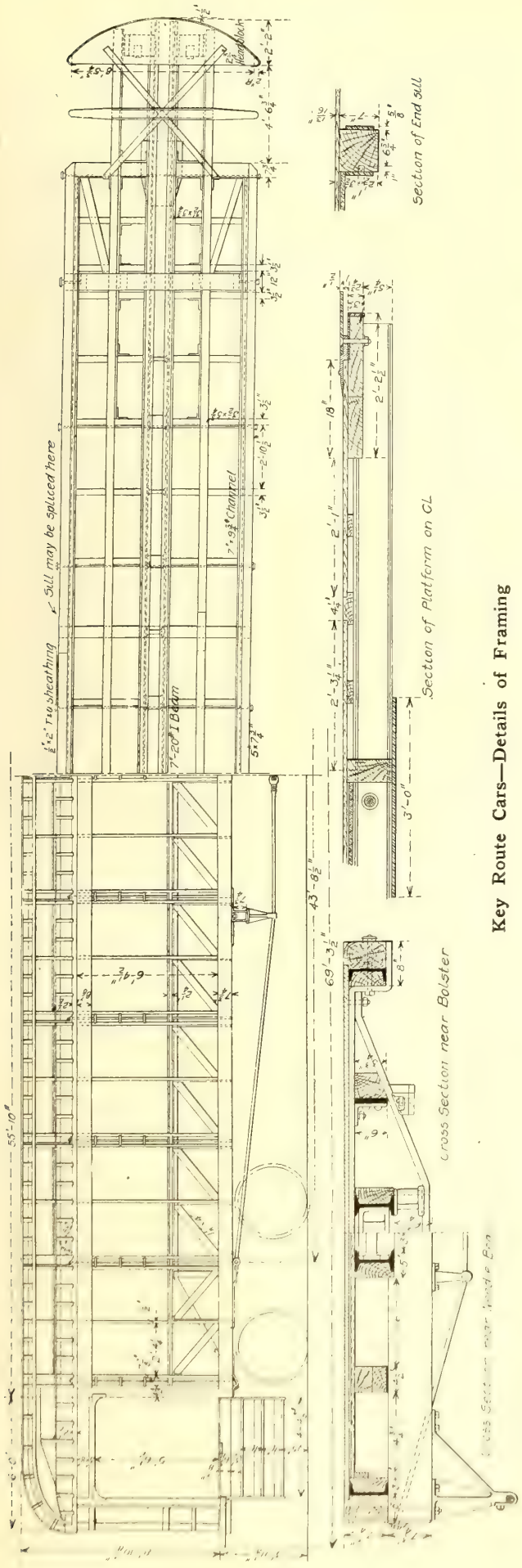


Key Route Cars—Interior View

The sliding gate used at the step opening is another detail that has been carefully worked out. After experience with heavy gates a light wire mesh carried in an iron frame has been adopted. This gate is supported from below by rollers which ride on an angle iron under the edge of the step and the top is guided by means of a channel held against the side of the car. The gates do not lock shut, but in the closed position drop into depressions in the carriers and at the same time engage V-shaped fittings at the corner vestibule posts. These fittings are a part of the grab handles. Illumination of the



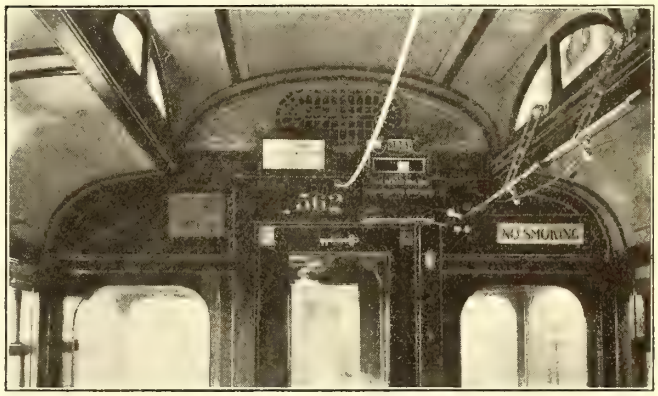
Key Route Cars—Exterior View



Key Route Cars—Details of Framing

steps is provided by incandescent lamps carried under the stanchion which divides the steps midway. Additional illumination is provided by lamps supported under the headblock. These lamps serve to illuminate the ground about the steps and are favored as a means of reducing boarding and alighting accidents, as well as facilitating night traffic by making it possible for passengers to see where they step when leaving the car.

The 16 new car bodies are mounted on trucks built in the company's shops. These trucks are of the M. C. B. type, with 36-in., 912-lb. Midvale rolled steel wheels. A saving in weight



Key Route Cars—Ventilating Duct in End of Deck

of 536 lb. per car is said to have been made by the use of this wheel in place of steel-tired wheels with cast-iron centers, which are used on some of the other cars. The truck center distance is 43 ft. 8½ in., and the overhang from bolster to face of bumper is 12 ft. 3 in. Westinghouse standard steam railroad passenger train brake equipment is used. A 350,000 circ. mil power bus is installed from end to end of each car, and all cars are provided with bus couplers, so that all the motors in a train may receive power from the trolley on any car.

Because of the comparatively short run from the ferry terminal to the end of any of the five branches of this road, it was deemed unnecessary to build the side framing so that the windows would raise. The omission of this feature in connection with the windows made possible a considerable saving in weight in the car body and economy in the cost of construction. The side framing also is narrower than it would be if the windows



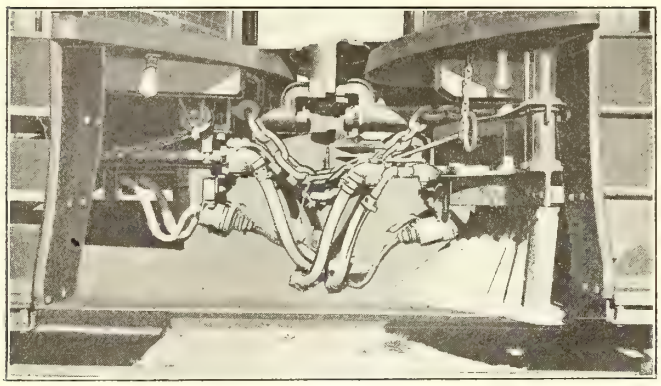
Key Route Cars—Sliding Platform Gates

were movable, and thus the overall width of the car was reduced somewhat without decreasing the available interior space. The interior of the car-body is finished in natural mahogany. Illumination is provided by four arc lamps in the body of the car and a series of six incandescent lamps on each platform, which series includes two lamps in the vestibule deck, two directly above the steps and two under the bumper block.

VENTILATION

The ventilation of these cars, which have stationary deck sash as well as stationary windows, is effected by four Globe

ventilators. One ventilator is installed in the side of the extended monitor over each corner of the car. These ventilators are 10 in. in diameter and are connected by sheet-steel ducts with ornamental openings in the ends of the clerestory. While the train is moving the ventilators draw the vitiated air through the openings in the ends of the clerestory and discharge it outside. To insure circulation, two deck sash at the center of the car are made adjustable. The use of stationary deck sash

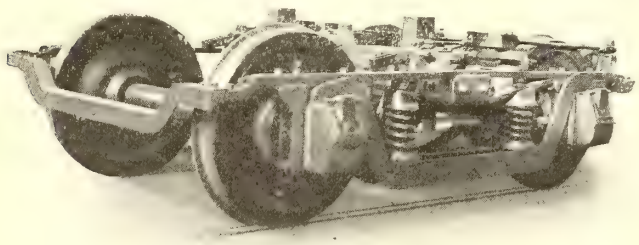


Key Route Cars—Train Connections

reduces the breakage of glass and largely prevents any damage that might be caused by the leakage of rain.

These 70-ft. cars with bodies 55 ft. 10 in. long have a seating capacity for 88 passengers and a generous amount of standing room. An idea of the capacity of one of the cars for handling peak loads is obtained from the statement that on one occasion 300 passengers were carried on one car. It is said that 200 passengers are not an exceptional load. As these cars were completed they were weighed, and the average of the actual weight was found to be 58,800 lb., or 668 lb. per passenger seat. This figure, of course, does not include any motor equipment. If the amount of electrical equipment necessary to operate one car as usually connected for train service is considered as 9000 lb., the weight per passenger is 770 lb., which is thought to be low for the class of service in which these cars operate. The large amount of standing room afforded by large aisles and platforms reduces the weight per passenger carried to a very low figure.

Acknowledgment is made to J. Q. Brown, assistant general manager and engineer, San Francisco, Oakland & San José Consolidated Railway, for information used in the preparation of this article. Mr. Brown has stated that these cars, although of unusual length and capacity, are proving to be successful, and are much appreciated by the public on account of the convenience and comfort which they afford. Their fine appearance will be noticed from the illustrations.



Key Route Cars—M.C.B. Type Truck

The Toronto National Exhibition Association has been successful in inducing Louis Brennan, inventor of the monorail car, to make an exhibition of his system at the Toronto Exposition to be held in September, 1910. A short section of track will be constructed and a nominal fee charged for riding on the railway.

ANNUAL REPORT OF THE MASSACHUSETTS RAILROAD COMMISSION

The annual report of the Massachusetts Railroad Commission for the year ended Sept. 30, 1909, was submitted to the State Legislature which convened on Jan. 5. An abstract of some of the features of the report follows:

The present commission has completed 40 years of service in the State. The report briefly reviews some of the more important tasks of the commission during this period. When the board commenced its duties, in 1869, 22 horse railroads were operated in the State, with a paid in capital of $4,649,930 and debts of $962,573. There are now 2,869 miles of street railway single track with a total capital of $80,728,880, and a total funded and floating debt of $87,899,271.

The original members of the board were embarrassed for means of enforcing their decisions. Forty years of service have proved, however, that while on many occasions an exercise of the recommendatory powers of the board is quite sufficient to secure needed changes in facilities and operation, there are certain cases, such as the equipment of railroads and railways with safety devices, where the power should be and has been given to the board to directly order the installation of such devices or other changes which look to the safety of the traveling public or of employees. The powers placed in the hands of the board in relation to the issue of stock and bonds are of the broadest character, and are to-day possessed by the commissions of less than six States in the Union. In the first year of the board's service 140 cases occupied its attention. Last year 709 cases were heard.

The board has acted favorably upon five petitions for issues of preferred stock by street railway companies. The attorney-general of the State was requested to give his opinion whether a street railway company organized under the laws of Massachusetts could issue preferred stock under the provisions of this act, and his report was affirmative. The board states that if peculiar reasons exist for the passage of special legislation permitting a company to issue bonds in excess of its capital stock (as in the case of the Connecticut Valley Street Railway Company), it is reasonable to assume that similar conditions may arise in the case of some other company, and that the passage of general rather than special laws is to be desired.

The actual construction of the Cambridge subway by the Boston Elevated Railway was begun in August, 1909, according to plans approved by the board. The work is now in full progress and on Dec. 20 the company reported that 1575 ft. of the subway had been completed. The Forest Hills elevated extension in Boston was opened by authority of the commission in November. Revised plans for the Malden extension of the Boston Elevated system are now before the board.

In its last annual report the board called the attention of the Legislature to the fact that the constitutionality of the act relative to the transportation by street and elevated railway companies, of pupils of the public day and evening schools and private schools had been put in issue by the Boston & Northern Street Railway, and that the board had referred the matter to the attorney-general of the State. During the present year a further question has arisen with respect to the application of the half-fare provisions to both day and evening pupils of the industrial schools, so-called. In the opinion of the board such pupils are not within the provisions of this act.

Special reports to be made by the board to the Legislature of 1910 will cover a number of important transportation matters not dealt with in the annual report. Among these are the proposed consolidation of the West End and Boston Elevated Railway companies; proposed tunnels and subways in Boston; the Boston & Eastern Electric Railroad tunnel and subway plans; and public improvements in the Boston metropolitan district.

Annual returns were received from 81 companies, three of which—the Natick & Cochituate, the Westborough & Hopkinton, and the Newton—were absorbed into the Middlesex &

Boston system. Of the 78 companies at the end of the year, 59 operated their railways; 16 were operated under leases or contract agreements, and three had organized and paid in a portion of their capital stock, but had not begun construction. The net increase in new mileage during the past year in Massachusetts electric railway lines was 4.656 miles of track and 6.05 miles of second track, making 10.706 miles of additional main track. There was also a net increase of 16.764 miles of side track, making a total net increase of 27.47 miles of single track. The Massachusetts companies now own 2,238.501 miles of street railway line, 447.092 miles of second main track, and 183.464 miles of side track, making a total single track length of 2,869.057 miles, exclusive of 3.2 miles of the Rhode Island Company, from which no return was received. All the track owned is surface street railway track, with the exception of 9.983 miles of elevated line and 9.809 miles of elevated second track. There are 4.295 miles of elevated side track. All the elevated track in the State is located in Boston.

The Boston & Northern Street Railway now leases the Nashua company, having 14.898 miles of track located in New Hampshire; and the Old Colony leases and operates the Newport & Fall River, having 20.632 miles, located in Rhode Island. There are now 35.530 miles of track operated outside the State. There was a gain of 27.47 miles of single track during the year.

The gross receipts of the street railways on Sept. 30 last were $177,745,988, an increase of $7,591,079 over 1908. The gross liabilities, including capital stock but not sinking and other funds, were $168,628,151. The surplus was $9,117,837, or 11.29 per cent of the capital stock. The aggregate capital stock of the 78 companies was $80,728,880. The total amount of dividends declared was $4,120,223—an increase of $432,570 over 1908. Forty out of the 81 companies paid dividends ranging from 2 to 10 per cent, and 41 companies paid no dividends. The average rate of dividend was 5.1 per cent.

The average cost of the street railways of the State per mile of main track, was: Construction, $31,746.92; equipment, $11,076.17; lands, buildings, parks, power plants and other permanent property, $15,757.48; total, $58,580.57, compared with $57,676.62 a year ago. The total income of the companies for the year was $33,657,478, and the total expenses, including dividends, were $33,250,154, giving a net surplus of $407,324. The cost of operation alone was $20,915,728.

The total number of passengers carried, computed on a 5-cent fare basis, was 624,532,753, compared with 602,400,874 in 1908. The total car mileage was 117,493,499, compared with 116,982,089 a year ago.

Operating expenses amounted to 65.45 per cent of the gross earnings, representing a reduction in the operating ratio of about 1.3 per cent over the previous year.

Gross earnings per mile of track were $11,899, and the net earnings, $4,111, compared with $11,507 and $3,828 a year ago.

Gross earnings per car-mile were 27.19 cents and the operating expenses 17.8 cents, leaving net earnings of 9.39 cents. The net earnings in 1908 per car-mile were 8.75 cents.

The average gross revenue per passenger was 5.12 cents and the operating expense, 3.35 cents, leaving net earnings of 1.77 cents.

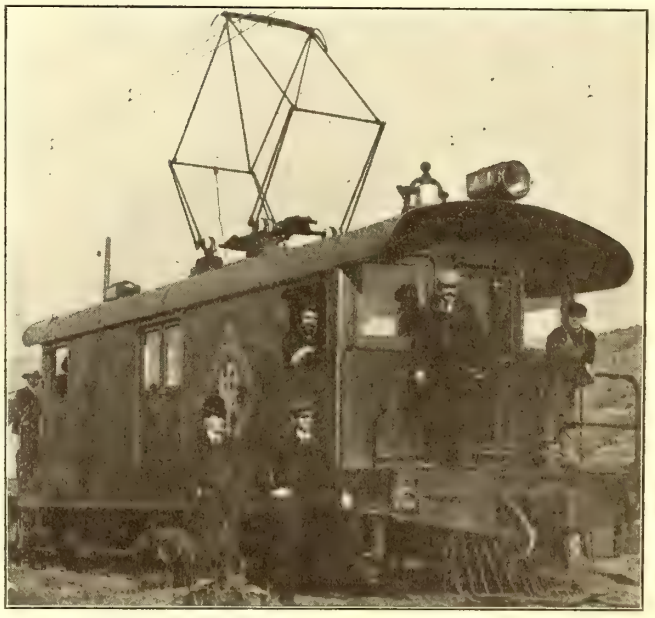
The number of employees increased from 17,267 in 1908 to 17,575 in 1909. The number of cars decreased from 7618 to 7546, and the motors owned were 16,649 in 1908 and 16,526 in 1909.

The number of persons injured was 6,003, of whom 89 received fatal injuries. The number of passengers injured was 4,360, of whom 17 were fatally hurt. The number of employees injured was 292, of which 21 were fatal injuries. The number of injuries to travelers and others on the street was 1351, of which 51 were fatal. These figures include a very large number of injuries of a trivial character which have been returned by the companies. Altogether there have been injured, fatally and otherwise, 25 less passengers, 7 less employees, and 158 less travelers and other persons, making 190 less accidents in 1909 than in the preceding year.

THE VISALIA FIFTEEN-CYCLE SINGLE-PHASE RAILWAY

The first purely single-phase, 15-cycle railway in the United States is the Visalia Electric Railroad, running from Visalia to Lemon Cove, in California, which has now completed two years of successful operation. For 10 miles, between Visalia and Exeter, the electric railway traverses the main track of the Southern Pacific Railroad, which has been electrified over this section by the addition of rail bonds and the 3300-volt trolley. Twelve miles farther, from Exeter to Lemon Cove, a new roadbed has been constructed, making the total length of the Visalia-Lemon Cove electrified route 22 miles. The road is single tracked throughout, with the exception of the switching and freight yards at Visalia, Exeter and Lemon Cove. The trolley construction is of the single catenary type, suspended from brackets on poles spaced 120 ft. apart.

Ground was broken for the Exeter and Lemon Cove extension in March, 1905, and the road was operated by steam locomotives in December, 1905. In March, 1908, the steam service was discontinued, and since then the road has been operated by electricity. From Visalia to Exeter the country is practically level. Between Exeter and Lemon Cove the land is of a rolling nature, but the maximum gradient on the road has been kept down to 0.9 per cent, and the curves are of long



Visalia Single-Phase Railway—Locomotive

radius. The worst conditions are met on a combined 10-deg. curve on a 0.9 per cent grade.

TRANSMISSION AND CONVERSION APPARATUS

For this electrification three-phase, 60-cycle power is purchased at 35,000 volts from the Mt. Whitney Power Company, which operates a hydro-electric generating plant on the Kaweah River. At the Exeter substation, located nearly at the center of the present railway line, the 60-cycle power is stepped down to 2200 volts, and then converted to 15-cycle, 11,000-volt, single-phase current by a synchronous motor-generator set. From the main frequency changing substation at Exeter the 15-cycle, 11,000-volt feeder lines, made up of a pair of No. 4 bare copper conductors, transmit 8 miles in each direction to the substations on the Lemon Cove and Visalia divisions. Transformers in these stations reduce the 15-cycle, 11,000-volt, single-phase supply to the trolley pressure of 3300 volts.

The frequency changer substation contains six 150-kw oil-insulated, water-cooled, 35,000-2200-volt, 60-cycle transformers and two two-bearing motor-generator sets, each composed of a 540-hp synchronous motor wound for 2200 volts, 60 cycles, with an induction motor for starting, direct-connected to a 375-kw rotating-field, single-phase alternator, delivering 11,000 volts, 60-cycle current. The 60-cycle incoming transmission

line is protected by low-equivalent lightning arresters, complete with oil-insulated choke coils and disconnecting switches. Three 15-kw, 2200-200-volt, 60-cycle transformers are supplied for lighting service and for operating the motor-generator exciter set. On the extended shafts of each motor-generator set are mounted 125-volt d.c. generators, which furnish excitation current, in addition to a similar d.c. exciter driven by a three-phase, 60-cycle induction motor supplied from the incoming transmission lines. The outgoing 11,000-volt, 15-cycle feeder circuits are protected against lightning discharges by complete arrester apparatus, and are controlled by oil switches. The Exeter substation also feeds the trolley wire through two 300-kw, oil-insulated, self-cooling, 15-cycle, single-phase transformers, reducing the potential from 11,000 to 3300 volts.

The two 15-cycle transforming substations, each located about 8 miles from Exeter in the direction of Lemon Cove and Visalia, respectively, contain a 300-kw, oil-insulated, water-cooled, 15-cycle, single-phase transformer, reducing from 11,000 volts to the trolley pressure. Lightning protective apparatus, choke coils and high-tension circuit breakers are included in the 11,000-volt apparatus, while the 3300-volt trolley feeders are controlled by oil circuit breakers. All the conversion apparatus was furnished by the Westinghouse Electric & Manufacturing Company.

LINE AND ROLLING STOCK

The 15-cycle, 3300-volt, single-phase trolley construction is of the single catenary bracket type, comprising a 7/16-in. steel messenger suspended from poles 120 ft. apart, and supporting No. 000 trolley wire. The redwood poles, 36 ft. long, are set 6 ft. in concrete.

The rolling stock comprises a 47-ton Baldwin-Westinghouse electric locomotive equipped with four 125-hp, series, compensated motors; four 40-ton passenger cars, each equipped with four 75-hp motors; two 28-ton trailer cars of construction similar to the motor cars. The cars and locomotives are all supplied with unit switch control and automatic air-brake equipment. The trailer cars as well as the motor cars are fitted with brake valves and master controllers, so that three-car trains can be operated from a trailer car at the head of the train if desired. The motor cars and locomotives are supplied with power through pantograph trolleys, and carry auto-transformers arranged with taps for reducing the trolley pressure to voltages suitable for supplying the motors, car lighting and air compressors. The motor cars have oil-insulated, self-cooled auto-transformers, while that on the locomotive is air-cooled

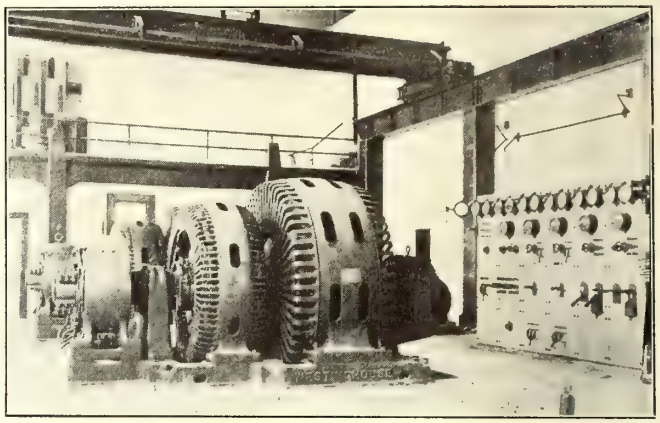


Visalia Single-Phase Railway—Combination Passenger and Baggage Car

from the motor-driven blower equipment furnished for the forced ventilation of the motors.

The 45-ton electric locomotive is of the double swivel truck class, provided with car type of cab, and has the following general over-all dimensions: Length over bumpers, 29 ft.; extreme width, 9 ft. 6 in.; height, rail to top of cab, 11 ft. 7 in.; rigid wheelbase, 7 ft. 4 in. With its four 125-hp motors connected to 36-in. wheels through a gear reduction of 66 to 17, this locomotive is capable of developing a continuous drawbar pull of 4500 lb. at 20 m.p.h. on level track. The full-load drawbar pull is 9000 lb. at 17 m.p.h. on the level. The maximum starting drawbar pull is 17,000 lb.

The capacity of each substation was designed to take care of the electric locomotive fully loaded, or one train of two motor cars and one trailer. In general service only single-motor cars are operated, without trailers; but when crowds



Visalia Single-Phase Railway—Frequency Changer and Exciter

are to be handled or the traffic conditions warrant, three-car trains are run. As an operating test, a six-car train has been successfully operated over the entire system. The maximum regular operating speed is 45 m.p.h., although a single-motor car has developed 62 m.p.h. The fast cars of the system run from Visalia to Exeter in 23 minutes, and from Exeter to Lemon Cove in 21 minutes, equivalent to a schedule speed of 31 m.p.h.

A recent incident provides evidence of the ample tractive power of the locomotive. While doing some switching around the yard at Exeter, in order to get hold of a certain car it was necessary for the electric locomotive to move a train of 40 standard refrigerator cars standing in the way. Twenty-eight of these were loaded, making the total weight of the train 1044 tons, which was handled and switched around the yards by the electric locomotive without special effort.

POWER CONSUMPTION

The following figures will afford some idea of the economy with which this single-phase road is operating. During a period of 40 days over which readings were taken the average power consumption of the locomotive was 72.4 watt-hours per ton-mile. During 60 days the average output of the frequency changer substation was 70.25 watt-hours per ton-mile, although during another period of 30 days, when operating conditions were better, the average station output was 66.6 watt-hours per ton-mile. During 60 days of operation of the motor cars the actual power consumption at the car was found to be 55.9 watt-hours per ton-mile.

ACCIDENTS REDUCED BY PAY-AS-YOU-ENTER CARS IN CHICAGO

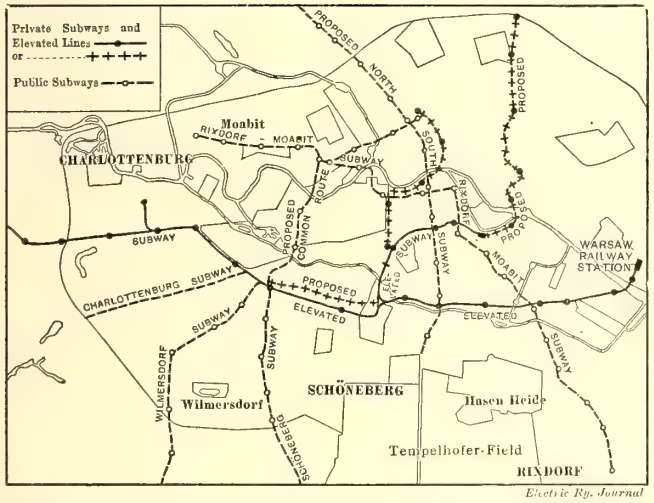
The Chicago City Railway has compiled comparative statistics of accidents before and after the introduction of pay-as-you-enter cars on its principal lines. Comparing the period from Nov. 24, 1906, to Jan. 31, 1908, which included but two months' operation of pay-as-you-enter cars on one line only, with the period from Nov. 24, 1907, to Jan. 31, 1909, during which pay-as-you-enter cars were in service on all trunk lines, the number of boarding and alighting accidents, accidents due to falling while the cars were rounding curves and accidents to persons stealing rides on cars was reduced 31.9 per cent.

PRESENT AND PROPOSED BERLIN SUBWAYS

The wonderful growth of Berlin in the last decade has led to the formulation of a bewildering array of rapid transit schemes. The situation is rendered extremely complicated in a political sense also because the suburbs of Berlin are self-governed while the royal government itself cannot act in an entirely unbiased manner since it is the owner of the local steam lines. Hence, even if the municipalities agree upon a certain plan of construction and operation, the routes may have to be changed if the steam lines would be seriously affected. Furthermore, the Berlin municipality would have to reimburse the Great Berlin Street Railway Company for any traffic losses incurred through the building of competitive lines.

PRESENT RAPID TRANSIT

Outside of the Government's steam lines, known as the Stadtbahn, which passes through the center of the city on an elevated structure, Berlin now has but one railway system besides the surface lines. This is the combined underground and elevated, owned and operated by a company known as the Gesellschaft für elektrische Hoch-und-Untergrundbahnen. The line runs as a double-track route practically east and west, except for a one-station stub in the western end of the city and a northern branch in the central business district. Of the total route length of 17.8 km (11 miles) only the eastern, or working, district section is elevated throughout. Through trains are operated over the triangular junction shown on the map between the western stations to the northern terminal at Spittelmarket and the eastern terminal at Warsaw Bridge; and also between Spittelmarket and Warsaw Bridge. No transfers, therefore, are necessary. In any event, there is little likelihood of boarding the wrong cars as the destination of the next train is always indicated by sliding metal signs hung out by the station despatcher. Each car also contains a conspicuous map of the system, so that a passenger can quickly rectify his mistake should he be on the wrong car.



Map of Berlin, Showing Present Elevated-Subway Line and Other Routes Proposed or Under Construction

The cars, which have longitudinal seating throughout, have no platforms, but are entered by two side doors which usually are opened by the passengers and closed by station platform men. This door-opening practice is not as dangerous as it would be in the United States, as the German passenger has acquired the habit from traveling in the compartment cars on the steam railroads. Nevertheless, the absence of train guards makes the stops appreciably longer than they would otherwise be, especially in periods of heavy service. The drawback of the custom was very apparent on Aug. 28, 1908, when the expected arrival of Zeppelin's airship at Berlin brought out vast numbers of people to coigns of vantage. On this occasion there were considerable delays in starting the trains and even the well-drilled Berliner was in danger of riding second-class on a third-class ticket. Another drawback to the rapid handling of large crowds arises from the system of zone fares, because every passenger must stop to have his ticket punched on entering the platform and to have it collected when leaving his terminal station.

The use of the zone-fare system on the Berlin rapid transit lines is in direct contrast to the practically universal 2½-cent fare of the street-railway company. As a result it has been necessary to give a frequent service with two- to four-car trains, and even to include smoking cars or smoking compartments to induce the public to patronize the service. The fares are based on the number of station stops made after the first station has been left. When riding third class, the fares are as follows: Four stops, 2½ cents; seven stops, 3¾ cents; 10 stops, 5 cents; 13 stops, 6¼ cents; 16 stops, 7½ cents. The corresponding second-class fares are: 3¾ cents, 5 cents, 7½ cents, 8¾ cents and 11¼ cents. The only reductions from these fares are made on certain early trains, on which the highest third-class fare is 6¼ cents and the highest second-class fare 7½ cents. As it has been found that these fares are rather high for Berlin conditions, it is proposed to modify the zone system in such a way that instead of charging 1¼ cents more for every three stations, the additional charge will include more stations the further out the passenger rides. For instance, this addition could cover three stations in the first extra fare zone, four in the second, five in the third, etc. One of the regulations of the company permits passengers to have their money refunded for any delays exceeding 10 minutes.

The experiment of having two classes of cars in city service was introduced because it was already in vogue on the local steam lines or Stadtbahn. While this provision satisfies the caste feeling of a portion of the public, it is hardly a financial success, for not more than 15 per cent to 20 per cent of the passengers pay the higher fare. As a matter of fact, the second-class cars on the eastern or workmen's section are practically empty, so that the second-class cars have a great deal of dead mileage. Both classes of cars are clean and comfortable and offer no material difference except in the seating, which is of wood in the third-class and of leather in the second-class. During 1908 the company carried 44,639,029 passengers, an increase of about 3,000,000 over 1907. The income for the later year was 5,763,396 marks ($1,440,849), an increase of $125,646. The heaviest traffic on any one day was 200,000 passengers. The total number of train-miles in 1908 was 1,980,830, made up chiefly of three and four-car trains. According to Councillor Kemmann (retired), of Berlin, the density of travel was 4½ passengers per car-kilometer (2.79 per car-mile), exceeding that of most of the London underground railways. The rolling stock at the end of the year 1908 comprised 114 motor-cars and 87 trailers, but 25 cars more were recently placed in service.

It may be interesting to mention that about one-sixth of the cardboard fare tickets are sold through slot machines similar to the American chewing-gum delivery devices. Although the machines will respond to slugs or to other coins of like weight, the losses from this source do not amount to more than $37.50 a year out of 7,500,000 sales. In one instance, where many slugs were being used at a certain station, the petty swindlers were caught in the following ingenious manner: The coin tube of the machine was prolonged so that the inserted piece would fall into a small room behind occupied by a watchman. As soon as a false coin or slug appeared, the watchman rang a bell and the malefactor was promptly captured by the nearest station guard.

PROPOSED EXTENSIONS AND MUNICIPAL SUBWAYS

The northern or Spittelmarket extension of the underground railway was opened in October, 1908, and permission has been obtained to extend this route northwesterly, as shown on the map previously mentioned. The authorities have also requested the company to four-track the section between the triangle and Wittenberg Platz, thereby changing the triangle into an ordinary crossing.

This project is intimately connected with the recently started subway of the Wilmersdorf municipality for the tracks of the latter to join the underground railway company's extension from Wittenberg Platz to Nürnberg Platz, as shown on the map.

The Wilmersdorf line is to run underground for 3.1 miles to Rastatter Platz, whence a shuttle service will be operated for 1.6 miles. Thus this line will work in harmony with the present underground system and the tunnel and car dimensions will be practically alike.

The municipality of Schöneberg is building a subway 2.17 miles long which will run at first only to Nollendorf Platz, where there is an elevated station of the present rapid transit company. Should Schöneberg build a station at this site, passengers who desired to go down town would have to ascend over 32 ft. No provision has been made for transfer or interchange of traffic at this point because the municipality could not be made to understand that the introduction of a connection point so far downtown would necessitate an extra charge by the private subway company on account of the mileage lost in bringing empty cars from the end of the line.

The suburb of Charlottenburg also desires to have a subway, but is undecided whether it shall have a shuttle service or join the Schöneberg line at Nollendorf Platz and thence proceed downtown over a new and common route, which would terminate at Friedrichstrasse, a main thoroughfare.

The Berlin municipality has received approval to build a north-south underground railway, which will be 5.11 miles long. It is proposed to have a wider tunnel than those used in the other projects. The cars will also be wider, and it is quite possible that they will be furnished with automatic doors. The design of the Illinois Central car is being studied in this connection. The Berlin municipality is also planning a subway 6.01 miles long to join the working districts of Rixdorf and Moabit.

PAINTING FENDERS AND TRUCKS WITH AN AIR-BRUSH

The accompanying illustration shows an economical method of painting fenders by coating them with a tar varnish as sprayed from an air brush at 80 lb. to 90 lb. pressure. The fender is set up under a hood which is provided with air-blowing connections for drawing up the varnish vapors. The air brush enables two men to paint 16 fenders an hour, as against three fenders painted by hand in the same time. The air



Painting Car Fenders a Varnish Color with Compressed Air

painting is also superior to the old hand method as there is no tendency for the paint to gather in lumps. The varnish which gets by the grids is caught in catchpans, the contents of which are afterward removed for re-use.

The same method has been applied to truck painting without using an exhaust hood. First the trucks are thoroughly scraped and cleaned with compressed air. By using the air brush, one man can coat a truck with a mineral quick-drying paint in one hour or about one-fourth the time required by hand.

TESTIMONY ON VALUATION OF CONEY ISLAND & BROOKLYN RAILROAD

Statements showing the deficits from early operation of the Coney Island & Brooklyn Railroad have been presented before the New York Public Service Commission, Second District, by Frank R. Ford, in the case involving valuation of the property of the company. These statements supplement the testimony of Mr. Ford, of which an abstract was given in the Electric Railway Journal for Dec. 25, 1909, page 1263. At the hearings intervening between the completion of his direct testimony and the present time Mr. Ford has been cross-examined by G. H. Backus, assistant counsel for the Commission. The cross-examination, however, has brought out few points that were not covered in the direct testimony.

A statement published in this issue shows the net income of the company as stated in reports to State engineers from 1862 to 1882, to the State Railroad Commission, from 1883 to 1906, and to the Public Service Commission from 1907 to 1909. Against the net results for these years there is charged the actual interest paid on funded and floating debt. Dividends on the capital stock were deducted at what Mr. Ford assumed to be a reasonable rate, 8 per cent from 1862 to 1884, and 6 per cent after 1884. The larger rate assumed prior to 1884 was based on the fact that before that year the bonds of the company bore 7 per cent interest and it was Mr. Ford's opinion that 8 per cent would represent the usual rate during that period for stock of the character under consideration. With these interest and dividend charges a deficit was shown for every year of operation of the horse period. The total deficit for the period was $846,856. In applying the same process to the transition period from horse to electric power, a net deficit was shown of $74,161, making a cumulative deficit of $921,017. During the electric period the surplus over the assumed reasonable rate of dividend was $783,119, so that at the end of the electric period the cumulative deficit as of June 30, 1909, was reduced to $137,898. If the argument was carried a little further and it was assumed that as the rates of dividend stated had not been paid and the stockholders therefore had not received the use of the dividends, an additional deficit could be added. If the use of the dividends was assumed at 7 per cent interest compounded annually up to 1884 and 6 per cent interest after that date the cumulative deficit with interest for the horse period amounted to $2,945,085, increasing to a total of $3,799,246 at the end of the transition period and to $7,663,654 at the end of the electric period.

Other statements presented by Mr. Ford showed that for the period of horse car operation the average rate of dividend was 1.2 per cent on the capital stock; for the transition period 3.7 per cent and for the electric period 8.6 per cent, giving an average for all the periods from 1861 to 1909 of 5.9 upon the outstanding stock.

Mr. Ford had been unable to find the original contract for the construction of the road, but checked the amount of the property account at the end of the year 1862, $501,364, by an estimate of the probable cost of construction of the amount of property which the records showed the company had on hand at the time. The physical property then consisted of 15 miles of track, of which approximately 6 miles was a graded right-of-way; 20 cars; approximately 80 horses and 30 sets of harness; barns, shops, office and real estate. By applying the unit costs of construction of horse railway and equipment, allowing a reasonable contractor's profit, costs of engineering and superintendence, interest and taxes during construction and costs of organization and obtaining franchises, an approximate estimate of $516,900 was made, comparing with $501,364, as shown in the statement.

The development of the property account, as shown on one statement, included a reduction of the total to the cost per mile of track owned. Starting with the initial cost of $501,364, or $33,400 per mile of track owned, the cost per mile reached $47,400 in 1890, the end of the horse period. During the transition period the cost rose to $63,800 per mile, standing at

that figure in 1894. From that time, with electric operation, the cost increased rapidly, reaching $112,100 in 1898 and $164,000 on Aug. 1, 1909.

A statement was presented by Mr. Ford to show that no large street railway company in America had accumulated a depreciation or renewal reserve fund covering both wear and tear and obsolescence of more than approximately 3 per cent of the cost of property. B. J. Arnold's estimate of obsolescence of the Coney Island & Brooklyn Railroad property was about 20 per cent of the cost of the property. Mr. Ford desired to show that the deduction of an allowance for obsolescence in a rate case was purely a theory and one that had never been substantiated by the current practice of the industry in this country. Of the 20 largest companies in the United States and Canada, seven showed the accumulation of depreciation funds from earnings, the systems of Minneapolis, St. Louis, Milwaukee, Montreal, Buffalo, Brooklyn and Boston. The largest amount of credit to depreciation or renewal reserve shown on the balance sheet at the end of the fiscal year was that of the Milwaukee company, $2,641,707, or 7.8 per cent of the total cost of the property, but the cost of property in this case included the lighting and heating business and the fund represented largely reserves for fire insurance, injuries and damages and miscellaneous, so that but a small part of this fund was represented by the reserve for obsolescence of the street railway property. The Twin City Rapid Transit Company, of Minneapolis, showed the largest street railway depreciation reserve of 2.75 per cent of cost of property.

CONEY ISLAND & BROOKLYN RAILROAD INCOME ACCOUNT BASED UPON A REASONABLE RETURN ON CAPITAL, SHOWING DEFICIT FROM EARLY OPERATION.—Presented by MR. FORD.

	Net income	Interest paid on funded and floating debt	Dividends—Reasonable rate—8 per cent to 1884, 6 per cent after 1884	Total charges for capital	Deficit for year	Cumulative deficit	Annual interest on cumulative deficit—7 per cent to 1884, 6 per cent after 1884	Cumulative deficit with interest
HORSE CAR OPERATION.								
1862	$6,874	.....	$39,504	$39,504	$32,630	$32,630	.....	$32,630
1863	—4,233	.....	39,541	39,544	43,777	76,407	$2,284	78,691
1864	9,148	.....	39,792	39,792	30,644	107,051	5,508	114,843
1865	4,127	$10,781	40,000	50,781	46,654	153,705	8,039	169,536
1866	—3,638	10,777	40,000	50,777	54,415	208,120	11,868	235,819
1867	—236	12,570	40,000	52,570	52,806	260,926	16,507	305,132
1868	—18,049	12,054	40,000	52,054	70,103	331,229	21,359	396,594
1869	13,067	16,635	40,000	56,635	43,568	374,597	27,762	467,924
1870	12,897	17,320	40,000	57,320	44,423	419,020	32,755	545,102
1871	10,144	17,280	40,000	57,280	47,136	466,156	38,157	630,395
1872	27,699	18,888	40,000	58,888	31,189	497,345	44,128	705,712
1873	20,567	22,555	40,000	62,555	41,988	539,333	49,400	797,100
1874	43,094	22,377	40,000	62,377	19,283	558,616	55,797	872,180
1875	25,091	22,893	40,000	62,893	37,802	596,418	61,053	971,035
1876	24,427	22,483	40,000	62,483	38,056	634,574	67,972	1,077,063
1877	35,713	21,411	40,000	61,411	25,698	660,172	75,394	1,178,155
1878	48,980	21,021	40,000	61,021	12,041	672,213	82,471	1,272,667
1879	43,176	20,230	40,000	60,230	17,054	689,267	89,087	1,378,808
1880	43,782	20,157	40,000	60,157	16,375	705,642	96,517	1,491,700
1881	53,640	19,462	40,000	59,462	5,822	711,464	104,419	1,601,941
1882	56,800	19,980	40,000	59,980	3,180	714,644	112,136	1,717,257
1883	60,393	21,013	40,000	61,013	620	715,264	120,208	1,838,085
1884	53,650	20,192	40,000	60,192	6,542	721,806	128,666	1,973,293
1885	10,100	17,235	30,009	47,235	37,135	758,941	118,398	2,128,826
1886	35,357	16,860	30,000	46,860	11,503	770,444	127,730	2,268,059
1887	36,306	15,375	30,000	45,375	9,069	779,513	136,084	2,413,212
1888	28,234	15,000	30,000	45,000	16,766	796,279	144,793	2,574,771
1889	20,073	15,000	30,000	45,000	24,927	821,206	154,486	2,754,184
1890	20,080	15,730	30,000	45,730	25,650	846,856	165,251	2,945,085
Total	$717,263	$465,279	$1,098,840	$1,564,119	$846,856	$846,856	$2,098,229	$2,945,085
TRANSITION PERIOD—HORSE TO ELECTRIC OPERATION.								
1891	$33,968	$30,908	$30,000	$60,908	$26,940	$873,796	$176,705	$3,148,730
1892	60,185	34,104	30,000	64,104	3,919	877,715	188,924	3,341,573
1893	59,570	37,169	44,994	82,163	22,593	900,308	200,492	3,564,658
1894	66,861	27,582	59,988	87,570	20,709	921,017	213,879	3,799,246
Total	$220,584	$129,763	$164,982	$294,745	$74,161	$921,017	$780,000	$3,799,246
ELECTRIC OPERATION.								
1895	$105,536	$28,208	$59,988	$88,196	$17,340(A)	$903,677	$227,955	$4,009,801
1896	119,319	32,500	60,000	92,500	26,819(A)	876,858	240,592	4,223,634
1897	99,017	35,000	60,000	95,000	4,017(A)	872,841	253,418	4,473,035
1898	324,721	151,723	120,000	271,723	52,998(A)	819,843	268,382	4,688,419
1899	408,776	175,024	120,000	295,024	113,752(A)	706,091	281,305	4,855,972
1900	470,639	190,078	120,000	310,078	160,561(A)	545,530	291,358	4,986,769
1901	536,473	196,079	120,000	316,079	220,394(A)	325,136	299,606	5,065,981
1902	527,044	198,702	120,000	318,702	202 342(A)	116,749	303,959	5,161,598
1903	489,083	200,221	120,000	320,221	168,862(A)	52,068(A)	309,696	5,302,432
1904	471,914	206,144	120,000	326,144	145,770(A)	197,838(A)	318,146	5,474,808
1905	424,750	230,656	120,000	350,656	74,094(A)	271,932(A)	328,488	5,729,202
1906	397,605	249,040	120,000	369,040	28,563(A)	300,497(A)	343,752	6,044,389
1907	273,649	253,450	120,000	373,450	99.801	200,696(A)	362,663	6,506,853
1908	164,735(B)	248,003	149,398	397,401	232,666	31,970	390,411	7,129,930
1909	323,813	250,825	178,916	429.741	105,928	137,898	427,796	7,663,654
Total	$5,137,074	$2,645,653	$1,708,302	$4,353,955	$373,119(A)	$137,898	$4,647,527	$7,663,654
SUMMARY.								
Horse car operation	$717,263	$465,279	$1,098,840	$1,564,119	$846,856	$846,856	$2,098,229	$2,945,085
Transition period—horse to electric operation	220,584	129,763	164,982	294,745	74,161	921,017	780,000	3,799,246
Electric operation	5,137,074	2,645,653	1,708,302	4,353,955	783,119	137,898	4,647,527	7,663,654
Total	$6,074,921	$3,240,695	$2,972,124	$6,212,819	$137,898	$137,898	$7,525,756	$7,663,654

(A) Surplus. (B) After including in operating expenses the following renewals shown as betterments in company's balance sheet: 1908, $86,498; 1909, $101,316; total, $187,814.

NOTE.—The first two columns of this statement were prepared from reports to State Engineers from 1862 to 1882, to State Railroad Commission from 1883 to 1906 and to Public Service Commission, 1907 to 1909.

During the cross-examination, Mr. Ford reiterated his testimony that sooner or later fares would have to be determined on a passenger mile or length of ride basis. He said that provision was made for obsolescence in the manufacturing industry in the selling prices of the products sold, but that the rates charged for street railway service had never been high enough to provide for this element of depreciation. The retirement of obsolete equipment was always accompanied by increased economy or efficiency through the adoption of im-

proved standards, but the great transitions from horse to cable and cable to electricity had to be made by increase in the property account, as the earnings were not large enough to provide the necessary funds for such improvements.

EFFECT OF IMPROVEMENTS IN OLD TYPES OF ELECTRIC RAILWAY EQUIPMENT ON MAINTENANCE

At the December meeting of the Boston section of the American Institute of Electrical Engineers, Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company, gave a talk on improvements in old types of equipment. Mr. Winsor stated that the company was one of the first in the country to be equipped with electric traction, and this gave it experience with the earliest forms of railway motors, including the F-30, S.R.G., W.P.'s, etc. The company still has many W.P. motors in operation, and it now has 500 GE-800 motors, with later types which have superseded the older machines. In the power station work of the company the first machines used were the old Thomson-Houston D-62 type, and some of these are still in actual operation every night during the peak load at the Allston power station. Later the company used some 300-kw machines, replacing them by 500-kw multipolars. Some of the latter are in use at present in the East Cambridge station. One is running as a booster with series fields only. Engine type machines followed and the latest generators are of the interpolar type.

Referring briefly to the system of analyzing car defects in Boston Mr. Winsor stated that in the past three years these have been cut down from about 50 per day to 17 per day. The details of this system have been fully described in the Electric Railway Journal. Passing to power station questions, the speaker spoke of a 1500-kw generator which had given trouble from sparking and was improved somewhat by slowing down the engine. Special care was taken to secure proper brush-holder operation. On some of the older machines the company has entirely changed the type of brush-holders to conform with the practice in later-designed generators. Emery cloth is no longer used in dressing down commutators and very little sandpaper is employed. One thing which helped is the method of cleaning a machine in shutting down. The company had a d. c. turbine machine which was very sensitive on the commutator, and it learned much from that. Before shutting down the machines are thoroughly cleaned, all the oil and lubrication being taken off the commutator, so that when the machines cool off the oil does not harden and injure the commutators. Without thorough cleaning there will be gum on the commutator, which is blotchy, and which starts sparking as soon as operation begins again. The 1500-kw machine was tested for distribution of voltage around the commutator. In some cases the balancing rings were disconnecting entirely; in other machines tested it was found that the brushes should not be set on the diameter—that the machine was enough out of balance on the different poles to require brushes not to be placed an equal number of bars apart. Again, in handling the machines, it was the tendency of the operator to adjust too much for the load, and the result was that instead of getting the spark from the top of the brush, there would be a spark under the brush, which tended to honeycomb the brush and give a bad-running commutator. The company has also gone carefully over the equalizing and compounding of its generators, so that the machines are very much more in harmony, which has been strikingly evidenced this winter in the loads which have been carried with much more ease than in past years.

Taking up the car equipment problem, Mr. Winsor stated that the older apparatus is not being used in as hard service as formerly, but it is still actively employed. The single item of broken car glass has been greatly reduced by holding somebody responsible for broken panes. It was found that the motormen had been breaking the glass by dropping the windows, largely because of the absence of proper latches, and this has been remedied to a great degree. Motormen do not now report as many cars as being defective when there is nothing the matter with them, as formerly, for if they report that the brake is out of order, for example, the motormen are required to show wherein the trouble lies.

The defects per 10,000 motor miles with the W.P. motors have dropped from 4.5 to 0.7 or 0.8. The company has improved this type of motor. The commutator has been undercut, and where the life of the commutator was formerly nine months, it now promises to be four or five years or over. This is partly due to slotting the mica bars, partly to a more satisfactory quality of brush, partly to turning the commutators often to keep them in good condition, and also because the motors are used on more suitable runs. These motors were originally equipped with thirteen-turn armatures, which gave a speed of 15 m.p.h. The demand for higher speed led to the removal of two turns, and when the second was taken off the motors became overloaded. They have since been put on lighter service, with better results. These motors were not very well bolted together in the frames, and they rub and pean each other out. The company has had to throw shells away because they were peaned out and did not give room for the armatures between the pole pieces. It was found that the foremen had put washers on the bolts in some cases, and this gave a considerable air gap. The motormen liked such equipments on account of their high speed. Mr. Winsor said that better results were obtained from the GE-800 motor than from the W.P.-50's, but the latter was improved poroportionately. The Westinghouse 12-A and the 68 were next used. The GE-58 is by no means a modern motor, but two years ago the company bought another thousand of these motors. The reason was that such good results were obtained from the GE-58 that, although their efficiency was not so high as might be expected from the most modern machines, it was desirable to install the older ones. Mr. Winsor stated that the company had 1000 Westinghouse-121 motors, and that the latest that has been in service any length of time is the GE-202 motor.

About two years ago the company started to put in Westinghouse-301 motors in the elevated service in place of some of the old types. Certain troubles were experienced with those first received, but for the last 18 months not one winding has been lost and but one armature. The latter was lost shortly after being installed on account of some fault under the pan. The latest motors which the company is installing are the GE-68, which is not an interpole motor, and the Westinghouse-312, which is of the interpole type. One thing which helped these motors was to go over the resistances and control connections. The equipments bought from time to time were originally set as the manufacturers advised, and in other instances the company made its own setting. A reduction in power required during acceleration was secured in several instances by modifications of the resistance setting made by the company.

The traveling armature tags used in Boston help a great deal. If an armature is reported to a car house foreman for flashing and the tag shows that the armature gave long service in another car house without trouble, the man who has it last is more likely to overhaul the armature and try to locate the trouble himself rather than to send it into the shop. The question of fields is a very important one in connection with armature trouble. It is very easy to take an armature out because it is burned or flashes, put another one in and have the same trouble. A few years ago that happened repeatedly. The same car would change armatures perhaps three times in one week. It is doubtful if that would happen to-day under the system of maintenance records and their study which is in vogue. Certainly after the second time the car house foreman would know there was something wrong with the motor, probably with the fields, and he would try to find what the field situation was. The old cotton fields charred out with the service which the company gave them. Within the past two years the company has had over 2000

motor fields on which the cotton was charred, and the coils would have been condemned under the old arrangement. The company now fills these with compound and has not lost one of the reclaimed fields. It has no impregnating plant. In winding the new coils very much the same result is obtained by using a mixture of japan and French chalk, and really filling the space up and making a solid field, so that, although the cotton chars, the wires cannot come together. The first mixture the company used was japan, simple varnish, and ordinary portland cement; but it was found that the portland cement had no effect except as a filler, and japan and French chalk are now being used. The japan divides the chalk up into thin layers so that it dries and the whole makes a very solid mass.

In the company's efforts to teach its men how to handle the cars in a better manner some interesting demonstrations have been made. One of these was to show the proper way to speed up, without skidding the wheels. The temptation on a bad rail is to speed up, and if the wheels spin, to speed up more. A car was put on a short piece of track, and the instructor then asked the men to see how quickly they could move that car from one point to another 150 ft. away. Invariably they all spun the wheels. One of the company's engineers then took the car and made the quickest time of all without spinning the wheels, simply feeding the controller handle slowly. Mr. Winsor said that one might talk all night to the motormen on the theory that as long as one spins the wheels progress cannot be made, but that it would not appeal to them as it does to see the actual result tried out on the track. Within six months the company has put an instruction car on the road, with a schoolmaster. It is too early to see the results, but it is expected to be of benefit to the company. The schoolmaster understands thoroughly that his whole business is personal work with the men. He cannot give them lessons to learn, but he must get them interested, and in this he is succeeding very well. A recent experience with a motorman who had been on the road for many years is representative. The motorman had been reported for using too much power at electric track switches. These switches are operated by current from the trolley wire. To throw the switch in one direction the car passes under it with the power on, and to throw it the other way, the car coasts under the switch. The motorman had been sent to the schoolmaster for instruction, and had declared that the switch could not be thrown short of three notches of power. The schoolmaster went out on the car with this motorman on his last trip, and demonstrated on the spot that the switch could be thrown with a single notch, and the lesson was thus driven home in a practical way.

In conclusion the speaker described the monthly meetings of the car house foremen in Boston and showed how the records in the car defect analysis system are transcribed on large sheets, and curves plotted, showing on a large scale the variation in defects from different causes from month to month and year to year. The car house foremen have complete record blanks starting with a daily log sheet on which troubles are put down. If a car misses a trip because of some fault it is called a defect. The car houses also keep mileage records. All their repairs are kept on a mileage basis. A certain kind of equipment has to be inspected every 1000 miles, etc. These log sheets come to headquarters and the information is posted there, so that finally the company establishes its records for the entire system. Tabulations are made on cards for different classes and types of equipment and the most accurate information concerning troubles is thus constantly at hand. Thus, there is a motor card for each type of motor, 50-C, 202, etc. The number and kind of failures each day are tabulated and these are footed up for the month. From the monthly records the company knows what is the most frequent kind of trouble and goes after it. Sometimes the trouble can be remedied and sometimes not. These monthly meetings have done a great deal of good. Sometimes a man gets "hauled over the coals" and does not have a happy time that evening, but most of the meetings are not of that nature. The men talk over things and tell their experience. Very good results have come from giving a man a certain subject to post himself on and have him give a talk. It is surprising how many of the foremen have risen to that point. These talks are often very interesting and have done a great deal toward making the men interested in their work. At first the meetings were considered a great hardship, but as time went on the results began to be clear. The men see the results of their past two or three years' work and are becoming more and more interested. Mr. Winsor closed with a brief reference to the company's standardization of brake shoe heads. These now take in practically every case a standard shoe, instead of having a large variety of shoes which had to be bolted on. Before, it was often necessary to break the bolt in order to take off the shoe. It is now held in place by a key. The number of resistance grids has been cut down from 14 to 3. These old equipments cannot be made as good as new ones, but much can be accomplished in the way of improvement with a little care and knowledge of what one is doing.

DISCUSSION

In the discussion of Mr. Winsor's remarks, M. V. Ayres, electrical engineer of the Boston & Worcester Street Railway Company, stated that the work of the Boston Elevated Railway Company well illustrated the saying that a problem once stated was half solved. By finding out what the matter was and the nature of the particular troubles the company has enormously reduced their frequency. Thus, tests on the car resistances showed that much motor trouble was due to the comparatively simple matter of irregularly adjusted resistances. Mr. Ayres said that the causes of motor troubles in his opinion fall into three classes: overheating, which is due to continuous overload; commutator troubles, which are due in a considerable degree to momentary overloads; and vibration, which is principally due to the way in which the motors are mounted on the cars. Commutator trouble is the thing which has been particularly remedied in Boston by resistance adjustment. Simply by cutting off the high peaks the trouble is greatly reduced. Overheating due to continuous overload can be reduced only by using a larger motor or using blowers to cool off the motor. The latter is not common practice except in the case of certain large locomotives. In the future it will probably be done frequently. The tendency is likely to be in the direction of using smaller and lighter motors cooled artificially.

Mr. Ayres stated that in his opinion vibration is responsible for a large portion of modern motor troubles, since stationary motors last much longer without repairs than car motors, even if the latter have the best of treatment. This is due largely to carrying the weight of the motor on the axle. It may be possible to devise some method of suspending the motor without mounting it directly on top of the car axle, perhaps spring-mounting it so that the present severe pounding will be decreased. Something of this sort with artificial ventilation will result in greatly reduced size and weight of parts and a greater life with less trouble.

Mr. Hamill, Schenectady, voiced his surprise at the success of the Boston Elevated Railway in modernizing the old "WP" motors, which have been obsolete for some 15 years. He stated that a railway motor has a remarkable life in the face of its conditions of operation. The armature trouble is often found to originate from something wrong with the fields and commutator trouble more often than anything else indicates brush holder difficulties. Excess of lubrication may cause sticking of brushes or holders. All this appears at the commutator and not at the brush-holder, so troubles are very much isolated. Defects may also arise from the springs.

Prof. A. S. Richey, Worcester Polytechnic Institute, stated that the three most important things relating to the maintenance of car equipment and the reduction of cost, outside the shop, are the proportioning of resistances, the selection of proper gear ratios, and the proper instruction of the motormen. The matter of gear ratios deserves more attention and there are undoubtedly many cases where 50-hp motors are pretty well loaded which could be handled by 40-hp motors equipped with

gears of the proper ratio. Properly instructed motormen can save a great deal of power, perhaps more than in certain fine power station economies. A saving of a fraction of a kw-hour per car-mile is better than saving a fraction of a cent per kw-hour in the station, and it can be done by teaching the motormen. On one road about 10 recording wattmeters were installed to each 100 cars. It was at first planned to switch these wattmeters around from car to car, but the motormen became interested and the cars were switched around to different runs instead. The motormen paid no attention to the constant of the meter, but called the plain figures watts, reporting that they had made a certain run on 231 watts where they used to take 245. The officials of the company did not care how the figures were read so long as the power consumption was cut down. There was a good deal of rivalry between the motormen to see who could make the runs with the least power.

DISCUSSION ON POWER PLANT ECONOMY

The address by Paul Winsor was followed by a short talk by Prof. I. N. Hollis, of Harvard University, on Power Station Economy. Professor Hollis commented upon the transition state in which prime movers now find themselves, and passed to a broad discussion of the evils of underload operation. He reviewed the conditions surrounding the exhaust steam turbine installation of the Interborough Rapid Transit Company, New York, as discussed before the Boston section of the American Society of Mechanical Engineers recently, and abstracted in the Electric Railway Journal. The importance of a good load factor in relation to station economy was the principal theme, the desirability of cutting down the stand-by losses in the boiler room being specially emphasized.

Jas. D. Andrew, Boston Elevated Railway Company, referred to the importance of having apparatus of high quality installed in a plant with plenty of working space. Equipment should be kept up to its guarantees after it is put into permanent service. All equipment will degenerate if not kept up, and no company should hesitate to put all the improvements it can into the older machinery. Improvements in electrical apparatus are largely matters of detail, and these details can frequently be applied to old machines. Mr. Andrew did not consider the exhaust steam turbine applicable to Boston Elevated plants at present on account of their use of direct current. The company has found it impossible to run a turbine-driven generator at 550 volts direct current. An alternating current machine could not be put on the system to act as an independent unit without a governor, and even then it would not work out at all well, as it would have to be tied to the rest of the system through substations. In the Interborough installation, spoken of by Professor Hollis, the conditions were ideal for exhaust turbine operation.

M. V. Ayres, Boston & Worcester Street Railway Company, called attention to the difficulties of securing operation of generators at rated load. Hardly anybody has this load upon his plant. In the Boston & Worcester work the most economical load has been found to be the largest load which can be put upon a single unit, the machines being of the alternating current type, and the load fluctuating. The greatest station economy on this road is obtained when the engines are slowing down every little while on the peak of the load and simply carrying all they can. It does not pay to start another engine until the engines running are repeatedly slowing down under the load. This could not be done in lighting service. In regard to power station equipment, Mr. Ayres stated that he no longer favors the general installation of electrical auxiliaries. They should never be used in any place where the failure of an auxiliary will cause the shut-down of the main machines. Small steam turbines are preferable, notably in the driving of circulating pumps for condensers.

In order to comply with the terms of the recent concession to electrify the tramway system in Constantinople, the entire trackage is being completely rebuilt at a cost of $1,000,000. The cost of new cars, overhead lines and power distribution network is estimated at an additional $1,400,000.

ANNUAL REPORT OF NEW YORK PUBLIC SERVICE COMMISSION, FIRST DISTRICT

The report of the New York Public Service Commission, First District, for the year ended Dec. 31, 1909, has been submitted to the Legislature. An abstract of the features of the report relating to street railways discussed in the preliminary chapter follows:

"During the year the commission has considered 271 formal cases, of which 57 were not yet determined at the end of the year.

"The applications relating to securities concerned principally the issue of stock and bonds. The largest amount involved was in connection with the pending reorganization of the Third Avenue Railroad. Due application of the committee of bondholders of this company was denied and another application, asking the approval of $54,916,000 of securities, is now before the commission.

"Experience has shown that most matters relating to conduct of employees, minor defects of cars or tracks, and even deficiencies in service, will be determined satisfactorily by the companies when their attention is called to them, without the necessity of a hearing and a formal order. During the year 1335 informal complaints relating to railroad, street railway and express companies have been handled, of which 73 were not concluded at the end of the year.

EQUIPMENT AND SERVICE

"The equipment of the railroad systems in the City of New York is now in better condition than ever before. The cars are less noisy and they are cleaner and better heated, and, because of the thorough overhauling of the cars, required by the commission, there are fewer breakdowns and blowouts of motor boxes and fuses. A great reduction of such accidents on the Brooklyn Bridge has made possible considerably better service on that structure.

"The Brooklyn Union Elevated Railroad, under the direction of the commission, is changing the type of air brake on its elevated cars; the New York & Queens County Railway has been ordered to double-track its system and all the companies in the city have been required to adopt fenders and wheelguards of an approved type. Good equipment well maintained not only makes better service possible, but also reduces the number and seriousness of accidents. The following figures are of interest:

	1908.	1909.
Total number of accidents on street, "L" and subway and steam railroads within New York City	56,481	52,618
Number of persons killed	444	325
Number of persons and vehicles struck by cars	11,405	11,426

"The service rendered by transportation companies is also now better than ever before in proportion to the physical conditions and the volume of travel. Due to the orders of the commission, the maximum service is continued for a much longer period that heretofore, and the rush-hour service has been increased. Upon the Manhattan surface lines, for example, as to which service orders have been issued, a comparison of service rendered before and after the orders shows an increase varying from 11 per cent to 57 per cent.

"The matter of adequate service is a serious problem, for during each 24-hour period passengers equal in number to about 85 per cent of the entire population must be carried. Fully one-third of all the passengers traveling in one direction during the day are carried in two hours out of the 24; that is, one-third of the traffic comes in one-twelfth of the time.

"An annual count is made of the number of persons who cross the East River between Brooklyn and Manhattan and return during a 24-hour period. The following schedule shows the figures of travel in both directions for three years:

Routes.	Travel to and from Long Island, 1907.	Travel to and from Long Island, 1908.	Travel to and from Long Island, 1909.
Brooklyn Bridge	423,000	309,783	323,006
Williamsburg Bridge	163,000	183,233	206,606
Queensboro Bridge	Not open for traffic	Not open for traffic	26,300
Ferries	120,000	175,749	120,841
Interborough subway	Not open for traffic	159,708	193,784
Total	706,000	827,473	870,537

"The following figures indicate the extent of the transportation problem in New York City:

Year ending June 30.	1907.	1908.	1909.
Number of operating companies:			
Street or electric railway.....	29	30	33
Steam railroad (Staten Island)	2	2	2
Miles of (single track).....	1,597	1,636	1,646
Number of passenger cars.....	10,062	11,049	11,623
Number of officers and employees	*34,113	39,839	37,609
Miles run by passenger cars.....	252,783,198	273,788,406	272,369,956
Revenue passengers carried.....	1,322,816,965	1,365,169,472	1,409,132,118
Revenue passengers per day.....	3,624,156	3,729,971	3,860,635
Revenue for transportation.....	66,838,721	68,461,349	70,732,928
Total revenue from rail operations	68,318,881	69,941,968	73,646,417
Total expense of rail operations.	37,779,099	43,087,446	44,022,578
Net revenue from rail operations.	30,539,782	26,854,522	29,623,839
Operating ratio, per cent.....	55.3	61.6	59.8
Per car mile, cents:			
Revenue	26.1	25.3	26.8
Expenses	14.1	15.6	16.0
Net revenue	12.0	9.7	10.8

*An average for the year.

RAPID TRANSIT

"A number of additions to the subway now in operation have been constructed or are under construction under Contracts Nos. 1 and 2, under authorization by the commission. The shuttle service between the Bowling Green and Battery Park stations has been completed and is now in satisfactory use. The work of enlarging the Ninety-sixth Street subway station has not been completed, because the company has been required to develop a speed-control system which promises to afford the necessary relief to the train congestion at this point. On the upper portions of the lines the rapid growth of population and travel has necessitated additional station facilities. The company, under orders from the commission, is equipping its subway express service cars with side doors. This improvement is affording material relief, for a gain of four seconds in reducing station stops means the possibility of an extra 8-car train per hour. With 17 side-door trains in operation, the company's general manager states that there has been a 20-second saving. In addition, the station platforms on both express and local tracks are being lengthened at an expense of $1,500,000. This will allow a 25 per cent increase in the size of trains, that is, allowing 10-car express trains instead of 8 cars as at present.

"The commission has given exhaustive attention to plans for additional rapid transit routes.

RECOMMENDATIONS AS TO LEGISLATION

"Railroad Law.—The subject of transfers on surface lines in cities cannot be rightly adjusted until the railroad law is amended. Out-of-date provisions in the railroad law regarding changes are entirely discordant with the rate-making provisions of the later law.

"Without going into detail at this time regarding the many needed amendments to perfect the railroad law, the commission desires to call especial attention to the imperfections of the grade-crossing provisions.

"Public service commission law.—The ability of the commission to prescribe reasonable joint rates, including transfers, should be made clear and effective, especially since transfers have been so largely abolished by the various operating companies in Manhattan. Experience has shown that numerous improvements can be made in the law which will be equally beneficial to the public and the public-service corporations.

"Apart from such particulars as can now be adjusted in the light of actual experience, it has been found that in three most important features the phraseology employed fails to carry out the general purposes of the enactment. This has been brought about by the interpretation placed upon the law by the State courts.

"1. It seems to have been the intention of the law that the commission should be an administrative body with power to prescribe rates and facilities in accordance with a rule laid down for guidance in each case. For instance, rates should be just and reasonable; service and facilities should be safe, adequate and in all respects just and reasonable. This commission considered that, when it made a careful inquiry into the facts of each case and gave a fair hearing to all interested parties, its conclusion embodied in an order should go into effect the same as an enactment of the Legislature. The State courts have declared, however, contrary to the holding of the United States Supreme Court, that the words employed in the act make the commission a judicial or quasi-judicial body in respect to rates, and it would seem to follow in respect to service and facilities. Accordingly, the courts have declared that the propriety of an order of the commission in these respects can be considered and decided by the courts, which thus become substituted for the commission just as if the acts of the Legislature could be reviewed by the courts, and set aside because the record of evidence was not sufficient to support or validate a statute. The result is that orders of the commission which are contested do not go into effect at once, but can be kept in litigation for a long time, their efficacy thus being made to depend, not upon their correctness, but upon a written record of evidence.

"2. The public-service commissions law requires that, before construction or operation of a railroad under a franchise can begin, the approval and permission of the commission must be granted. As all franchises proceed directly or indirectly from the State, it was understood and expected that the commission would perform a useful State function in preventing franchises that disregarded the public interests. It is of the greatest importance that franchise terms should be harmonious in the cities of the State, and that extravagant and perpetual rights should not be granted to public-service corporations. The courts have held, however, that, inasmuch as the section in question provides that the commission shall determine whether a railroad is convenient or necessary, it is limited to a consideration of the present convenience and necessity of a railroad, quite regardless of the franchise terms that may be inserted by the city, and which may be considered by the commission as hostile to the public interests. The result is that the public-service law does no more than the railroad law, which has for many years required the State railroad board to pass on the question of public convenience and necessity.

"3. One of the main purposes of the law was supposed to be the prevention of stock-watering. The courts have held, however, that the words used in the section relating to this subject only require the commission to determine whether stock and bonds sought to be issued come within one of the four purposes stated in the section, i.e., the acquisition of property, construction of its facilities, improvement and maintenance of its service, or the discharge or refunding of its obligations. The result is that this construction of the words used in the act deprives the commissions of power to stop stock-watering, for it is easy for the companies to bring within the four legal purposes sums that never should be capitalized, as, for instance, expenses of operation, taxes, replacements, or even dividends. Capitalization except for proper capital purposes should not be allowed, but the present section as interpreted by the courts leaves the law ineffective in this regard.

"Although these decisions of the court have devitalized the public service commissions law, they serve to indicate the changes which should be made by the Legislature to bring the law back to its original intention. Powers in the commissions to regulate rates and service, to prevent construction under franchises that do not safeguard the public welfare, and to prevent stock-watering, have been considered the main advantages of the new law. Without them the commissions can hardly touch foundamental evils. It is highly desirable that the essential purposes of the law be re-established."

The Western New York & Pennsylvania Traction Company, of Olean, N. Y., recently announced that the 46-trip monthly commutation ticket books, good to the purchaser for passage between any two local points in New York State where the regular one-way fare is 10 cents or more, will be sold to persons between the ages of 5 years and 20 years at one-half the regular one-way fare. Heretofore the use of these books has been restricted to scholars. Monthly commutation books containing 52 coupons each good for passage between Portville and Olean, sold at $3.25 per book, are good for passage to the purchaser only; heretofore the use has not been restricted to purchaser

OFFICIAL VALUATIONS OF PRIVATE PROPERTY*

BY FREDERICK W. WHITRIDGE, RECEIVER, THIRD AVENUE RAILROAD OF NEW YORK

Some years ago a very rich man who proposed to found a great institution of learning in one of the Far Western cities went to Cambridge to see what was being done at Harvard. He passed a day or two looking at its buildings, libraries and museums, and inquiring into the courses of study and the work carried on. At the end of that time he turned to those who were showing him about, and said: "Well, gentlemen, what is your whole plant worth?" They looked blank, and the millionaire reiterated: "What is the value of it—how much did it all cost?" The notion that Harvard University, the product of two centuries of time and of the lives and labors of thousands of good men, could be valued in money was strange; but the millionaire was insistent upon an answer, and one official finally said: "I suppose it cost perhaps so and so many millions"; and the plutocrat turned to his wife, who happened to be with him, and said: "Well, mother, I guess we can do better than that," and went away quite confident that it was within his power, by the mere expenditure of money, to at once produce an institution more valuable than Harvard University.

The Harvard representative at this conversation could not have been more aghast at the millionaire's question than I was when, some months ago, I received from the Public Service Commission of this district notice that it had undertaken the valuation of the property, tangible and intangible, of the street railways of this city, including one of which I happen to be the custodian.

I asked how it was proposed to make the valuation and what was the purpose for which it was to be made. In various forms I repeated these questions for more than a year, without any answer, until one of the commissioners, perhaps inadvertently, said that the purpose of the commission was, in brief, "to secure reliable information as to the value of the physical properties of the company for the purpose of being in possession of the facts necessary or important for its discharge of the duties devolving upon it in connection with issues of securities, passenger rates, etc.," and that I must be aware of it. That statement, if you please, being made with reference to a company of which all the securities had already been issued, and to a railroad and a community where the most widely known and universally accepted fact in respect to street service is that the fare of every passenger is fixed at 5 cents! This statement did not enlighten me, and for a long time I could not conceive what the commission was driving at. I have, however, now discovered what I suppose the most of you knew long ago—that the notion of a valuation of public-service properties originated in the State of Wisconsin, although it was first attempted to be applied in Texas, and that in Wisconsin there is a statute which provides for such valuation, primarily for the purpose of enabling the State to fix rates on the steam railroads, which would be more acceptable to the shippers; and in a recent address by Mr. Roemer, a member of the Wisconsin commission, I find the whole philosophy of a State valuation of public utilities expounded.

The New York commission for this district has apparently swallowed the Wisconsin doctrine whole, and is undertaking to apply it in a State where the Wisconsin statutes do not run. Mr. Roemer says that the duty of the valuation imposed upon the commission is the gravest and most important of all its functions, and asserts that "the value of every security of a public-service corporation in this State will be determined and perhaps irrevocably fixed by the appraisal made by the commission of such corporation, upon the credit of which such security will be issued. There can be no escape from this conclusion. Fair and reasonable as such appraisal may be, it will signify to the world that, in the future, public utilities in this State will cease to be a subject for speculative investment. It will also indicate that which is more important, to wit, that actual bona-fide investments in such concerns, when providently made, will be secure under State supervision, and the adequacy of the security will be maintained by strict enforcement of the law." These views I shall not undertake to discuss. Anybody who holds them is as much beyond the reach of any argument at my command as were those persons who some years ago believed that the relative value of two metals could be fixed by act of Congress. Mr. Roemer, however, goes on, as I understand him, to point out that the method of valuation—as if there were no other—is to have the engineering staff determine the "cost of reproduction."

*Abstract of an address presented before the American Economic Association, New York, N. Y., Dec. 30, 1909.

VARIOUS MEASURES OF VALUE

But Mr. Roemer omits to notice that besides the "cost of reproduction" there are other measures of value, such as market price, original cost, the rental value, all quite as efficient as the cost of reproduction. The salient fact about all but one of these methods of valuation is that, after all, they rest upon the testimony of experts. It is all very well to talk of a valuation by the State. That has an august sound, but when we come to examine the statement it shrinks, so that your State valuation is only the unsifted judgment or guess of one or more individual experts.

Now, with every respect in the world for science of every kind, and for those who are expert in it, I cannot but recall a remark made to me by Professor Huxley, of whom I was asking an expert opinion of our Government on a subject of which he had studied profoundly, and he said to me: "My dear Whitridge, there are, you know, three kinds of liars—liars, damned liars and experts."

I remember, also, in my early days at the Bar, I was directed to prepare a brief, based wholly upon expert opinions, to show that the Brooklyn Bridge would fall down, and in that brief I *proved* that the molecular rearrangement caused by the impact of the heavy traffic on the steel of which the bridge was constructed would result in a disintegration of that metal and the collapse of the bridge. If the theories of molecular action which then prevailed still hold true, that bridge may fall down at any moment, but fortunately I did not fix a date for the catastrophe.

I am personally quite unable, therefore, to look upon any valuation of anything with the complacency with which Mr. Roemer and his school regard a valuation of public utilities which rests entirely upon the judgment of experts. Assuming, however, that experts are to be depended upon absolutely, and that it is possible for a public body, speaking in the name of the State, to be willing to shelter itself behind expert opinion, it is quite evident, from the merest enumeration of the methods of valuation, that the conception of value is a very complex one, and it is easy to point out the inadequacy of any particular abstract method of reaching it.

The State has thus far generally undertaken to make a valuation of private property only for the purposes of various kinds of taxation, and it is important to note how it is made. In the first place, take the valuation of land, of real estate generally. In this country and in others where land is freely sold, valuations not only for the purposes of taxation, but for the purposes of sale, are very common; but such valuations are, so far as I know, invariably made with reference to the supposed present or prospective market value.

In the second place, take the valuation of personal property, for the purposes of transfer, inheritance and direct personal property taxes or the collection of duties. I believe that valuation for the purposes of the first three of these taxes is invariably fixed by reference to the market price ascertained from the dealers or published quotations, and for the purposes of customs duties the valuation is almost invariably fixed by the cost price, although in the case of personal effects where the cost price obviously no longer represents present value, our Government makes itself ridiculous at least 1,000,000 times a year—or would do so if it complied with the law—in the endeavor to have an official value such effects on the dock or in the public stores.

In the third place, take the State valuation of intangibles like franchises and good-will—for if competition in public utilities can be conceived under the Wisconsin doctrine, good-will must be recognized as an element of value—and it appears plain that the attempt to make such a valuation of franchises for the purpose of taxation has resulted in this State—and I know nothing of it elsewhere—in nothing short of a monstrous scandal. We have a State board of three persons whose sole duty it is to appraise franchises for taxation, which has been at work for 10 years.

The appraisals by this board of the street railway franchises in this city have been in litigation for nine of these years. The valuations have been reduced by the courts about 50 per cent. The board has gone gallantly on making its appraisals year after year, as if the courts had not spoken, and the courts will doubtless continue to perform their appointed task of correcting those appraisals. The theory on which this board of valuers proceeds I do not know, because they have not announced it, but I know of one instance in which the value of the franchises of a railroad was appraised by it as $40,000. Just after that appraisal was made the railroad, franchise, cars, roadbed and all appurtenances sold at auction for $500. The board of appraisers was furnished with an affidavit of the sale at that price, and a copy of the decree confirming it, and they thereupon reduced the value of the franchise, not to nothing, but from $40,000 to $20,000. The labors of this particular body of State functionaries instead of fixing values irrevocably, as Mr. Roemer dreams the State will do, have only opened a vista of litigation, apparently as long before as it is behind.

All the cases I have so far touched are comparatively simple, but when we come to the valuation of a public utility containing so many different elements as a street railway, an electric light, power or water plant the problem is vastly complicated and it is not surprising that the Wisconsin philosophers have frankly "funked" the whole thing and sought shelter for themselves behind the experts, and those gentlemen have in turn taken the line of least resistance, and say the value of a public utility is what it would cost to reproduce it. Is it? Is it?

If all experts agreed there would be less difficulty in accepting that measure of value, but I see no reason to suppose that experts in the employ of the State are any more nearly infallible than the experts in the employ of the great contractors, and the merest tyro in affairs knows that if bids were asked for the construction of a large public utility to-day the best contractors you could find would vary from 10 per cent to 50 per cent in their bids, and in this city I doubt if you could get any bid except for a percentage on cost. Nor is this remarkable in respect to railways, for the actual cost of a mile of underground electric trolley has varied from $64,000 in Washington to about $1,000,000 in New York.

"IRREVOCABLE" COSTS

Let us suppose, however, that the present cost of reproduction can be got at, it would obviously be unjust, either to the investors in the enterprise or to the public, unless it could be shown that the march of science had been stayed, and the prices of materials and the cost of labor had been as "irrevocably" fixed as they are in Mr. Roemer's vision of the world that is to be, and had not, therefore, changed since the date of production. The cost of reproduction, moreover, takes no cognizance of obsolete portions of a plant which contributed to its earning capacity and, therefore, as I contend, to its present value. The Third Avenue Railroad, for instance, was a horse railroad, then it was a cable railroad, now it is an electric railroad, and its security holders paid their money to construct those roads. The first two served their purpose and have ceased to exist. The Western Union has, I am informed, several millions of bonds outstanding which were issued for the money wherewith to lay cables, some of which have been lost in the primeval ooze at the bottom of the sea.

Now, if the cost of reproduction is the measure of the value of a property, and the aggregate of its securities is to be contained within that valuation, I suppose it must be a corollary of that proposition that the $5,000,000 of bonds issued by the Third Avenue for its cable plant and the other millions of Western Union bonds issued for its extinct cable should be surrendered by their owners, and perhaps filed with the statisticians of the Public Service Commission.

Finally, if we suppose that all the proposed valuations have been satisfactorily made, we must also suppose that civilized society has crystallized, as Mr. Roemer with his irrevocability would have us believe or Mr. Bellamy in his romance long ago imagined. If we do not so suppose, it must be conceded that the expiration of valuable patents, a decrease in population, bad times, increased prices of commodities or competition which might lead to the building of a new public utility alongside of an old one, may entirely alter the position of a public-service corporation and change every kind of value it may have except that fixed by the State.

Above all things, science must be chained, otherwise after the Public Service Commissions have got everything comfortably and "perhaps irrevocably" valued, somebody like Mr. Brennan with his monorail and gyroscope car—the most wonderful thing I have ever seen—may come along and, so far as railways are concerned, upset the whole official edifice by revolutionizing the business.

Notwithstanding all these considerations, it is urged as a general principle that it is essential to have an authoritative valuation of public-service corporations, first, to determine the reasonableness of the price paid by the public for services rendered, i.e., to fix rates; second, to enable the laws for the control of the issue of securities to be equitably administered; third, to determine the amount to be paid over to the public by way of taxes, which cannot be reached without an analysis of the value of the industry considered as a commercial concern. Professor Adams, who states these propositions fairly and moderately, unblushingly dodges the details and the methods of valuation, but rests his case upon the necessity for an authoritative valuation for the purposes specified. This view of the matter rather suggests the reply of Lord Chesterfield to the quack who was explaining by way of apology that "he must live," and Lord Chesterfield answered cheerfully: "I do not recognize the necessity."

Certainly the necessity for valuation for any of those purposes is as yet far from general recognition. Only two or three States have authorized it, and I had supposed the notion that valuation of a common carrier, however it might be measured, or the notion that capitalization, based upon such valuation, was a factor in fixing rates, was now an expiring delusion. It is the demand for a commodity and the price of it which mainly determine the freight rate for it, and thus, as a distinguished economist has said, the market price of wheat in Liverpool has more to do with fixing the freight on wheat between St. Paul and New York than the capitalization of the railroads between those points. It is quite possible that in a virgin land rates might be fixed with a view in part to a return on the cost of a newly constructed railroad, or to paying interest on the securities which represented that cost; but in this country there is no longer any such case, and a moment's reflection is sufficient to show that if two points are connected by two railroads, one of which cost or is capitalized at $10,000,000 and the other at $25,000,000, the rates must be the same on each railroad between those two points.

THE ORIGINAL COST

As respects the second necessity for a valuation mentioned by Professor Adams, I agree that in the case of a new enterprise the laws in respect to the issue of securities cannot be administered without regard to the value of the property, but the measure of value in that case is the original cost—there can be no other. To undertake, however, to apply that standard to a public utility with a long history and a demonstrated earning capacity is absurd and impracticable. The measure of value in such case is the income or yield, having regard to its permanence and possible increase, and it is the proved or probable income of a property also which, in the long run, establishes its market price, and, for that matter, the market value of everything else in the world, except merchandise and works of art,

as to which the demand, together with considerations of rarity, beauty and taste or sentiment intervenes.

If the value of a property measured by the cost of reproduction is less than the value of a property measured by its fruit or its income, any attempt to limit the securities to the amount shown by the first method is tantamount to confiscation, which our Constitution and laws do not yet allow. Furthermore, any proposal to limit the amount of the income of a property, by cutting down the amount of its securities on which the income is to be paid—and this, I am informed, is the theory of the arch and senatorial Wisconsin philosopher—appears to me to be undiluted nonsense.

As to the valuation of a public service industry for purposes of taxation, I understand that Professor Adams's "analysis of the value of the industry considered as a commercial concern" means exactly what I mean by saying that the value of an industry is measured by its product or income, and I only wish the laws in respect to taxation recognized that principle. They do not. These are the three purposes for which Professor Adams says we must, as a matter of general principle, have a system of valuation, and the Interstate Commerce Commission solemnly asked for an appropriation of $3,000,000 with which to "value" all the interstate railroads in the United States!

There is something fascinating about general principles, and I can understand how a man may persuade himself that, as a matter of principle, there must be a valuation to save the courts and officials trouble in doing what he thinks they ought to do. It certainly would be a convenience to have a bureau of values, like the standard measures in the mint, to which you could go and find out what everything was "perhaps irrevocably" worth. But the individual must wither indeed before the State can be sufficiently reorganized to offer such conveniences. I can only say here, "Beware of general principles." They can only be attained through patient and laborious years. They cannot be reached merely by the expression of vague desires. They are not to be promulgated by every weakling who wants them to lean upon. And remember that one of the things which most clearly marks the transition from youth to maturity is the willingness to formulate offhand "general principles."

The whole problem of the possibility and desirability of making a valuation of a public service corporation resolves itself into questions of the method of the valuation and the purpose for which it is made. I regret that it should be gravely discussed merely as necessary for the accomplishment of other purposes, because that appears to me to be a result of the un-American and, I hope, temporary tendency which now prevails, to run to the Government with every project and every conceivable grievance, like my landlady in Berlin 30 years ago, who cried out: "The price of meat is frightful, and the police ought to do something about it."

The people of this country have, I think wisely, made up their minds, in consequence of great corporate abuses, that public service corporations should be subject to regulation and, in some respects, control by the State; but when I see the laws showered from the Legislatures, and the indiscriminate volleys of rules and general principles from public officials, usually fired through an intellectual fog, I cannot help thinking that the heads of the commissioners, State and interstate, are addled by power, or the lust for it, as much as the head of the millionaire who wanted a price on Harvard University, was addled by his money.

These officials have great powers and most useful functions. They are trying to exercise them with zeal and honesty, and so far, I believe, desire nothing but the public good. As I consider their labors, however, I remember that the great Mommsen once said to me: "Your people play pranks in politics and would excuse them by their youth"; and really, in many of their endeavors, particularly in this matter of valuation, with its irreverence for facts, they seem to be singing the song of the Banderlog who dreamed of

> "Something noble, grand, and good
> Won by simply wishing we could."

UNITED STATES SUPREME COURT DECISION NULLIFYING MINNEAPOLIS LOW FARE ORDINANCE

The decision of the United States Supreme Court upholding the 5-cent rate of fare stipulated in the ordinance passed by the City Council of Minneapolis, Minn., on July 9, 1875, was mentioned in last week's issue. A full copy of the decision, which was delivered by Justice Day on Jan. 3, 1910, is now available. It discusses a number of points bearing on the relations of the municipality and the Minneapolis Street Railway, the subsidiary property of the Twin City Rapid Transit Company which was directly involved in the case.

The Court says in its decision:

"This is an appeal from a decree of the Circuit Court of the United States for the District of Minnesota, enjoining the city of Minneapolis from enforcing, as against the Minneapolis Street Railway Company, appellee, a certain ordinance of the city of Minneapolis, passed Feb. 9, 1907, prescribing the rate of fare for the transportation of passengers over any street railway line, or lines, of the company in the city of Minneapolis.

"The case was tried upon amended bill and answer. The ground alleged for injunction in the amended bill was in substance that the ordinance of Feb. 9, 1907, violated the terms of a previous and subsisting contract, prescribing the rates of fare to be charged by the company in the city of Minneapolis. It appears in the record that the railway company was organized on July 1, 1873, and that its alleged contract arises from an ordinance of the city of Minneapolis passed July 9, 1875, ratified by an act of the Legislature of the State of Minnesota passed March 4, 1879.

"It is sufficient for the present purpose to say that it is the contention of the company that by the ordinance of July 9, 1875, and the ratifying act, it became the owner of an irrepealable contract for the term of 50 years from the date of its organization, by the terms of which it had the right to charge a fare not exceeding 5 cents for each person carried on any continuous line which might be designated by the city council of the city, such continuous line, however, not to exceed 3 miles in length. The contract, it is alleged, is violated by the ordinance of Feb. 9, 1907, requiring the sale of six tickets for 25 cents.

"The existence of the alleged contract is denied by the city upon several grounds. It is urged that the complainant company was so organized that its charter, and consequently its corporate life, expired 30 years after the date of its incorporation, that is, on July 1, 1903, and, therefore, its contract rights ceased and terminated at that time. This contention is based upon the incorporation of the company, which, it is insisted, could only be under Title II of the laws of Minnesota, which includes transportation and other lawful business, and limits corporations organized thereunder to a continuation for not more than 30 years."

The decision discusses the contention of the company that it was organized under Title I of the laws of Minnesota for a term of 50 years, stating:

"Much of the elaborate briefs of counsel in this case is devoted to a discussion of the question of the organization of this corporation, and as to whether it was under the one title or the other. This is not a proceeding in *quo warranto*, and the jurisdiction of the Federal Court rested upon the contention that the company has a contract right protected from impairment by a legislative act of the State. It is only necessary to examine the question of the incorporation and organization of the company so far as is required to determine whether or not this alleged contract right exists, and whether it has been violated by the ordinance of the city of Minneapolis, attacked in the amended bill.

"There can be no question that the attempted incorporation of this company was under Title I of the statutes. * * * The corporation has continued to act since the expiration of the 30 years which would have been its corporate life had it been organized under Title II. There have been no proceedings, so far as the record shows, to inquire into its corporate existence since the expiration of the 30 years, and this record discloses

that a number of ordinances have been passed by the city of Minneapolis since July 1, 1903, requiring of the corporation the construction of additional lines of railway upon certain of the streets of the city of Minneapolis, and to otherwise discharge its duties as a continuing corporation.

"This record therefore shows that the company undertook to organize under Title I, for the period of 50 years, has continued to act as such corporation, and was so acting at the time of the passage of the ordinance of Feb. 9, 1907."

The Court then proceeds to examine the question, Did the ordinance of July 9, 1875, together with the ratifying act of 1879, make a contract between the city of Minneapolis and the street railway company, which would endure for the period of 50 years? Sections I, VIII and XVII of the ordinance of July 9, 1875, are quoted, and it is stated that the city filed its acceptance in writing of the ordinance on Aug. 18, 1875. The decision continues:

"In considering the terms of this ordinance and what it undertook to accomplish on its face, we are to bear in mind that public grants of this character are not to be extended by implication, and that all that is granted must be found in the plain terms of the act. This principle has been so frequently and recently announced in this court that it is unnecessary to cite the cases which have established it. Recognizing this principle, it must also be remembered that grants of the character of the one under consideration here, when embodying the terms of a contract, are protected by the Federal Constitution from impairment by subsequent State legislation, and, notwithstanding the principle of strict construction, whatever is plainly granted cannot be taken from the parties entitled thereto by such legislative enactments. Statutes and ordinances of this character are not to be extended by construction, nor should they be deprived of their meaning, if it is plainly and clearly expressed.

"Examining this ordinance in the light of these principles, there is no ambiguity in section VIII, which gives to the city the right to regulate the fares to be charged, provided the same are not reduced below 5 cents for each passenger over any one continuous line, to be designated by the city, of not more than 3 miles in length. By section 1 of the same ordinance the right and privilege of constructing and operating a railway line subject to the terms, conditions and forfeitures named in the ordinance is granted to the street railway company 'during the term of its charter.'

"What did this mean? The company had undertaken to organize, and filed its certificate of incorporation—which is its charter under the laws of Minnesota—and had therein stated its term of existence to be for 50 years from July 1, 1873. There was a positive requirement of the law that this period of duration should be stated in the certificate filed for the purpose of procuring incorporation, and it was there found, and was duly filed, recorded and published as required by law.

"It is unreasonable to suppose that the city and the company at that time entered into any inquiry or controversy as to whether the company could lawfully incorporate for more than 30 years. The charter referred to in the ordinance could not have been anything else than the certificate of incorporation required by law. Of this the city was bound to take notice, and when it granted the privilege 'during the term of the charter,' it could have meant nothing less than during the period named in the charter."

Referring to the terms of the ratifying act passed by the Minnesota State Legislature on March 4, 1879, the court holds:

"It has not been suggested in the elaborate briefs presented by the learned counsel for the city that the State Legislature at that time had not the constitutional right to pass this ratifying act.

"Looking to the terms of the act of March 4, 1879, we find that the right to construct and maintain the street railway upon the streets of the city, with the rights and privileges as set forth and qualified in the ordinance, is 'legalized and granted to said company.' Language could scarcely be plainer, and, if we are correct in construing the ordinance, as granting the right and privilege of maintaining railways in the streets of Minneapolis, for the charter term of 50 years, upon the terms therein mentioned, a vital part of which concerns the right of the company to charge a certain fare for passengers carried, it follows that this privilege, with the others, was vested in the company by the Legislature of the State of Minnesota.

"We may note in this connection that the mere fact that a contract may extend beyond the term of the life of a corporation does not destroy it.

"The ratifying act, being within the power of the Legislature, vested this contract right in the company, notwithstanding the want of power in the city to make it at the time it was entered into.

"But, it is contended, if a contract is found to exist, its rights were lost by virtue of the ordinance of Sept. 19, 1890, authorizing the street railway company to change its mode of operation from the use of horse power to electricity. It is insisted that by the acceptance of the electrical power ordinance the company abandoned any rights it had under the ordinance of 1875 and the ratifying act of 1879; and, furthermore, that by the express terms of the ordinance of Sept. 19, 1890, the right to control the future rates of fare was thereby vested in the city to an extent unlimited, except by constitutional inhibitions against confiscatory legislation.

"As to the termination of the rights of the company by reason of the substitution of electricity for horse power, is there such abandonment of the rights originally secured that they no longer exist? It is contended that the original ordinance was limited to the right to operate street railways by horse or pneumatic power, and that when the ordinance of Sept. 20, 1890, was passed conditions were entirely changed, and a new and different mode of operation was substituted, and rights existing under the original ordinance were terminated and abandoned."

The court then takes up the ordinance of 1875 to see if the company was limited to the use of animal or pneumatic power. It holds:

"There can be no doubt that, in the then state of the art, the use of electric power as the means of operating the cars of the company was not specifically in contemplation. While pneumatic power is also suggested, there does not seem to be any means of operation by that method. That the use of other motive power might be developed in the progress of street railway operation, we think, was clearly indicated in the ordinance itself. For, while animal or pneumatic power is named, it is provided that no propelling power shall be used after it shall be proved a public nuisance, and that the company might connect with other street railroads upon which power is used similar to that authorized to be used by street railways by the city council, but steam-power cars, such as are in common use, should not be used upon the city tracks, unless so authorized by the city council.

"In these terms of the ordinance it is evident that the parties had in mind that other propelling power might be developed, and it was the purpose of the city council to keep control of its use so as to prevent it from becoming a public nuisance in the streets. There was no positive limitation to animal power, and the possible progress and improvement in the means of propelling cars contemplated by the parties was carried into effect when the city passed, and the company accepted, the ordinance of Sept. 19, 1890. By that ordinance the railway company was authorized to operate all its existing lines, and all its lines to be thereafter constructed in the city by electricity as the motive power.

"It is the contention of the city that by the terms of this ordinance the street railway company became subject to regulation by the ordinances of the city then in force, or thereafter adopted, including the right to regulate and control the amount to be charged for fares for the transportation of passengers.

"In construing this section we must bear in mind that the company then had, as we have heretofore said, a contract upon the subject of fares, which limited the city in its right to regulate the same to a reduction not below 5 cents per passenger upon any one, continuous line. It needs no argument to dem

onstrate that the right to charge passenger fares is of the very essence of the contract, essential to the operation and success of the enterprise."

Section VI of the ordinance of Sept. 19, 1890, is then discussed as follows:

"This is the only section which mentions the subject of fares, and it is therein provided that transfer checks may be issued at certain points to persons paying 'one full fare,' the transfer check to be used only by the person receiving the same for one continuous passage.

"The rate of fare had been fixed in the ordinance of July 9, 1875, and if it was intended to change it it would seem clear that the parties would have entered into new negotiations concerning it, and would have adopted, if that was desirable, some definite measure concerning it. The ordinance of July 9, 1875, was not attempted to be repealed, and is referred to in section VIII of the ordinance of Sept. 19, 1890, 'as the same as has been amended, and as now in force,' and adopted, 'so far as applicable,' concerning the things mentioned in section VIII.

"It is true that by the ordinance of July 9, 1875, there was no right to reduce the passenger fare below 5 cents over any one continuous line not more than 3 miles in length, to be designated by the city council. By the terms of the ordinance of Sept. 19, 1890, transfers were to be allowed, so that, for one full fare, a passenger might receive a continuous trip very considerably exceeding 3 miles in length—it is stated in one of the briefs to include a trip of 11 miles. But we do not understand that the acceptance of this regulation had the effect to abrogate the contract as to the right to charge a fare of 5 cents over one continuous line, that is, for one continuous passage. Acquiescence in a regulation which may not have been deemed injurious, and may have been deemed wise and expedient, does not preclude a contest against the enforcement of regulations which are injurious and violative of contract rights."

Concerning Section VIII of the ordinance of Sept. 19, 1890, the court says:

"The right to future control under Section VIII was to include the 'construction, maintenance and operation' of the lines of the street railway company. Did this undertaking have the effect to abrogate the contract right already existing, and to subject the company for the future as to the right to charge fares, to the discretion of the city council? Or, do the terms 'construction, maintenance and operation' have reference to the manner of carrying on the business of the road, the laying of its tracks, the use of the streets, the keeping up of the equipment, the safety of the passengers and the public, and similar matters not involving the right to charge fares? We think these terms refer to the latter class of rights and privileges. Such as the import of the words used, and the subject of rates of fare is not mentioned. The case, Detroit vs. Detroit Citizens Railway Co., 184 U. S., 368, is an instructive one upon this point. In that case it was held that a street railway company having a valid contract, giving it the right to charge 5 cents for the transportation of each passenger, did not lose that right by accepting the terms of an ordinance reserving the right to make such further rules, orders and regulations as to the city council may seem proper.

"We therefore reach the conclusion that when the ordinance complained of, that of Feb. 9, 1907, was enacted by the city council, the company was the owner of a valuable contract right secured to it by the ordinance of July, 1875, ratified by the enactment of the Legislature of the State of Minnesota on March 4, 1879, which secured to the company for 50 years from July 1, 1873, the contract right to charge 5 cents per passenger for one continuous trip. We think that the requirements of the ordinance, that the company should operate its roads by the sale of tickets six for a quarter, as required by the ordinance of Feb. 9, 1907, was an enactment by legislative authority which impaired the obligation of the contract thus held and owned by the complainant company. We therefore reach the conclusion that the decree of the Circuit Court enjoining the execution of the ordinance, for the reasons stated, should be affirmed.

"An examination of the decree, however, shows that it goes beyond the necessities of the case in specifically decreeing that the complainant company is a corporation organized under Title I of chapter 34 of the Statutes of Minnesota for the year 1866, with charter rights as alleged in the amended bill. It also decrees that the contract under the ordinances of July 9, 1875, and July 18, 1878, as ratified by the act of March 4, 1879, constituted a contract for and during the term of complainant's charter, as alleged in the amended bill. In the amended bill it is alleged that the charter rights of the company were extended to March 1, 1937; this is undoubtedly averred because of the amendment to the charter which appears in the record, extending the term of the company's corporate life until that time. The decree as it stands might be construed as establishing a contract to endure until March, 1937.

"All that was necessary to adjudge was that the company, by virtue of the ordinance of July 9, 1875, as amended in July, 1878, as ratified and confirmed by the act of the Legislature of the State of Minnesota of March 4, 1879, constituted a valid contract for the term of 50 years from July 1, 1873, which is still so far in force as to prevent the City Council from reducing the rate of fare below the sum of 5 cents for each passenger for one continuous passage, and enjoining the city from publishing and enforcing the ordinance of Feb. 9, 1907, because the same impaired the obligation of the subsisting contract aforesaid. The court therefore directs that the decree of the Circuit Court should be modified so as to meet these requirements."

MEETING OF EXECUTIVE COMMITTEE OF ENGINEERING ASSOCIATION

A meeting of the executive committee of the American Street & Interurban Railway Engineering Association was held at the offices of the association, 29 West Thirty-ninth Street, New York, on Jan. 10. Those present were: F. H. Lincoln, president, Philadelphia; J. S. Doyle, New York; John Lindall, Boston, Mass.; E. O. Ackerman, Columbus, Ohio; Martin Schreiber, Newark, N. J., and John W. Corning, secretary, Boston, Mass. Past-presidents H. H. Adams, of New York, and Paul Winsor, of Boston, were also present. The meeting was called to determine the work and personnel of the committees during the coming year and also to consider the resignation of Mr. Lincoln as president of the association.

Mr. Corning reported that the chairmen of the various committees had accepted their appointments, and that he had heard from most of the gentlemen appointed on the different committees, accepting their assignments, but not from all. The chairmen of the committees for 1910 are as follows:

Committee on standardization, Paul Winsor, Boston, Mass.

Committee on maintenance and inspection of electrical equipment, John Lindall, Boston, Mass.

Committee on way matters, E. O. Ackerman, Columbus, Ohio.

Committee on power generation, W. S. Twining, Philadelphia, Pa.

Committee on power distribution, James Heywood, Philadelphia, Pa.

Committee on heavy electric traction, J. S. Doyle, New York.

Joint committee on shop accounts to act in conjunction with a similar committee from the Accountants' Association, W. G. Gove, Brooklyn, N. Y.

The first subject considered by the executive committee was the extent to which the different committees should include in their reports papers from persons not members of the committees. It was decided to leave this matter to the discretion of the chairman of each committee. In this connection there was also some discussion in regard to the proper treatment of written communications sent in by members on subjects considered at the convention. One of those present stated that the general practice in other national engineering societies was to encourage written communications, but that the manner of their presentation was left entirely to the discretion of the presiding officer or the executive committee of the organization. In some cases the entire communication might be read by the secretary,

or only such parts of it as the president thought would be of interest to the members present, or if the time did not permit of this, an announcement was made, simply that a communication had been received. The same degree of authority extended to the inclusion of these communications in the printed proceedings of the societies.

The next subject discussed was the resolution presented at the last meeting of the association by W. H. Evans, Milwaukee, suggesting the establishment of an apprentice course for electric car repair men. Mr. Evans' resolution, as presented at Denver, was as follows:

"Resolved, That the Engineering Association take up and investigate the question of a desirable system for the government and instruction of regular apprentices in the mechanical trades in connection with the maintenance of the equipment of electric railways. A regular apprentice, it is understood, is one who has had no previous shop experience and is not a graduate of a technical institution, and is between the ages of 16 and 19 years. This should apply not only to the regularly established trades, such as machinists, car builders, blacksmiths, electricians, painters and the others now well known and employed in the electric railway field, but should also include a new trade, which for the want of a better name could be designated as an electric car repairer. This apprentice course should combine practical experience and some knowledge of a number of the regular trades, and should be well defined and of such a character as to greatly improve the ability and efficiency of the class of men to be depended upon in the future to take care of electric railway equipment, both in the general shops and in the car houses."

A number of those present stated that, in their opinion, the subject was of great and increasing importance. Apprentice courses had been established on some roads for technical graduates leading up to responsible positions in the transportation department, and in most of these courses some time was spent in the various engineering departments. The need for electric repair men, however, was quite different, and few companies had any systematic method of developing men for this work. Mr. Winsor stated that by arrangement with the Boston Edison Company Professor Ashe, of Brooklyn, had been delivering a series of lectures this year to the employees of that company, and that the Boston Elevated Railway Company had arranged for the attendance at this course of 16 of its power station and wire men. Mr. Lindall said that a series of weekly meetings had been commenced in the shop department of the Boston Elevated Railway Company to discuss equipment matters, and that these meetings were in charge of the equipment inspectors. Mr. Lincoln said that Professor Ashe was conducting certain courses on electrical matters in Philadelphia under the auspices of the municipality, and that he himself was heartily in sympathy with the plan to have the association take up the subject of education and the establishment of apprentice courses, or at least to have a committee investigate the subject. Upon motion, the committee authorized the president to appoint a special committee to report at the next annual meeting on the education of engineering apprentices and co-operate in this work with the committee on education of the American Street & Interurban Railway Association.

The next subject considered was that of specifications for wrought-iron bars and for axles, as presented in the report of the committee on standards at Denver. The subject was referred back to the committee on standards, and at the same time the province of the committee, so far as specifications were concerned, was more clearly defined. It was decided that the specifications to be standardized should first be thoroughly worked out by the proper committee having in charge matters relating to the department in which the material specified is used, and that the work of the committee on standards should be judicial in character. It will pass on the specifications thus submitted and will not be under obligation to initiate this work.

A letter from W. H. Evans was then read by the secretary, suggesting that closer relations be established between the Engineering Association and the American Society for Testing Materials, so that the two societies could work along co-operative lines in standardizing specifications. The president and secretary of the association were requested to see what arrangements could be made to this end.

The secretary then reported that, as requested at the last meeting, he had taken up with the American Railway Engineering & Maintenance of Way Association the subject of the design of rail-joint plates to allow sufficient clearance space for bond wires.

The standard section of No. 0000 copper trolley wire and the table of sizes of wires included in the report of the committee on power distribution last year were referred to the committee on standards.

Mr. Schreiber called attention to the fact that one very important department in electric railway engineering work was not covered by any committee of the association. This was the department of buildings and structures, and he suggested that a standing committee of the association be appointed to be known as the committee on buildings and structures, and having the same organization as the other standing committees of the association; that is, with one-, two- and three-year members. This committee could take up the subject of bridges, elevated structures, shop design, power-station design, car-house design, trestles and other structures, and he suggested that this year the committee might give special attention to the design of urban and interurban terminals and the economical maintenance of buildings and structures. After discussion of the province of this committee the executive committee decided to authorize its formation and Mr. Schreiber was appointed chairman. The other members of the committee will be announced after their appointment has been made.

The executive committee then went carefully over the subject of expense for the coming year and decided that the plans under way would call for an expenditure of about $2,500, exclusive of the cost of publication of the *Proceedings*. It was decided to ask the executive committee of the American Association for this amount.

Mr. Lincoln then presented the following letter:

THE AMERICAN STREET & INTERURBAN RAILWAY ENGINEERING ASSOCIATION.

PHILADELPHIA, PA., Jan. 1, 1910.

TO THE EXECUTIVE COMMITTEE, AMERICAN STREET & INTERURBAN RAILWAY ENGINEERING ASSOCIATION:

GENTLEMEN.—Having severed my connection with the Philadelphia Rapid Transit Company, and having arranged to take up a commercial line of work, now, in accordance with the by-laws of the Engineering Association, it is necessary that I tender you my resignation as president.

In accordance with this understanding, I hereby resign the office of president of the American Street & Interurban Railway Engineering Association. Yours truly,

(Signed) F. H. LINCOLN,
President.

The resignation was received with regret and the following resolutions were adopted by unanimous vote:

"Whereas, Mr. F. H. Lincoln, the president of the Engineering Association, has offered his resignation, the executive committee of the association regrets to state that in following the established precedent, it now falls within its province to accept the resignation, and

"Whereas, the committee appreciates in every sense the earnest and faithful endeavors of Mr. Lincoln and his past work in the association and the electric railway field and, anticipating his further co-operation in the future work of the association,

"Resolved, that the position of president be not officially filled, but the duties of the office be assumed by the first vice-president as acting president."

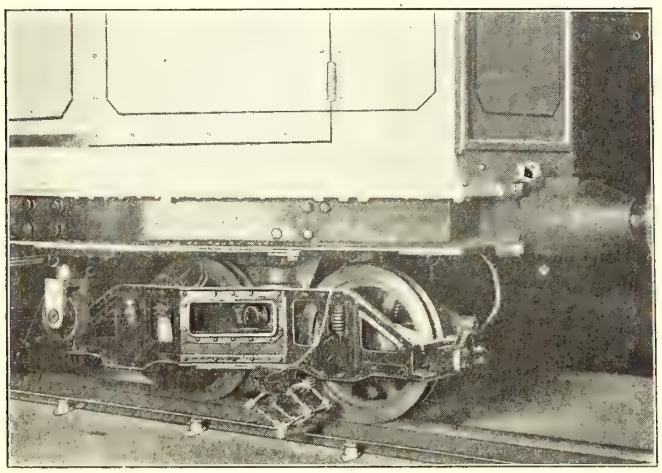
The first vice-president of the association this year is W. J. Harvie, chief engineer, Utica & Mohawk Valley Railway, Utica, N. Y.

After the adoption of this resolution the meeting adjourned, most of the members in attendance going to inspect the trial trip of the gyroscopic mono-rail car in Brooklyn.

GYROSCOPIC CAR IN BROOKLYN

On Jan. 10 the first test runs were made at the Clermont Skating Rink, Brooklyn, with the Scherl monorail car, which is operated on the gyroscopic principle. This car is boat-shaped, with an over-all length of 18 ft. and a maximum width of 4 ft. The dead weight of the car is 5500 lb., 5½ per cent of which covers the weight of the gyroscopes. The seating capacity is six riders, including the motorman. The body is mounted on two double-axle trucks which are spaced 15 ft. centers and carry 16-in. diameter wheels with a 1.2 in. double flange. One wheel of each truck is driven through a double reduction gear by 2-hp, 110-volt, direct-current series motor, all the motors being operated from either end by a controller. The current is collected through truck contact shoes from a copper conductor carried on insulators along each side of the running rail.

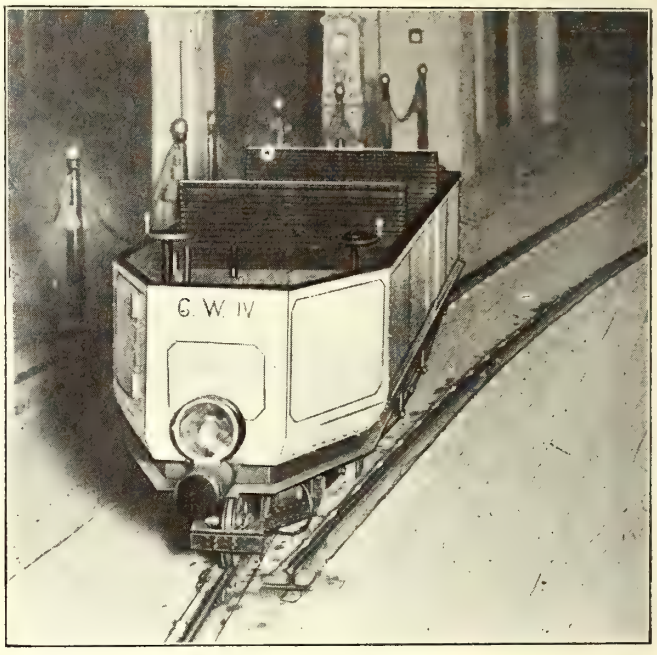
The stability mechanism comprises two gyroscopes revolving



Forward Truck with Current Collector and One of the Emergency Balance Rods at the Left

in opposite directions. Each gyroscope consists of a 110-lb. steel wheel rotating at 8000 r.p.m. in an air-tight chamber in which the pressure has been lowered almost to a vacuum. Each wheel is driven directly by a ½-hp, 110-volt, direct-current shunt motor. To obtain the balancing effort their precession is artificially influenced by means of an apparatus operated by oil under pressure. Should the motors which drive the gyroscopes fail from any cause, the high-speed wheels operating in the partial vacuum would easily permit the car to run safely for a considerable period. However, before the revolutions of the gyroscopes sink below a certain amount the motorman can apply an emergency brake, which consists of four vertical props, which are dropped to the ground to bring the car into stable equilibrium. The gyroscopes are carried underneath the car body.

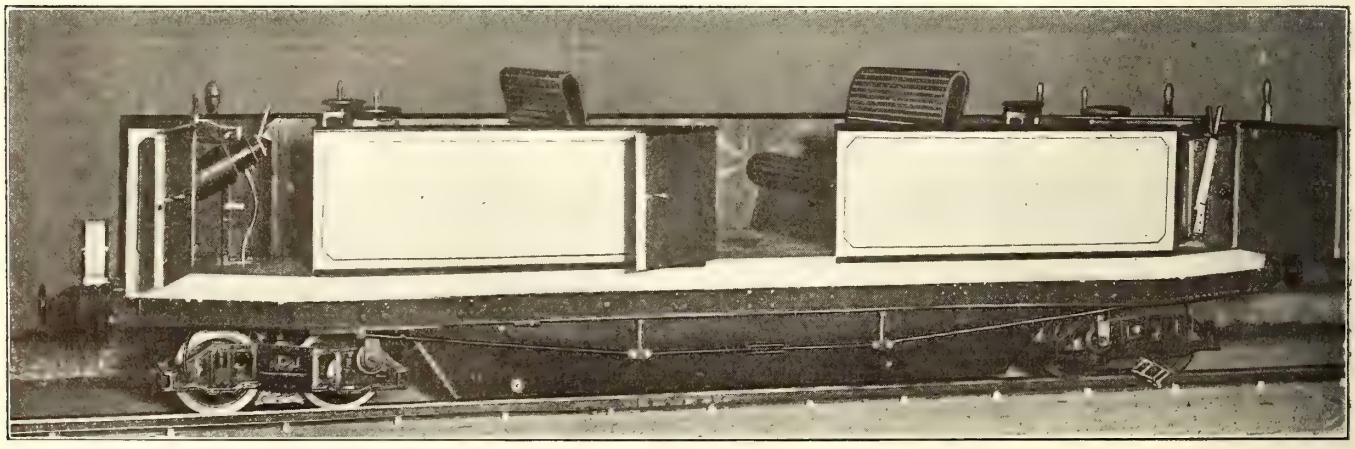
The test track at the Brooklyn rink was in the form of an oval, whose longest diameter was about 150 ft. The track was laid with a rail weighing about 20 lb. per yard of special section, having a rounded head about 1 in. wide. In addition to the oval track there was a spur running into one of the anterooms, in which the car was kept when not in use. Two tests were made on Jan. 10, one in the afternoon and one in the evening, and they were witnessed by a number of electrical engineers. After leaving the anteroom the car ran around the oval track at a speed of about 4 m.p.h. on straight track and 3 m.p.h. on curves, and at the curves took a natural inclination, although, of course, there could be no elevation of the



End-On View of Gyroscopic Monorail Car Exhibited at the Clermont Skating Rink, Brooklyn

monorail. Owing to some damage which had been done to the machinery in the transportation of the car from Germany, some difficulty was experienced during the afternoon, and also on the evening run of Jan. 10, said to be due to a leak in the partial vacuum in which the gyroscopes revolved, but on both occasions the car ran for a considerable time around the track without difficulty and carried passengers. It was also stopped. When still it stood in perfect equilibrium. It was also run backward on the track. When the passengers boarded the car on one side, the effect of the gyroscopes was to give the car an inclination in the other direction, but the car righted itself after the passengers were seated.

The tests will be continued for some time at the Clermont Skating Rink, and the public will be admitted on payment of a nominal fee.



Side View of Gyroscopic Monorail Car as Exhibited in Brooklyn

ASSOCIATION COMMITTEES AND OTHER NEWS

President Shaw has announced the following appointments to the committees of the American Street & Interurban Railway Association. Several of the committees are not entirely complete, especially the committees on active and associate membership, as the former will contain 58 members and the latter 42 members besides the chairmen:

COMMITTEE ON SUBJECTS

A. W. Brady, chairman, president, Indiana Union Traction Company, Anderson, Ind.
C. S. Sergeant, vice-president, Boston Elevated Railway Company, Boston, Mass.
R. T. Laffin, Western manager, Stone & Webster, Seattle, Wash.
H. S. Swift, secretary and auditor, Toledo Railways & Light Company, Toledo, Ohio.
F. H. Lincoln, assistant general manager, Philadelphia Rapid Transit Company, Philadelphia, Pa.
E. C. Carpenter, claim agent, Indiana Union Traction Company, Anderson, Ind.
R. I. Todd, vice-president and general manager, Indianapolis Traction & Terminal Company, Indianapolis, Ind.

COMMITTEE ON PUBLIC RELATIONS

C. Loomis Allen, chairman, vice-president and general manager, Utica & Mohawk Valley Railway Company, Utica, N. Y.
Hon. W. Caryl Ely, 902 Fidelity Building, Buffalo, N. Y.
W. G. Evans, president, The Denver City Tramway Company, Denver, Colo.
Frank Hedley, vice-president and general manager, Interborough Rapid Transit Company, New York, N. Y.
A. W. Brady, president, Indiana Union Traction Company, Anderson, Ind.
T. N. McCarter, president, Public Service Railway Company, Newark, N. J.
Gen. Geo. H. Harries, second vice-president, Washington Railway & Electric Company, Washington, D. C.
J. D. Callery, president, Pittsburgh Railways Company, Pittsburgh, Pa.
J. M. Roach, president, Chicago Railways Company, Chicago, Ill.
J. C. Hutchins, president, Detroit United Railway Company Detroit, Mich.
C. N. Black, general manager, United Railroads of San Francisco, San Francisco, Cal.
E. C. Foster, vice-president, New Orleans Railway & Light Company, New Orleans, La.
Russell Robb, president, Tacoma Railway & Power Company, 147 Milk Street, Boston, Mass.
W. G. Ross, managing director, Montreal Street Railway Company, Montreal, Can.
B. S. Josselyn, president, Portland Railway, Light & Power Company, Portland, Ore.
P. F. Sullivan, president, Boston & Northern Street Railway Company, Boston, Mass.
E. H. Davis, secretary, treasurer and manager, Williamsport Passenger Railway Company, Williamsport, Pa.

COMMITTEE ON COMPENSATION FOR CARRYING U. S. MAIL

R. S. Goff, chairman, general manager, Boston & Northern Street Railway Company, Boston, Mass.
H. A. Nicholl, general manager, Indiana Union Traction Company, Anderson, Ind.
C. H. Hile, assistant to vice-president, Boston Elevated Railway Company, Boston, Mass.
C. L. S. Tingley, second vice-president, American Railways Company, Philadelphia, Pa.
A. R. Piper, general freight agent, Brooklyn Rapid Transit Company, Brooklyn, N. Y.
J. K. Choate, general manager, Otsego & Herkimer Railroad Company, Hartwick, N. Y.
Edgar S. Fassett, general manager, United Traction Company, Albany, N. Y.

COMMITTEE ON INSURANCE

H. J. Davies, chairman, secretary, Cleveland Railway Company, Cleveland, Ohio.
A. H. Ford, president, Birmingham Railway, Light & Power Company, Birmingham, Ala.
F. A. Healy, secretary and treasurer, The Ohio Electric Railway Company, Cincinnati, Ohio.
S. L. Tone, second vice-president, Pittsburgh Railways Company, Pittsburgh, Pa.
S. J. Dill, general manager, Susquehanna Railway, Light & Power Company, New York, N. Y.
R. B. Hamilton, vice-president, Chicago City Railway Company, Chicago, Ill.

COMMITTEE ON WELFARE OF EMPLOYEES

H. C. Page, chairman, general manager, Springfield Street Railway Company, Springfield, Mass.
Wm. A. House, president, The United Railways & Electric Company, Baltimore, Md.
A. A. Anderson, general manager, Indianapolis, Columbus & Southern Traction Company, Columbus, Ohio.
John A. Beeler, vice-president and general manager, The Denver City Tramway Company, Denver, Colo.

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F. R. Ford, Ford, Bacon & Davis, New York, N. Y.
C. S. Sergeant, vice-president, Boston Elevated Railway Company, Boston, Mass.
G. O. Nagle, general manager, Wheeling Traction Company, Wheeling, W. Va.

COMMITTEE ON EDUCATION

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R. E. Danforth, general manager, Public Service Railway Company, Newark, N. J.
Prof. A. S. Richey, professor of electrical engineering, Worcester Polytechnic Institute, Worcester, Mass.
W. F. Kelly, second vice-president and general manager, Oakland Traction Company, Oakland, Cal.
J. F. Calderwood, vice-president and general manager, Brooklyn Rapid Transit Company, Brooklyn, N. Y.
D. C. Jackson, professor of electrical engineering, Massachusetts Institute of Technology, Boston, Mass.

SPECIAL COMMITTEE ON REVISION OF ASSOCIATE MEMBERSHIP

T. N. McCarter, chairman, president, Public Service Railway Company, Newark, N. J.
James F. Shaw, 8 Congress Street, Boston, Mass.
Gen. Geo. H. Harries, second vice-president, Washington Railway & Electric Company, Washington, D. C.
Hon. W. Caryl Ely, 902 Fidelity Building, Buffalo, N. Y.
Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company, Boston, Mass.
H. R. Goshorn, general claim agent, Philadelphia Rapid Transit Company, Philadelphia, Pa.
C. Loomis Allen, vice-president and general manager, Utica & Mohawk Valley Railway Company, Utica, N. Y.
Robt. N. Wallis, treasurer, Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.

SUPERVISING COMMITTEE TO CO-OPERATE IN THE PREPARATION OF THE NEW ELECTRIC RAILWAY DICTIONARY TO BE PUBLISHED BY THE M'GRAW PUBLISHING COMPANY

H. H. Adams, chairman, superintendent rolling stock and shops, Metropolitan Street Railway Company, New York, N. Y.
Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company, Boston, Mass.
Richard McCulloch, vice-president and assistant general manager, United Railways of St. Louis, St. Louis, Mo.

JUROR TO REPRESENT THE A. S. & I. R. A. IN THE MATTER OF THE PRIZES TO BE OFFERED FOR THE THREE BEST THESES ON DESIGN OF AN ELECTRIC RAILWAY CAR FOR CITY SERVICE BY THE J. G. BRILL COMPANY

Wm. A. House, president, The United Railways & Electric Company, Baltimore, Md.

COMMITTEE ON ACTIVE MEMBERSHIP WITH TERRITORY ASSIGNED

W. G. Ross, managing director, Montreal Street Railway Company, Montreal, Can.—Eastern Canada, east of Toronto.

Jas. W. Cartwright, Jr., treasurer, Bangor Railway & Electric Company, Bangor, Me.—Maine.

Franklin Woodman, general manager, New Hampshire Electric Railways, Haverhill, Mass.—New Hampshire.

G. Tracy Rogers, president, Binghamton Railway Company, Binghamton, N. Y.—Vermont and New York, A, including cities along the Vermont State line.

H. E. Reynolds, assistant general manager, Boston & Northern Street Railway Company, Boston—Massachusetts, Boston district (A).

R. N. Wallis, treasurer, Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.—Massachusetts, B, western district.

E. S. Wilde, general superintendent, Union Street Railway Company, New Bedford, Mass.—Massachusetts, C, southeastern district.

D. F. Sherman, president, Providence & Danielson Railway Company, Providence, R. I.—Rhode Island.

J. K. Punderford, general manager, The Connecticut Company, New Haven, Conn.—Connecticut.

C. Gordon Reel, second vice-president, Kingston Consolidated Railroad Company, Kingston, N. Y.—New York, B, Albany and south to New York City district.

J. F. Calderwood, vice-president and general manager, Brooklyn Rapid Transit Company, Brooklyn, N. Y.—New York, E, New York City district.

R. E. Danforth, general manager, Public Service Railway Company, Newark, N. J.—New Jersey.

R. P. Stevens, president, Lehigh Valley Transit Company, Allentown, Pa.—Pennsylvania, A.

E. H. Davis, secretary, treasurer and manager, Williamsport Passenger Railway Company, Williamsport, Pa.—Pennsylvania, B, central district, and Maryland, B, western district.

F. D. Shaffer, general manager, The Citizens Traction Company, Oil City, Pa.——Pennsylvania, C, northwestern district.

Wm. A. House, president, The United Railways & Electric Company, Baltimore, Md.—Delaware and Maryland.

A. B. Skelding, general manager, Tidewater Power Company, Wilmington, N. C.—North Carolina.

P. H. Gadsden, president, Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—South Carolina.

W. H. Glenn, secretary, Georgia Railway & Electric Company, Atlanta, Ga.—Georgia and Florida.

G. O. Nagle, general manager, Wheeling Traction Company, Wheeling, W. Va.—West Virginia.

Albion E. Lang, president, Toledo Railways & Light Company, Toledo, Ohio—Ohio, A, Cleveland district.

Dana Stevens, vice-president, The Cincinnati Traction Company, Cincinnati, Ohio—Ohio, C, Cincinnati district, and Kentucky, A.

C. H. Harvey, president and general manager, Knoxville Railway & Light Company, Knoxville, Tenn.—Tennessee.

F. W. Brooks, general manager, Detroit United Railway, Detroit, Mich.—Michigan.

E. C. Faber, general manager, Aurora, Elgin & Chicago Railroad Company, Chicago, Ill.—Illinois, A, Chicago district.

L. C. Haynes, vice-president, East St. Louis & Suburban Railway Company, East St. Louis, Ill.—Illinois, C, southern district.

P. P. Crafts, general manager, Iowa & Illinois Railway Company, Clinton, Ia.—Illinois, D, northwestern district, and Iowa.

W. W. Wheatly, general manager, Kansas City Railway & Light Company, Kansas City, Mo.—Missouri.

Dudley Montgomery, vice-president, Southern Wisconsin Railway Company, Madison, Wis.—Wisconsin.

Herbert Warren, general manager, Duluth Street Railway Company, Duluth, Minn.—Minnesota.

C. P. Brown, general manager, Fargo & Moorhead Street Railway Company, Fargo, N. D.—North and South Dakota.

R. A. Leussler, secretary and assistant manager, Omaha & Council Bluffs Street Railway Company, Omaha—Nebraska.

F. G. Kelley, secretary and treasurer, The Topeka Railway Company, Topeka, Kan.—Kansas.

J. A. Beeler, vice-president and general manager, The Denver City Tramway Company, Denver, Colo.—Colorado, Wyoming and Idaho.

R. E. Hunt, assistant general manager, Utah Light & Railway Company, Salt Lake City, Utah—Utah.

H. T. Edgar, vice-president, Northern Texas Traction Company, Fort Worth, Tex.—Texas.

E. C. Foster, vice-president, New Orleans Railway & Light Company, New Orleans, La.—Louisiana and Mississippi.

A. H. Classen, president, Oklahoma Railway Company, Oklahoma City, Okla.—Oklahoma.

C. K. Durbin, secretary, Tucson Rapid Transit Company, Tucson, Ariz.—Arizona, New Mexico and Nevada.

H. M. Littell, assistant to general manager, Pacific Electric Railway Company, Los Angeles, Cal.—Los Angeles district.

D. A. Hegarty, general manager, Little Rock Railway & Electric Company, Little Rock, Ark.—Arkansas.

Thos. Finigan, purchasing agent, United Railroads of San Francisco, San Francisco, Cal.—California, A, San Francisco and north.

R. T. Laffin, district manager, Stone & Webster, Seattle, Wash.—Washington.

Harro Harrsen, general manager, Mexico Tramways Company, Mexico City, D. F. Mex.—Mexico.

COMMITTEE ON ASSOCIATE MEMBERSHIP WITH TERRITORY ASSIGNED

H. H. Adams, chairman, superintendent rolling stock and equipment, Metropolitan Street Railway Company, New York, N. Y.

S. W. Mower, general manager, South-Western Traction Company, London, Can.—Canada.

F. D. Hall, chief electrician, Boston & Maine Railroad, Boston, Mass.—New Hampshire and Vermont.

M. H. Bronsdon, chief engineer, Rhode Island Company, Providence, R. I.—Rhode Island.

W. J. Harvie, chief engineer, Utica & Mohawk Valley Railway Company, Utica, N. Y.—New York, A and C, covering Rochester, Syracuse, Utica, Schenectady, etc., east of Vermont line.

J. S. Doyle, superintendent of car equipment, Interborough Rapid Transit Company, New York, N. Y.—New York City and north to and including Albany, east of Binghamton.

M. C. Brush, general manager, Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—New York, D, Buffalo and east to Binghamton, including Binghamton.

Martin Schreiber, engineer maintenance of way, Public Service Railway Company, Newark, N. J.—New Jersey.

J. M. Larned, engineer maintenance of way, Pittsburgh Railways Company, Pittsburgh, Pa.—Pennsylvania, D, Pittsburgh district.

Chas. J. Bendt, secretary and auditor, Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—North and South Carolina.

L. P. Crecelius, superintendent of power, Municipal Traction Company, Cleveland, Ohio—Ohio, A, Cleveland district.

F. A. Healy, secretary and treasurer, The Ohio Electric Railway Company, Cincinnati, Ohio—Ohio, C, and Kentucky, A, Cincinnati district.

L. C. Shipherd, superintendent, The Evansville & Southern Indiana Traction Company, Evansville, Ind.—Indiana, A, and Kentucky, B, south of Indianapolis.

J. B. Crawford, general superintendent, Winona Interurban Railway Company, Warsaw, Ind.—Indiana, B, north of Indianapolis, including Indianapolis and Terre Haute.

H. A. Davis, superintendent railway department, Nashville Railway & Light Company, Nashville, Tenn.—Tennessee.
M. M. Lloyd, master mechanic, East St. Louis & Suburban Railway Company, East St. Louis, Ill.—Illinois, C., and Missouri.
A. W. Warnock, general passenger agent, Twin City Rapid Transit Company, Minneapolis, Minn.—Minnesota and North and South Dakota.
C. F. Holmes, president, The Kansas City-Western Railway Company, Kansas City, Mo.—Nebraska and Kansas.
W. H. McAloney, superintendent rolling stock, The Denver City Tramway Company, Denver, Colo.—Colorado, Wyoming, Idaho and Utah.
W. J. Jones, president and general manager, Austin Electric Railway Company, Austin, Tex.—Texas.
D. A. Hegarty, general manager, Little Rock Railway & Electric Company, Little Rock, Ark.—Arkansas.
Joel Hurt, ex-president, Atlanta Consolidated Street Railway Company, Atlanta, Ga.—Georgia and Florida.
W. Worth Bean, Benton Harbor, Mich.—Michigan.

MIDYEAR MEETING

The program for the midyear meeting of the American Street & Interurban Railway Association, to be held Jan. 27 and 28 at the headquarters of the association, 29 West Thirty-ninth Street, has been completed, and notices in regard to it will be sent this week to member companies.

On Thursday, Jan. 27, meetings of the following committees will take place: Subjects, public relations, Interstate Commerce Commission affairs, compensation for carrying United States Mail and revision of associate membership. The chairmen of these committees will subsequently report to the executive committee on the afternoon of the 27th. It is also expected that official representatives of the various State and sectional associations will be present on Thursday to confer on ways and means of more effective co-operation.

On Friday, Jan. 28, a general conference will take place, open to the officials of member companies who have to do with the settlement of the policies of the companies they represent.

On Friday evening, Jan. 28, the officials of member companies who are in attendance at the meetings of the association will be tendered a banquet by the Manufacturers' Association at the Hotel Knickerbocker at 7 o'clock, to which all those present at the meeting are cordially invited. A number of prominent speakers will address the guests on subjects connected with electric railway interests.

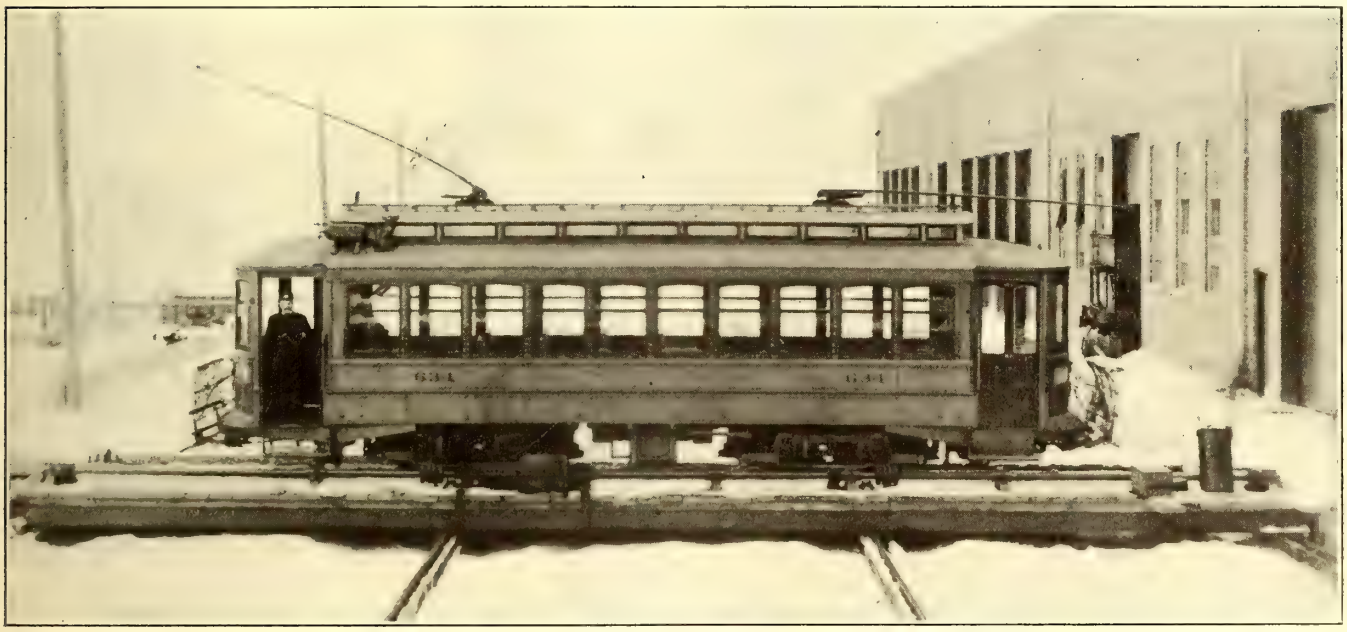
NEW BULLETIN

The association has issued Bulletin No. 109, containing statistical information relating to wages paid in different parts of the country. The data are classified under different headings. Copies of this bulletin have been mailed to all member companies.

TRANSFER TABLE AT SYRACUSE

An account was published in the ELECTRIC RAILWAY JOURNAL of Nov. 9 of the new shops of the Oneida Railway Company at Syracuse, N. Y. As will be remembered, a very important feature of these shops was the abandonment of entrance tracks and the substitution for them of two transfer tables, one at each end of the shop with a single entrance track. The installation was of such interest that an editorial was published in the following issue, discussing the arguments in favor of and against transfer tables and entrance tracks for electric railway repair shops.

The accompanying illustration gives a view of one of these transfer tables, the two being identical. The rated capacity of the table is 70 tons, but often it has to carry a greater weight. The length of the table is 54 ft. 9 in. and is built up of structural members, over which a plank floor has been laid. The



Transfer Table at New Shops of Oneida Railway Company

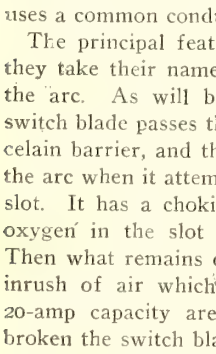
motive power is supplied by a G.E.-52 railway motor geared to a 3 7/16-in. shaft extending the entire length of the table. This shaft in turn, is geared at a reduction of 24-68 to the four driving wheels which are 22 in. in diameter.

The trolley wires for the cars are carried over the table at the usual height and the current for operating the table is obtained from an inverted third rail mounted next to one of the running rails. The current is taken from this rail by a standard Oneida Railway third-rail under-running shoe. As explained in the original article on the shops, the pits were made 1 ft. deeper than the run-ways on which the tables run, to prevent interference with the movement of the tables by an accumulation of snow in the pit. The tables have been in operation during the recent very heavy snowstorms, and so far it has not been necessary to remove the snow. The company estimates that a saving in cost of 50 per cent was made by the installation of these tables instead of entrance tracks and a complicated overhead network.

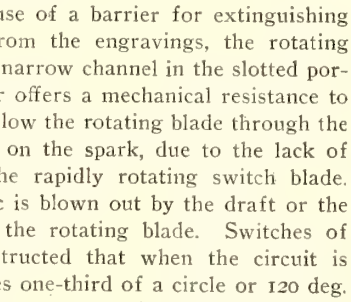
The tables were designed and built by the Archbold-Brady Company, of Syracuse, N. Y., and installed under the direction of W. J. Harvie, chief engineer of the Oneida Railway Company.

BARRIER SWITCHES FOR LAMP AND HEATER CIRCUITS

The accompanying illustrations show several types of a new line of 600-volt switches which have been put on the market by the Hart & Hegeman Manufacturing Company, of Hartford, Conn. These switches are made in single-pole, double-pole, three-way and two-circuit styles, and in various capacities from 1 amp to 25 amp. The single-pole switch is designed for the air-brake circuit, and with the double-pole or three-way switch can be used for the lighting circuit. With the three-way switch a light or group of lights can be controlled from either of two points. The two-circuit switch is designed for use on a combination arc and incandescent headlight. One turn cuts in the arc headlight, the second turn cuts out the arc headlight, the third turn cuts in the incandescent headlight, the fourth turn



Three-Way Barrier Switch

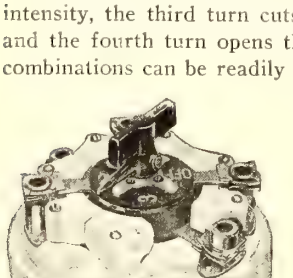


Wiring Connections for Three-Way Surface Switches

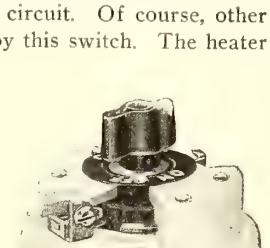
cuts out both lights. The switch has three contact terminals and uses a common conductor to both lamps.

The principal feature of all these switches, and from which they take their name, is the use of a barrier for extinguishing the arc. As will be seen from the engravings, the rotating switch blade passes through a narrow channel in the slotted porcelain barrier, and this barrier offers a mechanical resistance to the arc when it attempts to follow the rotating blade through the slot. It has a choking effect on the spark, due to the lack of oxygen in the slot behind the rapidly rotating switch blade. Then what remains of the arc is blown out by the draft or the inrush of air which follows the rotating blade. Switches of 20-amp capacity are so constructed that when the circuit is broken the switch blade rotates one-third of a circle or 120 deg.

The company also makes a 35-amp, 660-volt barrier-type switch for the control of electric heaters. This heater switch is a three-circuit switch and is connected as follows: The first turn connects the heater of medium intensity, the second turn cuts out the medium heater and throws in the heater of greater intensity, the third turn cuts in both heaters at the same time, and the fourth turn opens the heater circuit. Of course, other combinations can be readily effected by this switch. The heater



Three-Degree Heater Switch



Two-Circuit Headlight Switch

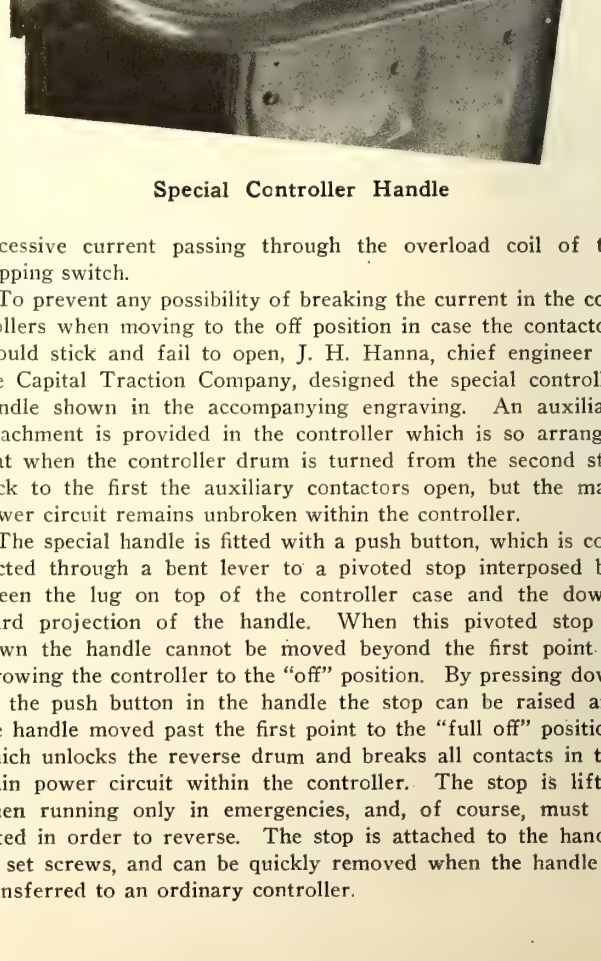
switch handle may be turned in either direction so that it is not necessary to pass from low to high degrees of heat in order to open the circuit.

The handles of these switches are of heavy, one-piece porcelain to insure the user doubly against shock. The insulation is of solid sheet mica, and all current-carrying parts are fully insulated from the handle and from the switch mechanism.

The latter is of a frictionless "eccentric" design and all wearing parts are of hardened steel. The contact jaws are of tempered spring phosphor bronze. The breaking movement of these switches is very rapid and they are designed to carry an overload greatly in excess of their rated capacity.

SPECIAL CONTROLLER HANDLE FOR AUXILIARY CONTACTOR CONTROL

The new pay-within cars of the Capital Traction Company, of Washington, D. C., which were described in the Electric Railway Journal of Sept. 18, 1909, page 434, are equipped with four Westinghouse 101-B, 40-hp motors and K-29 controllers, to which are added two auxiliary contactors. These contactors are similar to those used with standard type M control, and are mounted under the car body. They are connected in the main trolley circuit, and additional contacts are provided in the controllers for opening and closing the contactors when the controller is turned off or on, respectively. The connections are so arranged that when either of the controllers is in any of the "on" positions a circuit is completed through an automatic tripping switch, and the energizing coils of the contactors thus holding the auxiliary contacts closed and completing the main power circuit through the controller contacts to the motors. When the controller is moved to the "off" position and in passing from series to parallel connections the power circuit is broken in the contactors and not in the controller and the contactors also open in the event of an



Special Controller Handle

excessive current passing through the overload coil of the tripping switch.

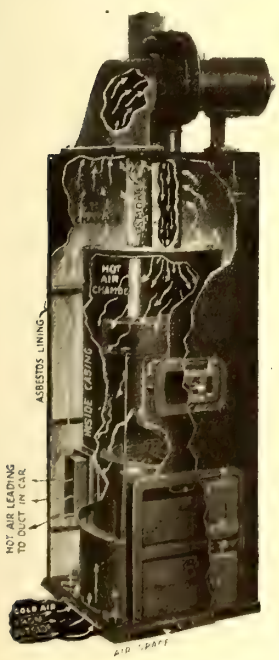
To prevent any possibility of breaking the current in the controllers when moving to the off position in case the contactors should stick and fail to open, J. H. Hanna, chief engineer of the Capital Traction Company, designed the special controller handle shown in the accompanying engraving. An auxiliary attachment is provided in the controller which is so arranged that when the controller drum is turned from the second step back to the first the auxiliary contactors open, but the main power circuit remains unbroken within the controller.

The special handle is fitted with a push button, which is connected through a bent lever to a pivoted stop interposed between the lug on top of the controller case and the downward projection of the handle. When this pivoted stop is down the handle cannot be moved beyond the first point in throwing the controller to the "off" position. By pressing down on the push button in the handle the stop can be raised and the handle moved past the first point to the "full off" position, which unlocks the reverse drum and breaks all contacts in the main power circuit within the controller. The stop is lifted when running only in emergencies, and, of course, must be lifted in order to reverse. The stop is attached to the handle by set screws, and can be quickly removed when the handle is transferred to an ordinary controller.

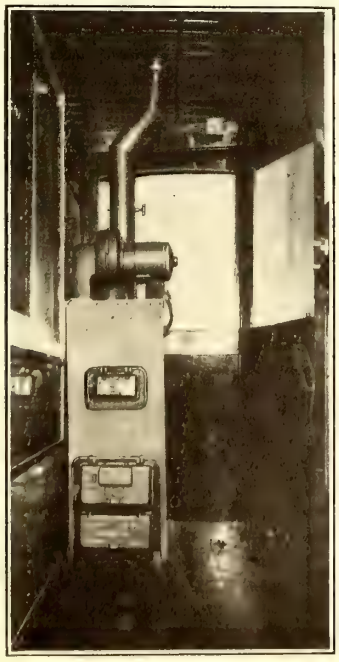
COMBINED HOT AIR HEATING AND VENTILATING SYSTEM

The Peter Smith Heater Company, Detroit, Mich., which is well known in the car heating field through its hot water system, has recently made a radical innovation by devising a forced circulation, hot air car-heating system to accomplish the dual object of heating and ventilation. The principle of this system is very simple and similar to that of the ordinary mechanical draft machinery used for the heating and ventilation of large buildings. Several electric railways are already using this method, but the following paragraphs will describe the single installation now being tried by the Public Service Railway Company, Newark, N. J.

As shown by the accompanying illustrations, this system is a combination of a car heater with a forced air circulation mechanism thereon and a duct under the longitudinal car seats on one side with suitable outlets for the discharge of heated air. It will be observed that the heater is mounted in the vestibule where it takes up no more floor room than the usual car stove. In this case, the heater was designed for cars measuring 30 ft. inside yet it is only 42 in. high and 16½ in. sq. The air circulating mechanism located at the top consists of a blower of the well-known "Sirocco" type which is driven by a ⅛-hp 500-volt motor. The motor is controlled by a snap switch and requires no attention except at very long intervals. When the fan is in operation, cold air is drawn from under the car through a hole cut in the floor beneath the heater. This cold air comes up through the perforated base plate of the heater and between the walls of the inner cylindrical hot air box and the square heater jacket. It then passes through the blower which forces it downward into the air-tight chamber surrounding the fire-pot of the heater and from thence it is forced into a duct which runs along the truss plank on one side of the car. This duct consists of 3 in. x 8 in. rectangular galvanized iron with circular outlets of 4 in. diameter spaced every 3 ft. These vents are placed in a gradually ascending



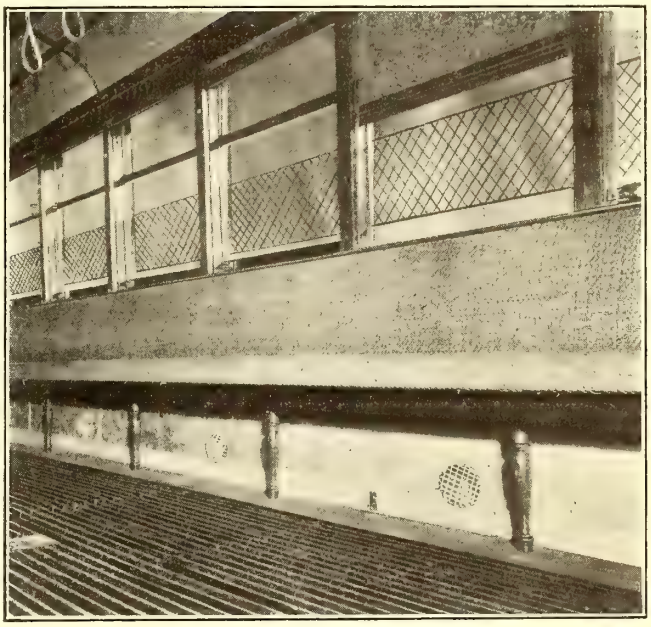
Sectional View of Heater



Heater Installed in Vestibule of Car

line beginning at the heater end because this arrangement permits the emission of equal amounts of air throughout the car. The steady volume of hot air passes over the floor and then rises to the ventilators, thereby insuring an even distribution of heat, dry floors and a complete change of air every five to six minutes. The fact that the bad air never has a chance to remain in the car is one of the features of this system.

It might be supposed that the draft at the outlets would be strong enough to inconvenience the passengers sitting over them, but this is not the case. The blower pressure is sufficient to allow the passengers on the other side of the car to enjoy its benefit. The duct outlets in this installation are screened to prevent passengers from throwing rubbish into them. Under longitudinal seats, the duct is placed back far enough to prevent its being kicked by the passengers. Where cross-seats



Hot-Air Duct Openings Under Seats

are used, the duct is placed alongside each seat in a magnesia-lined wooden box.

Although the blower motor is rated at ⅛ hp, its full capacity has not been required in practice. Under operating conditions, the motor takes .166 amp. at 500 volts, which means an electric operating cost of about 3.3 cents for a 20-hour day with power at 2 cents a kw-hour. The same heater in continuous operation will burn 40 lb. of hard coal in 20 hours, which at $6.00 per ton means a fuel cost of 12 cents a day. Thus the total operating changes would not exceed 15.2 cents a day.

HEATER DETAILS.

In view of the importance of having air tight joints in this heater to make the air circulating system effective, the following details may be of interest. The stove, which is on the inside of the hot air chamber, is of ordinary type except that it has a 12 in. diameter corrugated firepot. The grate is shaken with a side movement and can be rocked or dumped when desired. The base of the heater is a wrought plate casting which serves as a foundation and keeps the different parts permanently in line. Below the grate are two chambers equipped with pans, one for holding ashes and the other an extra coal supply. These pans have sufficient capacity for 18 hours service. The doors of the firebox, the ash pot and the reserve coal supply are hung on gravity hinges to prevent their being left open or unfastened by careless attendants.

The hot-air chamber which surrounds the firepot is circular in form with a 2½ in. air space between the stove proper and the casings and is made of No. 20 sheet iron. The outer casing is also made of No. 20 sheet iron lined throughout with 3-16 in. asbestos millboard and has a minimum spacing of 1 in. from the hot-air chamber. The framing on the top is cast iron, reinforced under the blower bedplate.

The city of Bonn, Germany, is considering a plan for electrifying the steam tramway connecting Bonn with Mehlem at a cost of $475,000, to be borne in equal amounts by the two municipalities

News of Electric Railways

Joint Commission Reports on Boston Electrification

The joint board composed of the Massachusetts Railroad Commission, the Boston Transit Commission, the Metropolitan Park Commission and the Harbor & Land Commission has issued a report to the Legislature of 1910 in accordance with a resolve of the General Court of 1909, directing it to investigate various commercial and transportation matters in connection with the improvement of the Boston metropolitan district. The report includes a short discussion of the electrification question in connection with railroad service at Boston, which is abstracted herewith:

"Most of the suggested improvements in the passenger and freight service of the metropolitan district are predicated upon the substitution of electricity for steam as a motive power. As the Metropolitan Improvements Commission reported that the question of transportation was the paramount question affecting the commercial and industrial development of the district and of the State, and as that opinion has been plainly endorsed by the Legislature and by the public, and is fully concurred in by the board, it becomes of primary importance that the work of studying the problem of electrification should be begun at once in a determined and comprehensive way.

"To electrify a complicated terminal is no simple undertaking; it involves fundamental changes and very large expenditures. It is very different from the problem of electrifying one or two through tracks for passenger traffic. That electrification for passenger traffic is practicable has been demonstrated in New York by the New York Central & Hudson River Railroad and the New York, New Haven & Hartford Railroad and in other places, both in this country and Europe. Information is meagre, however, as to the cost of installation and economy of operation under various conditions.

"The best method of furnishing electric power is undetermined. In New York the respective systems in use by the New York Central & Hudson River Railroad and the New York, New Haven & Hartford Railroad are different. On the former a third-rail is used as a conductor and on the latter an overhead wire. On the former an alternating current is carried at high tension to substations where it is transformed to a lower voltage direct current and then transmitted to the locomotive by a third rail; on the latter the alternating current is carried at high tension by overhead conductors directly to the locomotive, where it is transformed to a lower voltage. Moreover, electrification for freight traffic, and particularly the electrification of a large freight terminal, is a difficult matter regarding which there is little or no experience and much difference of opinion."

The board states that the study of this problem should now be taken up by the railroads and pushed with vigor. As against the great cost of installation of electricity there is opened the possibility of utilizing in terminal stations and yards the space over the tracks for offices, warehouses, manufacturing plants and roadways. With electrical operation the entire passenger and freight terminal area may be covered with buildings. In the matter of operation there are several elements of saving. One of these is a saving in fuel owing to the power being generated in a large central plant under favorable conditions. The consumption of fuel per horse-power is much smaller than that which results from the extremely wasteful method of the steam locomotive. It is estimated that power can be furnished at the locomotive under electrical operation with one-half the consumption of fuel required by our present steam locomotives. "Freedom from locomotive smoke, soot and gas will contribute in large measure to the comfort and health not merely of passengers in the stations and cars, but also of almost every person in the metropolitan district," concludes the report.

The board recommends that a resolve be passed requiring railroads operating within the Boston metropolitan district to prosecute studies with reference to the electrification of their passenger and freight service and to report their conclusions to the board by Sept. 1, 1910.

Cleveland Traction Situation

Two lists of names will be available to the City Council of Cleveland before a referendum vote is called. One of them was prepared and the names secured by former Mayor Johnson, but because Burr Gongwer, secretary to Mr. Johnson, refused to file the names with the city clerk, Mayor Baehr requested that another set of petitions be circulated. Mr. Gongwer then filed his list. It was decided, however, to complete the new list, and the names are being checked as fast as received by the clerks of the board of elections. It is claimed that the Johnson list contains 24,000 names and that 8000 will be added. Workers on the Baehr petitions state that they will get 20,000 names in a short time.

The employees of the Cleveland Railway are urging greater protection for conductors assigned to the pay-as-you-enter cars. Receiver Bicknell has agreed to erect partitions at the entrance as a temporary means of relief.

The report of Mr. Bicknell for December, 1909, shows a surplus of $94,703. The gross earnings were $565,066, and the net earnings $332,976. Maintenance charges amounted to $107,827; transportation, $187,895; general, $37,163. Rentals, taxes, interest and dividends made up the remainder of the charges against the receipts.

On the evening of Jan. 10, 1910, the City Council fixed Feb. 17, 1910, as the date to vote on the street railway franchise. The petitions obtained by the Baehr solicitors have been accepted by the Council.

Detroit United Railway Awaits Franchise Settlement

The reply of J. C. Hutchins, president of the Detroit (Mich.) United Railway, to Mayor Breitmeyer of Detroit, who had requested Mr. Hutchins to authorize a reduction of fares pending the settlement of the franchise question, was presented to the City Council of Detroit at its meeting on Jan. 4, 1910. In his letter to Mr. Hutchins the Mayor referred to the present rental of $300 a day being paid by the company pending the settlement of the franchise question, saying that he felt that "the most equitable form of temporary arrangement would be one under which a reduced rate of fare could be given at least on the lines on which franchises have expired, the company in return to be given the privilege of operating from day to day until a permanent arrangement shall be made."

Admitting the large return to the city under the present rental plan the Mayor said that this return could by no means have the same effect upon the growth of the city as a reduction in fare. He concluded: "I believe that any concession which your company is able to make temporarily should be made to the street car users rather than the taxpayers at large; and with that end in view I would invite your suggestions as to what your company might be able to do in the shape of a reduced fare given in return for the right to run your cars until such time as the entire franchise matter can be permanently settled."

In his reply Mr. Hutchins said that pending the results of the investigation of street railway affairs in Detroit now under way it would not be wise to jeopardize either the revenue or the credit of the company. His letter to the Mayor follows:

"Your desire to obtain for the people of the city every possible advantage is quite fully understood. We most heartily share that desire with you. Let me advise you of our situation and of the efforts we are making.

"The city of Detroit ranks in population as the eighth or ninth of our American cities. Its present ratio of growth in population and in industrial activities is probably greater than that of any other American city. The average rate of fare now in effect in Detroit is below the rate in effect in any other of these cities. Every dollar of this company's income, whether derived from the addition of new capital or from its earnings, is now being applied and for a long time past has been applied to the maintenance and extension of its service to meet the growth of the city. We have added this year 80 new cars to our car equipment, along with all of the appurtenances necessary

for the operation of same. It is very necessary that certain double tracking, to which your attention has been called, shall be done, and it will be necessary during the coming year to supply many additional cars and much additional equipment. All of the company's resources are being used for such purposes.

"There is now under way an investigation, as inaugurated by yourself through the Committee of Fifty, which should show the exact status of this company respecting its capitalization, its earnings and its expenses, so that all of these matters may be dealt with from the standpoint of actual facts. It would seem to me that under these circumstances it would be wise in the city to let our revenues and our credit alone until the results of this investigation are made manifest."

At the meeting at which Mr. Hutchins' letter was presented the Mayor urged immediate action looking to the submission of a franchise settlement ordinance to the voters, and the report of the Committee of Fifty was ordered printed. Alderman Glinnan at the meeting on Jan. 4, 1910, moved for the immediate submission of the question of municipal ownership of street railways to the people.

Proposed Chicago Subways

It was expected that two legal decisions which would define the right of Chicago to use its percentage of the net earnings of the surface railways for subway construction would be rendered during the week ended Jan. 15, 1910. The court has had these cases under consideration for two weeks. The points at issue are, first, whether the city has the right to build subways under the present powers conferred on it by the Legislature, and, second, whether the so-called traction fund totaling about $4,000,000, can be used for preliminary work or must be reserved until subway work has been started. It is anticipated that the court will conclude that the city does not need any additional enabling legislation to further the subway undertaking, and that the 55 per cent of the net receipts of the companies which goes to the city is a part of the municipality's general income and can be used from year to year. In an earlier decision Judge Windes enjoined the city from paying $75,000 from the subway fund for the expense of preparing a subway report. Walter L. Fisher, special traction counsel, has represented the city in the cases.

In any event, it is expected that the cases will be carried to higher courts and that efforts will be continued toward securing enabling legislation. Two weeks ago Senator Ettleson presented a bill amending the Cities and Villages Act which would give Chicago the power to undertake the construction of subways and municipal wharves. This bill was not presented at the request of Chicago. Now it is announced that Walter L. Fisher has drawn a subway bill with the assistance of the local transportation committee which will be presented to the Legislature at once. The bill provides essentially: That the city has a right to own, operate or lease a subway; that it has a right to grant a franchise for a subway; that in case of a franchise the grant be no longer than 20 years; that the subway may be used for street cars, elevated railroad trains, interurban cars and all public service cars not operated by steam; that the subway also may be used to contain galleries for wires, tubes for service, conduits for pipes, etc.; that the question of grant by franchise be submitted for a referendum vote; that the city has a right to compensation and also to fix rates in case of a grant by franchise.

One of the important features of the bill is the provision for a referendum vote. Another is the matter of compensation to the city for the use of the subway.

Growth of the Denver City Tramway

The daily newspapers of Denver on Jan. 1, 1910, presented large advertisements outlining features of the development of the Denver (Col.) City Tramway. The history of this property, which was chartered in 1867, includes a "story of trials and tribulations and ultimate success out of continued failure." The first rails laid weighed 16 lb. and supported 10-ft. cars, drawn by one horse. The company now has 198 miles of track in the city and 26 miles of interurban railway and operates 265 cars daily. In 1909, 84,000,000 passengers were carried, equivalent to handling the population of Denver 400 times. The following statement regarding taxes was included in the advertisement:

"Fifteen cities of the United States have a population of 6,689,126, and pay $5,787,375 in taxes, an average of 87 cents per capita. The figures for population are those of the 1905 or 1906 State or Government estimate census for cities of 8,000 or over, and while they are not accurate, now, and while some cities have grown faster than others, they do very well for the purpose of comparison. Chicago paid in 1908 in taxes $2,215,941, and has 2,049,185 people—we are talking of street car companies, of course—so Chicago paid $1.08 per capita. Denver, by the same census, had 151,920 people and paid $180,000 in taxes, or $1.18 per capita."

During 1909 the Denver City Tramway spent $1,000,000 in improvements. Eleven miles of new track were constructed and 10 miles of double track were reconstructed. During 1910 the company proposes to build 14 miles of new track, replace 7 miles of cable track, erect a new office building and car house at Fourteenth Street and Arapahoe Street, build a new suburban depot opposite the central loop, construct 35 new passenger cars and enlarge the central power station. These improvements will entail an expenditure of approximately $1,750,000.

Meeting of Central Electric Railway Association

The official call for the annual meeting of the Central Electric Railway Association to be held at Columbus, Ohio, on Jan. 27, 1910, issued by A. A. Anderson, president, and A. L. Neereamer, secretary, is dated Jan. 8, 1910. In addition to the program of the meeting, as published in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910, page 83, the circular contains a list of railways which are members of the association and a list of supply men who are members of the association. In view of the fact that this is the annual meeting and that officers for the ensuing year are to be elected and reports from the standing committees read, every member of the association is urged to be present, and it is suggested to those members living at a distance that the trip be made in special interurban cars. Members have the privilege of inviting friends to this meeting. The executive committee will meet at 7:30 p. m. on Jan. 26. The list of supply men who are members of the association follows:

Armstrong, G. E., American Railway Guide Co.
Ashley, R. W., General Electric Co.
Ayres, Chas. S., G. C. Kuhlman Car Co.
Beattys, W. H., Jr., The Westinghouse Electric & Mfg. Co.
Benham, John, International Register Co.
Berger, E. F., Midvale Steel Co.
Billau, H. E., The Sherwin-Williams Co.
Blackwell, W. L., Cooper Heater Co.
Bloss, W. H., The Ohio Brass Co.
Bone, Jas. L., The Ironsides Co.
Burch, T. A., Wm. C. Robinson & Son Co.
Burford, Wm. B., Stationery and Printing.
Callan, J. G., Arthur D. Little, Inc.
Clapp, Chas. W., The Brown Hoisting Machinery Co.
Cosper, W. P., Chicago Car Heating Co.
Cotabish, N. C., National Carbon Co.
Craig, Edward A., Westinghouse Traction Brake Co.
Crawford, S. W., More-Jones Brass & Metal Co.
Cutler, H. A., Wm. C. Robinson & Son Co.
Davis, Chas. H., The Westinghouse Electric & Mfg. Co.
Davis, Geo. S., *Electric Traction Weekly.*
Dexter, R. E., Midvale Steel Co.
Doan, C. H., Nelsonville Brick Co.
Dodge, C. H., Taylor Electric Truck Co.
Dodson, C. F., Standard Steel Works Co.
Dorner, H. A., The Dorner Railway Equipment Co.
Drake, L. J., Jr., Galena-Signal Oil Co.
Duclos, A. E., Massachusetts Chemical Co.
Eayrs, T. C., The Westinghouse Electric & Mfg. Co.
Farr, Eugene H., The A. H. Pugh Printing Co.
Field, A. W., Standard Motor Truck Co.
Gay, H. B., Electric Storage Battery Co.
Gohen, J. A., The Cleanola Co.
Gould, L. E., ELECTRIC RAILWAY JOURNAL.
Goodloe, Thornton M., The Fire Protection Co.
Greaves, J. L., Stromberg Allen & Co.
Griffey, B. E., Buschmann-Griffey Co.
Grimes, E. B., Ohmer Fare Register Co.
Gundrum, F. N. Jr., Chicago Varnish Co.
Hall, G. A., John Roebling's Sons Co.
Hamer, W. D., Electric Service Supplies Co.
Hanna, J. A., Niles Car Mfg. Co.
Henkle, T. H., Electric Service Supplies Co.
Hinmon, W. E., Cooper Heater Co.
Holloway, Harry C., The Rail Joint Co.
Hornstein, F. C., Indianapolis Brass Co.
Hunter, R. W., Poole Bros.
Hutchins, S. D., Westinghouse Traction Brake Co.
Kipp, J. G., Electric Railway Equipment Co.
Klinger, P. W., The Barney & Smith Car Co.

Lee, Ray P., The W. R. Garton Co.
Lewis, Arthur, Great Western Smelting & Refining Co.
Lloyd, F. C., Gelien & Co.
McGee, John G., Hildreth Varnish Co.
McLain, J. E., The Trolley Supply Co.
McLain, W., Wm. Wharton, Jr., & Co.
Marsh, H. C., General Electric Co.
Mason, Stephen C., McConway & Torley Co.
Midgley, Stanley W., The Curtain Supply Co.
Miller, L. G., Miller Lumber Co.
Morgan, F. A., Morgan Fare Register Co.
Naugle, A. T., Naugle Pole & Tie Co.
Naylor, N. C., Railway Steel Spring Co.
Ohmer, John F., Ohmer Fare Register Co.
Olberding, A. G., The Columbia Brake Shoe & Fdy. Co.
Pickupp, W. B., Positive Nut Lock Washer Co.
Poole, Stephen K., Poole Bros.
Porter, K. E., Carnegie Steel Co.
Salsich, N. E., Pennsylvania Steel Co.
Sample, Morris DeF., The Fire Protection Co.
Sawtelle, Charles E., Tool Steel Motor Gear & Pinion Co.
Saylors, George, H. W. Johns-Manville Co.
Seymour, John B., The National Lock Washer Co.
Shutt, E. A., Factory Oil Co.
Smith, D. W., The Peter Smith Heater Co.
Spencer, E. L., Dayton Mfg. Co.
Stanton, George, The Cleveland Frog & Crossing Co.
Staats, Henry N., The American Railway Insurance Co.
Stern, M. C., The Egry Register Co.
Strieby, F. H., General Electric Co.
Tate, H. F., The National Conduit Cable Co.
Taylor, Ross, Automatic Ventilator Co.
VanDorn, W. T., The W. T. VanDorn Co.
Weston, W. S., The Buda Co.

Illinois Traction System Completing Connecting Links.—The construction of the connecting links of the Illinois Traction System from St. Louis to Chicago is progressing rapidly. The line between Streator and Ottumwa, Ill., has been opened and plans are under way for a line from Streator to Peoria and a line from Ottawa to Aurora, at which place connections will be made for Chicago.

Meeting of the A. I. E. E.—A meeting of the American Institute of Electrical Engineers was called for Jan. 14, 1910, at 8 p. m. in the auditorium of the Engineers' Building, New York, N. Y. Under the auspices of the railway committee, Prof. W. S. Franklin and S. S. Seyfert were to present a paper entitled "On the Space Economy of the Single-Phase Series Motor." W. S. Murray, E. H. Anderson, C. P. Steinmetz and E. F. Alexanderson signified their intention in advance of the meeting to take part in the discussion.

Wisconsin Electrical Association.—As announced in the Electric Railway Journal of Dec. 11, 1909, page 1201, the annual convention of the Wisconsin Electrical Association will be held at the Hotel Pfister, Milwaukee, Wis., on Jan. 19 and 20, 1910. The program has not yet been announced. The entertainment features are in charge of an exhibitors' association, connected with the parent association, and the exhibitors are represented by a committee consisting of H. P. Andrea, of Julius Andrea & Sons Company, Milwaukee, Wis.; F. G. Bolles, Allis-Chalmers Company, Milwaukee, Wis., and W. R. Pinchard, Westinghouse Electric & Manufacturing Company, Chicago, Ill. The committee has arranged for a "good-fellowship" entertainment at the Elks' Club, Milwaukee, on the evening of Jan. 19.

National Conference on Railway Legislation.—Martin S. Decker of the Public Service Commission of the Second District of New York, president of the National Association of Railway Commissioners, has appointed the following delegates from that association to attend the national conference on uniform State legislation which has been called by the National Civic Federation to meet in Washington on Jan. 17, 18 and 19: Martin A. Knapp, chairman of the Interstate Commerce Commission; Ira B. Mills, chairman of the Railroad and Warehouse Commission of Minnesota; H. Warner Hill, chairman of the Railroad Commission of Georgia; B. A. Eckhart, of the Railroad and Warehouse Commission of Illinois, and William O. Seymour, of the Railroad Commission of Connecticut.

Annual Meeting of the A. S. C. E.—The fifty-seventh annual meeting of the American Society of Civil Engineers will be held in the house of the society in New York on Jan. 19 and 20, 1910. At 10 a. m. on Jan. 19 the annual reports will be presented, officers for the ensuing year elected and members of the nominating committee appointed. The progress report of the special committee on "Steel Columns and Struts" and the progress report of the special committee on "Bituminous Materials for Road Construction" will be presented for discussion. The board of direction of the society will meet after the adjournment of the annual meeting. At 2:30 p. m. on Jan. 19 members of the society will be afforded an opportunity to inspect the tunnel and terminal work of the Pennsylvania Tunnel & Terminal Railroad, by courtesy of George Gibbs, chief engineer of electric traction and terminal station construction of the company. A reception will be hald by the president in the house of the society at 9 p. m. on Jan. 19. Jan. 20 will be devoted to a visit to the Ashokan reservoir by invitation of the board of water supply of New York. At 9:30 p. m. there will be an informal smoker at the house of the society.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The Legislature of Massachusetts convened on Jan. 5, 1910. An important announcement the first day was the personnel of committees. Senator Abbott of Suffolk County was appointed chairman of the committee on street railways. Senator Turtle of Berkshire County was appointed chairman of the committee on railroads. President Treadway of the Senate on taking the chair spoke briefly of the transportation matters which are to come before the Legislature, including the questions referred to various commissions for expert information, which embrace metropolitan improvements at Boston, the construction of additional subways, tunnels or elevated structures in Boston, consolidation of the West End Street Railway and the Boston Elevated Railway; electric railway holdings by railroads. The relation of the New York, New Haven & Hartford Railroad to possible future electric railway developments in the Berkshire district, carried over from 1909 at the request of the petitioners, is one of the most important matters to be considered this year. On Jan. 7, 1910, the joint board, composed of the railroad, transit, harbor and land and metropolitan park commissions, reported to the Legislature on metropolitan improvements, advocating the study immediately of electrification by the steam railroads terminating at Boston. Several special reports from the commissions are expected within the next few days, and the Railroad Commission and Transit Commission will shortly submit a report on the proposed Boston & Eastern Electric Railroad tunnel to connect the proposed East Boston terminus of the route with Post Office Square.

New York.—The Legislature of New York convened on Jan. 5, 1910. No less than 55 new members of the Assembly were introduced. The death during the year of Senators John Raines and Patrick H. McCarren removed two conspicuous figures. Mr. Raines was Republican leader of the Senate, and the most resourceful opponent of Governor Hughes. Jotham P. Allds has been selected to succeed him. The annual appropriation bill has been introduced. The appropriations aggregate $23,750,000, as against $21,500,000 last year. Government by commission on the so-called Des Moines plan is proposed for Buffalo in a bill introduced by Senator Davis of that city. It is the first time the idea of municipal government by commission has been embodied in any measure submitted to the Legislature of New York. The Governor has again recommended the extension of the Public Service Commissions law so as to include jurisdiction over telegraph and telephone companies. This matter was referred last year to a joint special committee with instructions to report at this session. After the preliminaries had been arranged on Jan. 5 adjournment was taken until Wednesday evening, Jan. 12, at 8 p. m.

Ohio.—There is talk of the enactment by the General Assembly of a law which will provide for a State tax commission to supplant the numerous boards which now decide tax values. As a basis for the tax, it has been proposed that the market value of the stock minus the tax value of the real estate and personal property returned for taxation shall represent the property value to be taxed. The tax on the capital stock will be apportioned among the counties in which the property lies in the case of a railroad, telephone company or other corporation having property in several counties. Talk of a public service commission has also been revived, Speaker Mooney referring to the subject in addressing the House. So far as known, this idea includes the features incorporated in a bill before the last General Assembly which resembled the law in force in New York. One objection is that a measure of this kind takes away the power of municipalities to grant franchises, as cases of disagreement or dispute regarding a grant must be referred to the commission.

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Financial and Corporate

New York Stock and Money Market

January 11, 1910.

The stock market during the last week has been irregular and weak. Traders appear to be nervous and there exists a persistent pressure to sell. This condition is attributed to an uneasiness over the action that may be taken by Congress upon the recommendations made by President Taft and the continued firmness in the money market. The traction shares, however, have not been affected materially. Third Avenue and Brooklyn Rapid Transit have held their prices on moderate trading, while Interborough-Metropolitan issues have advanced several points.

Money has shown no disposition to recede, and quotations to-day were: Call, 5 to 5½ per cent; 90 days, 4½ to 4¾ per cent.

Other Markets

Philadelphia Rapid Transit stock has been active but prices have changed only fractionally since Jan. 1. Union Traction has also been active at former prices.

In the Chicago market the active dealing in the various series of Chicago Railways has in a measure subsided. There has been some selling of Kansas City Railway & Light and the price has receded several points.

In Boston, Massachusetts Electric has been the leading traction feature. Price changes have been merely nominal, the common selling for about 18 and the preferred for about 80.

As usual, the trading in Baltimore has been confined, practically, to the bonds of the United Railways Company. Prices are about as formerly: incomes, 60¼; 4s, 86½, and funding 5s, 84¼.

Quotations of various traction securities as compared with last week follow:

	Jan. 4.	Jan. 11.
American Railways Company	a48¼	a49
Aurora, Elgin & Chicago Railroad (common)	*57	a62⅜
Aurora, Elgin & Chicago Railroad (preferred)	*92	a95
Boston Elevated Railway	136½	134
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	74	74
Boston & Worcester Electric Companies (common)	a11	a11½
Boston & Worcester Electric Companies (preferred)	a48	a47
Brooklyn Rapid Transit Company	79½	79
Brooklyn Rapid Transit Company, 1st pref., conv. 4s	86¾	86
Capital Traction Company, Washington	a135¼	a136½
Chicago City Railway	185	185
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a109	a108
Chicago Railways, ptcptg., ctf. 2	a35½	a33
Chicago Railways, ptcptg., ctf. 3	a20	a17
Chicago Railways, ptcptg., ctf. 4s	a10	a9½
Cleveland Railways	*84	a91½
Consolidated Traction of New Jersey	a77	a77
Consolidated Traction of New Jersey, 5 per cent bonds	a106	a106
Detroit United Railway	*65	*63
General Electric Company	159⅜	159⅛
Georgia Railway & Electric Company (common)	a104½	a105½
Georgia Railway & Electric Company (preferred)	87½	87½
Interborough-Metropolitan Company (common)	24¾	25¼
Interborough-Metropolitan Company (preferred)	61	62¼
Interborough-Metropolitan Company (4½s)	83	82⅞
Kansas City Railway & Light Company (common)	a35	a36
Kansas City Railway & Light Company (preferred)	*75	a76½
Manhattan Railway	138	*138
Massachusetts Electric Companies (common)	a19	a18½
Massachusetts Electric Companies (preferred)	a80½	80
Metropolitan West Side, Chicago (common)	a19	a17½
Metropolitan West Side, Chicago (preferred)	a57	a54¼
Metropolitan Street Railway	20	*20
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	83⅝	81½
Northwestern Elevated Railroad (common)	a17½	a17½
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a51¼	a52¼
Philadelphia Company, Pittsburg (preferred)	a45¼	a46
Philadelphia Rapid Transit Company	a28⅜	a27½
Philadelphia Traction Company	a89	989
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a104	a106
Seattle Electric Company (common)	a115	a115½
Seattle Electric Company (preferred)	a105	a104
South Side Elevated Railroad (Chicago)	a56	a55
Third Avenue Railroad, New York	18⅞	18
Toledo Railways & Light Company	15½	15½
Twin City Rapid Transit, Minneapolis (common)	117	115
Union Traction Company, Philadelphia	a52¼	a52½
United Rys. & Electric Company, Baltimore	a14	a14⅛
United Rys. Inv. Co. (common)	11¼	12
United Rys. Inv. Co. (preferred)	*71⅞	*71⅞
Washington Ry. & Electric Company (common)	a43¼	a42¾
Washington Ry. & Electric Company (preferred)	a91¼	a90½
West End Street Railway, Boston (common)	a95	a94¾
West End Street Railway, Boston (preferred)	*106	*106
Westinghouse Electric & Mfg. Company	82	79⅛
Westinghouse Elec. & Mfg. Company (1st pref.)	*130	*130

aAsked *Last Sale

Segregation of Light and Railroad Properties in Port Jervis

The Public Service Commission of the Second District of New York has rendered a decision in which it approves the segregation of the railway and electric light properties in Port Jervis and refuses an application from new interests to enter into competition with the companies which took over the property of the old consolidated company.

The Port Jervis Electric Light, Power, Gas & Railroad Company, which operated the gas and electric plants and an electric railway in Port Jervis, because of excessive funded debt, and other liabilities, and extensive depreciation of the railroad property, found itself unable to comply with an order of the commission requiring that the railroad be put in a condition of safe and satisfactory operation. In consequence, a mortgage foreclosure suit was instituted by the bondholders, who bought in the property. Two successor corporations were formed, one to take over the lighting property and one to take over the railroad. The commission grants capitalization to the Port Jervis Light & Power Company of $118,000 capital stock and $170,000 bonds, and to the Port Jervis Traction Company of $20,000 capital stock and $70,000 bonds. The stock of each company goes to the bondholders as the purchase price of the property. The bonds to be issued by each company are solely for improvements necessary to put the properties in proper condition, except that the bonds of the Port Jervis Light & Power Company include the taking over by that company of the bonds of the Port Jervis Traction Company. The commission says that the bonds of the Traction Company are likely to sell at a large discount, while the bonds of the Port Jervis Light & Power Company are to bring at least 90 per cent of face value. The combined capital thus fixed for the new companies is based upon actual value and is a reduction of $357,000 from the capitalization of the old company, which amounted to $735,000. In an opinion written by Commissioner Martin S. Decker, the commission holds that the successor corporations are as such entitled to take over the properties and to issue capital stock and bonds upon a fair basis.

The decision also disposes of the application of C. F. Wright and others, who desired to form a corporation to furnish gas and electricity in Port Jervis and to build and operate an electric railway in Port Jervis and develop power at Mongaup Falls, 14 miles from Port Jervis, and transmit it to Port Jervis. These petitioners also proposed to build an electric railway from Port Jervis to Milford, Pa. The object of this proposed corporation was to supplant the old lighting and railroad company and its successor corporations in Port Jervis. The decision declares that as the successor companies are in possession of property rights that cannot be denied, this object cannot be attained by order of the commission. If the new company were authorized by the commission to produce and supply gas and electricity in Port Jervis both companies would probably become bankrupt in a short time and one would without question, with probable resulting consolidation and unnecessary increase of capitalization on that account. In regard to the Traction Company the commission says that the company cannot be compelled by the city or by the commission to vacate the streets; there is no suggestion that another road could be operated in the same streets; no franchise for a road in other streets has been granted by the city and if it had, proof must be submitted that it could be operated without continual loss, and with good service by the present line it seems no such proof could be presented.

The opinion of Commissioner Decker states the service of the old company was so poor and the rights and proper interests of the people of Port Jervis were disregarded to such extent that if the petition by Mr. Wright had been presented before the sale on foreclosure it would have been granted; but the situation in its legal aspect has been so changed by the sale and formation of companies to take over both the lighting and railroad properties and operate them under capitalization fixed by the commission, that a just basis for approving the exercise by the proposed new company of the new franchises in Port Jervis is lacking. The commission says that serious disregard by the new lighting company of its obligations to the public will result in drastic action through the approval of the exercise of a new franchise by a competing company. The petitioners for new

rights are free to present the application at any time of a corporation to develop the Mongaup River power and build an electric transmission line to Port Jervis.

Birmingham Railway, Light & Power Company, Birmingham, Ala.—An annual dividend of 2 per cent on the $3,500,000 of common stock of the Birmingham Railway, Light & Power Company was paid on Jan. 1, 1910. This is the first dividend on the common stock since Dec. 31, 1906.

Boston (Mass.) Suburban Electric Companies.—The directors of the Boston Suburban Electric Companies have declared a quarterly dividend of $1 a share on the preferred stock, payable on Jan. 15, 1910, to stock of record on Jan. 3, 1910.

Lynchburg Traction & Light Company, Lynchburg, Va.—The American Railways, Philadelphia, Pa., has purchased from R. D. Apperson and his associates the controlling interest in the Lynchburg Traction & Light Company, Mr. Apperson and his associates receiving in part payment bonds and stocks of the American Railways. Mr. Apperson will be retained as president and general manager under the same conditions as when he and his associates owned the property. Mr. Apperson's associates, however, have retired as officers and directors of the company and H. J. Crowley has been elected vice-president and C. L. S. Tingley secretary and treasurer of the company in the interests of the American Railways. Mr. Crowley, Mr. Tingley, J. J. Sullivan, E. Clarence Miller, William H. Shelmerdine, Walter H Lippincott and R. D. Apperson remain as directors of the company.

Metropolitan Street Railway, New York, N. Y.—The hearing on the motion to terminate the lease of the Fourth Avenue, Eighth Avenue and Ninth Avenue lines to the Metropolitan Street Railway, which was to have been held before Judge Lacombe in the United States Circuit Court on Jan. 5, 1910, has been postponed until Jan. 21, 1910.

Ocean Shore Railway, San Francisco, Cal.—Fred S. Stratton, receiver of the Ocean Shore Railway, has announced that he proposes to apply to the courts for authority to issue $2,000,000 receiver's certificates, the proceeds of which will be used to complete the road.

Portland Railway, Light & Power Company, Portland, Ore.—The Portland Railway, Light & Power Company is said to have concluded negotiations for the purchase of the property of the Portland Water Power & Electric Transmission Company and the River Mill Company.

Roanoke Traction & Light Company, Roanoke, Va.—The American Railways, Philadelphia, Pa., has purchased from R. D. Apperson and his associates the controlling interest in the Roanoke Traction & Light Company, Mr. Apperson and his associates receiving in part payment bonds and stock of the American Railways. Mr. Apperson will be retained as president and general manager under the same conditions as when he and his associates owned the property. Mr. Apperson's associates, however, have retired as officers and directors of the company and H. J. Crowley has been elected vice-president and C. L. S. Tingley secretary and treasurer of the company in the interests of the American Railways. Mr. Crowley, Mr. Tingley, J. J. Sullivan, E. Clarence Miller, William H. Shelmerdine, Walter H. Lippincott and R. D. Apperson remain as directors of the company.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—The Sheboygan Light, Power & Railway Company has asked the Wisconsin Railroad Commission to sanction an issue of $114,000 of 5 per cent bonds to cover the cost of extensions and improvements.

Southern Colorado Power & Railway Company, Trinidad, Col.—The property of the Southern Colorado Power & Railway Company was bid in for $500,000 at foreclosure at Trinidad on Dec. 24, 1909, by the Northern Securities Company, a temporary holding company, which on completion of the reorganization will turn the property over to the Colorado Railway, Light & Power Company, which was incorporated in Colorado on Dec. 21, 1909, with an authorized capital stock of $5,000,000.

Winona Interurban Railway, Winona Lake, Ind.—The Winona Interurban Railway has leased the property of the Winona & Warsaw Railway for 99 years from Jan. 1, 1910.

Traffic and Transportation

Increase in Wages in Brooklyn

The Brooklyn (N. Y.) Rapid Transit Company announced an increase in the wages of conductors, motormen and guards in the employ of the company of practically one cent an hour, effective on Jan. 28, 1910. This is a further recognition of the service of the men in addition to the pension system adopted on Jan. 1, 1910, of which mention has previously been made in the Electric Railway Journal. The announcement was conveyed to the men in a communication addressed to them by J. F. Calderwood, vice-president and general manager of the company. This letter follows:

"In consideration of your past loyalty and hearty cooperation, so essential, not only in serving the public, but in protecting the interests of the company, the management takes pleasure in announcing, in addition to the pension system recently adopted, an increase in wages of trainmen on both surface and elevated lines, conforming to schedules shown on the attached bulletin.

"With reference to the latter, special attention is invited to the provision which makes possible, by good conduct and record free from demerit, promotion to the higher grades at periods earlier than those prescribed for advancement, by reason of length of service alone."

The statement to the motormen, conductors and guards of the elevated lines was signed by J. J. Dempsey, superintendent of elevated lines of the company. It follows:

"Effective on dates given below, the following changes will be made in the rates of pay for trainmen, elevated lines:

"The flat rates of 25 cents for motormen, 20 cents for conductors and 17½ cents for guards, will be discontinued and all employees of these classes receiving the rates just mentioned will receive the rates of 26 cents, 21 cents and 18½ cents, respectively.

RATES OF PAY, PER HOUR (MOTORMEN).

Years of service.	Present rate. Cents.	Rates effective Jan. 28, 1910. Cents.	Rates effective Jan. 6, 1911. Cents.
1	25	26	26.0
2 and after	30	31	31.5

RATES OF PAY, PER HOUR (CONDUCTORS).

	Cents.	Cents.	Cents.
1	20	21	21.5
2	20	21	21.5
3	21	22	22.5
4	22	23	23.5
5	22	23	23.5
6 and after	23	23	23.5

RATES OF PAY, PER HOUR (GUARDS).

	Cents.	Cents.	Cents.
1	17.5	18.5	18.5
2	17.5	18.5	19.0
3	18.4	19.0	19.5
4	19.2	20.0	20.5
5	19.2	20.0	20.5
6 and after	20.0	21.0	21.5

"The present seniority rules and regulations will govern in determining the grade to which an employee is entitled."

The statement to the conductors and motormen of the surface lines was signed by W. Seibert, superintendent of surface lines of the company. It follows:

"Effective on dates given below, the following changes will be made in the rates of pay for conductors and motormen, surface lines:

"The flat rate of 20 cents per hour will be discontinued, and all conductors and motormen heretofore receiving 20 cents per hour, effective the dates given below, will receive the rate as shown in the table for Grade 3.

RATES OF PAY PER HOUR.

Years of service.	Present rate.	Rate effective Jan. 28, 1910.	Rate effective Jan. 6, 1911.	Grade.
1	20	21	21.5	3
2	20	21	21.5	
3	21	22	22.5	2
4	22	23	23.5	1
5	22	23	23.5	
6 and after	23	24	24.5	1 A

"PROMOTION ON EFFICIENCY

"Employees are advised that good conduct will be rewarded by promotion which may be earned under the following conditions:

"FROM GRADE 3 TO GRADE 2

"At the end of the first year, if record shows 20 demerits or less. If at this time an employee has more than 20 de-

merits, promotion will be given when he reduces his record of demerits to 20.

"FROM GRADE 2 TO GRADE 1

"At the end of the second year, if record is free of demerits. If at this time an employee has demerits, promotion will be given when demerit record is cleared.

"FROM GRADE 1 TO GRADE 1-A

"At the end of the fourth year, if record is free of demerits. If at this time an employee has demerits, promotion will be given when demerit record is cleared.

"The present seniority rules and regulations will govern in determining the grade to which an employee is entitled."

Mr. Calderwood subsequently made this statement to the public through the newspapers:

"Now that the stockholders who have invested their money in the property are receiving a partial return, the directors feel that the trainmen, whose rates have not been uniformly changed, should also share in the prosperity the company has enjoyed in the past year, and as a result they will receive an increase which will amount to about $200,000 a year, and this amount will be further increased by efficient service, depending entirely upon the efforts of the men. The above increase is more than 10 per cent of the last year's surplus of the company."

Complaint Against Service in Albany, N. Y.

The Public Service Commission of the Second District of New York recently received a complaint from Augustus S. Downing, first assistant commissioner of education of New York, against the service furnished by the United Traction Company, Albany, N. Y., on its Pine Hills line between 5 p. m. and 6 p. m. on days other than Saturday and Sunday in that sufficient cars were not provided to accommodate persons employed in the Capitol who reside in that part of the city served by the Pine Hills Line, on which the commission about 10 months ago limited the number of passengers to be carried on each car.

Mr. Downing alleged that many residents of the western part of the city who have offices or are employed in the Capitol have been seriously inconvenienced by the failure of the company to furnish a sufficient number of cars during these hours. Instances were cited when he was required to wait 30 minutes during which time seven cars passed and he was finally obliged to take a car at State and Pearl Streets; another instance when he waited 20 minutes and five cars passed without stopping; another when he waited 18 minutes, during which time five cars passed without stopping and on the last instance he walked up Washington Avenue to Lark Street where two more cars passed without stopping and finally at Madison Avenue and Lark Street he succeeded in boarding a car. The petitioner asked that the company be required to operate more cars between the hours mentioned and to rescind the rule limiting the number of passengers to be carried on each car.

Attached to the petition was an affidavit from Frank B. Gilbert, chief of the law division of the State Education Department, who recited that on one occasion he left the Capitol at 5.40 p. m. and seven cars passed without stopping, all having the full number allowed by the rules and that he did not arrive at his destination until 6.20 p. m.

The company has filed with the commission an answer, in which it states that since March 30, 1909, it has been complying with an order of the commission limiting the number of passengers on the larger type of cars to 40 and the smaller type to 35. The company states that a sufficient number of cars are being operated for the number of passengers carried, and if the order were set aside or rescinded, the cars which are not now by its terms permitted to stop because carrying the maximum number of passengers fixed by the order, would stop to receive and carry more passengers, which would afford greater convenience.

The company maintains it gives the Pine Hills line during the rush hours a service of 2½ minutes headway and a 5-minute headway during the rest of the day, and that during the rush hours cars are run at less than a minute headway on State Street, Eagle Street and Washington Avenue, and if it were possible to operate an additional number of cars during the rush hours and earn enough to pay the interest on the cost of such additional equipment of cars, it would be difficult, if not impossible, to employ men to operate cars for only two, three or four hours a day.

A statement is attached showing the number of cars operated, the total number of passengers carried and the average number of passengers per car at the time they were made. The company denies all the allegations of the complaint, which charges that an insufficient number of cars is being operated on the Pine Hills line, that the service is inadequate for the travel thereon, and that the public is inconvenienced on account of the service rendered, except in so far as inconvenience is due to the limiting rule.

The commission announced that it would take up the various complaints as to the service on the Pine Hills line of the company, as to alleged insufficiency of cars and the operation of the limiting rule now in effect, on Jan. 12, 1910. Complaints to be heard at that time were those of the Pine Hills Association, Augustus S. Downing and Charles S. May.

Order Regarding Use of Side Doors

The Public Service Commission of the First District of New York has issued substantially the following order regarding the operation of center side doors in cars used in the subway, on which subject hearings were held before the commission on Dec. 21, 1909, and Dec. 24, 1909, as previously noted in the ELECTRIC RAILWAY JOURNAL:

"The Interborough Rapid Transit Company shall operate all completely equipped side-door trains in its possession continuously throughout the scheduled time for express-train operation in the subway, excepting for such time or times as side-door trains may be required to lay up for adjustment of mechanism or for cleaning or repairs.

"During December, January, February and March of each year the company shall open the side doors of all cars on all side-door trains (not including mixed trains in which side-door cars are mingled with other cars) at all stations on the Lenox Avenue Branch of the subway south of and including Prospect Avenue Station, and on all stations south of Dyckman Street, on the Broadway Branch of said subway, where the platforms are adjacent to the side doors and during all other months the company shall open the side doors on all cars on such side-door trains at all stations where the platforms are long enough to come in front of the side doors.

"This order shall take effect on Jan. 10, 1910, and remain in force until further order of this commission.

"The company shall notify the commission five days after service of this order upon it whether the terms of this order are accepted and will be obeyed."

The opinion of Commissioner Eustis, on which this order was based, after reciting the testimony taken at the hearings, says in part:

"I do not believe it would be wise to change the company's plan of operation, in view of the fact that within a few weeks the company expects to have a sufficient number of side-door trains to cover the whole of the rush-hours. But those trains should be kept in operation continuously during the express service, from 6 a. m. until 1 a. m., or until the time of the express service expires, excepting for such time as the trains should be required to lay up for adjustment, cleaning or repairs.

"The use of the side doors at all stations was objected to by the company, especially on that part of the structure which is elevated, on account of the small number that would use them, and also on account of the difficulty of keeping the cars properly warm during the severe winter weather. In the spring, when the express service will be nearly all side-door trains, the side doors should be operated at all stations.

"As to the use of the middle side door in the cars that are now used in mixed trains, the company claimed that it would add very largely to the risk by using them. The commission's expert testified that while the use of these doors would add something to the risk, the doors could be safely operated even in a mixed train. As these cars are only operated to make use of all the cars the company has while awaiting motor cars to make up solid center side-door trains, I would recommend that the company be

allowed to continue the use of these side-door cars, for the purpose of trailers in mixed trains without operating the center doors, while they are so used; but that all of the solid center-side-door trains should use the side doors at all times when in operation, excepting on the stations on Lenox Avenue line north of Prospect Avenue station, and on the Broadway line north of Dyckman Street, and except where the side door of the end car does not stop in front of a platform."

Service in Schenectady

The Public Service Commission of the Second District of New York has made public its conclusions in relation to the complaint of a committee of citizens of Schenectady regarding the service of the Schenectady Railway. The conclusions of C. R. Barnes, the electrical expert of the commission, which have been endorsed by the commission, follow:

"1. The Schenectady Railway with its present tracks and equipment is unable to handle its traffic properly.

"2. Certain portions of the city, including the American Locomotive Works, are not properly provided with street car facilities.

"3. The tracks should be extended, the equipment should be increased, and the car routes should be changed to permit a large increase in the number of cars operated and to furnish service to all localities needing it.

"4. The changes required can only be carried out by the cooperation of the railway company, the city authorities and the citizens."

In conclusion the commission says:

"To make any order of this commission effective it will be necessary for the city authorities to grant permission to the railway to lay additional tracks where new tracks are finally determined to be necessary, and to widen streets where they are too narrow to permit such tracks to be laid. It will also be necessary for the property owners involved to consent to the laying of new tracks and to cooperate in the widening of streets. As the changes recommended, or equivalent ones, are, however, apparently necessary to the welfare and growth of the city, the commission believes that the cooperation of all parties will be readily secured.

"The problem of improving the street railway service of Schenectady is more complicated and difficult of solution than that of any city outside of Greater New York. Schenectady has increased in population from 22,000 in 1892 to about 77,000 in 1909. This increase has not been accompanied by any change in the width or location of streets in the business section, and the city has consequently outgrown the available business area."

The commission has presented several plans involving double-tracking and extensions and has suggested a conference for a discussion of the problem.

Pensions for Employees in Newburgh

The Orange County Traction Company, Newburgh, N. Y., on Jan. 6, 1910, announced that it had been decided to pension employees of the company, after 20 years of continuous service or if they became incapacitated while in the service of the company. The announcement to the men, signed by B. B. Odell, Jr., president of the company, follows:

"On and after Jan. 1, 1910, this company will establish a pension for those who desire to retire after 20 years of continuous service, at the rate of $25 per month during the balance of their life.

"This pension can also, at the option of the management, be extended to meet conditions where the employee is physically incapacitated, and apply to those who have worked for a less term than 20 years. Should the incapacitated employee regain health and strength, sufficient, in the opinion of the management to resume his duties, he may do so by surrendering his right to a further receipt of the pension while actively employed. The number of years of continuous service up to Jan. 1, 1910, will be credited to each employee, in determining the 20 years of continuous service.

"This applies to conductors, motormen, shopmen, and trackmen.

"Similar arrangements for long and continuous service, for those who are upon a regular salary, will be announced hereafter."

On Christmas the company gave each married employee a turkey and every unmarried employee the equivalent in cash with the exception of the office force, heads of departments, inspectors, etc., who received from $5 to $20 in gold.

On Dec. 31, 1909, the company distributed $500 in gold as prizes for the merit system, inaugurated on Jan. 1, 1909, for conductors and motormen. Prizes ranged from $5 to $30 per man.

The conductors and motormen presented Mr. Odell, president of the company, who was formerly Governor of New York, a gold-mounted ebony cane and F. S. Berry, general manager of the company, a gold-mounted pipe.

Winona Interurban Railway.—Cars were operated on Sunday on the Winona & Warsaw Railway, Winona Lake, Ind., for the first time in the history of the company, on Jan. 2, 1910. The change in policy of the company followed the lease of the property on Jan. 1, 1910, to the Winona Interurban Railway.

Lowell & Fitchburg Street Railway Seeks Freight Rights in Ayer.—The Lowell & Fitchburg Street Railway, Ayer, Mass., has petitioned the Selectmen of Ayer for permission to transport, as common carriers, newspapers, baggage, express matter and freight upon all parts of its line in Ayer, and a hearing has been ordered for Jan. 17, 1910.

Freight and Passenger Departments of Ohio Electric Railway Consolidated.—The freight and passenger departments of the Ohio Electric Railway have been combined, and W. S. Whitney, whose appointment as general freight and passenger agent of the company is noted elsewhere in this issue, has appointed district passenger agents, district freight agents also.

Increase in Service Ordered on New York City Lines.—The Public Service Commission of the First District of New York has ordered the Metropolitan Street Railway, New York, N. Y., to increase the service on its 116th Street crosstown line by providing a sufficient number of cars to be run past a given point to furnish as many seats as there are passengers in each quarter of an hour. The point at which the commission will make observations will be at 116th Street and Seventh Avenue.

Conference on Rules for Indiana Interurban Railways.—The Railroad Commission of Indiana has called a conference with a committee of interurban managers to be held in the State Capitol at Indianapolis on Jan. 18, 1910, at which amendments to the code of interurban rules adopted in 1908 will be considered. The committee of managers, which consists of H. A. Nicholl, Indiana Union Traction Company; C. D. Emmons, Ft. Wayne & Wabash Valley Traction Company; G. K. Jeffries, Terre Haute, Indianapolis & Eastern Traction Company, and F. M. Durbin, Evansville & Southern Indiana Traction Company, will present a report recommending some changes in the rules which will be considered and acted upon by the commission.

City Limits Extended in Tacoma to Frustrate Fare Increase.—Suburbs of Tacoma, Wash., aggregating 105 square miles voted on Jan. 9, 1910, for annexation to Tacoma, giving that city an area of nearly 150 square miles. In December, 1909, 6 square miles between Tacoma and Fern Hill were similarly annexed. It is expected that Milton, Puyallup and Steilacoom will vote for annexation before March. The suburbs thus annexed have 25,000 population, increasing Tacoma's population to 150,000. The street railways in Tacoma operate under a franchise requiring 5-cent fares within the city limits, but in October, 1909, the Puget Sound Electric Railway increased the fare on its lines outside the city to 2 cents per mile. This action started a movement for annexation of all territory to Milton, 6 miles east; Puyallup, 9 miles southeast; Spanaway, 11 miles south, and Steilacoom, 11 miles southwest, in the hope of obtaining low fares to these suburbs when made part of Tacoma. The company has taken the matter into the Federal Court.

Policy Toward Employees in Boston.—William A. Bancroft, president of the Boston (Mass.) Elevated Railway, made the following reference to the employees in the report of the company reviewed in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910, page 85: "The company has continued its liberal policy toward its employees in respect to their wages, as well as in other matters. Compensation for learners during the year amounted to $24,917.92. There was paid during the year the sum of $25,078.93 as a guaranteed minimum wage for new or extra men. There was also paid as increased compensation to long service men the sum of $71,346.40. There was paid in pensions, under the provisions recited in former reports, the sum of $12,225.92. There was also paid in 'satisfactory service' money, in sums of $15, $20 or $25 to each of the employees deemed worthy thereof, the sum of $53,815. The aggregate sum of increased payments to employees, under the provisions adopted six years ago, amounted during the year to $187,384.17. The provisions of two years ago raising the rate of wages increased this amount by about $130,359.36, making a total of about $317,743.53."

New Transfers in Worcester.—The Worcester (Mass.) Consolidated Street Railway has modified its transfer system by printing the date of issue and the time in larger characters so as to enable conductors to see readily if the transfer is being properly used. The new transfers were placed in use on Jan. 1, 1910. H. C. Page, general manager of the company, in a statement which he issued regarding the new transfers said: "The new transfer rule is not intended to deprive the people of any of the rights that they have previously enjoyed. Stated simply, the aim of this new transfer is to stop persons from obtaining a transfer on a transfer, and from using a transfer that is several days old. The transfer places absolutely no hardship on the traveler. He can go just exactly as far as he could on the old transfer, and we are just as willing to give it. We issued in November, 1909, 81,873 more transfers than we did in November, 1908. This is double the increase in passengers carried and shows that the transfers were used improperly. The conductors have been instructed to use discretion in the matter at all times. If a man forgets to ask for a transfer and he looks respectable, of course we will not deny him a transfer, and especially so until the people get used to the new method. The conductors have all been instructed to explain the matter to the patrons in case they fail to understand."

Bulletins to Portland (Ore.) Employees.—J. F. Roach, chief dispatcher of the Oregon Water Power Division of the Portland Railway, Light & Power Company, Portland, Ore., posts daily on the bulletin board of the company notices in which various subjects concerning the operation of interurban cars and the attitude of the employees of the company toward the traveling public are considered. The result has been satisfactory in increasing the efficiency and enthusiasm of the men. The following notice, dated Dec. 18, 1909, is reproduced as typical of the statements: "We sometimes hear the expression, 'Anyone can run a car,' and in a sense this may be true. Experience, however, teaches us that this phrase is not well founded. It is not every man who can operate a car and be able to say at the end of the day's work that the car is in as good condition as when it was taken from the shops, except for ordinary wear and tear. You may be sure that the man who does this has not imposed upon, or has not abused the apparatus on the car in order to maintain his schedule throughout the day. The man who makes the best and safest time is the one who handles the equipment as it was intended to be handled. Motors are constructed to give a certain efficiency. . . . In other words, the equipment will perform its work in proportion to the rate and manner in which it is used, the efficiency decreasing as the abuse increases. You cannot give this matter too much attention, and the subject is not as deep as is generally supposed. It is a plain, every-day matter, needing very little probing to get at the true inwardness of the thing. The use of the electric motor is coextensive with the growth of all cities, and it will fully repay any man to gain a full understanding of the ailments of motors, the consequences of their abuses, and how motors can be handled to the best advantage."

Personal Mention

Mr. J. C. Thirlwall has been promoted to foreman of the Fresh Pond inspection shop of the Brooklyn (N. Y.) Rapid Transit Company.

Mr. G. E. Miller has resigned as superintendent of the railway department of the Chattanooga Railway & Light Company, Chattanooga, Tenn.

Mr. John J. Skinner has resigned as superintendent of the St. Joseph Valley Traction Company, Elkhart, Ind., to enter the insurance business at Peru.

Mr. D. L. Beaulieu has resigned as superintendent and purchasing agent of the Northampton Traction Company, Easton, Pa., to accept a position as commercial representative of a company with offices in Boston.

Mr. G. K. Jeffries, superintendent of the Brazil and Danville lines of the Terre Haute, Indianapolis & Eastern Traction Company, with offices in Greenfield, Ind., has been appointed general superintendent of the company.

Mr. William McDaniel has accepted a position with the Covington & Southwestern Railway, Kingman, Ind., which is under construction. Mr. McDaniel was formerly general superintendent of the Chattanooga (Tenn.) Railway.

Mr. B. B. Bell, passenger agent of the divisions of the Ohio Electric Railway from Columbus to Zanesville and Columbus to Morgans, has had his jurisdiction increased by being made passenger and freight agent for these divisions.

Mr. Bert Meredith has been appointed chief engineer of the power plant of the Mansfield Railway, Light & Power Company, Mansfield, Ohio, to succeed Mr. O. S. Newton, whose resignation was announced in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910.

Mr. W. S. Whitney, general passenger agent of the Ohio Electric Railway, with offices in Springfield, Ohio, has been appointed general freight agent of the company to succeed Mr. J. C. Forester, resigned. Mr. Whitney will retain the office of general passenger agent.

Mr. Albert Koch, who has been ticket agent of the Ohio Electric Railway at Columbus, Ohio, for the last four years, has been appointed passenger and freight agent of the lines of the company between Dayton and Columbus, effective Jan. 10, 1910, with headquarters at Dayton.

Mr. I. M. Burns has been appointed foreman of inspection of the elevated lines of the Brooklyn (N. Y.) Rapid Transit Company for the Eastern Division, succeeding Mr. E. Keller, whose appointment with the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910.

Mr. Charles E. Hubbard retired as secretary, general manager and purchasing agent of the Farmington Street Railway, Hartford, Conn., following the recent absorption of the company by the New York, New Haven & Hartford Railroad in the interest of the Connecticut Company. Mr. Hubbard has not announced his plans for the future.

Mr. A. D. McDonald has resigned as secretary and auditor of the Pacific Electric Railway, Los Angeles, Cal., to become auditor of the Southern Pacific Railroad with offices in San Francisco, Cal. Before becoming connected with the Pacific Electric Railway Mr. McDonald was assistant to Mr. C. B. Seger, auditor of the Southern Pacific Railroad, who resigned recently to accept a position in Chicago, Ill.

Mr. M. J. Leary has been appointed general foreman in charge of maintenance of equipment of the New York State Railways, Rochester (N. Y.) Lines. Mr. Leary entered railway service with the Cleveland Electric Railway on July 23, 1894, in the Holmden Avenue shops, and remained with the company at that place until 1899, when he entered the operating department in the capacity of road master. He continued with the Cleveland Electric Railway as roadmaster until 1905, when he was appointed foreman in the mechanical department. Early in 1908, Mr. Leary accepted a position with the mechanical department of the Rochester (N. Y.) Railway under Mr. Terrence Scullin, master mechanic. On account of changes in organization due to the resignation of Mr. Scullin on Dec. 15, 1909, Mr

Leary has been advanced to general foreman in charge of maintenance of equipment.

Mr. G. M. Cameron has been appointed master mechanic of the New York State Railways, Rochester (N. Y.) Lines, to succeed Mr. Terrence Scullin, whose appointment as master mechanic of the Cleveland (Ohio) Railway was noted in the Electric Railway Journal of Dec. 25, 1909. Mr. Cameron was graduated from the Ohio State University of the class of 1904 with the degrees of mechanical and electrical engineer. Immediately after leaving college, he entered the service of the Jeffrey Manufacturing Company, Columbus, Ohio, in the mine locomotive department, but resigned after a year's service with that company to accept a position with the Electric Controller & Supply Company, Cleveland, Ohio. He continued with the latter company until the beginning of 1906 when he was appointed draughtsman as applied to power plant and equipment design with the Cleveland Electric Railway. Early in 1908, Mr. Cameron became chief draughtsman and engineer of buildings of the Rochester Railway, in which position he continued until appointed master mechanic of the company.

Mr. Frank W. Payne, whose appointment by Governor Marshall of Indiana to succeed Mr. Henry M. Dowling as a member of the Railroad Commission of Indiana, was noted in the Electric Railway Journal for Jan. 8, 1910, was born in Jeffersonville, Ind., on March 14, 1875, and was in the service of the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad for 13 years preceding his appointment to the commission, eight years as a fireman and five years as a locomotive engineer. Mr. Payne was appointed to the commission in accordances with a promise made by Governor Marshall during the campaign preceding his election that he would appoint a member of some railway brotherhood to the commission. He was endorsed by the Indiana lodge of the Brotherhood of Railway Trainmen, the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen and Enginemen and the general committee on adjustment of the Brotherhood of Locomotive Engineers of the Pennsylvania Lines west of Pittsburgh. His appointment completes the reorganization of the commission under the amended act of the Legislature.

Mr. E. F. Schneider, whose appointment as general manager of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, to succeed Mr. C. N. Wilcoxon, was noted in the Electric Railway Journal of Jan. 1, 1910, has been interested in electric railway work for 15 years. His service with the Cleveland, Southwestern & Columbus Railway covers a period of 11 years, during 10 years of which he has acted as secretary of the company and in various other capacities. Mr. Schneider's business experience also extends to commercial fields. He is well qualified by his intimate knowledge of the affairs of the Cleveland, Southwestern & Columbus Railway and the requirements of the territory which the company serves for the position of general manager. The Cleveland, Southwestern & Columbus Railway comprises 220 miles of line over which 60 motor and 17 miscellaneous cars are operated.



E. F. Schneider

Mr. J. C. Forester, who resigned as general freight agent of the Ohio Electric Railway, Cincinnati, Ohio, on Dec. 31, 1909, expects to engage in the manufacturing business in Cincinnati. Mr. Forester entered railroad work in 1877 with the Port Huron & Lake Michigan Railroad, which has been succeeded by the Chicago & Grand Trunk Railroad, and in 1881 went with the Wabash Railroad at St. Louis. Subsequently he served with the Wisconsin Central Railroad at Milwaukee and the Chicago, St. Paul, Minneapolis & Omaha Railroad at St. Paul. Returning to Milwaukee, Mr. Forester became chief clerk in the general freight office of the Milwaukee & Northern Railroad. On Dec. 1, 1886, he was appointed general freight agent of the Milwaukee & Northern Railroad and on Dec. 1, 1889, was appointed commercial agent of the Missouri-Pacific Railway at Atchison, Kan. One year later he was transferred to Kansas City by the Missouri-Pacific Railway and five years later was transferred to Cincinnati by the company, which he served for 18 years in Atchison, Kansas City and Cincinnati. Mr. Forester retired from the Missouri-Pacific Railway on Feb. 29, 1908, and was almost immediately appointed to the position with the Ohio Electric Railway which he has just relinquished.

Mr. Frederick H. Lincoln, who resigned as assistant general manager of the Philadelphia Rapid Transit Company last month, as announced in the Electric Railway Journal for Dec. 25, 1909, has accepted the office of vice-president and general manager of the Pay-Within Car Company and will make his headquarters at the company's Philadelphia office. Mr. Lincoln, as is well known, is one of the co-inventors of the pay-within car and is not only well suited for this reason to direct the affairs of that company but understands from his operating experience in Philadelphia the advantages of this form of prepayment car. Mr. Lincoln is a native of Boston, Mass., where he was born on May 28, 1867. His first work was in the machine shop of the Walworth Manufacturing Company, but in 1884 he entered the employ of the Thomson-Houston Electric Company and from that period until March, 1891, he took an active part in the installation of many of the early electric lighting and railway systems on which that company was engaged. In 1891 he resigned from that company to become connected with the Toledo (Ohio) Consolidated Street Railway, with which he remained for about two years, when he entered the employ of the People's Traction Company, Philadelphia, Pa., as an inspector. This company at that time was changing from horse to electric power and in 1894 Mr. Lincoln was given full charge of all the company's power stations. At the time of the consolidation of all the surface roads in Philadelphia in 1895 Mr. Lincoln was made superintendent of lines and cables, and in this capacity had entire charge of the re-designing and rebuilding of the company's electrical distribution system. He was also superintendent of the Willow Grove Park, owned and operated by the Philadelphia Rapid Transit Company. In August, 1905, he was made assistant general manager of the company and as such has had particular charge of the Market Street elevated and subway division as well as of the maintenance of equipment of the entire system. While the elevated and subway system was being planned, Mr. Lincoln was sent by the company on an extended trip to the principal cities of Europe to study elevated and subway systems. Mr. Lincoln has always taken an active part in the work of the American Street & Interurban Railway Engineering Association and at the convention held in Denver last fall was elected president of the organization. He is also a member of the American Institute of Electrical Engineers.



F. H. Lincoln

OBITUARY

Henry L. Shippy, formerly treasurer, manager and director of the John A. Roebling's Sons Company, New York, N. Y., is dead. Mr. Shippy had been connected with the Roebling Company for 35 years.

G. Hilton Scribner, who was president of the Central Park, North & East River Railroad, New York, N. Y., prior to its lease by the Metropolitan Street Railway in 1892, is dead. Mr. Scribner was president of the Street Railway Association of the State of New York in 1886-87 and Secretary of State of New York State in 1870-73.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

St. Louis, Springfield & Peoria Railroad, Champaign, Ill.—Incorporated at Springfield in the interests of the McKinley syndicate. Capital stock, $5,000,000. Incorporators: George M. Mattis, W. P. Carnahan, Charles Zilly, R. E. Bramble and Charles E. Cox, all of Champaign.

***Chicago, Bloomington & Peoria Railway, Chicago, Ill.**—Incorporated for the purpose of building an electric railway from Chicago to Bloomington and Peoria, passing through the Counties of Cook, Du Page, Will, Kendall, Grundy, La Salle, Livingston, Woodford, Tazewell, McLean and Peoria. Principal office, Chicago. Capital stock, $25,000. Incorporators and first board of directors: Jerome J. Danforth, Charles S. Sollars, Averne A. Hyde and Frank M. Capp, all of Chicago, and Virginius L. Garnett, Highland Park, Ill.

***Motor Grand Traction Company, Belleville, Kan.**—Chartered to build a railway, to be operated by gasoline or electricity, from Belleville via Concordia, Minneapolis, Salina, Canton and Newton to Wichita, a distance of 150 miles. It will extend through Republic, Cloud, Ottawa, Salina, McPherson, Harvey and Sedgwick Counties. Capital stock, $1,000,000. Headquarters, Belleville. Incorporators: E. S. Alnutt, E. N. Van Hosen, G. L. Litel and Roy S. Johnson, Belleville, and W. L. Hope, Fairbury.

***Fostoria, Napoleon & Defiance Railway, Columbus, Ohio.**—Incorporated in Ohio with a capital stock of $100,000 to build an electric railway through Seneca, Wood, Henry, Hancock and Defiance Counties. Incorporators: W. S. Reece, R. T. Betts, George Schrock, Charles Aten and Charles A. Bliss.

***Renovo & Gleaston Street Railway, Harrisburg, Pa.**—Incorporated at Harrisburg to construct an electric railway from Renovo to Gleaston, 5 miles. Office, Renovo. Capital stock, $30,000. Officers: R. V. Rogers, W. B. Reilly, Renovo; J. H. Crissman, and T. W. Gleason.

Greenville, Spartanburg & Anderson Railway, Columbia, S. C.—Incorporated with an initial capital of $300,000, to build an electric railway from Belton through Williamson, Pelzer and Piedmont to Greenville and thence to Spartanburg, 30 miles. The total length of the line will be 65 miles. Incorporators: J. B. Duke, B. N. Duke, Ellison Smyth, W. J. Thackston, H. J. Haynesworth and Lewis W. Parker. [E. R. J., Dec. 18, '09.]

FRANCHISES

Cœur d'Alene, Idaho.—The Common Council has granted a franchise to J. H. Hall and Herman J. Rossi, representing the Spokane, Wallace & Interstate Railway, for an electric railway through Cœur d'Alene along Independence Avenue to Government Way; thence north to connect with the Spokane International Railway into Spokane. [E. R. J., Jan. 30, '09.]

Greenfield, Ind.—Perry J. Freeman has applied to the Commissioners of Hancock County for a franchise for the Greenfield & Northern Railway, Greenfield, to construct an interurban railway from Greenfield north to Pendleton. [E. R. J., Dec. 25, '09.]

Indianapolis, Ind.—The Capital Circuit Traction Company organized to connect the seven county seat towns and numerous intervening villages around Indianapolis by an interurban railway has asked for renewals of several of its franchises. [E. R. J., Dec. 18, '09.]

***Sioux City, Ia.**—C. A. Magee has applied to the City Council for a franchise for an electric railway he proposes to build from Sioux City to Parkston, S. D., via Sioux Falls, Freeman, Yankton, Centerville and Elk Point. An extension is also to be built from Freeman to Pierre.

Boston, Mass.—The Railroad Commissioners have granted the petition of the Worcester & Northern Street Railway Company for an extension of 18 months in which to construct its proposed railway.

Springfield, Mo.—The County Court has granted the Springfield Traction Company an extension of time until April 21 to complete the new line on Nichols Street.

New York, N. Y.—The Public Service Commission of the First District on Jan. 8 adopted a resolution approving the franchise recently granted to the New York & Queens County Railway by the Board of Estimate for the operation of its cars from Jackson Avenue, Long Island City, over the Queensboro Bridge.

New York, N. Y.—Application has been made to the Board of Estimate by the Manhattan Bridge Three-Cent Line for a franchise to operate a street railway from Flatbush Avenue and Fourth Avenue, Brooklyn, over the Manhattan Bridge to Desbrosses Street and West Street, Manhattan. [E. R. J., Jan. 8, '10.]

***Lexington, N. C.**—S. E. Williams and J. E. Foy are reported to have applied to the Board of Aldermen for an electric railway franchise.

Portage, Pa.—The City Council has granted to the Johnstown & Gallitzin Railway, Johnstown, a six months' extension of its franchise until July 1 in which to begin work on its proposed street railway through Portage. [E. R. J., Dec. 25, '09.]

Towanda, Pa.—George R. Hill has asked the City Council for an extension of time of from 60 to 90 days on the franchise granted the Bradford County Traction Company in which to begin work on its line. [E. R. J., April 10, '09.]

Wheeling, W. Va.—The County Commissioners have passed an ordinance granting a franchise to the Rapid Transit Railway to construct an electric railway through Ohio County. [E. R. J., Dec. 25, '09.]

TRACK AND ROADWAY

***Fort Smith, Van Buren & Interurban Light & Traction Company, Van Buren, Ark.**—This company has been organized for the purpose of building a line through Crawford, Franklin, Johnson, Madison, Boone and Searcy Counties. T. A. Bailey, engineer, is said to have made a preliminary survey through Crawford County, and rights of way have been secured from Van Buren to Mulberry, Ark. Capital stock, $10,000. Officers: W. F. Keller, president; L. W. Burgett, vice-president; T. A. Bayley, secretary; S. A. Pernot, treasurer, and S. R. Chew, attorney.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill.—This company expects to electrify 30 miles of track and for this purpose will purchase cross ties, rail braces, tie plates, electrically driven gravel loaders. W. C. Cram, Jr., general manager.

Union Consolidated Elevated Railway, Chicago, Ill.—A work order has been passed by the board of managers of this company authorizing the renewal of rails and ties on this 2-mile, double-track structure in the heart of the business district of Chicago. It is stated that the 30-ft. rails will be replaced by rails 60 ft. long. Some form of continuous joint also will be used for the same purpose.

Springfield & Jacksonville Electric Railway, Springfield, Ill.—This company has awarded a contract to the J. H. McFarland Company for the construction of its proposed railway between Springfield and Jacksonville, 33 miles. Work on the railway will commence as soon as the weather will permit. John Melick, chief engineer. [E. R. J., Jan. 1, '10.]

***Brookston, Ind.**—Surveyors are locating a route for an interurban railway from Battle Ground to Reynolds by way of Brookston, a distance of 24 miles, in the interest, it is said, of the Ft. Wayne & Wabash Valley Traction Company, which operates to Battle Ground.

Fort Wayne & Toledo Electric Railway, Harlan, Ind.—This company announces that grading has begun on its 55-mile railway between Fort Wayne and Harlan, Ind., Hicksville, Farmer Bryan, Toledo and Montpelier, Ohio. Preliminary capital stock, $200,000. Bonds authorized, $18,000 per mile. Franchises from the various municipalities are being obtained as fast as possible. R. T. Bastress, Harlan, general manager. [E. R. J., Sept. 25, '09.]

Cincinnati, Madison & Western Traction Company, Indianapolis, Ind.—J. E. Greenley, president, says that work on the line to connect Scottsburg and Madison will be be-

gun on April 1, 1910. Subsidies of more than $100,000 have been voted and the preliminary survey has been made. [E. R. J., Nov. 20, '09.]

Vincennes (Ind.) Electric Railway.—This company advises that work will probably be started next spring on the projected 14-mile gasoline motor railway which is to connect Vincennes, Ind., Lawrenceville and Bridgeport, Ill. Officers: R. V. Stinson, Mt. Vernon, president; J. D. Madding, Bridgeport, Ill., vice-president; J. D. Lacroix, Vincennes, secretary; Charles Breen, Lawrenceville, Ill. [E. R. J., Dec., 11, '09.]

Lawrence Railway & Light Company, Lawrence, Kan.—This company has recently placed in operation a section of its street railway in Lawrence. The entire line will be 9 miles in length, and will be partly single and partly double track. About one-half mile of track still remains to be completed. Track consists of 70-lb. T-rails and is laid with 6-in. x 8-in. x 8 ft. No. 1 white-oak ties at 2 ft. centers. The overhead installation consists of No. 00 trolley wire and No. 0000 feeders. All construction work was carried out by the Dwyer Construction Company, Lawrence. A reinforced concrete car house has been built to accommodate the company's rolling stock which is made up of 7 open cars and 12 closed single-truck cars. Power to operate the line is secured from the local power plant which is owned by the company. Headquarters, Lawrence. Albert Emanuel, Dayton, Ohio, president. [E. R. J., April 17, '09.]

Central Kansas Interurban Railway, Salina, Kan.—C. B. Kirtland writes that this company expects to begin work during the spring on its projected railway which will connect Newton, Canton, Roxbury, Gypsum City, Abilene and Salina. Gasoline motor cars will be operated. The company has not yet been incorporated. Stock, authorized, $1,500,000. Officers: John C. Nicholson, Newton, president; J. C. Bruner, Abilene, secretary; C. B. Kirtland, Salina; O. Mooreshead, Newton, chief engineer. [E. R. J., Jan. 1, '10.]

***Little Falls, Minn.**—Henry Diebel, Long Prairie, is promoting an electric railway from Little Falls to Alexandria by way of Long Prairie.

Nebraska Traction & Power Company, Omaha, Neb.—During 1910 this company expects to build 3 miles of new track. William D. Crist, general manager.

Easton & Washington Traction Company, Washington, N. J.—This company is said to have announced that arrangements are being made to continue its line from Port Murray, the present terminus, to Hackettstown, and thence to Lake Hopatcong, where it will connect with the Morris County Traction Company.

Manhattan Bridge Three-Cent Line, New York, N. Y.—This company has filed an application with the Public Service Commission for a certificate of convenience and necessity for the construction and operation of a street railway from Flatbush Avenue and Fourth Avenue, Brooklyn, through the Flatbush Avenue extension, over the Manhattan Bridge and through Canal Street to the Hudson River. John C. Brackenridge, vice-president. [E. R. J., Jan. 8, '10.]

Hendersonville Light & Power Company, Hendersonville, N. C.—C. H. Broward writes that work will be started in the spring on its 4½-mile street railway. Contracts are not yet awarded. Capital stock, authorized, $125,000. Bonds, $100,000. Officers: R. M. Oates, Hendersonville, N. C., president; M. D. Peder, secretary; C. H. Broward, superintendent. [E. R. J., Oct. 23, '09.]

Grand Forks (N. D.) Street Railway.—During 1910 this company will construct 3 miles of new track. T. D. Campbell, general manager.

***Fostoria, Napoleon & Defiance Railway, Toledo, Ohio.**—Charles A. Bliss and R. T. Betts, Toledo, two of the incorporators of the company, state that McKeen gasoline motor cars will be used on the line, instead of electric cars. The right-of-way is now being secured. The company has just been incorporated to build a line through Seneca, Wood, Henry, Hancock and Defiance Counties.

Muskingum & Morgan Railway, Light & Power Company, Zanesville, Ohio.—W. H. Pierpont writes that this company will begin construction work in the early spring on the line between Zanesville and Duncan Falls. A power plant will be erected at Duncan Falls. Capital stock, authorized, $10,000. Officers: A. W. McDonald, Pittsburgh, Pa., president; John J. Adams, Columbus, vice-president; W. H. Pierpont, Zanesville, secretary; R. C. Burton, treasurer; F. C. Connas, chief engineer. [E. R. J., July 17, '09.]

Erie, Cambridge, Union & Corry Railway, Erie, Pa.—This company has filed for record at Erie a mortgage in favor of the Carnegie Trust Company, New York, to secure an issue of $1,000,000 in bonds. The proceeds are to be used for completing the electric railway which is to connect Erie, Union City, Cambridge Springs, Corry and Titusville.

***Franklin, Pa.**—Emory C. Read is said to be preparing to begin work securing rights-of-way for a route for the proposed railway between Franklin and Ellwood City. A committee, consisting of C. E. Smith, Dr. S. G. Foster, P. D. Murphy and G. B. Woodburn, has charge of all preliminary matters in connection with the new line.

Philadelphia & Suburban Elevated Railroad, Philadelphia, Pa.—The State Charter Board will give a hearing on March 1 on the application of this company for a charter for a line partly elevated and partly underground, including a subway on Broad Street. S. S. Neff, president. [E. R. J., Dec. 4, '09.]

Franklin & Towamensing Street Railway, Slatington, Pa.—A. P. Berlin, writes that this company will begin construction work in the spring on the line to connect Slatington, Palmerton, Bowmans, Parryville, Weissport, Lehighton and Mauch Chunk, Pa., 10 miles. Officers: A. P. Berlin, Slatington, Pa., president; H. T. Craig, Lehigh Gap, Pa., secretary; John T. Semmel, treasurer. [E. R. J., April 25, '08.]

Waynesburg & Blacksville Street Railway, Waynesburg, Pa.—This company is said to have awarded a contract to W. A. Martin for the construction of that section of its street railway between Blacksville and Morgantown. The contract for the Mannington-Blacksville division has also been let. A power station will be erected at Blacksville. The main line will extend from the Pennsylvania-West Virginia State boundary to Waynesburg, 14 miles. The extensions to be built will total 50 miles. J. L. Johnson. [E. R. J., Nov. 6, '09.]

***Regina, Sask.**—J. D. McArthur, in conjunction with the Western Trust Company, Winnipeg, Man., is said to be considering the construction of a street railway in Regina.

Corpus Christi & Interurban Railway, Corpus Christi, Tex.—An official writes that this company has nearly completed its street railway in Corpus Christi and will place it in operation wnthin the next few weeks. It will be a belt line with a loop in the business section of the city and will be 5 1/3 miles long. Five miles of track has been laid and the rest is now being graded. The company is using a 60-lb. T-rail and is installing span type of overhead construction, with No. 00 grooved wire. About one-half of the overhead work has been completed. There will be only two grades of about 4 per cent each. All construction work is being done by the company. Power will be rented from the People's Light Company. V. S. Heinly, Corpus Christi, secretary and treasurer. [E. R. J., Dec. 4, '09.]

***Galveston, Tex.**—C. L. Hoges, Chicago, and L. L. McSweeney, New York, are reported to have announced that they are in charge of the preliminary work of a projected electric railroad connecting the larger cities of Texas behind which is a syndicate representing $26,000,000 capital. They state that surveys providing for lines connecting Fort Worth and San Antonio, 250 miles; San Antonio and Houston, 270 miles, and Houston and Dallas, 275 miles, have been made and construction will begin within 90 days on the Fort Worth and San Antonio line.

Galveston-Houston Electric Railway, Galveston, Tex.—This company has filed for record a mortgage for $5,000,000 in favor of the City Trust Company, Boston, Mass., as trustee, to secure an issue of bonds. Of this amount $3,000,000 will be issued to cover the cost of the construction of the interurban railway between Galveston and Houston in accordance with the authority of the Railroad Commission of Texas. [E. R. J., Jan. 1, '10.]

***Greenville, Tex.**—Mayor Frank Nichols is said to be at the head of a plan to organize a company for the construc-

tion of an interurban railway from Greenville to Wolfe City. Extensions are also projected from Greenville to Plano and from Wolfe City to Clarksville.

Mt. Adams Electric Railroad, White-Salmon, Wash.—H. S. Hall, chief engineer, writes that this company expects to begin construction about May 1, 1910, on the proposed 60-mile line between White-Salmon and Glenwood, Wash. The company has not yet been incorporated. It is proposed to build a power plant on the White-Salmon River. Capital stock, authorized, $1,000,000. C. L. Colburn, White-Salmon, Wash., secretary. [E. R. J., Dec. 18, '09.]

Bay Shore Street Railway, Green Bay, Wis.—This company has almost completed its street railway which is to connect Green Bay, Preble, Bay Beach, Bay View Beach and Harbor View, a distance of 2 miles. It is stated that this company is affiliated with the Green Bay (Wis.) Traction Company which operates a line from Duck Creek to Green Bay. Four cars will be operated over the new line. Power will be rented from the Green Bay Traction Company. Capital stock, authorized, $30,000. Issued, $10,000. Officers: F. E. Murphy, president; W. B. Allen, vice-president; A. C. Neville, secretary; F. A. Rahr, treasurer and general manager; J. M. Carl, superintendent, all of Green Bay. [E. R. J., July 3, '09.]

SHOPS AND BUILDINGS

Edmonton Radial Railway, Edmonton, Alta.—This company will erect a new fireproof car house in Edmonton to be 250 ft. x 80 ft. The structure will accommodate 50 cars, and will contain six tracks. A machine shop and offices will also be provided for in the building.

Dayton & Troy Electric Railway, Dayton, Ohio.—This company will erect a steel and brick office building at Tippecanoe City, 40 ft. x 100 ft. and two stories high. Steel has already been received. C. M. Paxton, general manager.

Pittsburgh & Allegheny Valley Railway, Leechburg, Pa.—The car house of this company located in Leechburg was destroyed by fire on Jan. 1. The loss is said to be $30,000. No cars were burned.

Philadelphia (Pa.) Rapid Transit Company.—This company expects to erect a station at Front Street, Water Street and Market Street, to cost $30,000. A similar station will be built in the vicinity of Twelfth Street and Filbert Street.

Pittsburgh & Butler Street Railway, Pittsburgh, Pa.—It is announced that contracts will be awarded by this company within the next few days for the erection of a freight depot.

POWER HOUSES AND SUBSTATIONS

Colorado Railway, Light & Power Company, Trinidad, Col.—This company expects to build during 1910 an extension to its power house and will purchase turbo-generators and steam-generating equipment. H. N. Siegfried, general manager.

New Orleans Railway & Light Company, New Orleans, La.—This company has awarded a contract to the Jefferson Construction Company, Perrin Building, New Orleans, for the erection of a substation and emergency house, 154 ft. 8 in. x 53 ft. 8 in. The substation is to be of fireproof construction and the emergency house of mill construction.

Boston (Mass.) Elevated Railway.—The auxiliary power plant of this company, located on Harrison Avenue, Boston, was destroyed by fire on Jan. 3. The building was of brick construction and two stories high. The loss is said to have been about $50,000.

Nebraska Traction & Power Company, Omaha, Neb.—This company is considering the purchase of a rotary converter. W. D. Crist, general manager.

New York & North Shore Traction Company, Roslyn, N. Y.—This company has filed plans for a power plant to be located on Albany Creek north of Broadway, Douglaston. The building will be 105 ft. x 79 ft. and one story high, and will cost about $90,000. This plant will furnish power for the line from Manhasset to Whitestone. C. H. Clark, Roslyn, chief engineer. [E. R. J., Oct. 9, '09.]

Grand Forks (N. D.) Street Railway.—This company expects to purchase second-hand power-plant equipment complete with a capacity of 200 kw to 300 kw. Thos. D. Campbell, general manager.

Manufactures & Supplies

ROLLING STOCK

Denver (Colo.) City Tramway will have 35 new cars built during 1910.

Public Service Railway, Newark, N. J., has ordered 100 pay-as-you-enter cars from the Cincinnati Car Company.

Michigan United Railways, Lansing, Mich., is in the market for from 15 to 20 pay-as-you-enter cars for city service.

Power, Transit & Light Company, Bakersfield, Cal., expects to place an order within the next two weeks for some new cars.

Petaluma & Santa Rosa Railway, Petaluma, Cal., expects to order 12 to 20 M. C. B. trucks for 30-ton freight cars within the next two months.

Missoula (Mont.) Street Railway has placed an order with the American Car Company for three closed vestibule cars to be equipped with Brill No. 39-E trucks.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C., contemplates purchasing some GE-57 and 67 motors and Brill single and double trucks during 1910.

New York & North Shore Traction Company, Mineola, N. Y., has placed an order with the Westinghouse Electric & Manufacturing Company for four 40-hp four-motor equipments, including control and wiring.

Hudson & Manhattan Railroad, New York, N. Y., mentioned in the ELECTRIC RAILWAY JOURNAL of Dec. 11, 1910, as being in the market for 30 all-steel passenger cars for tunnel service, has placed an order with the American Car & Foundry Company for 50 cars of this type.

Oregon Electric Railway, Portland, Ore., mentioned in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1909, as contemplating the purchase of some cars, has placed an order with the Niles Car & Manufacturing Company, through W. S. Barstow & Company, New York, N. Y., for two observation trail cars. The remaining cars to be bought will be ordered within the next few weeks.

Third Avenue Railroad, New York, N. Y., which recently ordered 100 pay-as-you-enter cars from The J. G. Brill Company, has divided the order for two-motor equipments for these cars between the Westinghouse Electric & Manufacturing Company and the General Electric Company, each company obtaining 50, including the wiring and control, but not the brakes. These motors will be 70 hp each.

TRADE NOTES

Northern Engineering Works, Detroit, Mich., have purchased land adjoining their works on which to extend their crane plant.

F. H. Niles Car Company, Chicago, Ill., has increased its capital stock from $50,000 to $500,000 and changed its name to the Blue Island Rolling Mill & Car Company.

Jones Change Register Company, New York, N. Y., has the Jones duplex check gate in operation at both ends of a car of the Ocean Electric Railway, Far Rockaway, N. Y.

Carborundum Company, Niagara Falls, N. Y., will open an office in New York City at 26 West Broadway about the middle of January, to carry a full line of the company's products.

Stone & Webster, Boston, Mass., announce that the New York office of the company will soon be located in the Hanover National Bank Building on Nassau Street, where a suite of offices is being fitted up.

W. H. Zimmerman, First National Bank Building, Chicago, Ill., announces the incorporation of the W. H. Zimmerman Company to do general engineering, with offices in Chicago and a branch in Lansing, Mich.

Paul J. MacCutcheon has resigned as manager of the New York office of the M. B. Foster Electric Company, electrical engineers and contractors of New York and Boston. Mr. MacCutcheon has not yet announced his plans for the future.

Bruce Macbeth Engineering Company, Cleveland, Ohio, has opened a branch office at 1020 Drexel Building, Philadelphia, Pa., in charge of M. E. Jackson. The company

builds gas engines in units up to 300 hp, and has equipped more than 500 plants.

George T. Steele has been appointed receiver of the Indiana Engineering Company, Indianapolis, Ind., on application of George Stewart, who alleges the company is insolvent. H. T. Wilkerson is president of the company, and H. E. Gaddis, secretary.

Allis-Chalmers Company, Milwaukee, Wis., has received an order from the Southwest Missouri Railroad, Webb City, Mo., for four two-motor, double-end car equipments and two four-motor, double-end equipments, including controllers. The motors are of a new interpole type.

Kinsman Block System Company, New York, N. Y., reports that throughout the heavy blizzard of Christmas week its block signal installation for the Public Service Railway gave perfect service. This installation was described in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1909, pages 1239 and 1240.

Idealo Company, Philadelphia, Pa., has recently placed on the market a new preparation called Idealo car cleaner, which, it is claimed, contains no alkali, acid, grit or water, but is a perfect and lasting emulsion. It is said to produce a fine finish and luster on the varnish and a small quantity will cover a large surface.

John Watts, of the Canadian General Electric Company, Toronto, Ont., had charge of the rehabilitation of the electrical equipment of the Lac Du Bonnet water-power plant of ths Winnipeg (Man.) Electric Railway after the recent accident, and not G. W. Watts, as stated in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, page 1275.

O. M. Edwards Company, Syracuse, N. Y., received an order for its window fixtures 13-OD1 for use on the 50 new cars ordered from The J. G. Brill Company by the Chicago City Railway and the 33 cars being built by the Cincinnati Car Company for the Louisville Railway. Window design, 7-D1, and Edwards trap doors will be used on 30 suburban steel cars now under construction at the plant of the Pullman Car Company for use by the Pennsylvania Railroad.

Watson-Stillman Company, New York, N. Y., has made several additions to its sales department to handle the increasing business in hydraulic tools and turbine pumps. Edwin Stillman has entered the sales department, and is assisting in taking care of customers in New York State, while all southern railroad business is now in charge of Frank C. Clark. The company's representative in the Orient is F. W. Horn, the well-known machinery importer of Yokohama, Japan.

Ackley Brake Company, New York, N. Y., announces the appointment of John C. Raymond as secretary and manager of the New York office in the Hudson Terminal Building. Mr. Raymond was for some years connected with H. A. Clark, of Middletown, Pa., who was at that time acting as eastern agent for the National Brake Company. Later he was in charge of the order department of the Middletown Car Works at Middletown, Pa., and for the past year he has represented the National Brake Company in the West and in Mexico.

Brill & Gardner, Chicago, Ill., is a new partnership between George M. Brill and Horace C. Gardner for the continuation of the engineering and architectural practice conducted in the past by Mr. Brill. Mr. Brill has been engaged in constructive engineering work for many years, and for 12 years has specialized in the design of complete manufacturing and power plants. Through his position as manager of the construction and mechanical departments of Swift & Company Mr. Gardner has had active experience in the wide range of construction and engineering matters for 20 years, including all that pertains to packing-houses, industrial plants, cold storage, ice-making and refrigeration and the building and maintenance of railway equipment. The offices of Brill & Gardner will be located at 1134 Marquette Building, Chicago, Ill.

National Brake Company, Buffalo, N. Y., announces that it has made certain changes in its organization due to the arrangement made with G. S. Ackley, the former president of this company, as mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 8. While Mr. Ackley will sell the Ackley adjustable and Peacock brakes in foreign countries through his own company, the National Brake Company will still own and retain for itself all the patents on these in the United States, Canada, Mexico and the Hawaiian Islands. The officers of the National Brake Company as now organized are as follows: President and manager, Frank D. Miller; vice-president, E. B. Stone; second vice-president, B. W. Lewis; treasurer, O. S. Mills; secretary, W. D. Brewster. The only change in the personnel is the return of O. S. Mills to the office of treasurer, which position he held with the National Brake Company at the time of its organization. The National Brake Company states that the new arrangements will enable it to give better and closer attention to the requirements of its customers in this country, and that the little change there has been in the personnel of the company will in no way affect its general policy. Mr. Miller, who is well known in the street railway field, will assume active management of the company and will see to it that the company's customers receive the same consideration and courteous treatment as in the past.

ADVERTISING LITERATURE

Frank Ridlon Company, Boston, Mass., has issued its January list of second-hand electrical machinery.

Poole Brothers, Chicago, Ill., printers of railway tickets and timetables, are sending out a large wall calendar for 1910.

Vulcan Steam Shovel Company, Toledo, Ohio, is distributing a 1910 calendar calling attention to Vulcan power shovels.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., is distributing two folders describing improved porcelain strain insulators and Anderson trolley wire ears.

H. B. Underwood & Company, Philadelphia, Pa., is distributing large calendars for 1910 on which are advertised the company's line of portable tools for railway repair shops.

Allgemeine Elektricitats-Gesellschaft, Berlin, Germany, has issued three publications in German as follows: Flaming arc lamps; single and polyphase turbo-generators, and turbine-driven power-plant auxiliaries.

Hurley Track-Laying Machine Company, Chicago, Ill., is distributing a folder which refers to a record-breaking performance of one of its track-laying machines on the Manistee & North-Eastern Railroad.

Lord Electric Company, New York, N. Y., has prepared advertising leaflets descriptive of Heany arc lamps, M. V. G. cell lightning arresters for a.c. circuits, the Bradshaw car skid and also of two Westinghouse air compressors which it has for sale.

Engineering Department of the National Electric Lamp Association, Cleveland, Ohio, has issued Bulletins Nos. 6 F and 6 G, in which are described and illustrated, respectively, the tungsten 250-watt multiple lamp for 100-125 volts and the tungsten street series lamps. Bulletin No. 6 G supersedes Bulletin No. 6 A.

Brown Hoisting Machinery Company, Cleveland, Ohio, has published a handsomely illustrated catalogue describing the application and manifold uses of Ferroinclave, a corrugated sheet-steel reinforcement for concrete roofs, floors, walls, bridges, tanks and other structures.

Trussed Concrete Steel Company, Detroit, Mich., has printed in pamphlet form a report of a fire, load and water test made upon reinforced concrete floor arches at the Columbia University fire testing station, New York, N. Y., by Prof. Ira H. Woolson in co-operation with the City Building Bureaus. The Detroit company's "Rib Metal" and "Hy-Rib" were used as reinforcement in these experiments and developed a high carrying capacity.

Western Electric Company, New York, N. Y., has issued Bulletin No. 1105 in which is described in detail the company's intercommunicating telephone systems. The bulletin contains 40 pages of descriptive matter, showing the different combinations of systems in which the new Western Electric metal intercommunicating telephones may be used. It also contains the wiring diagrams necessary for the installations of these systems. This company has also issued two folders describing the application of the Gill selector for telephone train dispatching and the use of telephones in railway terminals.

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Indiana Rules Amended

At a conference called by the Railroad Commission of Indiana on Tuesday of this week the Indiana code of interurban rules was amended to make it conform, with a few minor exceptions, to the standard code adopted by the American Street & Interurban Railway Association. The changes made are, in general, modifications in wording designed to make the meaning of rules clear without modifying the practice in any essential particular. The revision of Rules 107 and 162 of the Indiana code is intended simply to cover additional situations not specifically referred to in the old rules. This endorsement of the standard code is most encouraging, and establishes a safe precedent for other State commissions. It will be of great assistance to the industry, as well as conducive to safe operation, to have a recognized standard of interurban rules, and the action of the Indiana commission is a step toward this end.

Employees as Stockholders

It is to the interest of every railway property to have its employees enthusiastic for the advancement of their road. We have in the past called attention to many methods for increasing the *esprit de corps.* These have included "heart to heart" talks, orally or through the medium of attractive bulletins, the award of premiums for good service and the older and more generally followed practice of advancement from the ranks. Still another method is being used by the Fort Wayne & Springfield Railway. This company hires no trainmen unless they will purchase one share of the stock of the company and subscribe for five additional shares. Some of the motormen and conductors hold as many as 30 shares of the company's stock, and every motorman and conductor and every employee who occupies a responsible position is a stockholder. One advantage claimed for this plan is that besides interesting the men in the efficient operation of the company, it confines the service to those who are thrifty. It may occasionally exclude a good man, but the number thus kept out is undoubtedly small and the disadvantage is more than counterbalanced by the fact that shiftless men are not taken on, and a shiftless man is apt to be a careless one. It has also been found that the purchase of the first share of stock almost always instills a desire for the employee to increase his holdings in the company. The prime reason why this means for stimulating loyalty is successful is because each man, as the owner of some stock in the corporation, feels that he is working for his own interest and advancement as well as for that of the company. The management of the Fort Wayne & Springfield Railway, which has followed this plan of requiring its employees to be stockholders ever since the road first was opened, commends the scheme very highly, and emphasizes its commendation with the statement that no accidents have happened that could be attributed to the negligence of the men.

The Improvement of the Single-Phase Railway Motor

The paper read before the American Institute of Electrical Engineers by Prof. W. S. Franklin and S. S. Seyfert is interesting to the designer of railway motors not only because it discusses some possibilities of very material improvement from the spacial standpoint of single-phase motors, but also because of the novel suggestions made to accomplish this result. As the paper in question does not raise directly the rancorous question of alternating current versus direct current operation, we shall gladly let the question alone here, noting only that Prof. Franklin's comment on the existing electrical equipment of the New York, New Haven & Hartford Railroad is very pertinent as coming from an expert and one who has taken no part in the controversy that accompanied the equipment of that road. Prof. Franklin's judgment is that the equipment as it stands meets all the conditions specified by the railroad company, and also that the equipment is somewhat too light, the tractive effort at starting being less than is desirable. This opinion harmonizes with that derived from other examinations of the equipment.

Coming now to the motor itself, it is difficult to speak with assurance of its possible performance because of its radical differences from standard design. The inherent characteristics of the alternating current series motor, from the very nature of its current supply, are such that one must be content with a moderate frequency and must go to very careful construction in order to get good output. The armature of such a machine must be relatively very powerful; special forms of commutating devices must be used to prevent sparking, and the winding design must be very carefully worked out on account of the necessity for a very powerful armature. The first step taken by Prof. Franklin to meet these conditions and to economize space between the wheels is to turn the motor inside out—that is, to build it with a stationary armature and an internal revolving field. Viewed from an electrical standpoint, this is certainly the logical arrangement for a machine of which the armature is to be altogether predominant in the electro-magnetic design. His second step is to remove the commutator, now stationary, together with the high-resistance leads or induction coils, or other anti-sparking devices, from its customary position on the motor and to place it where it can be gotten at more readily, for instance above the motor, revolving the brushes at the necessary speed by means of simple gearing. This step certainly saves a great deal of valuable axle space and permits it to be taken up by the armature and field rather than by their accessories. It also allows the brushes on the commutator to be placed where they can be very readily inspected, an advantage not lightly to be cast aside, even though obtained at the risk of a somewhat complicated brush connection.

As an example of what can be done by this construction, Prof. Franklin gives figures on single-phase motors of the ordinary and of its modified design, each being limited to 30 in. external diameter and to a speed approximately 550 r.p.m. at the full load, the same length of iron and general characteristics of design being used. The results obtained by three independent computors give a gain of nearly 20 per cent for the new design owing to the better arrangement of the material. The new type is slightly heavier than the old, but the weight of the active material per horse-power is slightly less. The efficiency remains about the same, and the power factor is several per cent in favor of the external armature. A design is also given showing the characteristics of a new construction for a 500-hp machine of 50 in. outside diameter and a total motor length of just over 39 in.

In the discussion, considerable doubt developed as to the success of the external commutator in practical service. It seems also that the design would cost for ordinary voltage and speeds considerably more than the ordinary arrangement. But these points could be determined only by actual construction and use.

Training Men for Electric Railway Work

The appointment last week by the executive committee of the Engineering Association of a committee to investigate and report upon the subject of educating engineering apprentices brings three propositions now before electric railway companies for instructing men in electric railway work. The purpose of each plan is different. Two aim to take what might be called raw recruits and by an intelligent and systematic method under competent instruction to train them to take responsible positions, in one case in the transportation department and in the other case in the engineering department. The third plan proposed is for the improvement of men already in the employ of the railway companies. The first and third plans were those proposed by the committee on education of the main association, and the second plan, or that on the training of engineering apprentices, will be taken up by the new committee appointed to consider the subject by the Engineering Association. As the provinces of the three methods are entirely unlike, they do not clash in any particular. In fact, there is no reason why any company could not, with profit, carry on all three at the same time.

It seems to us that there are two underlying principles which must be accepted before progress is made in any one of these proposed plans. The first is that it is just as important to have men of ability and expert knowledge in each of the different departments of an electric railway company to conduct its affairs as it is to have sufficient capital to maintain the physical property and to extend its lines. This being admitted, it seems most logical that the desired results can be obtained much more satisfactorily if undertaken along some systematic plan. The second proposition is that to be of material benefit to the industry at large, this work should be carried on by a considerable number of companies. Otherwise, individual companies, by what might be called predatory tactics, could reap a considerable amount of the benefit of work undertaken by others, and unless the source of supply was constantly being replenished, the industry as a whole would suffer.

We do not mean to say that the requisite amount of experience cannot be secured through the hard knocks of actual experience. This has been the method followed up to the present time, and by a process of the selection of the fittest, capable men have been advanced and are occupying responsible positions with marked ability. There is no reason, however, to believe that this is the most efficient way of accomplishing the desired result, or that in the training of men for electric railway positions advantage cannot be gained from experience in other lines of industry. Large steam railroad companies and manufacturing companies have found it to their advantage both to offer incentives in the way of learning the business to young men and to instruct those already in their employ, and as there are ever-increasing demands in the electric railway industry for men of intelligence, as much incentive, both finan-

cial and in future opportunity, must be afforded in it as in the other vocations if the best kind of men who are now choosing their vocations are to be attracted to the service of the electric railway companies.

Minneapolis Low-Fare Ordinance Nullified

The binding force of a contract between a street railway company and a municipality is defined clearly in the decision of the United States Supreme Court in the Minneapolis case, published in last week's issue. The City Council of Minneapolis passed an ordinance on Feb. 9, 1907, which, if upheld, would have obliged the Minneapolis Street Railway Company to sell six tickets for 25 cents on its Minneapolis lines. On Jan. 3, 1910, the United States Supreme Court, in an opinion delivered by Justice Day, approved the action of the United Circuit Court for the District of Minnesota in enjoining the city from enforcing the ordinance. The Supreme Court based its decision on the ground that the measure impaired the obligation of an existing contract.

While the history of the low-fare movement in Minneapolis and the litigation arising therefrom are familiar to many who are in close touch with street railways, the final decision of the United States Supreme Court emphasizes a number of points which have a direct bearing on the conditions that confront the industry in other cities and it therefore merits careful attention.

The plea upon which the Minneapolis Street Railway secured the injunction preventing the city of Minneapolis from enforcing the low-fare ordinance was that this measure violated the terms of a previous contract passed by the City Council on July 9, 1875, and ratified by an act of the Legislature of Minnesota on March 4, 1879.

This contract gave the company the right for 50 years to charge a fare not exceeding 5 cents for each person carried on any continuous line which might be designated by the City Council or the city, such continuous line, however,, not to exceed 3 miles in length. The contention of the company was that this contract was irrepealable. The position of the representatives of the city was first, a denial of the existence of this contract. They held that the Minneapolis Street Railway Company was organized under such a section of the laws of Minnesota that its charter and consequently corporate life expired 30 years from the date of incorporation, that is, on July 1, 1903. The company contended that it had been organized under another section of the law for a term of 50 years.

Considering the contending arguments on this point, the Supreme Court found that no proceedings have been instituted to inquire into the corporate existence of the company since the end of the 30-year period; that various ordinances have been passed by the city of Minneapolis since July 1, 1903, and that the corporation has continued to act since the expiration of that period.

The court therefore held on this point that the company undertook to organize for 50 years, had continued to act and was so acting at the time of the passage of the ordinance attempting to prescribe a low rate of fare. Disposing in this manner of this aspect of the city's case, the court then examined the original ordinance and the ratifying act of the Legislature to ascertain whether they constituted a binding contract between the city and the street railway for 50 years. The ordinance granted the exclusive right and privilege to the company to construct and operate a passenger railway line. In considering the undeniable obligation which this ordinance imposed upon the city for the full term of 50 years, the Supreme Court takes occasion to emphasize the fact that "contracts of this character are protected by the Federal Constitution from impairment by subsequent State legislation." This bears directly upon the controversy involved in the case under consideration.

From its careful conclusions regarding the nature of a contract in so far as the city is concerned the Supreme Court, however, evidently felt that its duty was to suggest as a corollary another aspect of a contract. It must be borne in mind, the court said, "that public grants of this character are not to be extended by implication and that all that is granted must be found in the plain terms of the act." The decision did not refer in detail to the cases which established this fundamental point, but added that the principle had been announced so frequently and recently in the court that citation was unnecessary. To emphasize again its position on these points the court reiterated that "statutes and ordinances of this character are not to be extended by construction, nor should they be deprived of their meaning if it is plainly and clearly expressed." Later in the decision the court added that language could scarcely be plainer than that in the 1875 ordinance.

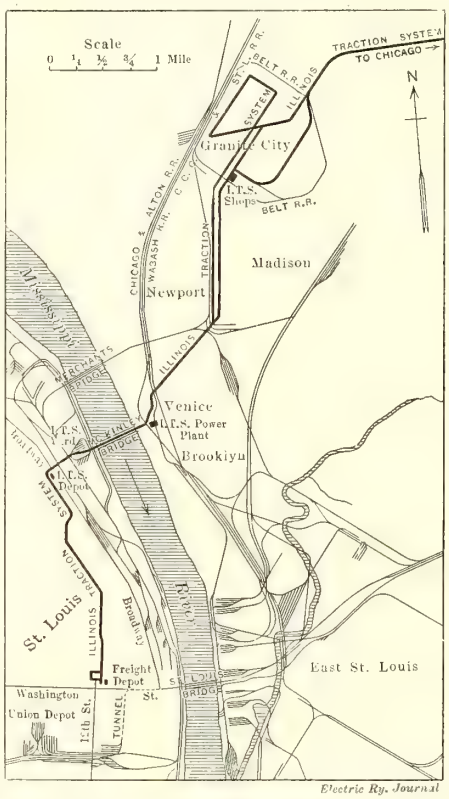
Taking up another point in the array of arguments advanced by the city against the company, the court discussed the contention that the rights granted in 1875 were lost by virtue of the acceptance of an ordinance passed on Sept. 19, 1890, authorizing the company to change from horse to electric operation. The city contended that by this 1890 ordinance, it acquired the right to regulate future rates of fare to an extent unlimited except by constitutional inhibitions against confiscatory legislation. The ordinance of 1875 provided for the use of either animal or pneumatic power for the operation of the cars and prohibited steam cars. But it also stipulated that no propelling power should be continued in use if it should prove to be a public nuisance; and the court held that while the use of electric power as a means for operation was not specifically in contemplation at the time of the passage of the 1875 ordinance, this language indicated that those who agreed upon the conditions of the contract had in mind the probability of progress in the art.

One section of the 1890 ordinance provided that the company should be subject to the conditions of the 1875 ordinance as amended and in force and any other ordinance of the city in force or "hereafter adopted so far as applicable." It was the contention of the city that this clause made the company subject to regulation as to fares. The court held, however, that if it had been intended to change the rate of fare fixed in the 1875 ordinance, it would seem clear that new negotiations would have been opened concerning it and that some definite measure would have been adopted if desirable. The ordinances of 1890, however, did not attempt to repeal the earlier measure, but on the contrary referred to this act as in force. The 1890 measure provided for transfers, but the court added that it did not understand that the acceptance of this regulation had the effect of abrogating the requirement for the fare of 5 cents for a continuous passage.

The decision of the court therefore reaffirms the contract under which the company operates. It serves to strengthen in every way the position of the company during the life of this measure.

IMPORTANT NEW WORK OF THE ILLINOIS TRACTION SYSTEM

The construction program of the Illinois Traction System in 1909 included work of considerable general interest. Most of it was completed by the end of the year according to the plans announced in the Electric Railway Journal for April 3 and April 17, 1909. The principal additions and improvements included the construction of a large bridge over the Mississippi River at St. Louis, the development of a terminal in the heart of St. Louis, the re-equipment of nearly 100 miles of single-phase railroad for operation with standard d.c. apparatus, the construction and purchase of many new cars, expansion of the repair shop plant and the design and foundation work for a 28,000-hp generating station. Good progress was made on the construction of the Mississippi River bridge, but this, of course, is too large an undertaking to be completed in one year. The present article includes a description of the large terminal work at St. Louis; describes the principal features of the new generating station for the southern division of the road; presents the interesting details in connection with the a.c.-d.c. change, and gives accounts of a number of novel operating features which have been developed. Acknowledgment for assistance in the preparation of this article is made to H. E. Chubbuck, general manager; C. F. Handshy, general superintendent of interurban lines, and H. C. Patterson, electrical and mechanical engineer of the Illinois Traction System.



Illinois Traction System—Map of St. Louis and Vicinity, Showing Location of McKinley Bridge and New Terminal

EXTENT OF THE SYSTEM

The Illinois Traction System and the Chicago, Ottawa & Peoria Railway are owned by the "McKinley Syndicate," and include about 550 miles of interurban track, exclusive of running rights over the street tracks of many small city lines owned by the same interests. Reference to a map of the State of Illinois will show that the McKinley interurban lines closely follow a direct line between St. Louis and Chicago. There is a gap of about 15 miles in the electric route at the northern end between Morris and Joliet, and an incomplete section about 40 miles long between Mackinaw Junction and Streator. The preliminary engineering work on these two open sections is now completed and construction work soon will close the gaps, making possible through electric service from Chicago to St Louis.

At the present time the schedules of the Illinois Traction System offer continuous rides between East St. Louis and Peoria, 172 miles, and East St. Louis and Danville, 227 miles. Extending as it does diagonally across that part of the State of Illinois richest in mining and agriculture and serving the center of the State with duplicate north-to-south routes 60 miles long, this railway system has possibilities for developing traffic sufficient to warrant the expenditure of large sums for terminals. For this reason and because of the fine future for suburban development in the territory within 20 miles of St. Louis, the McKinley interests undertook the construction of a bridge across the Mississippi River which would afford a high-speed entrance into the traffic center of St. Louis. With the work under way and proposed, the St. Louis terminal project will require the expenditure of $6,500,000. A map of the route in and near St. Louis is presented.

ST. LOUIS TERMINAL

Briefly, the principal features of the St. Louis terminal project include the construction of 2.5 miles of double-track line on private right-of-way leading from a point on the present system in Granite City, Ill., south to the Mississippi River; the erection of a bridge across the Mississippi River which with its approaches will be nearly two miles long; the development of a large freight terminal at the St. Louis end of the bridge; the construction of a double-track line on 2.5 miles of streets in St. Louis, and the erection of terminal buildings in the commercial center of that city. The increased load occasioned by the St. Louis terminal lines over which 30 local suburban cars will be operated, and the need of power on the southern division of the Illinois Traction System, required the construction of a large power plant near St. Louis. The foundations for this plant, which will have an ultimate capacity of 28,000 hp, have been completed and a large part of the structure and apparatus is under contract. At the close of the year the connecting tracks in Illinois, one main span of the Mississippi River bridge, 850 ft. of the structural steel work on the Missouri side and five miles of single track in St. Louis had been completed.

MCKINLEY BRIDGE

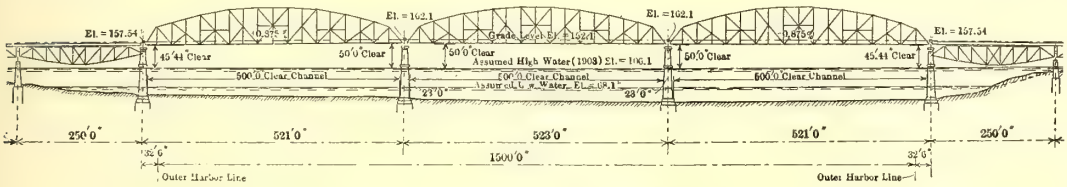
The large bridge over the Mississippi River, which forms the most important link in the St. Louis terminal project of the Illinois Traction System, is designed to have a normal carrying capacity of 10,000 lb. per lineal foot of track and 3000 lb. per lineal foot of driveway. The steel structure includes three river spans, 521, 523 and 521 ft. in length, respectively, two shore spans each 250 ft. long and three shoe spans each 150 ft. long. Structural steel elevated approaches will afford a connecting grade of 1.75 per cent at each end of the bridge. The approach structure on the Missouri side passes over the freight terminal property of 24 acres owned by the traction system, over several steam railroad tracks and St. Louis streets to connect with the street grade 2700 ft. from the west end of the bridge. The steel section of the Illinois side approach is 500 ft. long.

The three river spans of the main bridge are riveted, inclined top chord, through Pratt trusses; the five spans over the shallower part of the river near the shores are riveted deck trusses. The main bridge carries two railroad tracks through a center space 26 ft. 6 in. wide and 20 ft. high in the clear. Two roadways, each 14 ft. wide, are carried outside of the trusses on cantilever brackets at the ends of the through floor-beams. The total width of the bridge over all is 65 ft. and the clearance above high water is 50 ft.; clearance above assumed low water is 84 ft., and the height of the river piers from bedrock to capstones is 150 ft. The masonry of the four large river piers is red granite and Bedford limestone which is backed with concrete. The piers supporting the approach structures on either side are concrete monoliths resting in reinforced concrete piles. All the timber in the floors of the bridge and the paving of the roadways was treated with creosote. The designs for this bridge, which is said to have a larger track-load carrying capacity than any structure spanning the Mississippi River, were prepared by Ralph Modjeska, consulting engineer, Chicago. It is expected that the bridge will be completed and ready for service early in the coming summer. The steel work for the approaches is being furnished and erected by the Strobel Steel Construction Company. The steel work for the river spans was furnished by the Pennsylvania Steel Company and is being erected by the Missouri Valley Bridge & Iron Company.

TRACK WORK IN ST. LOUIS

In St. Louis the interurban tracks leading off the west approach of the bridge extend partly on private right-of-way, but mostly in city streets to a terminal loop at Twelfth Street one block north of Washington Street. This location is about two blocks from the Jefferson Hotel and close to the business center of St. Louis. The terminal loop encircles four city blocks and passes the passenger and express station property now owned by the company.

The total trackage in St. Louis, measured as signal track, is 6 miles and is now ready for use. All track is laid with



Elevation of McKinley Bridge Over the Mississippi River at St. Louis

125-lb., Pennsylvania section No. 273, grooved girder rail, carried on creosoted ties. A concrete foundation, brought to a surface 1½ in. above the tops of the ties, supports a pavement of creosoted blocks which were supplied by the Kettle River Quarries Company, St. Louis. In St. Louis all tracks have a minimum center distance of 12 ft. The curves have a minimum radius of 90 ft. and are so designed that large interurban cars may have ample clearance to pass on them. The trolley wires are supported on steel poles set in concrete.

STATIONS IN ST. LOUIS

The franchise under which the Illinois Traction System will operate in St. Louis permits the handling of trains of "Pullman" and express cars over the entire route. Plans for a large passenger station to be built at the terminal loop in the commercial center of St. Louis are not yet finished, but it is expected that this project will include a large office building designed to permit the use of the first floor as a passenger loading station and waiting room. A freight and express depot is now under construction at the corner of Twelfth and Gay Streets on the terminal loop. This building will include facilities for the economical handling of a large freight and express traffic and its operation will be supplementary to the freight terminal and storage yard located under the west approach to the Mississippi River bridge.

A passenger and freight station is now being erected at the west bridge approach near the intersection of Salisbury Street and Broadway on one of the trunk lines of the United Railways of St. Louis. The building will include ticket offices, baggage rooms, restaurant, etc., on the ground level of Broadway, and loading platforms on the track elevation opposite the second floor. The architectural design will be similar to that of the smaller stations built recently along the Illinois Traction System. The structure, which is to be 65 ft. wide and 150 ft. long, will be built of red paving brick to the water table, buff pressed brick for the exterior walls and will have a red tile roof. The interior finish will be of Venetian oak. Thirty local cars are to be operated between St. Louis, Venice and Granite City, Ill., and the Broadway station will be used largely by patrons of this bridge service. At the track elevation of the station there will be four loading platforms covered with umbrella-type sheds. The baggage and freight-handling equipment of the building will include a freight elevator operating between the street and track levels.

The St. Louis freight yard property, 24 acres in extent and located at the Missouri end of the McKinley Bridge, will be developed as fast as conditions warrant. An incline will first be built with tracks leading from the level of the west approach down to the yards beneath and practically encircling the property. As traffic develops teaming tracks and unloading platforms will follow. The first freight-handling station will soon be erected on this property directly under the approach structure. Track connections with several steam roads are available at this location.

SUBURBAN SERVICE

The proposed bridge service between St. Louis and the densely populated manufacturing center north of East St. Louis on the Illinois side of the Mississippi River will operate over 7 miles of double-track line. It is planned to begin the service with 30 cars now in course of construction in the shops of the American Car Company. These cars will give local service in St. Louis, Venice, Granite City and Madison, Ill., as well as handle the local bridge traffic. The terminals of the local service will be at the downtown station in St. Louis and at the junc-



Illinois Traction System—McKinley Bridge over the Mississippi River, Nearing Completion

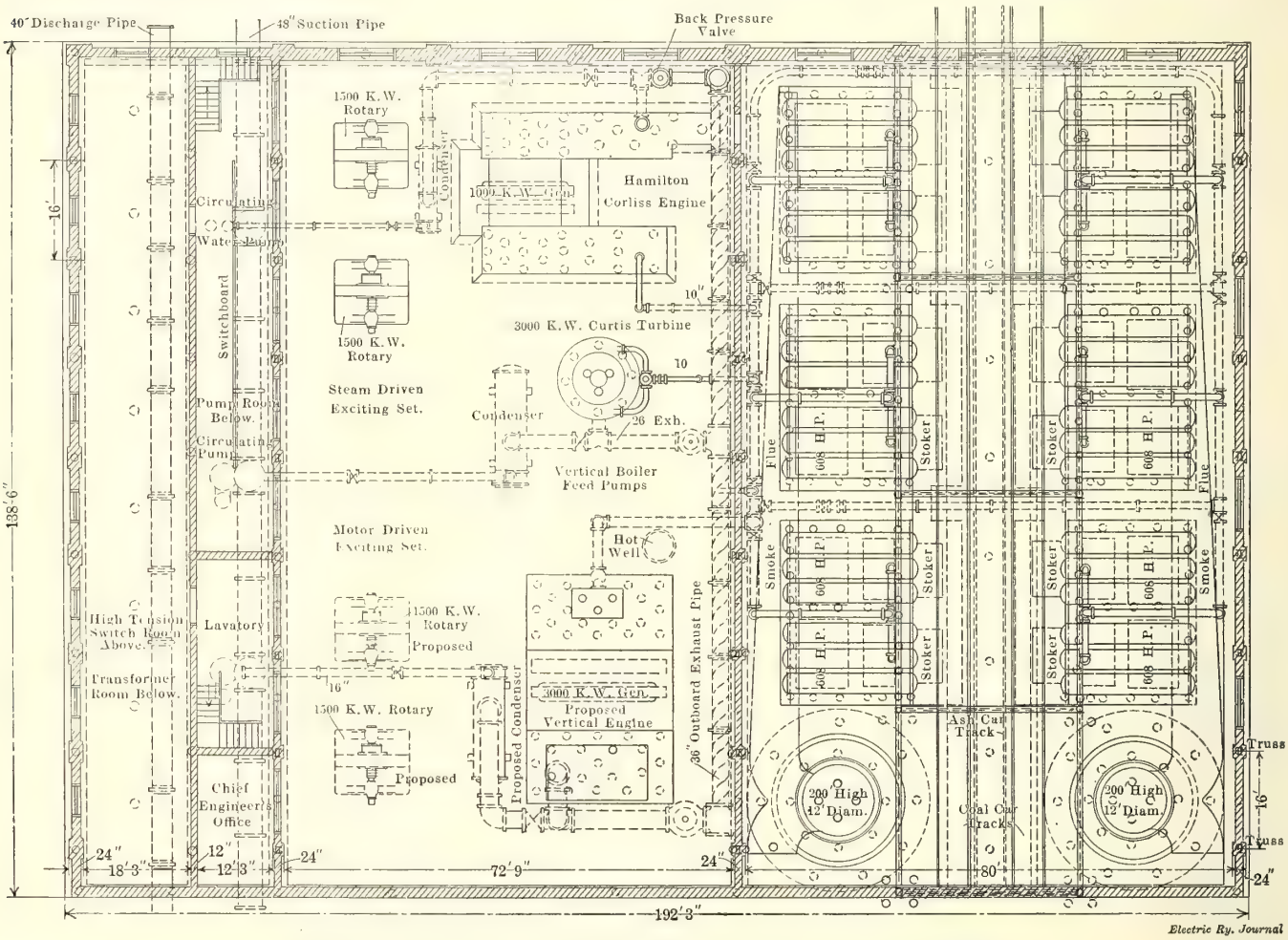
tion of the new bridge cut-off and the old interurban line in Granite City.

NEW GENERATING STATION

Work is now well advanced on the enclosing structure for the large power station at Venice, Ill. Additional generating capacity is needed near St. Louis for the present interurban service, and the local bridge service in and near St. Louis, together with a rapidly increasing lighting load and the probability of building up a commercial service load, called for the construction of a large station. The new plant is designed as one-half of a station with an ultimate capacity of 28,000 hp. The building now under construction is 192 ft. 3 in. x 138 ft. 6 in. in plan. The first section will be subdivided into three main parts, each 136 ft. long. These subdivisions are a boiler house 80 ft. wide, engine-room 72 ft. 9 in. wide, and a transformer and switching section 31 ft. 6 in. wide. The latter section in turn is subdivided into a number of small rooms for the accommodation of the various classes of electrical apparatus and for general service.

Five hundred concrete piles support a foundation floor of concrete 3 ft. thick. The basement side walls are watertight concrete to a point 23 ft. above the basement floor. About 8700 cu. yd. of concrete, in addition to the 500 concrete piles, were used in the foundation work. The concrete piles were supplied by the Raymond Concrete Pile Company, Chicago. Each pile is about 34 ft. long, 8 in. in diameter at the bottom and 20 in. in diameter at the top. In placing the piles a steel casing with a collapsible core is sunk in the ground to the desired depth. Then the core is contracted and withdrawn, the casing inspected for its full length and, finally, filled with concrete. It is estimated that some of the foundation piles at the Venice power station will carry loads of nearly 50 tons each.

The boiler house side of the new station is 162 ft. south of the east end of the new Mississippi River bridge, and the tops of the boiler-house walls will be on a level with the tracks on the bridge. A trestle will connect the railway tracks on the bridge with tracks located above the storage bunkers in the boiler house, thus affording an economical means for handling coal. Fuel may be brought to the plant in trains and the coal cars run into the boiler house and dumped directly into the bunkers without the use of elevating apparatus. The power-plant building is located close to the river's edge and facilities are also available for handling coal by water, should this be desirable. A steel-plate bunker, with a storage capacity of 1400 tons, will extend the full length of the boiler house over the firing aisle. Coal will be fed through gravity chutes and the ashpits are designed to empty directly into cars standing on tracks in the basement. At first six 608-hp John O'Brien water-tube boilers will be installed. These will be equipped with superheaters, to add 75 deg. of superheat, and will be fired by chain grates supplied by the Illinois Stoker Company.



Illinois Traction System—Floor Plan of Venice Power Station

Two self-supporting steel stacks 200 ft. high by 12 ft. internal diameter are being built at one end of the boiler-room. When the intended extension of the plant has been made these stacks will then be in the most efficient location, midway between the rows of boilers.

The present power-generating equipment of the Venice station will include one 1000-kw a.c. unit driven by a Hamilton-Corliss engine with cylinders 26 in. and 52 in. by 48 in., and one 3000-kw Curtis turbine unit. Provision also is being made for the installation of a 5000-kw Curtis turbine generating set. Current for local feeding will be converted by two 1800-kw rotary converters, and provision has been made for the future installation of two additional units of the same size. The engine-room is to be spanned by a 30-ton electrically operated crane.

Condensing water will be drawn from the Mississippi River, 800 ft. distant.

ROADWAY

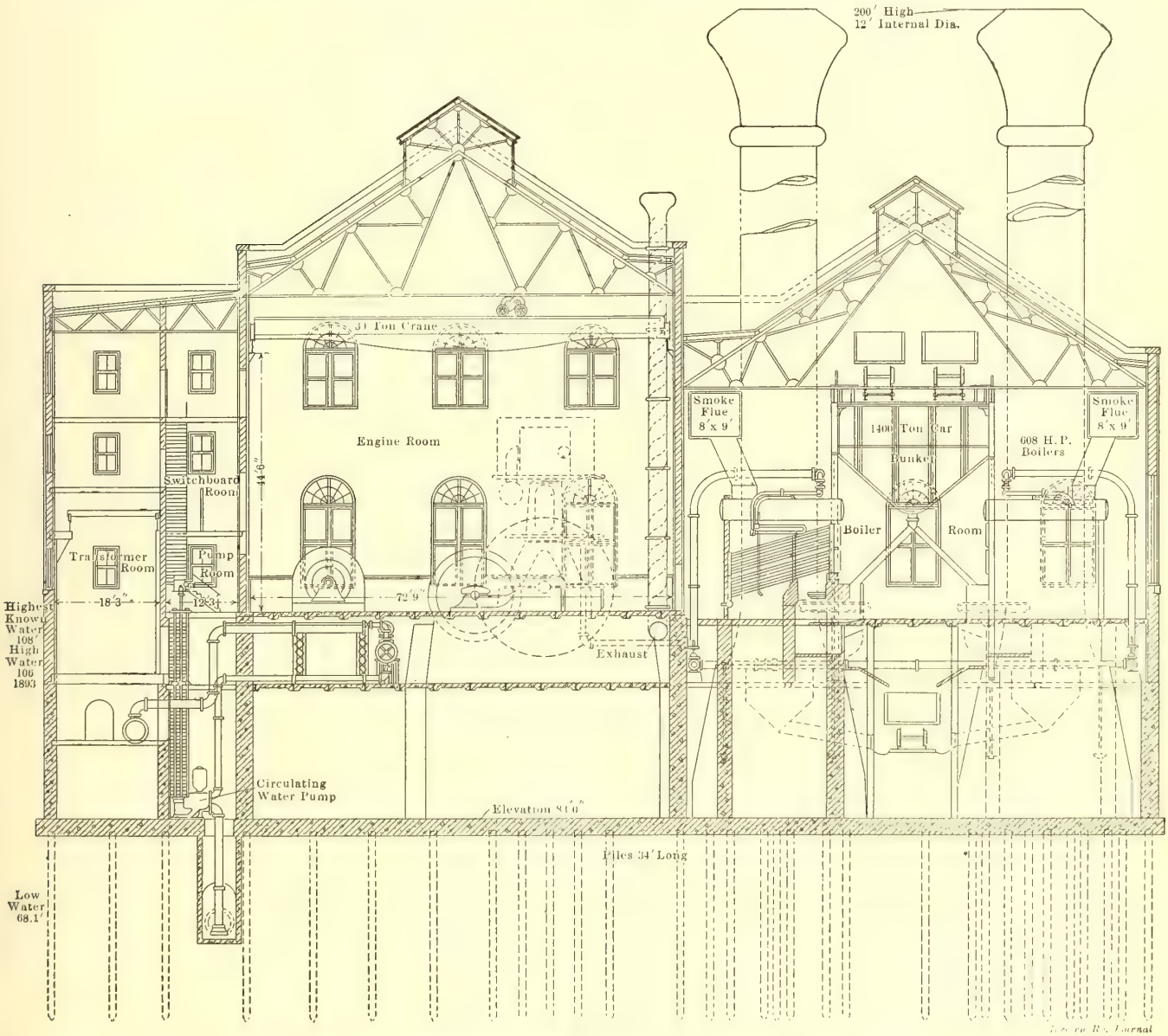
In the ELECTRIC RAILWAY JOURNAL for April 17, 1909, an extended description of the track and roadway organization of the Illinois Traction System was presented. The work of standardizing the roadway and track structures, as announced in the earlier article, has gone forward during 1909. This work has included the replacing of many timber bridges with steel and concrete structures. The passenger stations also are being standardized. A consistent style of architecture is being followed in this work, and all of the new buildings will be of an attractive ornamental type designed to meet the requirements for years to come.

During 1909 the maintenance of way department placed 100,000 new ties in the track. All ties now used on the Illinois Traction System are creosoted according to the process of the American Creosoting Company. Each tie is impregnated with 2½ gal. of oil of creosote. In accounting for this work of replacing ties the cost of the tie itself is charged to maintenance, but the cost of creosoting is charged against construction.

The right-of-way is being improved in appearance wherever conditions will permit. It is interesting to note that one long section of the right-of-way south of Bloomington is leased to a farmer who cultivates the soil between the track of the electric railway and the parallel track of the Illinois Central Railroad. The farmer has a strip of land available for cultivation 175 ft. wide and 4 miles long, on which grain is raised.

ELECTRIC LIGHTING SERVICE

The McKinley syndicate operates electric lighting and other public services in practically all of the large cities served by its railway system. An additional lighting business now is being developed in a number of small towns located within a strip 5 miles wide on either side of the right-of-way. A typical small installation for the town of Glen Carbon, near Edwardsville, has just been completed. This is a mining town located 3 miles from the interurban railway. The traction system has obtained a 50-year franchise to furnish current for residence and commercial use, and a 10-year street-lighting contract for 22 arc lamps. A motor-generator set at a substation on the interurban line supplies 2300-volt, single-phase current over a pair of copper wires leading to the village. The arc-lamp current is handled by a remotely controlled switch located in Glen Carbon. By means of an independent single iron wire connecting this switch with the railway substation, the lights in the village may be turned on or off from the substation without affecting the lighting service.



Illinois Traction System—Sectional Elevation of Venice Power Station

In Worden, a town of 1500 people located on the interurban line, the railway company has a 10-year contract for 21 lamps. Arrangements are being made to install lighting circuits in the towns of Danvers, Williamsville and Elkhart. Additional towns will be served as fast as suitable arrangements can be made. Wherever current is sold in a small town not located on the interurban line a working arrangement is made with some

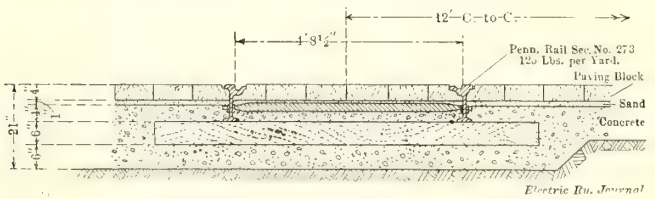
person or company who purchases the current in bulk from the traction company and retails it to the local consumers.

A.C.-D.C. CHANGE

An important part of the engineering work executed in 1909 was the change-over of the system of electrical distribution on 80 miles of track, from 3300 volts a.c. to 600 volts d.c. The principal reason for making this change was to bring about a standardization of current distribution. With the single-phase division of 80 miles connecting with the d.c. division at Bloomington and Springfield, the transportation department frequently was embarrassed in providing equipment suitable for operating over both divisions. The amount of d.c. road and equipment was so large in comparison with the 80 miles of single-phase road and a.c. equipment that conversion of the single-phase division to d.c. operation thus became necessary to facilitate operation.

Conversion of the a.c. lines for d.c. operation has practically done away with three short divisions, thus greatly facilitating the arrangement of schedules and through cars. Before the a.c.-d.c. change was made the schedules provided for running d.c. cars from Decatur north only as far as Bloomington, which was a division point and the connecting point with the a.c. division extending through Mackinaw Junction to Peoria, and from Mackinaw Junction south to Springfield. Now that all of the track is fed with direct current the Decatur-Bloomington service has been extended and trains operate from Decatur through Bloomington to Peoria and from Springfield through Mackinaw Junction either to Peoria or to Bloomington. The running time from Decatur to Peoria, 83 miles, is 3 hours and 10 minutes, equaling the time of parallel steam-road trains.

As built for single-phase operation the electrical transmission



Illinois Traction System—Cross Section of Track Work in St. Louis

system feeding the converted lines comprised a line of three-phase feeders carried on independent poles and a No. 0000 trolley, catenary supported with hangers spaced 50 ft. apart. The single-phase trolley was fed from six static transformer stations. With the conversion for direct-current operation no change was necessary in the transmission system other than making the connections to new rotary-converter substations. The catenary-supported trolley wire has given very satisfactory service for three years, and the only change made in the original construction was the addition of two hangers for each pole spacing of 150 ft.

NEW SIZE OF FEEDER

The current-carrying capacity of the overhead conductor was augmented with a 000000 solid copper feeder. The wire was rolled by the American Steel & Wire Company, and so far 105 miles have been erected. This is said to be the largest order for 000000 solid-drawn feed wire ever placed, and it is thought that the Illinois Traction System is the first to use it for auxiliary trolley feeders. The results with the large wire have been noteworthy. In actual service the 000000 solid feeder seems to provide better current distribution to interurban cars than two 0000 feeders. The large body of copper is slower to heat on a heavy momentary rush of current, and thus the apparent drop is less. Also, the single large wire requires fewer joints and taps than two smaller wires, and the original cost for erection is less.

NEW SUBSTATIONS

The static transformer stations, which formerly supplied 3300-volt current to the trolley wire, have been dismantled and d.c. is now supplied by four new and two remodeled rotary-converter substations. A seventh station will soon be erected.

The north end of the converted division is fed with direct current from power stations at Peoria and Bloomington. The equipment of the large generating station at Peoria formerly included two 750-kw General Electric rotaries. One of these has been moved to Bloomington and installed in the generating station of the local street-railway property and now is being operated there to serve both interurban and city lines. In its place at Peoria an 1800-kw General Electric rotary converter has been installed. The rotary converter at Bloomington receives current from the main high-tension transmission system which is fed from Peoria, 37.7 miles; Danville, 173.8 miles, and Riverton, 82 miles, all of the stations normally being operated in parallel.

One of the newly erected combination passenger and rotary-converter substations is illustrated. The electrical equipment of these stations includes one 300-kw General Electric rotary converter and the necessary transformer and switching equipment for handling 33,000-volt a.c. and 600-volt d.c. The machinery room for these combination stations is 25 ft. 2 in. wide by 49 ft. 6 in. long, located in the center of the building with a waiting-room at one end and a freight-room at the other. The entire structure is 93 ft. 2 in. long over all and of the same interior width as the machinery room. These buildings have concrete foundations and 5-in. concrete floors placed on a filling of cinders.

The walls of the new substation buildings, up to the sill course, are made of pitch-faced, chocolate-colored paving brick; above the sill course the walls are of buff pressed brick. The roofs are covered with red-clay interlocking tile supported on steel trusses with angle-iron purlins. The interior walls of the buildings are sheathed with concrete reinforced with Hy-rib lath, manufactured by the Trussed Concrete Steel Company. Venetian oak is used for the interior finish. The structural materials used in this type of building afford a fireproof structure which is substantial in design and has an especially attractive exterior. A concrete walk serves for a loading platform in front of each station. The cost of such a building is said to be about $5,000.

The conversion of the a.c. lines for d.c. operation made advisable a considerable number of changes in a.c.-d.c. rolling-stock equipment. The details of this work were described in the Electric Railway Journal for April 3, 1909, page 636. Twenty-six cars were re-equipped, each with four GE-205 commutating-pole motors. Since this change was made motors of similar design have been installed on a considerable number of other cars.

SHOP ADDITIONS

The interurban shops of the Illinois Traction System at Decatur were described in detail in the Electric Railway Journal April 3, 1909, page 635. The property on which the shops are located is amply large for considerable expansion of the shop facilities. Part of the plan for expansion is now under way and two new structures parallel with the main shop are nearly ready for use. The new buildings will accommodate the wood mill, foundry, shop storeroom and blacksmith shop. The wood mill and erecting shop building is 300 ft. x 60 ft. in plan and built of brick and tile. A saw-tooth roof provides good daylight illumination throughout the whole interior, which is not subdivided. A gallery along each side increases the space available for storage of patterns, etc. At the rear end of the building the cabinet-shop equipment will be installed on the first floor and a pattern shop on the balcony floor. In the main part of the building an equipment of heavy woodworking tools for car erection will be placed.

The second shop building is a brick and tile structure with a steel-supported roof. This building is subdivided by fireproof cross-walls into a brass foundry, shop storeroom and blacksmith shop. A new oil house and a two-story dry kiln also are being erected. With the completion of the two large new shop buildings considerably more room will be made available in the main building, where general and electrical repair work is done.

ROLLING STOCK

At the present time the rolling-stock equipment of the interurban system includes 77 passenger motor-cars; 10 passenger trailers; 1 office car; 2 sleeping cars; 11 electric locomotives; 16 motor express cars; 5 overhead line cars; 2 work cars; 1 pump car; 36 express trail cars; 4 refrigerator cars; 5 Rodger ballast cars; 402 gondola coal cars; 56 box freight cars; 2 portable substation cars and 1 tool car. The following equipment is now under construction: Thirty 50-ft. suburban cars for the St. Louis bridge service; 2 sleeping cars; 1 private car; 4 combination baggage, smoking and passenger cars; 50 80,000-lb. capacity coal cars; 35 80,000-lb. capacity box cars; 4 caboose cars; 4 express motor-cars; 11 electric locomotives for freight service and 32 express trail cars.

New rolling stock received during the year included 10 interurban passenger cars built by the American Car & Foundry Company; 35 coal cars of 80,000-lb. capacity, built by the Haskell & Barker Car Company; 25 grain cars of 80,000-lb. capacity, built by the American Car & Foundry Company, and 7 passenger trail cars, built by the Danville Car Company.

The Illinois Traction System recently became a member of the Master Car Builders' Association, and, as earlier announced, has completed interchange agreements with the Chicago & Eastern Illinois, Rock Island and 'Frisco systems. It is now necessary for the company to observe the M. C. B. rules for



Illinois Traction System—New Standard Passenger Depot and Substation

interchange of equipment, and the company's cars also are at all times subject to inspection by the representatives of the Interstate Commerce Commission.

TRAFFIC

During 1909 the interurban system of the McKinley syndicate enjoyed a substantial increase in traffic. This increase is due to natural causes and also to improvement in service brought about by faster schedules and by vigorous advertising. The regular schedules out of the Springfield terminal alone now include 106 trains a day. These trains operate over lines extending north to Peoria and Bloomington, east to Decatur, Champaign and Danville, and south to Edwardsville and St. Louis. The Springfield-St. Louis service includes a sleeping car in each direction every night. This sleeping-car service shortly will be extended to include the run from Peoria to St. Louis, 171.3 miles. At present there is no steam railroad through sleeper between these cities.

Two new sleeping cars of improved design are now being built for the Peoria-Springfield-St. Louis service by the American Car & Foundry Company at St. Charles, Mo. The design of these cars includes several novel features originating with H. E. Chubbuck, general manager, and J. M. Bosenbury, superintendent of motive power and equipment, Illinois Traction System. There will be 20 berths in each car, and one distinguishing feature will be windows at the sides of the upper berths. This novelty in design is made possible by the use of a turtle-back roof without a monitor. The sleeping cars now operated between Springfield and St. Louis are equipped with motors, and there has been some criticism of the service on account of noise. For this reason the new sleepers will have heavy M. C. B. passenger-car trucks without motors and will be operated as trailers hauled behind through express motor-cars.

The freight and passenger traffic has shown a substantial increase during the past 12 months. In one item alone, coal, a daily average of 1500 tons is transported. The United States Express Company handles the express business and has messengers on two trains a day out of the larger terminals. The schedules of the express cars are arranged so far as possible to give merchants the maximum amount of time for delivering their outgoing goods to the freight depots. Through express trains operate each way between Peoria and East St. Louis and between Danville and East St. Louis. The latter service is run in connection with the freight service of the Chicago & Eastern Railway, with the trains of which road close connection is made. The growth of freight traffic requires the operation of trains of increased length, and, therefore, the purchase of electric locomotives of large capacity has been necessary. The company now has 11 electric locomotives operating freight trains, and 11 additional locomotives are on order.

The maintenance of way department is engaged in constructing four belt lines around as many cities and these will permit handling long trains over any part of the line without running cars through city streets. These new belt lines are located as follows: Decatur, 5 miles long; Springfield, 6 miles long; East St. Louis, 1.6 miles long, and Granite City, 1.5 miles long. The work of constructing storage yards and connecting tracks at Glover, the junction with the Chicago & Eastern Illinois Railroad, has just been completed. This new track layout permits an interchange of equipment with the steam road.

The Illinois Traction System is under contract to handle 300 tons of coal a day from one mine. Another source of freight traffic is handling grain between widely scattered agricultural centers and the larger terminal cities. To facilitate this grain traffic private concerns have erected grain elevators at several points along the interurban route. One elevator has just been completed near the town of Ospur, on the Illinois Central Railroad, distant about one mile from the interurban line. The new elevator has been built close to the interurban right-of-way. Ample switching facilities provide for handling trainloads of grain. The farmers unload their grain into hoppers on one side of the elevator and then it is raised by electric motor power to storage bins, later to be loaded by gravity into M. C. B. box cars handled by the Illinois Traction System. Applications for sidings for 25 grain elevators, to be built during the coming year, are now in hand.

NEW TELEPHONE LINE

The growth in traffic on all parts of the interurban system has demanded an improvement in the telephone service. Until recently all cars were equipped with telephone instruments and jack boxes were provided at the sidings and other convenient points along the route. These telephone arrangements are now being changed, and instruments are being placed in weatherproof booths at sidings, in addition to the usual substation and passenger-station installations. A new commercial line is being installed. This line will relieve the dispatcher's circuits of considerable business. The commercial wire will cover the entire system and leads will be taken into each of the booths along the route, so that in event of trouble on the dispatching line the commercial circuit may be used. The new commercial-line installation is No. 10 copper wire.

SYSTEM OF DISCIPLINE

Discipline among the trainmen is maintained with a merit system, which is said to be largely responsible for the cordial relations existing between the company and its employees. The system used is an adaptation of the well-known Brown system of merits and demerits, each man being given a credit of 100 marks, against which violations of duty are charged. When an employee has 90 demerit marks he is called before the super-

intendent and warned that 10 additional demerit marks will call for dismissal from service. The board which apportions the merits and demerits is composed of C. F. Handshy, general superintendent of interurban lines; F. L. Richards, trainmaster; W. W. Street, W. Waterson, W. M. Seavers and M. O. O'Connor, assistant trainmasters and local superintendents. This board meets twice a month and passes judgment upon the violation of rules and all meritorious acts performed. Minutes of the meetings of the board are kept, and each employee is notified of any action of interest to him. Protests may be made in writing and the board will then reconsider its decision. An opportunity for final appeal to the general manager is afforded, and each employee has permission to examine his own record at any time. A six months' clear record entitles an employee to 25 credits and a record of 100 merit marks in one year entitles him to a complete new uniform as a reward for good service.

PUBLICITY DEPARTMENT

With a view of increasing the friendly relations with the public, now so highly valued, a separate department of publicity has recently been established. This department attends to the advertising of the service and to the relations with the daily press. Fred G. Buffe, formerly with the Denver (Col.) *News* and more recently with the Peoria *Herald-Transcript,* is in charge of the publicity department. As a means of gaining better publicity, representatives of the daily press frequently are taken over the road so that they may view the new construction and other improvements made. Recently the publicity department published an eight-page insert in 50 different papers located in the more progressive towns in Illinois. In this way 150,000 copies were circulated. The articles making up the eight-page newspaper were illustrated with 55 large half-tone and zinc engravings showing the principal constructional features and stations on the property. There were 43 separate articles on various phases of the McKinley syndicate property, including interesting descriptions of its growth from a road of 11 miles in 1896 to a system of nearly 800 miles in 1909.

INSURANCE ORGANIZATION

All the McKinley public-service companies are united according to contract in supporting the Western Illinois Accident Association, which is operated mutually to receive and disburse the money required for settling accident claims. Each interurban and each street railway company in the McKinley syndicate pays 2 per cent of its gross earnings to the Western Illinois Accident Association. Similarly, the light and gas properties pay one-half of 1 per cent of their gross earnings into the common insurance fund. This fund is held in trust by a board of trustees, which includes the assistant treasurer of the Illinois Traction System, the assistant treasurer of the Western Railways & Light Company, the general manager and the general attorney of all properties.

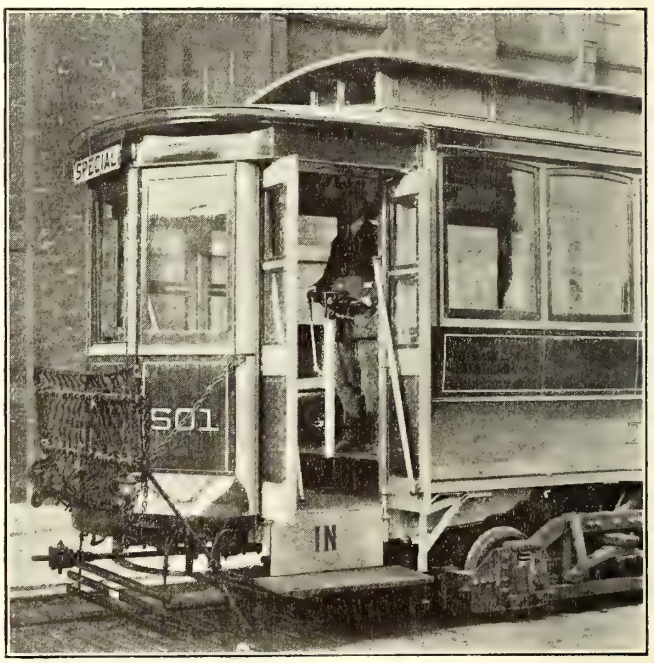
When this method of accumulating an accident surplus had been in effect eight months the fund totaled $60,000. Payments of claims are made out of the fund on the joint signatures of the two assistant treasurers, who also are authorized to invest the surplus money of the association. The assessment of 2 per cent and one-half of 1 per cent made against the electric railway and lighting and gas properties, respectively, are remitted to the trustees in cash and are held in a separate bank account. It is intended to build this fund up to a total of $150,000, if these percentages will allow it. Should it be found by experience that the stated percentages are not sufficient they will be increased, and when the fund reaches $150,000 the percentages will be fixed so as to maintain the fund as close to this amount as possible. With nearly a year's experience in paying claims according to this plan the results are found to be satisfactory. The credit of arranging for this method of paying accident claims is due to H. E. Chubbuck, general manager.

The next convention of the Vereins Deutscher Strassenbahn und Kleinbahn-Verwaltungen (German Street & Interurban Railway Association) will be in Berlin, September, 1911.

IMPROVEMENTS IN PAY-WITHIN CARS IN PHILADELPHIA

The Philadelphia Rapid Transit Company is rebuilding 10 18-ft. single-truck, closed car bodies for pay-within operation, and will embody in them several novel features. The old bodies are being cut in two and a section 8 ft. 6 in. long spliced in, making the new bodies 26 ft. 6 in. long as against 28-ft. body length of the company's standard double-truck semi-convertible cars. The 4-ft. 6-in. platforms of the old bodies are to be retained without changing their dimensions.

The principal feature of interest in the rebuilt cars is the use of twin folding doors opening outward instead of sliding doors to close in the platforms. In the cars in which sliding doors are used the old tapered platforms are built out flush with the inside of the sliding door pocket, and the step folds up to close the opening between the bottom of the sliding door and the platform floor. With the folding doors no change whatever is necessary in the platform floor, and the step folds up against the riser flush with the edge of the floor. The folding doors swing on vertical hinge rods turning at the bottom in trunnions bolted to the outside platform sill and at the top in bearings attached to a shelf over the doors. The pneumatic operating device is mounted on this shelf above the doors, and consists of two opposed cylinders of unequal diameter whose pistons move a common crosshead. To this crosshead are attached two racks



Folding Doors for Pay-Within Cars

engaging with sector gears fastening to the upper ends of the door hinge rods. The folding step is operated simultaneously with the doors by a system of links and bell cranks back of the riser, which connect the door hinge rods with the step hinges. The conductor's and motorman's operating handles are located in the same positions as on the sliding door cars, but the movement of the handles is transmitted through mechanical connections under the floor and inside of the body corner posts to the operating valve on the air engine above the doors. The valve is turned by a cross-rod, which also raises the spring latches holding the doors open and closed, so that the movement of the operating handle first releases the latches and then admits compressed air from the brake reservoir to the operating cylinders.

In opening the doors the large cylinder is open to the atmosphere and the pressure in the small cylinder moves the crosshead to the left. To close the doors pressure is admitted to both cylinders, but the excess pressure on the piston of the large cylinder overcomes the opposing pressure on the small piston and moves the cross-head to the right. A check valve on the exhaust of the large cylinder prevents the doors from slamming when opened outward, and an adjustable detent on the

cross-head reduces the pressure in the large cylinder near the end of the stroke so as to prevent the doors from pinching anyone caught between them as they close. The power required to close the doors and raise the step is adjusted so that a pressure of less than 5 lb. on the step or against the edge of the doors will arrest their movement. There are no grab handles on the outside of the car, but long, slanting grab handles are fastened to the inside of the doors as shown in the accompanying illustration from a photograph.

These 10 cars are to be fitted inside with vertical hand rods rising from the edge of the seats and curved at the top to fasten to the deck rail. A longitudinal rod will be run the entire length of the car on each side within easy reach of those standing in the aisle. There will be five vertical posts on each side and staggered. This arrangement is similar to that employed in the new cars of the Hudson & Manhattan Railroad, which were illustrated and described in the ELECTRIC RAILWAY JOURNAL of Oct. 2, 1909, page 604, with the exception that no division plates are to be used to divide the seats at the posts.

A new method of ventilation is also to be tried in these cars. In the end deck sash at each end of the car will be mounted two revolving fan ventilators or spinners 8 in. in diameter. These will be protected on the outside from the entrance of rain or snow by a flat shield hinged at the top, which may be raised or lowered as required by means of a notched sector and latch inside of the car. The shields will also control the amount of air entering at the front end and leaving at the rear.

All of the sliding door pay-within cars in service in Philadelphia are to be equipped immediately with emergency valves for opening the platform doors. An exhaust valve is to be connected to the cylinder of each pneumatic operating device which is under pressure when the door is closed. A cord attached to the handle of this valve will be carried up inside of the body corner post and over a pulley terminating in a red knob on the outside of the post near the top. By pulling on this cord the pressure in the cylinder is quickly released and the door can then be opened by hand. In order to restore the pneumatic operating mechanism it will be necessary to lift the end seat cushion and close the emergency valve by hand.

THE OCCLUDED GASES IN COAL

Bulletin 32 of the Engineering Experiment Station, University of Illinois, contains the results of researches by S. W. Parr and Perry Barker to determine the behavior of coal upon exposure to the atmosphere with reference to the gases normally contained by it in the mine. The investigation is a part of a study which is being made by the Engineering Experiment Station relating to the deterioration and weathering of coal, as well as its spontaneous combustion. As a result of these experiments, it appears (1) that freshly mined coal when subjected to a vacuum yields an appreciable percentage of combustible hydrocarbons; (2) that the escape of these combustible hydrocarbons takes place slowly in coal exposed to ordinary atmospheric conditions, and is almost entirely suppressed when submerged in water; (3) that the avidity of coal for oxygen is so marked that a sample in an airtight jar with a large volume of air quickly exhausts the air completely of its oxygen, and this experiment may be repeated a number of times without appreciably lessening the avidity of the coal for oxygen; (4) a comparatively small amount of this oxygen shows itself as carbon dioxide of water, but is seemingly more largely involved in the formation of organic acids, such as humic acid, etc.; (5) the finely divided coal is more active in these processes than the coarse coal. On the whole, these experiments afford positive indications as to some of the underlying causes of the heating and spontaneous combustion of coal in storage piles.

The Twenty-third Chapter of Tau Beta Pi, the honorary engineering fraternity, was installed in Cornell University on Jan. 17 by Prof. L. E. Moore, Massachusetts Institute of Technology, president of the fraternity.

GOVERNMENT REPORT ON TRANSPORTATION OF UNITED STATES MAIL

The report of Joseph Stewart, Second Assistant Postmaster-General, relating to the fiscal year ended June 30, 1909, has been made public. The bureau of which he has charge comprises six divisions, including those of railway mail service and railway adjustments. Of electric and cable car routes 525 were in operation at the conclusion of the fiscal year, with an aggregate length of 6,969.34 miles, involving an annual expenditure of $643,977.78. The summary of all classes of mail service in operation during the year shows an average rate of cost per mile of length of $180.01, or an average rate of cost per mile traveled of 14.89 cents. A comparison between the service and expenditure for railroad transportation and electric and cable car service shows the following:

SERVICE AND EXPENDITURE.

	Electric and Cable Car Service.	Railroad Transportation.
Number of routes	525	3,316
Length of routes, miles	6,969.34	217,115.907
Annual travel, miles	11,939,373.11	413,546,194.73
Annual rate of expenditure	$643,977.78	$44,885,395.29
Average rate of cost per mile of length	$92.40	$206.73
Average rate of cost per mile traveled, cents	5.39	10.85
Average number of trips per week	16.47	18.31

Comparison with the previous year shows—

	Per cent.	Per cent.
Increase in number of routes.	17 or 3.346	23 or 0.698
Increase in length of routes, miles	204.57 or 3.024	3,895.43 or 1.826
Increase in annual travel, miles	222,956.85 or 1.902	5,747,155.29 or 1.409
Increase in annual rate of expenditure	$2,241.46 or 0.349	$162,409.82 or 0.363
Decrease in average rate of cost per mile of length	$2.46 or 2.593	$3.02 or 1.439
Decrease in average rate of cost per mile traveled, cent	0.08 or 1.462	0.11 or 1.003
Decrease in average number of trips per week	0.18 or 1.081	0.08 or 0.435

The appropriation for electric and cable car service for the fiscal year was $725,000; the amount expended was $645,554.05, leaving a balance of $79,445.95, out of which unsettled accounts must be paid. For the fiscal year 1910 the appropriation is $730,000. The annual rate of expenditure was $647,643.42 on July 1, 1909, and $650,746.25 on Sept. 30, 1909. In the fiscal year ending June 30, 1911, the sum estimated as necessary is $740,000, being $10,000, or 1.37 per cent, more than the appropriation for the fiscal year 1910. The report then continues:

ELECTRIC CAR RATES

"In accordance with the provisions of law authorizing maximum rates of compensation to be paid for electric and cable car service readjustments have been made, where the facts and circumstances would justify them, which have resulted in a net increase of $1,562.63 for the fiscal year.

"The act making appropriations for this service for the fiscal year of 1909 includes a provision that not exceeding $30,000 of the sum appropriated may be expended in the discretion of the Postmaster-General where unusual conditions exist or where such service will be more expeditious and efficient, and at no greater cost than otherwise. Under this provision an annual rate of $2,348.48 for such service has been authorized."

AUTHORITY DESIRED TO PAY FROM THIS APPROPRIATION FOR SUBSTITUTED MOTOR-WAGON SERVICE

"In view of the demands made by electric car companies for higher rates for service in the large cities it is found desirable in some cases to substitute motor-wagon service for the electric car service. Under existing law, service of this character must be paid for out of the appropriation for regulation, screen or other wagon service, although it may replace electric car service. The appropriation for regulation, screen or other wagon service is never adequate for this purpose, as the estimate for it is made with a view of caring for only such wagon service as is in existence at the time and for small increases. Such substituted wagon service would in all cases replace electric car service, and thereby relieve the appropriation for that class. If a certain amount of the appropriation for electric car service were made available for substituted motor-wagon service it

would enable the department to care for these cases. It is therefore recommended that Congress be asked to add the following to the last proviso of the paragraph appropriating for electric and cable car service, viz.: 'and that not to exceed $100,000 of this appropriation may be expended for regulation, screen or motor screen wagon service, which may be authorized in lieu of electric or cable car service.'"

The work of the division of railway mail service relates largely to steam lines, but there were 21 electric car lines, with 19 crews of 21 clerks. Railway post office service on electric car lines covered a length of 600.25 miles, an increase of 12.26 per cent over the previous year, and involved an annual service of 615,259 miles, an increase of 3.11 per cent. The corresponding statistics for closed pouch service on electric lines are as follows: Length of lines, 6,037.27; increase, 1.60 per cent.

ELECTRIC AND CABLE CAR SERVICE.

State or Territory.	Number of routes.	Length of routes.	Distance traveled per annum.	Annual rate of expenditure.
		Miles.	*Miles.*	*Dollars.*
Maine	12	143.10	197,675.94	7,128.54
New Hampshire	9	78.46	130,557.95	9,217.61
Vermont	7	40.86	85,780.61	2,865.52
Massachusetts	65	661.73	1,193,669.93	73,173.06
Rhode Island	11	130.92	312,0 3.28	10,721.61
Connecticut	25	199.20	326,772.69	10,523.60
New York	44	601.00	1,195,336.67	65,553.07
New Jersey	15	140.12	250,892.05	8,7 5.01
Pennsylvania	71	898.88	1,631,617.85	83,338.08
Delaware				
Maryland	14	220.53	515,696.14	47,950.63
Virginia	9	78.31	100,740.98	3,397.30
West Virginia	6	66.19	87,531.21	2,795.73
Total first section	288	3,259.30	6,028,285.30	325,359.76
North Carolina	1	3.44	6,051.64	250.00
South Carolina	4	23.63	36,079.88	1,129.16
Georgia	3	25.88	54,726.78	1,794.33
Florida	3	17.53	26,076.47	897.85
Porto Rico	1	7.37	17,304.65	519.13
Alabama	5	46.51	119,560.49	3,586.80
Mississippi	1	1.34	1,817.04	54.51
Tennessee	6	83.95	157,311.10	5,986.55
Kentucky	2	29.74	80,879.58	2,426.34
Total second section	26	239.39	499,807.63	16,644.67
Ohio	68	1,075.39	1,567,672.43	68,079.49
Indiana	14	280.50	2 2,727.04	6,411.87
Illinois	24	317.35	634,811.72	66,309.87
Michigan	20	419.03	556,546.87	23,141.58
Wisconsin	6	33.04	59,510.77	1,976.75
Minnesota	8	120.07	154,220.11	4,796.23
Iowa	9	221.48	242,053.34	9,094.12
Missouri	4	123.90	417,337.15	60,916.49
Total third section	153	2,590.76	3,844,879.43	240,726.40
Arkansas				
Louisiana	1	15.06	58,803.36	1,764.09
Texas	3	51.59	72,413.13	2,219.80
Oklahoma	2	12.66	22,186.52	695.27
Kansas	3	27.95	48,729.12	1,476.62
Nebraska	2	26.25	117,521.24	4,577.74
South Dakota				
North Dakota	1	2.51	2,473.15	175.00
Montana				
Wyoming				
Colorado	3	48.91	74,362.04	2,243.31
New Mexico				
Arizona				
Utah	2	24.79	37,330.06	1,214.82
Idaho	2	61.62	75,053.82	3,378.84
Washington	8	129.42	170,994.44	8,610.70
Oregon	6	87.06	130,427.10	5,218.05
Nevada				
California	25	392.07	756,076.77	29,672.71
Alaska				
Hawaii				
Total fourth section	58	879.89	1,566,400.75	61,246.95
Grand total	525	6,969.34	11,939,373.11	643,977.78

Postal Service on Electric and Cable Cars, Year Ended June 30, 1909

Annual miles of service, 8,768,376; increase, 0.95 per cent. On electric and cable lines 24 cars were in use in the service. Electric and cable car lines were subject to deductions and fines amounting to $3,586.58, but remissions on account of service during the previous year aggregated $12,752.49. During the year arrangements were made for payments monthly instead of quarterly for the transportation of mails by railroad and electric companies.

COST OF THERMIT-WELDING MOTOR CASES

A company which repairs its motor cases by the thermit process, using wax matrices, finds that the average cost of a weld, including labor, is $13, whereas it would have to pay $90 for a new top half. Before applying the thermit, the motor cases are heated to a cherry red in from 1 to 1½ hours with a blow torch, using a mixture of city gas and compressed air. A broken journal box has been welded with thermit for $7.20. Thermit is also successfully used by this company for the repair of cast-steel machine parts.

ANNUAL MEETING OF NORTHWESTERN CEDARMEN'S ASSOCIATION

The fourteenth annual meeting of the Northwestern Cedarmen's Association was held in Chicago on Jan. 11 and 12. E. L. Clark, of the Valentine-Clark Company, Chicago, presided. In his presidential address Mr. Clark reviewed business conditions for 1909, calling attention to the renewal of activity at the close of the year. He said, in part:

"Our stock report of Jan. 1, 1910, shows considerable encouragement in the fact that while we have not had a normal year for sales by any means, yet we were able to reduce our pole stocks fully 20 per cent from what they were a year ago and the output this present winter will not be one-half of what it was last winter. One fact which I think assists matters more than any other point is that the little miscellaneous stocks in the hands of 'scalpers' and companies that are not members of our association have all been cleaned up; these stocks were partially the cause of the low range of prices which we have been compelled to meet.

"In my opinion the demand for the season of 1910 will be better than normal and, as one of our members has put it, we will all see the bottom of our piles before snow flies next winter. If this member is correct, and I am inclined to believe that he is, it behooves us not to let the material go at less than inventory figures; we are warranted in holding on to it for a fair living margin of profit, as the output this winter will not warrant anyone figuring that he is going to be able to produce material the balance of this winter at prices sufficiently low to warrant his sacrificing his seasoned stock. The company that disposes of its material early this year will be the one that makes the least money."

The annual report of the secretary was read by H. H. McKinney, who had assumed the duties of that office late in the association year. The Northwestern Cedarmen's Association has a membership of 32 companies. About 60 representatives attended the meetings. The secretary told of the stock reports collected and furnished the members of the association, of the changes in tariffs governing freight rates and the issuance of the association's freight-rate book. The report of the treasurer, W. B. Thomas, showed the finances of the association to be in a healthy condition. The legislative committee announced that it had been unsuccessful in its attempts to have the duty on cedar poles made specific instead of ad valorem.

The railroad committee called attention to the matter of minimum loading weights and said the railroad companies in Michigan had raised the minimum weight to a figure higher than the cars could be loaded. The State commission had asked the association to have its members make tests, and these had substantiated the statement just made. H. P. Grover, of the Dregge-Grover Lumber Company, Grand Rapids, Mich., attended a conference with the Michigan State Railroad Commission when a minimum for poles of 36,000 lb. on cars 36 ft. to 40 ft. long was requested. Mr. Grover felt this minimum could be had if the questions of loading poles and posts were kept separate. A. T. Naugle, of the Naugle Pole & Tie Company, Chicago, reported for the pole committee that there was a reduction of fully 20 per cent in the stocks of poles on hand now and a year ago. The secretary was instructed to furnish the members with a comparative statement of the estimates of production last year and this, together with the names of those furnishing the estimates, the statement to be tabulated by districts. It was decided that in the future reports of stocks of the various sizes of poles 20 ft. and 25 ft. long and longer be kept separate.

At the close of the session a vote of thanks was tendered E. L. Clark, Chicago, the retiring president, in appreciation of the zeal manifested during his term of office. The following officers were elected: T. M. Partridge, T. M. Partridge Lumber Company, Minneapolis, president; J. E. Gerlich, MacGillis & Gibbs Company, Milwaukee, vice-president; W. B. Thomas, White Marble Lime Company, Manistique, Mich., treasurer; H. H. McKinney, Valentine-Clark Company, Chicago, secretary.

CHICAGO TRACTION DISCUSSED BY WESTERN SOCIETY OF ENGINEERS

The annual meeting and dinner of the Western Society of Engineers was held at the University Club of Chicago, Jan. 12. At this meeting the following officers were installed: J. W. Alvord, president; O. P. Chamberlain, first vice-president; A. Bement, second vice-president; W. K. Hatt, third vice-president; A. Reichmann, treasurer.

Andrews Allen, the retiring president, spoke of the advancements made by the Western Society during 1909. The present membership is 1085, and there has been a net increase of 92 members during the year, with 40 applications for names yet to be acted upon. The net gain in finances of the society for the year was $1,128.

The average attendance at the 35 meetings held was 112. A bridge and structural section had been organized with a membership of 190. This section promised to offer meetings of considerable interest in its particular phase of the field. The society had arranged for a mural standard of length to be donated to the city of Chicago and installed in the city hall, witnessed by a suitable bronze tablet. Mr. Allen suggested that the next administration revise the membership requirements so that each grade of membership would have a definite meaning and that the highest grade would be the equal of the highest grade of any of the national societies. At the close of his remarks Mr. Allen introduced the president elect, J. W. Alvord, who spoke on the history and future of the Western Society of Engineers.

The speaker of the evening was B. E. Sunny, president of the Chicago Telephone Company and a director of the General Electric Company. Mr. Sunny spoke on "The Engineering of Chicago," and his remarks included considerable about the local transportation systems. On the subject of subways Mr. Sunny first referred to the 1902 report of Bion J. Arnold, recommending a system of high-level subways to connect the north and south side lines through the business district and low-level subways for the west side lines. Attention also was called to the recommendations made in 1906 by Mr. Arnold for subways to carry the cars of the surface roads only. Initial subway routes proposed by the committee on local transportation were to serve the business district and handle the cars of both surface and elevated roads.

Mr. Sunny strongly urged that the city be supplied with a board of high-class engineers to which should be referred all data on the property now owned by the city and all of the suggestions that had been made with respect to improvements. An engineering board made up of specialists in several fields, such as subways, water, sewerage, railways, harbors, etc., could, in a brief time, make a definite and no doubt satisfactory recommendation with reference to all important matters of subways, and could also, in a year or 18 months, submit a complete report for a greater Chicago which would be a standard to work to for many years to come.

Chicago spreads out for miles north, south and west, and to arrange for the conduct of its passenger traffic is a more difficult problem than that of New York, where the travel is mostly in a north and south line. In New York one four-track subway through the middle of the narrow island can carry approximately 860,000 passengers in one day and the elevated roads an equal number—a total of 1,720,000 passengers—while all of the Chicago elevated roads carry but 450,000. Similar figures for the surface road would probably show a proportionate comparison. The Chicago transportation facilities are greater than in New York with respect to miles of track and the number of cars available. This means that as a unit the Chicago local transportation system is less efficient. Mr. Sunny asked whether with a properly constructed subway it would not be possible to rearrange the transportation lines in Chicago so that they would operate chiefly between the north and south sides. He suggested two four-track subways and one three-track subway on the north and south streets through the business district. This plan would permit the removal of all surface cars from the north and south streets in the "loop" district except on Wabash Avenue, and on all the east and west streets except Randolph, Madison, Adams and Van Buren streets. It would dispose of seven-tenths of the surface lines in the loop district, do away with all surface crossings, reduce traffic on the Union Elevated Loop by more than one-half and would involve the building of only about 3.5 miles of high-level subway, practically without curves and with no crossings. Attention was called by the speaker to the excellence of the street car subway built under Park Avenue, New York, between Thirty-third Street and Forty-second Street, more than 30 years ago.

Bernard Snow, chairman of the finance committee of the city of Chicago, stated that the problem of providing local transportation in any large city was the most important question to be dealt with. Without proper transportation facilities the radius of action would be so limited that the community would become a group of detached business centers. The Chicago transportation problem for the entire city should be considered as a unit. Surface, elevated and subway lines should be combined in order that through routing and proper service might be given. This combination would require cooperation by all interests, but would be of the greatest value. Mr. Snow favored a centralized engineering board to lay out a plan for all engineering work to be done in the next two or three decades.

L. C. Fritch, chief engineer, Chicago Great Western Railway, and formerly consulting engineer in charge of the study of electrification for the Illinois Central Railroad system, spoke of the steam railroad transportation problem. There are 2200 miles of steam railroad track in the city of Chicago, a large proportion of which is required for handling through freight which passes close to the business center of the city and thus congests traffic. If the railroads would adopt the plan of grouping their union passenger stations and would provide for passing the through freight around the congested portion of the city, electrification would become a far more simple problem.

Mr. Fritch said that the sooner the steam railroads faced the problem of equipping for electrical operation and worked out rational plans the better it would be for them, because otherwise the community might force electrification and this would not permit sufficient time for thorough development of plans. At the present time he objected to electrification on account of cost, but he had faith that the electrical engineers would soon be able to offer a system of electrification which would be more economical to operate than the present steam locomotives.

Milton J. Forman, chairman local transportation committee Chicago City Council, spoke of the financial aspect of the engineering work of Chicago.

Bion J. Arnold, chief engineer, Board of Supervising Engineers, Chicago Traction, told of the city's transportation needs. Chicago must have surface, elevated and subway lines to handle its traffic. It would be an ideal condition if the surface of the streets could be kept clear of railway lines, but this would hardly ever be possible on account of congested traffic in the business district. Referring to his subway recommendations made in 1902, Mr. Arnold said that these were the result of but four months' work, and while the scheme as originally laid down was still suited to the needs, the amount of initial work proposed would now necessarily have to be increased because of the growth of the city since the presentation of the report. The consolidation of the local transportation lines in Chicago would be an excellent thing if financial arrangements would permit it. If the consolidation took place one result would be that the long haul passengers would be carried by the elevated roads and the short haul passengers by the surface lines. Thus the two kinds of transportation facilities would need to be owned jointly so that the losses of one might be recouped with the profits of the other. Mr. Arnold firmly believed that great benefits would be had from consolidation.

ANNUAL REPORT OF SECOND DISTRICT PUBLIC SERVICE COMMISSION, NEW YORK

The New York Public Service Commission, Second District, has submitted its annual report for 1909 to the Legislature. Of the 811 corporations, municipalities and individuals over which the commission has jurisdiction, 139 are street railroad corporations. The electric railroad mileage is 2,744.54 miles. Following are the results of operation of electric roads during three years:

	Year ended June 30,		
	1907.	1908.	1909.
Gross earnings from operation	$19,293,052	$21,194,486	$21,919,652
P. C. of increase over preceding year.	15.9	9.85	3.4
Expenses of operation	$12,471,755	$14,129,150	$14,647,399
P. C. of increase over preceding year.	17.7	13.3	3.7
Net earnings from operation	$6,821,197	$7,065,336	$7,272,253
P. C. of increase over preceding year.	12.8	3.6	2.9
Passengers carried	A427,520,000	451,388,415	462,455,932
P. C. of increase over preceding year.	11.4	7.2	B3
Total dividends paid during the year.	$1,659,157	$2,065,242	$2,965,206

A.—Includes 6,356,000 other than passengers paying single fare and continuing travel on transfers, which is the basis for 1908 and 1909 figures; and this number is deducted before calculating percentage of increase in 1908.

B.—The total for 1908 is decreased by 2,542,000 before deriving this percentage in order to compare like returns in both years.

IRREGULAR DIVIDEND RETURNS

Interesting statements of the dividend abilities of electric railroad corporations, electrical corporations and gas corporations are submitted by the commission, as follows:

Total number of corporations, all classes	310
Total number paying no dividends	237
Total number paying dividends	73
Total number paying no dividends on common stock	243
Total number paying no dividends on preferred stock	16
Total number paying dividends on common stock	67
Total number paying dividends on preferred stock	15
Amount of common stock paying no dividend	$126,956,530
Amount of common stock paying dividend	53,859,074
Amount of preferred stock paying no dividend	15,317,400
Amount of preferred stock paying dividend	18,461,072

The commission adds that "the very remarkable showing made by these tables and summaries demands but little comment from the commission at this time. Attention should, however, be directed to the fact that they have no wide range of use except by way of suggestion for investigation. The significance of the facts which they disclose depends wholly upon the further fact not disclosed whether these stocks represent actual cash investment in the properties of the several corporations or whether they are lacking in that particular characteristic.

"It is common belief that the plants of the public service corporations included in these tables have been constructed, as a rule, upon the bond issues, and that the common stock, at least, is representative only of hopes entertained. The precise truth with regard to so many corporations, many of which are the product of reorganization, it is difficult, if not impossible, to ascertain. The intervention of construction companies to which a lump amount of stock and bonds has been issued for construction, makes a clear showing of what has been paid for with stock and what with bonds, or how much has been realized for the stock, impossible.

"The general fact is believed to be beyond dispute, although it may not be susceptible of legal proof in many cases, that in launching public service corporations prior to the regulation of capitalization by the State, it has been thought that capital could not be enlisted without the aid of large bonuses in the form of stock upon which returns could be had either by way of dividends or by sale to those seeking an investment. It has been feared, unquestionably, that the regulation of capitalization by the State and insistence by the commission upon the law, that capital stock should be issued only for full par value in money, property, or services, would hinder, if not prevent, the further growth of such corporations by making them unattractive as business enterprises. Upon this point certain observations seem pertinent.

"If the stock of non-dividend-paying corporations represents no actual investment of money, and was in its inception issued merely as a bonus or gratuity in connection with the promotion of the enterprises upon the expectation that it would yield profits, and thus become of substantial value, the table demonstrates the fatuity of any such expectation.

"If the stock was a bonus or gratuity to those to whom it was issued, but has been transferred to holders, for a valuable consideration, who made the purchase as an investment, the table is a warning against dealings in stocks issued for no value, representing no property, and having no prospect of a return except from unreasonable charges.

"If the stock represents actual investment, then there is grave reason to consider what is wrong in the condition of public service corporations in this State that they cannot earn returns upon such enormous sums of money invested in them.

"Any system of law which permits uninstructed investors to place their money in stocks of public service corporations which either ought not to or cannot yield any return, and which, in fact, are non-productive, is distinctly injurious to the non-investing as well as the investing public. Eventually capital will learn by experience the actual results of such financing and will carefully avoid enterprises thus handled.

"The value of the tables presented lies in their conclusive demonstration that, broadly speaking and taking the corporations included as a class, such corporations have either been financed by methods which the event has shown to be disastrous or they are now operating under conditions which need careful investigation."

ISSUES OF SECURITIES AUTHORIZED

During the year the commission granted authority for the issue of $142,855,035 of stocks, bonds and other evidences of indebtedness, making a total of $252,839,681.34 authorized during the 30 months since the commission was established. The increase in the amount of capitalization authorized in 1909 over 1908 was 56.6 per cent and the increase in the number of cases during that time was 33.8 per cent. Of the securities authorized last year, the following related to electric railroads: Stocks, $4,154,000; bonds, etc., $4,950,360.

COMPLAINTS AND HEARINGS

The commission devoted 202 days to public hearings and heard 415 matters during the year. Five hundred and thirty-two formal complaints and others which were treated informally numbering 1088 were received, a total of 1620 as against 1399 during 1908, an increase of 30 per cent. The number of applications from corporations for various authorizations was 225, as against 207 in 1908. The commission disposed of 1515 of these matters. Discussing its practice in taking up complaints for informal investigation and disposition whenever practicable the commission says: "Such practice serves: One, to cause prompt settlement of cases by concession of relief to the complainants; second, to promptly advise many complainants that the law does not apply to the matters they present, either from lack of jurisdiction or because no violation of the statute is shown; third, to keep the number of cases requiring formal investigation and action down to a minimum.

"So far as rates and rate regulations are concerned, and in many cases as to service, the public is best served by this method of informal investigation. Where authority to effectively correct abuses is fully conferred by the statute, the changes of rates and provision of better service called for by well-founded complaints can generally be secured by the commission without trial and issuance of orders.

"The commission has had called to its attention from time to time some tendency on the part of shippers to refrain from complaining to the commission because of the fear that such action may prejudice them in the minds of the railway managers and in some indefinite way result injuriously to their shipping business. Of course, such fear is entirely unfounded and not likely to exist to any extent after shippers have come thoroughly to realize that common carriers in this State are required by the law to act and conduct their business in conformity with accepted standards of reason and justice.

"Some of this tendency on the part of shippers to withhold rate and service complaints is undoubtedly due to the fact that a few subordinate railroad officials have misrepresented the requirements and prohibitions of the law and have based refusal to accord relief to shippers upon a claim that the con-

cession was forbidden by the regulating statute. Several instances of this kind have been brought to the attention of the commission. In every such case the shipper has been notified that the claim so asserted was wholly without foundation, and the subject has been taken up vigorously with executive officers of the railroad company. Their replies have invariably disclaimed responsibility for such action on the part of their subordinates."

DOWNWARD TENDENCY OF RAILROAD RATES

The commission finds, from actual investigation of freight and passenger tariffs, that the trend of rates and fares in the State has been downward.

Freight and passenger tariffs of electric and interurban railroad companies have undergone some revision to the extent of making various rate changes in 32 passenger schedules, seven class-rate freight tariffs and 45 commodity freight tariffs, of which 59 per cent of the passenger fare schedules and 83 per cent of the commodity freight tariffs contained reductions, and 43 per cent of the class-rate freight tariffs contained advances.

ELIMINATION OF GRADE CROSSINGS

Because of the failure of the Legislature to make any appropriation for steam railroad grade elimination last year the commission has been unable to proceed in the 65 applications for grade crossing now pending. The commission says the lack of appropriation to carry on this work has not only seriously interfered with the State's policy to insure public safety at crossings, but also has undoubtedly acted to prevent both railroads and municipalities from presenting further petitions for grade crossing elimination. It is on account of this lack of funds that the commission has been unable to make orders for grade separations at Bronxville, Scarsdale, Irvington, Tarrytown and Hartsdale, within the electric zone of the New York Central & Hudson River Railroad.

INSPECTION OF RAILROADS

During the year, with the exception of the Delaware & Hudson, all steam railroads and 1898 miles of street railroads have been inspected as to physical condition and operation. Recommendations made by the commission as a result of these inspections have resulted in repairs to roadbed, track and bridges, improvement in equipment, additions and needed repairs to terminals and stations, and the correction of faulty operation.

In 1908 the Delaware & Hudson company presented a bill to the commission amounting to $2.450 for the use of an observation engine employed in transporting an inspector of the commission over the road of the company while engaged in inspecting such road. The commission has not paid this bill and last year the company refused to provide facilities for inspection without the payment of special train rates. It was impossible for the commission under these circumstances to have an inspection of the road made. Among the recommendations is the following:

"Additional employees are asked for so that traveling auditors may be sent about through the State to assist the smaller corporations and municipalities operating public utilities that are required by law to report to the commission. The corporations, while rendering an important and usually highly appreciated service in their respective communities, are, because of the smallness of these communities, limited to extremely slender revenues, such that the cost of the services of skilled accountants seems one of the expenses most easily avoided and therefore least necessary to incur. Most of the municipal plants are particularly in need of such aid, and many of them have made requests for it."

TIE AND POLE CONSUMPTION IN 1908

The Census Bureau of the United States Department of Commerce and Labor, in co-operation with the Forest Service, Department of Agriculture, has issued a forest products report for 1908, which contains some very interesting figures on tie and pole consumption, particularly regarding preservatives.

DATA ON CROSS-TIES PURCHASED

The steam and electric railways purchased 112,463,449 cross-ties in 1908, this number being a decrease of 41,236,171 ties, or 26.8 per cent, from the number purchased in 1907. The chief cause of this decrease was the widespread business depression during the year. In 1908 only 7,431,170 ties, or 6.6 per cent of the total, were reported as purchased for new track, while in 1907, 23,557,000 ties, or 15.3 per cent of the total, were purchased for the same purpose. Two-thirds of the ties purchased for new track in 1908 were reported by the steam roads, and one-third by the electric railways. Since the total mileage of the steam roads was several times that of the electric lines, these figures indicate that the building activity on the part of the electric railways was relatively much greater than that of the steam roads in 1908.

The bulk of the ties was composed of comparatively few kinds of timber, although at least 40 different species were used to some extent. The oaks were credited in 1908 with 48,110,853 ties, or 42.8 per cent of the total number of ties purchased. In the production of ties white oak is more largely used than any other species. Three or four Southern yellow pines, taken together, furnished 21,528,874 ties, or about one-fifth of the total number. Combined, the oaks and pines supplied about five-eighths of all the ties purchased. Cedar, chestnut and Douglas fir were used for about 8,000,000 ties each, the three varieties combined forming over one-fifth of the total number purchased. The principal species of wood included under "all other" are in order of their importance: Maple, spruce, birch, elm, sycamore, mesquite, locust, hickory, cherry, walnut and mulberry. There was an increase in the proportion of oaks, chestnut and cedar used in 1908 as compared with 1907, while decreases are shown for Southern pines, Douglas fir and cypress.

The steam railroads purchased 106,038,081 cross-ties, or 94.3 per cent of all the ties purchased. Of this number 82.4 per cent were hewed and 17.6 per cent were sawed. Steam railroads used 95 per cent of all the hewed ties and 91.1 per cent of all the sawed ties purchased during the year. The electric railroads purchased 6,425,368 ties, or 5.7 per cent of the total number of ties purchased. Of these 71.5 per cent were hewed and 28.5 per cent were sawed. While the quantity of ties purchased in 1908 was much less than in 1907, the average prices in the two years were remarkably close together, being 50 cents in 1908 and 51 cents in 1907. The lowest priced ties in

TIES BOUGHT BY ELECTRIC RAILWAYS IN 1908.

	Total			Hewed			Sawed		
Kind of wood.	Number.	Cost.	Average cost per tie.	Number.	Cost.	Average cost per tie.	Number.	Cost.	Average cost per tie.
Oaks	2,414,403	$1,285,968	$0.53	1,812,916	$951,403	$0.52	601,487	$334,565	$0.56
Southern pines	944,690	592,016	0.63	513,759	275,596	0.54	430,931	316,450	0.73
Cedar	850,687	377,868	0.44	777,875	347,498	0.45	72,812	30,370	0.42
Chestnut	1,282,128	605,077	0.47	923,984	434,563	0.47	358,144	170,514	0.48
Douglas fir	357,460	133,148	0.37	37,785	12,785	0.34	319,675	120,363	0.38
Tamarack	28,249	10,327	0.37	28,249	10,327	0.37	.....	.....	..
Cypress	107,676	44,727	0.42	100,879	41,075	0.41	6,797	3,652	0.54
Hemlock	25,063	9,501	0.38	25,063	9,501	0.38	.....	.....	..
Western pine	23,024	9,305	0.40	8,063	3,799	0.47	14,961	5,506	0.37
Redwood	330,762	170,473	0.52	310,412	158,607	0.51	20,350	11,866	0.58
White pine	18,427	11,014	0.60	15,934	9,972	0.63	2,493	1,072	0.43
All other	42,799	23,225	0.54	37,276	20,749	0.56	5,523	2,476	0.45
Total	6,425,368	$3,272,709	$0.51	4,592,195	$2,275,875	$0.50	1,833,173	$996,834	$0.54

1908 were hemlock, the average cost of ties of that wood being 38 cents. The highest priced ties were the Southern ties, the average cost per tie being 54 cents. The average cost of the hewed ties purchased by both the steam and the electric roads was 50 cents, while the average cost of the sawed ties was 52 cents for those purchased by the steam roads and 54 cents for those purchased by the electric roads. An accompanying table shows the number and average cost of each kind of tie bought by electric railway companies in 1908.

The rapid progress of wood preservation during recent years is disclosed in the rapidly increasing percentages of treated ties in the total annual purchases. In 1908, 23,776,060 ties were reported by the steam and electric roads as having been treated by them or purchased already treated, which was 21.1 per cent of all of the ties purchased in that year. The corresponding percentages in 1907 and in 1906 were 12.9 and 11.5, respectively. In 1908 the steam roads treated 12,590,643 ties and purchased 10,565,925 treated ties, the total for these roads being 23,156,568 treated ties, or 21.8 per cent of the total number of ties purchased by them, and 97.4 per cent of the treated ties reported for that year. The use of treated ties is less general among the electric than among the steam roads. The electric railways treated after purchase 212,356 ties, and purchased in treated form 407,136 ties, making a total of 619,492 treated ties, or 9.6 per cent of the total number purchased by them. Among the woods which are most generally treated when used for ties are loblolly and shortleaf pines, lodgepole pine, Douglas fir, Western pine and the red and black oaks.

DATA ON POLES

The number of poles purchased in 1908 showed a slight falling off as compared with the number purchased in 1907. The decrease in the cost of the poles purchased was much larger, however, amounting to 26.6 per cent. The decrease in number is not remarkable, since there have been even more marked decreases in many other lines of forest products during the general business depression. During 1908 the telephone and telegraph companies bought 2,562,239 for $3,425,621; the steam railroads bought 155,418 poles for $501,704, and the electric railway, light and power companies bought 531,497 poles for $2,001,449. Details of the electrical installations are presented in the table below:

POLES BOUGHT BY ELECTRIC RAILWAY AND ELECTRIC LIGHT AND POWER COMPANIES.

	1908			1907		
	Number.	Cost at point of purchase.	Aver. cost per pole.	Number.	Cost at point of purchase.	Aver. cost per pole.
Cedar	285,689	$1,108,976	$3.88	346,813	$1,920,428	$5.54
Chestnut	166,050	625,624	3.77	187,077	762,626	4.08
Oak	2,523	3,638	1.44	2,347	4,715	2.01
Pine	19,919	94,687	4.75	26,969	134,748	5.00
Cypress	30,619	84,663	2.77	71,136	275,594	3.87
Juniper	14,087	45,136	3.20	19,098	77,493	4.06
Tamarack	1,847	5,208	2.82	1,057	3,632	3.44
Douglas fir	3,766	8,366	2.22	3,408	9,284	2.72
Redwood	2,918	15,061	5.16	6,586	37,852	5.75
Locust	37	60	1.62	74	142	1.92
Spruce	1,821	5,018	2.76	4,981	17,539	3.52
All other	2,221	5,062	2.28	7,283	31,920	4.38
Total	531,497	$2,001,499	$3.77	676,829	$3,275,973	$4.84

Increases in the number of poles purchased by all companies are shown in the case of several kinds of wood used for poles, the largest relative gains being 203.7 per cent for bois d'arc, 118.8 per cent for locust and 110.2 per cent for oak. The largest percentage of decrease for the kinds of wood shown was 58.5 for redwood. One of the most interesting changes was the decrease in the purchases of chestnut poles. This decrease was probably due in part to the ravages of the chestnut worm, which have resulted in the killing of a large amount of the pole timber in the northeastern part of the United States. Although the purchases of pine poles show a considerable falling off in number in 1908 as compared with 1907, the average cost per pole was greater in the later year by 33 cents. The wood which showed the greatest increase in average cost per pole was Douglas fir, the change amounting to $1.53; on the other hand, there was a decrease of $1.44 in the average cost per pole for cypress.

The electric railways and the electric light and power companies purchased 16.4 per cent of the total number bought in 1908 by all companies. It was this latter class of consumers whose purchases of poles in 1908 showed the greater actual decrease, although the percentage of decrease in the case of the steam railroad companies was 47.3, and for these companies it was only 21.5. The average cost per pole of different woods varied more widely in 1908 than in 1907, the range in the later year being from 59 cents for oak to $4.09 for Douglas fir. The average cost of the Douglas fir poles was high because a large percentage of them were treated. The highest average cost per pole for any class and species, $18.93, was reported for oak poles 60 ft. or more in length, while the next highest, $18.12, was reported for redwood poles 40 ft. or more in length. Less than 62,000 of the poles of all kinds purchased in 1908 had a length of 45 ft. or over, while nearly 2,860,000 poles, or 88 per cent of the total number, were under 35 ft. in length. Over nine-tenths of the oak poles purchased were less than 25 ft. long, but not quite one-fifth of the total number of chestnut poles were less than that length.

Each year substantial progress is disclosed in the practice and methods of treating poles with chemicals to preserve them from decay, and the benefits derived from such treatment are being demonstrated under practical conditions. A recent inspection of some poles on a Georgia line showed that at the end of four years 67 per cent of the poles that had been treated with certain derivatives of wood and oil compounds were still sound, while the untreated poles were more or less decayed, in some cases to such an extent that their renewal was necessary. The returns for 1908 showed that 344,388 poles purchased during the year received some preservative treatment before being set in position. Of these poles, 101,998, or 29.6 per cent, were bought already treated, while 242,390, or 70.4 per cent, were treated after purchase. The number of poles reported as having been given some preservative treatment in 1908 showed a slight falling off as compared with the corresponding number for the preceding year, because the abnormal business conditions obtaining during the later year caused the purchasers of poles to practice every possible economy in expenditure. The number of treated poles reported formed 10.6 per cent of the total number bought in 1908 as against 12.1 per cent of the total in 1907. Telephone and telegraph companies reported 218,317 treated poles, or 63.4 per cent of the total of all treated poles, for 1908. Electric railway, light and power companies reported 78,083 treated poles, or 22.7 per cent of the total in 1908. Steam railroad companies reported 47,988 treated poles in 1908, or 30.9 per cent of their total purchases. While about seven-tenths of the treated poles were treated after purchase, the proportion was slightly less in 1908 than in 1907, for all companies, and for each class of companies, except in the case of steam railroads, where the percentage increased from 53.4 per cent in 1907 to 77.9 per cent in 1908.

COST OF MAINTAINING A STORAGE AIR-BRAKE SYSTEM

An electric railway which is using the Magann storage air-brake system reports that the total maintenance, power and operating cost based on the use of about 250 equipments does not exceed $1 per month per car. The longest route operated is a 7-mile belt line over which eight trips are made without recharging. The initial charge is taken at 300 lb. and reduced to 40 lb. for train-line use. In the morning the cars are charged in groups at the depots and usually only one additional charge is necessary during the same day. The storage apparatus on the car is easily maintained. The reducing valve is placed under a seat near the stove, where it is always in a warm and accessible position. Since the original trial of the pressure tanks at 500 lb. before installation there has been no need of making any hydraulic tests.

Despite the little extra expense that would be occasioned, no air-brakes are used on the single-truck cars, as it is the company's experience that light city cars are more safely operated with a well-maintained hand brake.

AN ENGLISH CAR HOUSE USED FOR A POLITICAL MEETING

A novel use of an electric railway building was made on last New Year's Day when a mass meeting was held in the car house of the Reading (England) Corporation Tramways, where Mr. Lloyd-George, Chancellor of the British Exchequer, addressed some 10,000 persons who had assembled to hear him defend the proposed budget. The platform, accommodating some 300 persons, was constructed along one side of the car house, and a temporary floor was laid over the car pits. Barriers were erected to divide the audience and all the doors forming the south side of the building were thrown open. The quadrangle formed by the store block of buildings and the boiler house of the power station, between the car house proper and the entrance, was filled with people. The car house was brilliantly illuminated with arc lights, and the network of electric



Mr. Lloyd-George Speaking in British Car House

wires along the roof materially assisted the acoustic properties of the building, a large sounding board being erected just over the speaker's head. Photographs were taken during the meeting by means of a number of flashlights arranged along the walls, which were fired by electricity, under the control of the photographer in one part of the building.

Walter Binns, the general manager and engineer of the tramways, was responsible for the whole of the arrangements and the preparations made for adapting the building for the purposes of this huge meeting, and both Mr. Lloyd-George and Rufus Isaacs, K.C., M.P., the borough member, personally congratulated him upon the excellent arrangements made for the meeting. A substantial sum was paid for the use of the car house and a number of cars conveyed the audience from the car house to all parts of the town immediately after the meeting. The temporary flooring was removed a few minutes after the meeting closed, and the cars ran into the sheds as usual the same evening.

PRODUCER-GAS POWER PLANTS IN THE UNITED STATES

The United States Geological Survey, in Bulletin 416, publishes some statistics of producer gas power plants in the United States compiled by R. H. Fernald. The first producer-gas plants were installed about 10 years ago. At the present time there are over 500 such plants in operation, with an aggregate horse-power of about 115,000. Tests made with the Government plants at St. Louis, Mo., and Norfolk, Va., have shown a fuel consumption under the most favorable conditions as low as 0.95 lb. per electrical horse-power at the switchboard. Tests with 75 grades of bituminous coal show a ratio of coal per brake horse-power fired under a boiler to coal per brake horse-power burned in a producer of 2.7. Many low-grade coals and lignites which cannot be burned successfully under a boiler give excellent results in a gas producer.

MASSACHUSETTS COMMISSIONS REPORT ON ELECTRIC TRANSPORTATION MATTERS AT BOSTON

The Massachusetts Railroad Commission and the Boston Transit Commission, sitting as a joint board by order of the Legislature of 1909, has submitted to the Legislature of 1910 three reports embodying the most important discussion of electric transportation matters at Boston that has been presented to the General Court for many years.

The joint board recommends the passage of a law which will permit the Boston Elevated Railway to acquire control of the system of the Boston & Northern Street Railway, the Old Colony Street Railway, the Middlesex & Boston Street Railway, the Lexington & Boston Street Railway, the Boston & Worcester Street Railway, and the Blue Hill Street Railway, such control to be exercised under the well-established principles of public utility supervision by commission which have characterized the history of Massachusetts transportation for nearly four decades. Under the proposed acquisition of these companies the management of the Boston Elevated Railway would administer the affairs of a system at present comprising about 1700 miles of track, with annual gross earnings of $23,000,000, a yearly traffic of about 460,000,000 revenue passengers, a rolling stock movement of 83,000,000 car-miles per annum, and a payroll of over 13,000 employees, with total operating expenses exceeding $15,000,000.

The lines operated by the Boston Elevated Railway Company would extend in such event from Newport, R. I., on the south to Nashua, N. H., on the north, connecting with the Worcester Consolidated Street Railway system on the west. Large economies in operation and administration are anticipated, and the joint board points out in its report, that the public will, with proper safeguards, gain through a unified system of transportation centering in Boston, enjoying increased accommodations and decreased rates. Through fares, more speedy transit and a common management will induce travel and result in benefits to both the public and the companies.

Other matters considered in the reports are the terms of the consolidation of the West End Street Railway and the Boston Elevated Railway; the proposed tunnel and subway of the Boston & Eastern Electric Railroad under Boston Harbor, and a large number of subway and tunnel questions referred to the joint board by the last Legislature. The board reviews thoroughly the relations of the Boston Elevated and West End companies and concludes that a 7 per cent dividend is an ample and liberal return upon the second preferred stock of the Boston Elevated Railway, to be issued upon consolidation in exchange for the common stock of the West End Street Railway. The latter organization has contended vigorously for an 8 per cent dividend, since the passage of the act of 1908 setting the rate at 7 per cent. The joint board also finds that it is inexpedient, inadvisable and not in the public interest to provide for any distribution of assets among the stockholders of the West End company. The anticipated benefits of the consolidation are emphasized.

Regarding the Boston & Eastern tunnel and subway the joint board considers it necessary to suspend judgment until the quadruple joint commission upon metropolitan improvements shall have made its investigation and final report to the Legislature of 1911. Without in any way withdrawing from the position which the Railroad Commission assumed in its finding that public convenience and necessity call for enterprise in the field undertaken by the Boston & Eastern road, the joint board, as a member of the above quadruple board, considers that the matter should be studied in relation to the broader plans of transportation improvement in the metropolitan district, which are intimately related to the construction of a possible new tunnel between the North and the South Stations and the electrification of the steam railroads in the metropolitan area.

An exhaustive discussion is given in favor of constructing a subway or cross-town tunnel from Park Street to the South Station, with the conclusion that such an underground route

should be built as the natural extension of the Cambridge subway, now under construction. The total cost of this tunnel would be about $3,000,000, and its length 3000 ft.

The joint board recommends no legislation to establish a station at Castle Street, on the Washington Street tunnel line of the Boston Elevated Railway.

Relative to the restoration of elevated train service in the Tremont Street subway the board states that such a course would greatly obstruct traffic, lead to great inconvenience and invite danger of accident, as well as congesting existing tracks, reducing the capacity of the Washington Street tunnel one-half. The crossings which would be necessitated at grade would "form an intolerable nuisance."

An extended study is made of the traffic conditions in South Boston, in connection with the construction of a proposed subway or tunnel line from the city proper to the vicinity of Marine Park. The board finds that the cost of such an undertaking would be all out of proportion to the traffic, being from $6,000,000 to $8,000,000 to handle a maximum of about 28,000 passengers per day. No legislation is, therefore, recommended.

Like action is taken in regard to a proposed subway from Sullivan Square to the North Station, the board finding no evidence that the present combined surface and elevated facilities are inadequate to handle the traffic. Such a line is declared objectionable on account of the impossibility of fitting it into the present system of tunnel lines.

The board finds that the cost of a subway from Tremont and Park streets to Milton Lower Mills would be prohibitive, requiring between $13,000,000 and $14,000,000, exclusive of land damages, and being 6⅛ miles in length. The district is unfavorable for such a project.

No legislation is recommended in case of the proposed union of terminals and stations of the steam and elevated lines of Boston.

The board finds that a tunnel between Boston and Chelsea would be unduly costly, but recommends that a loop be constructed at Scollay Square, in the East Boston tunnel, and that arrangements be made by the Boston Elevated Railway and the Boston & Northern Street Railway for joint use of the tunnel, with transfers given at the Boston Elevated stations.

Bills providing for the discontinuance of the elevated structure on Washington Street, Boston, and the extension of the Washington Street tunnel to Dudley Street were declared unconstitutional by Attorney-General Dana Malone, of Massachusetts.

P. A. Y. E. RESULTS ON THE CHICAGO CITY RAILWAY

This paper presented in its issue of Jan. 15 a statement regarding the 31.9 per cent reduction in accidents on the Chicago City Railway since the use of pay-as-you-enter cars. A more complete analysis of results which this road has obtained with pay-as-you-enter cars is now available. The following statement compares the receipts, car-hours and accidents on the Cottage Grove Avenue division of the Chicago City Railway, from the commencement of the pay-as-you-enter car service on Nov. 24, 1907, to the close of the fiscal year ending Jan. 31, 1909, with the same period for the previous year, when pay-as-you-enter cars were only operated for two months on one line of that division:

	Receipts.	Car hours.	Receipts per C. H.
Nov. 24, 1907, to Jan. 31, 1909	$1,808,321.52	702,395	$2.57
Nov. 24, 1906, to Jan. 31, 1908	1,686,712.17	796,843	2.12
Increase	$121,609.35	*94,448	$0.45
Per cent.	7.2	*11.9	21.2
Per cent increase or decrease on all lines	2.8	*3.0	6.0
Per cent of increase or decrease due to "P. A. Y. E." cars	4.4	*8.9	15.2

* Decrease.

ACCIDENTS

FALLING AT CURVES OR WHILE BOARDING OR LEAVING CARS OR STEALING RIDES.

Nov. 24, 1907, to Jan. 31, 1909	1,280
Nov. 24, 1906, to Jan. 31, 1908	1,821
Decrease	541, or 31.9 per cent.

NEW SINGLE PHASE MOTOR DESIGN DISCUSSED AT INSTITUTE OF ELECTRICAL ENGINEERS

A paper entitled "The Space Economy of the Single Phase Series Motor" was presented at a meeting of the American Institute of Electrical Engineers on Jan. 14 by Prof. W. S. Franklin and S. S. Seyfert. The authors stated that the object of their paper was not to discuss the relative merits of single phase and direct current electrification, or to consider the question of the locomotive versus the multiple unit system of electric propulsion, or to argue in favor of the axle motor as against the detached motor with side-bar or gear connection. Its sole purpose was to discuss the question of the maximum single phase series motor rating which can be placed within a given space. They complimented the designers of the motors of the present New Haven locomotives, but believed that improvements were possible in the way of increasing the motor rating for a given weight of locomotive, especially in increasing the tractive effort at starting.

The principal novel feature in the design proposed by the authors consisted in removing the commutator from its usual position, making the armature stationary, arranging the field structure to revolve and placing the stationary commutator at some convenient point where the revolving brushes may be positively driven by the revolving field structure.

For this arrangement it was claimed that all of the available space between the wheels would be occupied by active material, which would be utilized to the best possible advantage. The resistance leads, balanced choke-coils and similar apparatus could then be designed practically regardless of the amount of space they should occupy, and the designer could produce a machine which would commutate satisfactorily with a higher short voltage circuit than would otherwise be possible. Again, the power losses of the non-sparking device would take place outside of the motor region proper, and hence would not have to be taken care of by ventilation. Repairs to resistance leads, or other devices for preventing sparking, could be made with great ease and without opening up the motor in any way, and arrangements could be provided for the short-circuiting of any portion of the resistance leads of the disconnecting or the choke-coils at any prescribed motor speed, thus enabling the designer to treat the problem of starting and the problem of steady running independently of each other.

The authors then presented diagrams of a 500-hp motor of this general construction, and described the type of revolving brush holder which they proposed and of a non-sparking device based on the use of leads, providing great impedance for any short-circuit current and almost non-inductive for the main-line current.

The paper was discussed by several of those present. S. M. Kintner thought that there would be many difficulties in constructing and operating the machine, especially so far as the commutator and revolving brushes were concerned. He also doubted whether there would be any gain in output per unit weight of active material. E. H. Anderson criticized the complication of the proposed motor.

E. F. W. Alexanderson also thought that there was no evidence in the paper that the space occupied by the motor would not be quite as large as that of the motor designed along familiar lines. He commented on the close agreement as regarding weight and space per horse-power of the single-phase railway motors of standard type, as manufactured by different makers in America and Europe. S. S. Seyfert defended the design of the motor.

The report of the Public Service Commission of New York, Second District, on passenger train delays for the month of November shows that 54,891 trains were run, of which 84 per cent were on time at division terminals. The average delay for each late train was 25.3 minutes and the average delay for each train run was 4.1 minutes. The causes of delay were waiting for trains on other divisions, train work at stations, trains ahead, meeting and passing trains, wrecks and engine failures.

HEARING ON FORM OF HEATING ORDER

The rehearing before the Public Service Commission of the First District of New York regarding the form of notice to be posted in the cars of street railways within the jurisdiction of the commission to show the amount of heat required in cars as fixed by the commission, was held before John E. Eustis of the commission on Jan. 10, 1910. Frederick W. Whitridge, receiver of the Third Avenue Railroad, and Henry A. Robinson, counsel, represented that company, and J. L. Waugh represented the Interborough Rapid Transit Company, New York & Queens County Railway and the New York & Long Island Traction Company. H. H. Whitman represented the commission as counsel. Mr. Eustis said that it had been decided to supply the companies with a form of notice drawn by the commission which could be followed without the necessity of the companies submitting notices for approval, but that any material change from the form as proposed by the commission would have to be approved by the commission. All forms of notices approved by the commission previous to the drawing of the conditional notice by the commission would stand. Mr. Eustis thought that two weeks would be sufficient time for the companies to prepare and post the notices, but said that further time would be given if required. The Brooklyn Rapid Transit Company, Metropolitan Street Railway, Interborough Rapid Transit Company and several others have submitted forms of notices which have been approved by the commission.

THE CHEMIST AND THE POWER PLANT

The function of the industrial chemist in improving power plant efficiency was discussed at the recent meeting of the American Association for the Advancement of Science at Boston by Arthur D. Little, before the division of which he is chairman, of the American Chemical Society. Speaking to industrial chemists and engineers, Mr. Little pointed out that in the selection of raw materials the chemist has the power to institute savings amounting to many thousands of dollars yearly, to open up new sources of supply and to improve specifications, analyses and physical tests. In the field of power supply the natural outcome of this line of attack is the improvement of combustion processes, analysis of boiler compounds, study of lubricants, determination of fuel qualities and mixtures, control of the operations of the fire room, and, in general, skilled supervision of plant management.

Within the last few years the chemist has come to see that his work along certain lines in connection with public utility improvement deals with energy no less than with matter, and the excellent results that have in many cases followed the study of power house conditions by the industrial chemist have been in part due to the narrowing of the gap that formerly existed between chemistry and physics. The laboratory has thus been brought close to the field of commercial service, and among public utility enterprises few have benefited more than electric railways from the work of the industrial chemist.

The selection of the most efficient type of coal and its proper use in the boiler room under all conditions of load are essentially chemical questions, and in the gas engine and producer fields the securing of high efficiency is far more than a physical problem. Similarly, the development of power from waste gases of blast furnaces, the storage of coal, prevention of spontaneous combustion by thermometric exploration of fuel piles, abatement of smoke, improvement of draft conditions, analysis of fuel for calorific power, moisture, sulphur, etc., and the purification of boiler feed water are matters in which the chemical engineer has often saved money for operating companies. In stating that the analysis of boiler compounds as an end in itself presents little to excite enthusiasm, but when such analyses are made the means of saving $3,600 a year in the plants of a single company they take on a new and larger aspect. Analytical work is by no means the sole sphere of the power plant chemist. Boiler and engine tests, studies of the efficiency of grates and stokers, applicability of new equipment, such as the low-pressure turbine, behavior of engine and cylinder oils in service, costs of waste, relative efficiency of different lubricating equipment, selection and maintenance of bearing metals, are some of the wider interests of the chemist in connection with the power plant, in each case with the object of reducing the unit costs of service.

HEARING BY MASSACHUSETTS COMMISSION ON HAMILTON FARES

The Massachusetts Railroad Commission gave a hearing on Jan. 10 upon the petition of citizens of the town of Hamilton for a fare readjustment on the Beverly-Gloucester line of the Boston & Northern Street Railway. Selectman Norwood represented the town, and the company was represented by Bentley W. Warren. The petitioners desired a 5-cent fare within the limits of the town of Hamilton, and also a 5-cent fare between Hamilton, Beverly, Ipswich and Essex.

Under cross-examination, the witnesses for the petitioner admitted that the line passes through a comparatively deserted part of the town of Hamilton, being merely a part of a through route between Beverly and Gloucester. There are practically no public buildings of any kind in this part of the town. Mr. Warren stated that the fare in vogue between Essex and Beverly had little to do with what was equitable between Hamilton and Beverly. A charge of 10 cents was made between Essex and Beverly, and also between Hamilton and Beverly, although Essex is slightly beyond Hamilton. The directors of the company still felt that when the board reduced the fare between Essex and Beverly several years ago the traffic conditions of the line did not warrant such action, and that this fare should in no case be regarded as a criterion as to what was proper elsewhere on the system. So far as traffic originating on this line was concerned it would be a benefit to the company and its patrons elsewhere if the line could be taken up, for the business was unremunerative, and the line was of use only as a short section of a through route.

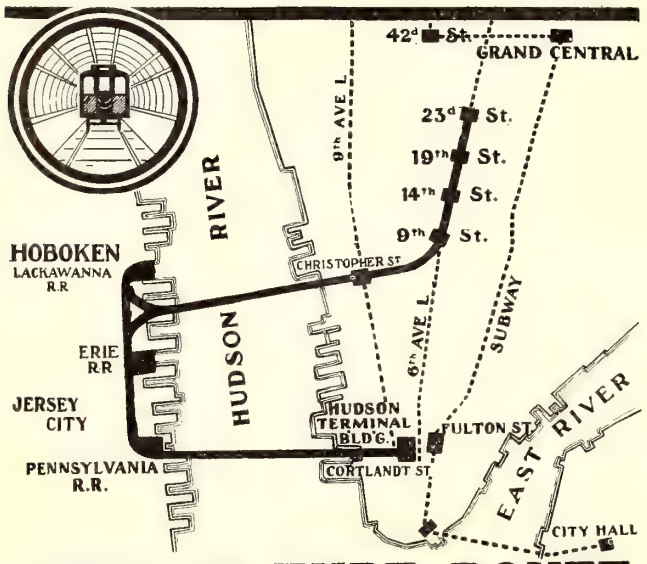
In itself the franchise given to the old Gloucester, Essex & Beverly Street Railway was of practically no value. It covered 3 miles of track that were an absolute burden to the company so far as local business was concerned. It was not what was so often called a "valuable franchise given the company for nothing." The line passed through the back part of the town, and no sane man would ever think of building it except as a part of a through route. In the 12 years that the line had been built probably not over a dozen new houses had been erected along the tracks. The center of Hamilton was adequately served by a different line of the company.

Mr. Warren stated that the difficulty in the case was largely one of fare division points unless the board took the position that the company ought to carry its patrons at a rate per mile that was simply prohibitive of profitable business. When the petitioners asked for a 5-cent fare from all parts of Hamilton to Beverly they wanted the company to carry them a possible 7.9 miles through a country district for 5 cents. The maximum ride which passengers might take from points in Hamilton to Ipswich and Beverly was in several cases in excess of 5 miles. Mr. Warren urged the board to ride over the line or send an inspector over the route to see how little there was in the way of traffic possibilities. He submitted a number of recent photographs taken along the route.

In conclusion, Mr. Warren said that in establishing the fare division point in Hamilton at the junction of the Essex-Gloucester line with the Hamilton-Wenham line, the company had proceeded on the theory that such few patrons as the line had would prefer to be carried for a single fare from the junction into the center of Ipswich to having the limit at the town line. This gave a ride of over 5 miles for 5 cents. The company was ready to go back to a 5-cent fare within the town limits if it could have a 10-cent fare from town to town. It did not think that such a plan would serve, although probably it would be more profitable than the present arrangement. The board took the case under advisement.

"PUBLIC BE PLEASED" ADVERTISEMENT OF HUDSON RIVER TUNNELS

The Hudson & Manhattan Railroad has commenced the publication of large advertisements in the daily newspapers of New York, calling attention to its service through the Hudson River tunnels between New York City and New Jersey. The



HUDSON TUBE ROUTE

"The Public be Pleased"

Quickest—surest—safest—route between New York and New Jersey.

A time, trouble and money saver. The map above shows it at a glance.

Study it! Remember the stations!

The next time, every time, you cross the Hudson **go under it** via the Hudson River Tubes.

QUICKEST because you start from the heart of the city. No trip to the water front. Trains run every few minutes day and night. Make all connections at Pennsylvania, Erie and Lackawanna Stations.
SUREST because you can't be stopped by storm, fog, or ice. If one train is missed another follows shortly. No ten minute wait and a connection lost.
SAFEST because the tubes and trains are equipped with the most perfect safety devices known—steel cars, automatic signals, automatic switches, automatic stops, electric operation.

Hudson & Manhattan Railroad Co

Newspaper Advertisement of Hudson & Manhattan Railroad

first advertisement is shown above, and includes a reference to the policy of pleasing the public which has been expressed so frequently by William G. McAdoo, president of the Hudson & Manhattan Railroad.

SPLICING WITH SILVER SOLDER

A good electrical shop kink is the butt-end soldering of broken or burned-out wires without removing them from the armature or field coil. If the splice is to be made on an armature coil the damaged wire is raised a little way out of the slot. The insulation is then scraped off for a few inches and the ends of the broken wire are filed off smoothly, after which a piece of wire is cut to fill the gap. One end of the inserted wire is then butt-ended with the armature wire and the ends heated by a gas torch until they are red hot. Upon this a little borax is applied as the flux, and then some silver solder is inserted between the ends. When both splices are completed in this fashion the bare wire is wound with silk, as the latter takes up less space than tape. After the silk has been covered with insulation the coil is ready to be returned to the slot. During the operation of heating with the torch the adjacent wires are protected by fiber barriers. Field coils also can be spliced in this way, and the same method used to solder the ends of successive reels of wire.

CHICAGO ELECTRICAL SHOW

The fifth annual Chicago Electrical Show in the Coliseum was opened to the public at 1 p. m. on Jan. 15 and will continue until Jan. 29. It is open daily from 10 a. m. to 10:30 p. m. except on Sundays. The building has been beautifully decorated and the attendance promises to be larger than in any previous year. The illumination scheme is novel and spectacular. The exhibits are illuminated by tungsten lamps mounted on the corner posts and in domes suspended over the center of each space, while the spectacular illumination which is independent of the useful illumination is accomplished by throwing beams of light from projector lanterns among streamers of ribbon and tinsel suspended from the ceiling of the building. These streamers, about 3500 in number, hang straight down at intervals of 2 ft. to 4 ft. with their lower ends free. Of the tinsel streamers about one-half are gold and one-half silver. The ribbon streamers are one-half yellow and one-half gray. There are three 90-amp 30-in. General Electric projector lamps at each end of the building, making six in all. The purpose of these is simply to illuminate the moving streamers, which are of different lengths. The projectors have colored glass slides for varying the effect. The floor area of the building which is occupied by the exhibits aggregates 51,000 ft. The general decorative and illuminating designs were made by D. H. Burnham & Company, architects, of Chicago.

One striking feature of the show is the Wright aeroplane which is exhibited by the United States Government. This machine is suspended from the ceiling in the center of the hall and has been fitted for demonstrating wireless telegraphy. While most of the exhibits are of electrical devices intended for household and commercial use, several manufacturers of electric railway apparatus show samples of their products. Brief descriptions of the exhibits of a number of these manufacturers are given in the following paragraphs:

Allis-Chalmers Company, Milwaukee, Wis., has a machinery exhibit which includes a 30-hp polyphase induction motor and a portable air compressor of 11 cu. ft. capacity driven by a 115-volt, 60-cycle, three-phase, alternating current motor. A model of the Allis-Chalmers horizontal steam turbine is also shown.

American School of Correspondence, Chicago, Ill., exhibits its line of text-books used in school work and its encyclopedias, of which some 13 are published.

American Steel & Wire Company, Chicago, Ill., has an exhibit of its "Crown" and "United States" rail bonds and machines for applying these bonds. Rubber-covered wires and cables, weatherproof wire, lead-encased cables, trolley wire, lamp cord, telephone and telegraph wires and miscellaneous wires of varied description are shown. The exhibit also includes wire railroad fencing.

Chicago Fuse Wire & Manufacturing Company, Chicago, Ill., shows some fine display boards, on which are exhibited a representative line of the company's conduit outlet boxes, covers and switch boxes, also enclosed fuses and blocks, fuse wire and fuse links, all sold under the trade name "Union."

Chicago Pneumatic Tool Company, Chicago, Ill., displays a complete line of portable electric drills, grinders and hoists, as well as portable pneumatic tools, consisting of hammers, drills, etc.

Crane Company, Chicago, Ill., has an exhibit of motor-operated cast-steel gate valves, as well as high-pressure gate valves of ferro steel, and a working exhibit of "Cranetilt" steam traps. There is also a cast-steel header 7 ft. 6 in. long with two outlets, samples of flanging, miscellaneous brass valves, packing, etc.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has furnished its large booth as a reception room. Here a model of the new C-H porcelain switch and a typical sample of steel mill contactors are displayed.

Driver-Harris Wire Company, Harrison, N. J., exhibits its line of resistance alloys in the form of round and flat wire. It also displays Nichrome wire glowing at working temperature in the open air to demonstrate the non-oxidizable properties and efficiency of this wire for all types of resistance. Nichrome

wire has a resistance 60 times that of copper. It is non-corrosive, ductile and can be worked unprotected at temperatures up to 1800 deg. Fahr. Climax (a nickel-steel alloy), Advance (a copper nickel alloy) and Monel metal are among the other alloys shown.

Duntley Manufacturing Company, Chicago, Ill., exhibits Duntley pneumatic cleaners in all sizes for operation, both by electricity and by hand power, together with a portable electric generator to operate the electric cleaners.

Electrical Testing Laboratories, New York, N. Y., have an instructive exhibit designed to show the color values of modern electric illuminants and the great progress that has been made recently in their efficiency.

Electromagnetic Tool Company, Chicago, Ill., shows its new electric hammer in operation. This tool is particularly designed for the drilling of concrete, brick and stone. The amount of electric energy required is 3.5 amp at 110 volts. This device differs from previous electric percussion tools in that the blow is produced, not by direct action of an electromagnet on the plunger or by the centrifugal force of a flywheel arrangement on the motor shaft, but by means of a magnetic clutch so arranged as to provide adequate cushioning of the blow and prevent sudden strain on the motor.

Fairbanks, Morse & Company, Chicago, Ill., exhibit a large collection of electrical machinery, including 14 alternating-current polyphase motors, ranging in size from 1 to 30 hp, and nine direct-current motors ranging in size from 1 to 15 hp. Monarch lamps are also shown in various sizes.

General Electric Company, Schenectady, N. Y., pays particular attention to lighting and heating appliances in its large, centrally located exhibit near the main entrance.

General Vehicle Company, Long Island City, N. Y., has an exhibit of two electric commercial vehicles, a 1000-hp delivery wagon and a 4000-lb. truck.

G. M. Gest, New York, N. Y., displays a full-size brick manhole with fiber conduits leading out on one side and clay conduits on another side. This manhole is equipped with the Gest patented bracket frame and hangers and contains several sections of spliced cable.

Hamler-Eddy Smoke Recorder Company, Chicago, Ill., exhibits the Eddy automatic smoke recorder. This is an instrument carrying a card calibrated for time on which is blown and affixed a continuous ribbon of smoke of the precise shade and density appearing at the top of the power plant stack. The instrument on exhibition is connected with the Coliseum chimney and is shown in operation.

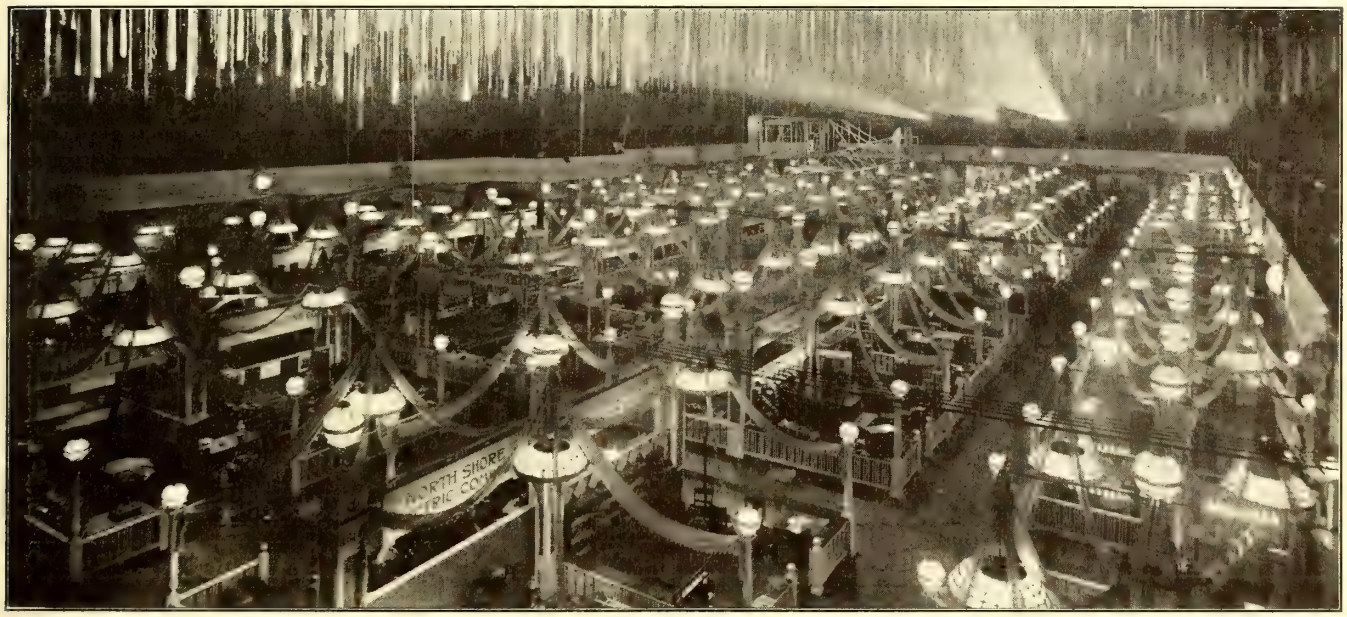
Mathias Klein & Sons, Chicago, Ill., display linemen's and electrical construction tools adapted for pole line work as well as for underground construction and interior wiring. The new Goehst insulation stripper is shown, as well as grips for small wires and cables, gasoline torches, wire reels, pliers, wrenches and a large assortment of other tools.

National Carbon Company, Cleveland, Ohio, displays a complete line of carbon products, primary batteries, motor brushes, arc lamps and electrodes, as well as carbon packing rings for turbines and many other carbon specialties.

National Electric Lamp Association (Engineering Department), Cleveland, Ohio, has a large exhibit of a complete line of 110 and 220-volt Mazda tungsten lamps. Tantalum lamps for the same voltages are also shown. Ten 16-cp carbon lamps and 10 16-cp tantalum street railway lamps are burned continuously during the show.

New York Pole Company, New York, N. Y., shows a number of sections of reinforced electric railway poles.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., shows a complete line of telephone apparatus for use on railroads, as well as the company's selective dispatcher signal for use on interurban roads. Several different types of switchboards are also displayed, including both magneto and central energy systems with standard equipment.



General View of Chicago Electrical Show in Coliseum Building

United States Light & Heating Company, New York, N. Y., displays all types of storage battery plates for light and power, propulsion, ignition and automobile lighting, in addition to a plate recently developed for car lighting purposes, which is made by the National swedging process. The Bliss and Moskowitz car lighting system owned by the company is shown in detail.

Western Electric Company, New York, N. Y., devotes much of its space to telephones, but also shows Hawthorn motors and miscellaneous electrical goods.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., displays a very complete line of its smaller apparatus particularly intended for domestic service.

Theodore P. Shonts, president of the Interborough-Metropolitan Company, announced at the annual meeting of the stockholders of the company on Jan. 18, 1910, that J. P. Morgan & Company were ready to furnish $100,000,000, or more, to finance new lines that may be constructed by the company, but said that he did not care to name the conditions which Morgan & Company had made.

VALUATION OF BROOKLYN RAPID TRANSIT SYSTEM

Bion J. Arnold was recalled on Dec. 23, 1909, as a witness in the case before the New York Public Service Commission, First District, involving valuation of the Brooklyn Rapid Transit system in connection with the petition for a 5-cent fare to Coney Island. Mr. Arnold's testimony supplemented his testimony at the hearing on Dec. 15, when, as stated in the Electric Railway Journal of Dec. 25, 1909, page 1261, he estimated the total cost to reproduce the properties at approximately $100,000,000. He presented the accompanying statement, dividing the reproduction value by companies. The total value determined is $103,216,789.30, which includes $2,511,099.31 for non-operative property. The statement represented an attempt to segregate the total value by companies. There should be added whatever is finally agreed to be the value of the real estate over and above the assessed value, since only the assessed value of this class of property was allowed in the valuation. No percentages were added for anything outside of construction expenses. Mr. Arnold was not aware of any properties belonging to the companies which had not been included in his compilation unless it might be rights-of-way that were not assessed.

The allowance for depreciation below cost of reproduction new in properties of this character, Mr. Arnold testified, would depend upon the actual physical condition, which would have to be ascertained after a careful examination, but it would usually extend from 15 to 25 per cent of the value of the physical property. Sometimes a property was found to be worth 85 per cent, sometimes as low as 75 per cent, and there might be cases where the value would be much lower. Mr. Arnold would not attempt to state the percentage for the properties of the Brooklyn Union Elevated Railroad without an exhaustive examination and a carefully prepared estimate. He would say, however, that the property was in very good condition and well kept up, much better than other properties which he had examined. A good deal of the property had been reconstructed. Mr. Arnold spoke more particularly of the Brooklyn Union Elevated road because of his examination of that part of the property, but his remark applied generally to the entire system of the Brooklyn Rapid Transit Company.

George D. Yeomans, general counsel for the company, asked whether Mr. Arnold, in computing the reproduction value, considered the fact that the company had acquired practically all of its 300 lineal ft. of easements. This was not considered, as the property was not assessed. No values were included for intangible elements or franchises.

In answer to a question by Commissioner McCarroll as to the percentage value of a road in good operating and efficient condition, Mr. Arnold stated that in Chicago it was thought that the property, after proper reconstruction, could be maintained at 85 per cent of the cost to reproduce new. Some authorities thought a road could not be maintained at better than 80 per cent, so that probably 80 to 85 per cent of the cost to reproduce new would be first-class condition.

BROOKLYN RAPID TRANSIT SYSTEM—REPRODUCTION VALUE OF PHYSICAL PROPERTY AS ESTIMATED BY BION J. ARNOLD.

PRELIMINARY TOTALS BY OWNERSHIP.

	Ownership.	Operative property. Percentages for contractor's profit, incidentals, engineering and administration. Without.	With.	Total non-operative property.	Grand total operative and non-operative property with percentages.
1.	American Ry. Traffic Co.	.....	.....	$1,000,000.00	$1,000,000.00
2.	Bridge Operating Co.	$72,632.83	$83,527.75	.....	83,527.75
3.	Brooklyn City R. R. Co.	20,470,051.16	25,066,297.00	438,483.00	25,504,708.00
4.	Brooklyn Hts. R. R. Co.	443,180.83	510,726.65	1,000.00	511,726.65
5.	Brooklyn, Queens Co. & Suburban R. R. Co.	4,148,237.47	4,962,498.70	32,483.00	4,994,981.70
6.	Brooklyn Un. Elev. R. R.	20,768,694.51	25,262,154.18	597,282.31	25,859,436.49
7.	Canarsie R. R. Co.	2,853,250.33	3,283,672.57	420.00	3,284,092.57
8.	Coney Island & Gravesend Ry. Co.	379,628.55	463,511.95	.....	463,511.95
9.	Nassau Elec. R. R. Co.	9,800,200.14	11,924,049.18	112,967.00	12,037,016.18
10.	Prospect Park & Coney Island R. R. Co.	1,824,949.06	2,148,614.54	11,440.00	2,160,054.54
11.	New York & Coney Island R. R. Co.	.....	.....	.....	.....
12.	Prospect Park & South Brooklyn R. R. Co.	12,325.00	15,591.13	.....	15,591.13
13.	Sea Beach Ry. Co.	1,297,242.36	1,489,519.32	35,515.00	1,525,034.32
14.	So. Brooklyn Ry. Co.	2,346,875.86	2,799,279.24	52,756.00	2,852,035.24
15.	Transit Development Co.	19,028,308.78	22,696,247.66	228,753.00	22,925,000.66
	Grand total.	$83,445,576.88	$100,705,689.99	$2,511,099.31	$103,216,789.30

INDIANA INTERURBAN RULES AMENDED

At a conference of a committee of Indiana interurban railway managers and the Railroad Commission of Indiana, held at Indianapolis on Jan. 18, the Indiana code of interurban rules was amended to make it conform more closely with the standard code of rules of the American Street & Interurban Railway Association. The committee, composed of H. A. Nicholl, Indiana Union Traction Company; C. D. Emmons, Fort Wayne & Wabash Valley Traction Company; F. M. Durbin, Evansville & Southern Indiana Traction Company, and Guy K. Jeffrus, Terre Haute, Indianapolis & Eastern Traction Company, presented a report recommending the following changes in the Indiana code, all of which were adopted:

Rule 82 (c) to be changed to read "four bells" instead of "three bells," and the positions of Rules 82 (c) and 82 (d) reversed, conforming with American Street & Interurban Railway Association Rule 103.

Rule 134 to have the following paragraph added:

"Conductor must leave the car from the rear platform, and before doing so securely fasten the rear vestibule door opposite the side from which he leaves to flag the crossing, and not give a signal to the motorman to proceed until after he is positive that no one is attempting to board or leave his car. Before starting, the motorman will look back, when conditions will permit, to see that no passengers are getting on or off."

Rule 107, signals at switches, to read as follows:

"After a regular scheduled train or an extra train holding meeting or time orders against an opposing train clears the main track, and switches are properly set for the main track, the conductor must step to the side of the track opposite the switch stand until after the opposing train has passed, keeping his hand lantern at night in full view of the approaching train, but giving no proceed signal. Under like conditions, conductors of extra trains not holding meeting or time orders will remain with their train or out of view of the motorman of opposing train."

Rule 113 to be amended to conform to American Street & Interurban Railway Association Rule 203, and Rule 113-A added, conforming to American Street & Interurban Railway Association Rule 203-A.

Rule 138 to be amended to conform to American Street & Interurban Railway Association Rule 230.

Rule 155 to be amended to conform to American Street & Interurban Railway Association Rule 261.

Rule 162 to be amended to read as follows:

"When a train order is to be given affecting the movements of more than one train, the train or trains whose rights are to be restricted must first receive the order and be given the complete before the order is given to the train or trains whose rights are to be increased; except when the train or trains whose rights are to be restricted are flagged by authorized agents or operators, as per Rule 152."

Rule 239 to be amended to conform to American Street & Interurban Railway Association Rule 398.

MESSAGES OF THE GOVERNORS

The Legislatures of New York, Ohio, Massachusetts, Rhode Island, New Jersey and Maryland have organized for the session of 1910. Sessions of the Legislatures of Kentucky, Mississippi, South Carolina and Virginia are also to be held this year. The Legislature of Illinois convened in special session in December, 1909. Most of the messages of the Governors contained recommendations for legislation affecting railroad interests, several such recommendations being embodied in reference to the necessity for creating public utility commissions. Abstracts of the messages of the Governors of a number of States, so far as they relate to public utility enterprises, follow:

GOVERNOR HUGHES, OF NEW YORK

I again recommend that the Public Service Commission law should be extended to telegraph and telephone companies, and that these companies should be brought under appropriate regulation as to rates, service and other matters similar to that which has been provided for corporations at present subject to the law. The events of the past year have served to emphasize the importance of adequate supervision and regulation, and I know of no sound reason for excluding these activities from the established policy of the State.

Such amendments of the Public Service Commission law as experience has shown to be advisable, to improve its provisions, to aid administration or to carry out the intent of the statute, should be supplied.

I disapproved the consolidated railroad law passed at the last session because the inclusion in the consolidated statute (if enacted as worded), of the provisions of sections 37 and 38 of the railroad law, with regard to rates and charges, might form the basis for a claim that it was the intention of the Legislature to continue these provisions, notwithstanding the subsequent enactment of the public service commissions law. I advise the formal repeal of these provisions of the railroad law. And if a consolidated statute, without a general revision, is enacted—the wisdom of which is open to serious question—they should be omitted.

GOVERNOR FORT, OF NEW JERSEY

In my inaugural address and first annual message, the creation of a public utilities commission, with ample powers to regulate public-utility corporations, was recommended. This recommendation was in line with the pledges made to the people of the State by both political parties in their respective conventions in 1907.

The opposition to such legislation emanates solely from interested sources and corporations which control the franchises for public utility purposes. If the people of the State could fully realize the character of the influence exerted to defeat this beneficent legislation, or could be brought to appreciate fully the advantages which would accrue to them under it, the result would not be doubtful.

There is a statute which prevents the sale of bonds at a less price than 80 per cent of their par; but it in no way prevents the capitalization of futures or of combinations in the same line of business. The law should be clear and stringent against any attempt at the merger of public-utility companies, or the issuance of bonds or stocks by such companies, except upon the approval of some State board.

Every dollar of exploitation, in the way of excessive bond or stock issues, is simply adding to the burden of the people who use the street cars, the electric light and the gas. The same thing is equally true of the telephone service and the charges for express matter. Each of these public-serving companies now conducts these public matters in its own way and in its own time and under any rate it chooses; and the people are helpless. The consumer has no place to go for relief against any exactions, inequalities or neglect, and a long-suffering public must submit and allow all this to continue unless a commission, with ample power to protect and relieve the people, is created.

This question touches every householder and tenant in the State. It affects every home. It is a vital issue and will not down. The failure to enact this legislation during the past two years has been a flagrant violation of a most honorable and specific political pledge.

Whatever bill is enacted should provide for the consolidation of the present Railroad Commission with the new commission created by it, and thus the question of expense which has been raised (not by the people, but by the interested ones) would not avail as an objection. The present Railroad Commission was opposed when created. No one would now abolish it. It has done, and is doing, splendid work. The commissioners now in office can be continued for their unexpired terms, as the commissioners under the new bill. Practically no additional expense would be involved. Forty thousand dollars would cover the cost of this commission, and justice between the people and the public-serving corporations would be assured. This is a small cost for a consummation so greatly to be desired.

There is no subject that is to come before the present Legislature which casts so great an obligation upon us as the creation of a public utilities commission with ample powers. It is an obligation as sacred as the good faith of a political pledge can make it. It is as binding as should be the loyalty of a representative to the people who elected him.

GOVERNOR DENEEN, OF ILLINOIS

The city of Chicago has under consideration the question of the construction, maintenance and operation of subways for the use of street railroads and other public utilities belonging to the city or to public utility corporations, and for general traffic. In this connection the question has been raised as to the authority of the city to appropriate money for the securing of expert advice upon the question whether a subway system for Chicago is desirable, and if so, the precise character and location of such subways. An early decision of this question is of great importance to Chicago, and in view of the purely local character of the questions involved, I have been requested to submit to the General Assembly the question of conferring upon cities the powers mentioned by the passage of an enabling act, and I urge that such an act be passed at the present session.

MIDYEAR MEETING OF THE A. S. & I. R. A.

Since the publication of the list of committees in the issue of last week scheduled to meet at the midyear meeting of the American Street & Interurban Railway Association next week, meetings have been called of the following additional committees: Classification committee of the Accountants' Association, to meet on Jan. 26-27; city rules committee of the Transportation & Traffic Association, to meet on Jan. 27; subjects committee of the Claim Agents' Association, to meet on Jan. 26, and the executive committee of the Manufacturers' Association, on Jan. 27.

Advices have been received from a large number of railway companies that they will be represented at the midyear meeting of the American Street & Interurban Railway Association on Jan. 28, and it is expected that from 150 to 200 persons will be present at the banquet on the evening of Jan. 28 at the Knickerbocker Hotel. Among those who will speak on that occasion are George A. Post, of New York, and Charles W. Colby, professor of history at McGill University, Montreal.

COMMITTEE ON SUBJECTS OF THE TRANSPORTATION ASSOCIATION

R. I. Todd, president of the American Street & Interurban Railway Transportation & Traffic Association, announces the appointment of the following committee on subjects of that association:

J. H. Pardee, chairman, J. G. White & Company, New York

G. W. Parker, general express and freight agent, Detroit United Railway Company, Detroit, Mich.

H. W. Fuller, general manager, Washington Railway & Electric Company, Washington, D. C.

MEETING OF THE WOOD PRESERVERS' ASSOCIATION

The fifth annual meeting of the Wood Preservers' Association was held at the Auditorium Hotel, Chicago, Jan. 18, 19 and 20. About 75 members and guests were present. The association now has a membership of 60, and is growing rapidly. C. W. Berry, Laramie, Wyo., superintendent, Union Pacific & Western Pacific Preserving Works, was secretary during 1909. The program included discussions of the following papers:

"Precautions to Be Observed to Prevent Fires at Plants," by H. J. Whitmore, superintendent, Missouri, Kansas Wood Preserving Works.

"Results Obtained by Treating with Crude Petroleum," by C. Marshall Taylor, in charge department chemistry and tests, International Creosoting & Construction Company.

"Proper Grouping of Timbers for Treating," by F. J. Angier, superintendent timber preservation, Chicago, Burlington & Quincy Railroad.

"Advantages and Economy of Various Retort Doors," by David Allerton, superintendent, Kettle River Quarries Company.

"Amounts of Various Antiseptics Required per Cubic Foot to Obtain Good Results for Various Purposes," by R. L. Allardyce, general superintendent, International Creosoting & Construction Company.

"What Per Cent of Creosote Oil Can Be Withdrawn from Wood by Subsequent Vacuum?" by J. B. Card, superintendent, Chicago Tie & Timber Preserving Company.

"What Effect Does the Time of Cutting Timber Have on the Rate of Seasoning and Treatment of Same†" by J. G. Williams, superintendent wood preserving department, The Barber Asphalt Paving Company.

"Inflammability of Treated Timber," by H. M. Rollins, superintendent, Texas & New Orleans Wood Preserving Works.

"Economics of Cables, Electricity or Locomotives in Moving Materials at Plant," by Andrew Gibson, superintendent timber preservation, Northern Pacific Railway Company, Brainerd, Minn.

"Precautions to Be Observed for Prevention of Fire in Creosoting Plants," by Lowry Smith, assistant superintendent, Northern Pacific Railway tie-treating plants.

"Advantages and Economy of Various Retort Doors," by Samuel M. Rowe.

During the discussion which took place in earlier sessions of the meeting the following statement of the material treated during 1908 by all processes was presented (this statement is said to be not complete because reports were lacking from some treating plants):

STATEMENT OF MATERIAL TREATED DURING 1908—ALL PROCESSES.

Piling and Poles.

Treatment—	Lineal feet.
Creosote	8,960,400
Zinc Oil	630,800
Total	9,591,200

Lumber.

	Board feet.
Creosote	72,800,600
Zinc Oil	430,300
Zinc Chloride	1,150,800
Total	74,381,700

Building Timber.

	Board feet.
Creosote	16,230,700
Zinc Chloride	840,070
Total	17,070,770

Cross Ties.

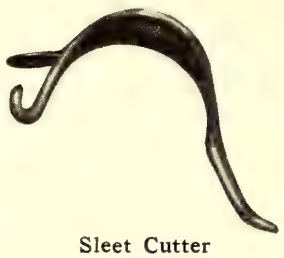
	Number of Ties.
Creosote	9,620,420
Zinc Chloride	8,640,230
Zinc Oil	3,260,530
Total	21,521,180

Miscellaneous (Cu. Ft.).

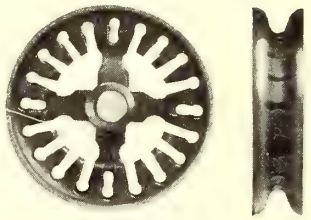
	Switch Ties.	Paving Blocks.	Cross Arms.
Creosote	1,304,840	1,260,020	480,640
Zinc Chloride	570,600	.....	.....
Zinc Oil	95,700	.....	.....
Total	1,971,140	1,260,020	480,640

SLEET WHEELS, SLEET CUTTERS AND HARPS

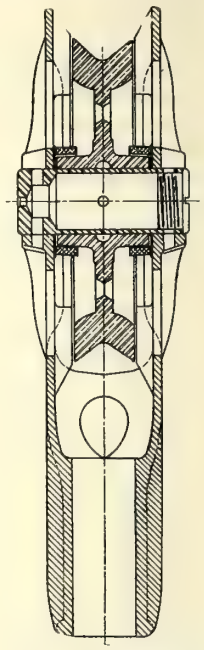
The accompanying illustrations show three interesting overhead current collection specialties of the Holland Trolley Supply Company, Cleveland, Ohio. The sleet wheel and sleet cutter should be of particular interest in view of the operating difficulties brought about by the present severe winter. This company also manufactures several types of harps, of which the type "B" illustrated is perhaps the most interesting. The peculiarity of this harp is that its top flanges project beyond the wheel so that the side wear is taken by the harp flanges,



Sleet Cutter



Sleet Wheel



Projecting Flange Harp

and not by the wheel. Although many assert that rigid iron flanges of this kind wear out the overhead line very rapidly, the manufacturer of this harp states that these opinions have not been borne out in practice. For instance, this harp is reported as having been used with a 6-in. wheel on a line about 13 miles long for over nine months, yet during that period the wear on the harp flanges has been only ¼ in. During the same time even the overhead special work has shown no appreciable wear. The protection afforded by this harp has made it possible to secure a wheel life of 12,000 miles in nine months' service near Cleveland. This company also makes ball-bearing trolley bases and other fittings for overhead current-collecting devices.

CAB SIGNAL SYSTEM FORMALLY ACCEPTED BY THE TORONTO & YORK RADIAL RAILWAY

The Simmen Automatic Railway Signal Company, Toronto, Can., announces that the Toronto & York Radial Railway has formally decided to take over the Simmen cab signal and despatching system, being fully satisfied through eight months' operation that this method has fulfilled all its claims. In the operation on the Toronto & York Radial Railway during the months of November and December, a total of 129,314 signal indications were had, showing an efficiency of 99.995 per cent. The past two months offered a number of opportunities successfully to operate the system under frost, sleet, ice and snow conditions. The company is prepared to say that with its present type of third-rail contact, satisfactory results can be obtained under all climatic conditions.

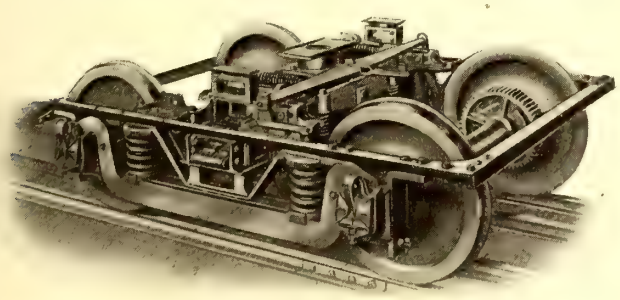
As to the maintenance cost of this method, the routine established on the Toronto installation is as follows: Each day a newly charged storage battery is placed on the cars. The despatchers attend to the charging of the batteries and the

motormen are required to get their batteries from the despatcher's office and place and connect them on the car. The batteries in the despatcher's office are looked after by the despatcher. About half a day each week is devoted by a competent man to the inspection of the signal and telephone apparatus on the cars, besides which the car house men examine the wearing plates on the shoes and the electrical connections to the same. During the nine months of operation there were seven cases of broken wires along the line, which required the attention of a lineman; five cases of broken wires on the car equipment, which were quickly repaired by car house men. The system is so arranged that a broken wire results in a danger signal. As a rule, such a broken wire only incapacitates the signal end of the system and leaves the telephone end intact, thus still permitting the safe and quick despatching of cars until the trouble is repaired. Another strong feature regarding these failures is the fact that when they occur the despatcher instantly has notice of it, thus enabling him to direct repairs as quickly as possible. In its letter of acceptance, the Toronto & York Railway says that even the trackmen can handle the apparatus successfully. The motormen also have more confidence and consequently it is now possible to operate on a closer headway and with more regularity.

ELECTRIC MOTOR TRUCK FOR THE DETROIT UNITED RAILWAY

The accompanying engraving illustrates one of 10 motor trucks recently built by the Baldwin Locomotive Works for the Detroit United Railway Company. These trucks are designated by the builders as class 78-25-A, which signifies a truck of the equalized pedestal type with angle iron end frames, having a wheel-base of 78 in. and designed for a center-pin load of 25,000 lb. The track gage is 4 ft. 8½ in. and the trucks are to be used in interurban passenger service, with maximum running speed of 60 m.p.h. They are arranged for inside hung Westinghouse motors. The axles are finished in accordance with A. S. & I. R. A. standards, and have 4¼ in. x 8 in. journals. The wheels were manufactured by the Standard Steel Works Company; they are of solid forged and rolled steel, 36 in. in diameter, with rims 2½ in. thick.

The truck side frames are of wrought iron, 1¾ in, x 3 in. in section, while the end frames consist of 3 in. x 3 in. angles. The side frames are bent downward at the outer ends in order to clear the car body. Plate gussets brace the frame at the corners, while the side frames are secured to the transoms by



M.C.B. Type Truck for Detroit United Railway

cast-steel gussets of most substantial construction. The transoms consist of 9-in. channels. The bolster and center-pin are of cast steel, and the pedestals are forged iron. In accordance with the practice of the builders, the equalizing beams are punched from steel boiler plate.

The equalizing beam springs are double coil, while the bolster springs are double elliptic. The lower spring plank is composed of a pair of 2½-in. x 2½ in. angles, suspended on swing links. The top swing link bearings consist of steel castings, which span the channel transoms, and constitute a substantial brace at a point where stiffness is essential.

The brakes are inside hung, and the transverse brake beam is pinned directly to the live levers. The brake levers and brake shoe hangers are carried by the transom gussets. The hangers are arranged with a fine adjustment in order that the points of suspension can be located to avoid chattering. The brake shoe, furthermore, is partially cut away in such a manner that the shoe wear will be equalized over the entire bearing surface. It has been found in practice that the form of the brake shoe and the method of suspending the shoes are largely responsible for the amount of chatter. The design of brake applied to these trucks has been patented. The trucks described above embody all the latest improvements adopted by the builders.

THE EDISON NICKEL-IRON STORAGE BATTERY

The Edison Storage Battery Company, of Orange, N. J., announces the completion of the new Edison cell, which is now being placed on the market for traction service. In outward appearance it does not differ except in minor details from the original cell brought out in 1901, but the structure of the positive plate has been radically modified and other improvements embodied to increase the capacity and durability. At present the battery is made in two sizes; one size having four positive and five negative plates, and the other possessing six positive and seven negative plates. The active material in the positive plate consists of nickel oxide and iron oxide is used in the negative electrode. The electrolyte consists of potassium hydrate (21 per cent solution) to which has been added a small amount of lithium hydrate. The function of the lithium hydrate is not clearly defined, but it has been found to improve the working of the positive electrode. The normal specific gravity of the solution is 1.210, which does not change during charge or discharge. The efficiency and capacity of the cell, however, are not affected to any extent if the specific gravity of the solution is as low as 1.160. Below this a temporary effect is noticeable in the output of the cell.

The retaining cans are made of electroplated steel welded at the seams by the autogenous method—that is, by the application of the oxyacetylenic blow-pipe. The walls of the can are corrugated so as to obtain the greatest amount of strength with minimum weight. The iron element has an excess capacity over the nickel element. Much time has been spent in perfecting the latter. The original positive plate was made up of flat rectangular pockets containing nickel oxide and graphite. It was found that the graphite oxidized and that mechanically the structure could not resist the swelling action of the nickel oxide. In the new plate round tubes 4 in. long and about the diameter of an ordinary pencil are used to retain the nickel oxide. The tube is made of thin perforated steel, which when filled with the active material and properly bound by eight steel rings, makes expansion of the active material impossible and insures perfect internal contact. Instead of the graphite formerly employed, electrochemically prepared flakes of pure nickel are interspersed in the oxide to increase the conductivity of the active mass, because nickel oxide of itself is a poor conductor. Each positive plate consists of a grid of nickel-plated steel holding 30 of these tubes. The negative plate comprises 24 flat rectangular pockets supported in three horizontal rows in a nickel-plated grid. The pockets are made of thin nickel-plated steel perforated with fine holes, each pocket being filled with an oxide of iron and afterward subjected to very heavy pressure.

The plates of each group are hung on a connecting rod perpendicular to, but integral, with the pole. They are held apart by nickel-plated steel washers and held in contact by nuts screwed on both ends. The two outside plates are negative and are insulated from the retaining can by sheets of hard rubber. Hard-rubber pieces are also fixed between the can and the side and bottom edges of the plates, and these, together with the hard-rubber rods inserted between the plates, maintain correct spacing and insure permanent insulation.

The cover of the cell, which is also welded in place, has four mountings. Two of these are for stuffing boxes through which the positive and negative poles extend; one is a separator which

prevents the loss of electrolyte while allowing the gases to escape and the other is an opening for water and electrolyte.

This opening is fitted with a water-tight cap held in place by a catch. Fastened to the cap is a spring so arranged that the cap will fly open unless properly fastened. In an assembled battery each individual cell is held securely in place and from contact with adjacent cells by a small hard-rubber button which extends through the slat on each side of the tray and fits over an emboss pressed out on the side of the can. The bottoms of the cells are held in position by small buttons protruding from a conveniently arranged wooden block fastened to the bottom slats of the tray. The indentations in the bottom of the cell fit over these buttons. A rubber apron insulates the cell from the block.

The separator through which the gases escape while the battery is charging is designed in such a way that these escape in a substantially dry condition, the globules of liquid coalescing with a liquid film which forms at the base of the casing and the seat of the ball valve with which the battery is fitted, and in this way falling back into the cell. The electrolyte, therefore, need only be replenished with distilled water until completely changed every eight or 10 months.

Electrical connections between the cells are made by heavy copper connectors, well plated with nickel. The lugs at the end fit over taper-joint binding posts and are held in place with a nut. A socket wrench for removing the nuts which hold down the connectors and a specially designed jack for lifting the lugs from the binding posts when disconnecting the cells are sent with each battery. The trays in which the cells are assembled are very light, and where formerly the ends and the bottom were dovetailed together, the trays are now made of continuous strips, the corners being bent. The data of the cells are given herewith:

	Type A-4.	Type A-6.
Normal ampere-hour output	150	225
Average discharge voltage per cell	1.2	1.2
Normal rates of charge and discharge in amperes	30	45
Weights (in pounds) of cell complete	13.5	19.2
Width of can	2 9/16	3 3/4
Breadth of can	5	5
Height of can	13 3/8	12 3/8
Height of cell to top of pole (not assembled)	13 3/8	13 3/8
Required height of battery compartment	15	15

While the normal rate of charge of the smaller cell, for instance, is 30 amp, charging may be done at double this rate for a one-hour boost if the temperature is kept from rising much above 100 deg. Fahr. It is also permissible, though not recommended, to discharge a battery continuously at rates up to 25 per cent above normal, and for occasional short intervals of time, as in hill climbing or starting on heavy roads, no harm is said to result if the rate be increased to three or four times normal. The capacity of the Edison battery increases after being in service so that when working some time the efficiency is increased and greater output obtains also. This process of self-forming continues over a period of from one to three months of regular service and it is partly to assist in this forming up that the overcharges are recommended at intervals.

The battery possesses reserve capacity. The highest practical limit of output is reached when a battery is charged 10 hours at the normal rate, and its value will be, for a fully formed battery, perhaps 30 per cent more than the rated output. A seven-hour charge at normal rate is considered a normal charge. With a rated discharge three times normal the voltage drops 0.03 volt for every 10-amp increase. On returning to normal discharge the voltage comes up to a value a trifle higher than normal owing to the heat generated at the heavy discharge rate. Heat on discharge increases the output, while heat on charge diminishes it; but excessive heating at all times impairs the life of the battery. The watt-hour efficiency ranges from 60 per cent to 65 per cent. The smaller battery gives about 14 watt-hours per pound of cell, and the larger cell 16 watt-hours. The manufacturer lays stress on the claims that the battery cannot be injured by overcharging; it does not deteriorate when left discharged; any cell can be removed simply by detaching the connections from the poles, and the battery has nearly twice the output or mileage of other batteries weight for weight.

CATENARY WITH FEEDERS FOR MESSENGERS

An account was published in the Electric Railway Journal, for May 22, 1909, of a proposed method of catenary construction to be employed on the Rochester, Syracuse & Eastern Railroad. The chief feature of novelty in this construction was the use of the regular copper feeder cables for messenger wires, thus dispensing with the usual steel messenger cables. Since the publication of that article a section of this line has



Catenary with Feeders for Messengers

been built by the Rochester, Syracuse & Eastern Railroad, and is illustrated in the accompanying engraving.

The feeders are of 500,000 cir. mil section and are carried on the cross girders of the bridges in porcelain saddle insulators, which are lagged to a kyanized spruce timber 4 in. x 6 in. x 18 in. mounted on the top member of the girder. The bridges are spaced every 300 ft. on straight track, the same distance as when steel messengers were used, and the hangers are 30 ft. apart, or 10 to each messenger span. It is estimated the cost is reduced about $400 per mile over that with steel messengers. As yet no objectionable features have developed.

The Rochester, Syracuse & Eastern Railroad Company built the foundations and installed the bridges, which were designed and furnished by the Archbold-Brady Company, of Syracuse. The Ohio Brass Company supplied the saddle insulators.

TOOTH FOR ICE PLOWS

At this season of the year considerable trouble is caused in Northern latitudes by the accumulation of ice and snow packed between the rails. This cannot be removed by the snow plow, and frequently builds up until it wears against the gear-cases under the cars. To overcome this difficulty the Gifford-Wood Company, Arlington, Mass., has invented an adjustable point or knife, made of tool steel, which can be easily attached to a heavy straight bar, say, 4 in. x 5/8in. This heavy bar can



Ice Plow Tooth

then be bolted to the under side of the scraper beam. An important feature of these knives is that they are easily adjusted and readily replaced without disturbing the rest of the set. These teeth have been in use for some years by the Boston Elevated Railway, Old Colony Street Railway and others.

News of Electric Railways

Franchise Conference in Detroit

A closed conference was held on Jan. 5, 1910, between J. C. Hutchins, president of the Detroit (Mich.) United Railway, F. W. Brooks, general manager of the company, and the committee of the City Council of Detroit on ways and means and ordinances to consider the question of the extension of the franchises of the company. It is understood that what is known as the Carstens plan of extensions, which was presented to the Committee of Fifty, was considered, and that the company will report to the Council as soon as possible which of the extensions proposed in the Carstens plan it thinks should be built at once. The terms of the Codd-Hutchins franchise, which was drawn in 1905 and which the directors of the company approved in 1906, were suggested, but Mr. Hutchins is reported to have said that the company could not meet the terms of the grant now. Detroit has increased greatly as a manufacturing center since then, and suburban districts have been incorporated with the city which would impose too great a burden on the company under the terms of fare proposed in the Codd-Hutchins grant.

The representatives of the city are said to have again asked Mr. Hutchins what concession the company would be willing to make pending the settlement of the franchise, although Mr. Hutchins wrote Mayor Breitmeyer recently that pending the results of the investigation of street railway affairs in Detroit it would not be wise to jeopardize either the revenue or the credit of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1910, page 122. The company is said to favor a uniform fare good on all lines day and night. Mr. Hutchins is reported to have said:

"Betterments can be provided in only two ways, out of the profits or by the issue of bonds. We cannot sell bonds for improving lines for which we have no franchise, and we cannot make improvements out of profits unless we earn the profits. If we are forced to reduce our rate of fare or to pay a heavy occupation tax our profits will be reduced just that much and we will be able to do that much less work on betterments. It seems to me that pending a final adjustment under which we can go ahead and bond for all the extensions that are necessary, it is much more important that we should be allowed to continue making profits and putting them into betterments, than to make a reduction in the rate of fare that would benefit only a comparatively small portion of the population."

Decision Affecting Construction of Chicago Subways

Judge George A. Carpenter, in the Circuit Court of Cook County, handed down a decision on Jan. 15, 1910, which is said to remove the only barrier to the construction of the subways in Chicago. The case before Judge Carpenter grew out of an appropriation amounting to $48,429, which it was desired to make from the subway fund to defray expenses incurred in preparing a preliminary subway report under the direction of the local transportation committee of the Chicago City Council. A suit to enjoin the payment of this amount was brought, the right of the city to construct or authorize the construction of transportation subways and to expend any of the money realized under the traction settlement ordinances being raised. A lower court had found that the city could not pay any portion of the so-called "subway fund," as appropriation for payment had been made irregularly. In the present suit it was contended by those seeking the injunction that the State had not conferred upon the city the right to build subways. Judge Carpenter in his decision said:

"The clear inference of the act is that the city is limited in its control and regulation of its streets only by the demand of the public. Whether or not the building of a subway may be regarded as a necessary improvement of the street is a matter which lies wholly within the discretion of the governing body, and in the absence of an abuse of power that discretion will not be interfered with by the court.

"The only test by which the city is governed in determining what use shall be made of the streets is whether or not it is for the benefit of the public, and to that end a legitimate use of the streets."

As a result of the decision it is held that Chicago is empowered to proceed immediately under the traction settlement ordinances to construct a down-town system of subways, the street railways paying for that portion of the underground facilities which shall be used for transportation purposes, and the city defraying the cost of the portion which its individual requirements demand.

Cleveland Traction Situation

Burr Gongwer, secretary to ex-Mayor Johnson of Cleveland, states that Mr. Johnson does not intend to take part in the referendum campaign and that he will not oppose the Tayler ordinance. According to Mr. Gongwer, Mr. Johnson is visiting his daughter in New York and does not propose to return to Cleveland until thoroughly rested.

The selection of Feb. 17, 1910, as the date for the referendum vote pleases Judge Tayler as he wishes to be relieved of the responsibility that rests upon him in arbitrating the differences between the company and the city and desires particularly that the property of the Cleveland Railway be turned over to it as soon as possible by the receivers of the Municipal Traction Company. All the old cars that could be used have been pressed into service, but the rolling stock facilities of the company are not adequate to the demands of service during the rush hours.

Members of the committee of the City Council on judiciary and ordinances agreed on Jan. 14 to recommend the passage of the Horner ordinance repealing the grants made to the Cleveland Underground Rapid Transit Company under the former administration. W. R. Hopkins, who appeared before the committee, said that the company had accepted the ordinances and that they could not be legally repealed now, citing several cases before the Supreme Court. The grants should be presented to the people for approval. The latest ordinance has not been made legal as its publication has been prevented by injunction. An injunction was also secured to prevent the counting of blank ballots in the referendum vote on the first ordinance. Neither case has been decided.

Tentative Ordinance Drawn in Des Moines

The City Council of Des Moines, Ia., passed on Jan. 10, 1910, and A. J. Mathis, Mayor of Des Moines, approved on the same day a proposed ordinance drawn under the direction of R. O. Brennan, city solicitor of Des Moines, in accordance with a resolution of the City Council on Jan. 3, 1910, as a basis for negotiations for an extension of the franchise of the Des Moines City Railway for 25 years. The ordinance imposed in general the following principal provision:

The company shall use electricity as motive power, but shall have the right to use any other power except steam which the city shall approve. Within two years after the passage of the grant the company shall construct or reconstruct 10 miles of line, increase its power capacity 50 per cent and place in service at least 25 new cars to be equipped with power and hand brakes. All work in the streets shall be done under the supervision of the city engineer and be approved by him. The width of the devil strip shall not be lessened and, wherever practicable, the tracks at curves shall be laid so as to enable cars to pass with safe clearance. The rail of single track and the inside rails of double track shall be cross-bonded not less than every 1000 ft. Poles shall be set in concrete and be spaced on an average from 100 ft. to 115 ft. apart, the location of poles to be subject to the approval of the superintendent of the department of streets and public improvements.

The company shall grade, pave and keep in repair 7 ft. of all streets occupied by single track and 14 ft. of all streets occupied by double tracks, and shall sprinkle such tracks

for a similar distance and remove the snow from streets occupied by its tracks. It shall also keep the pavement between its tracks in repair and pave and keep in repair 1 ft. of the street outside of its tracks. Similar provisions regarding paving, repairs, etc., apply to bridges over which the company operates. The city is to have the use, without compensation, of the poles of the company for stringing signal, telephone and telegraph wires. Unused tracks shall be removed at the request of the city. The city shall have the right to regulate the service of the company, but such instructions regarding service issued by the city as are considered burdensome by the company or unjust shall be submitted to arbitration as provided in the ordinance.

The cash fare for each passenger more than 7 years of age shall be 5 cents for a continuous trip in one general direction. Children under 7 years of age, accompanied by a person paying fare, shall be permitted to ride free. These provisions apply to the present and future limits of the city. At 25 convenient places in the city the company shall sell six tickets for 25 cents. Transfers shall be issued from one line to another, but shall not be issued where passengers can return to the point of starting for a single fare. All disagreements between the company and the city regarding transfers shall be submitted to arbitration. Policemen and firemen on duty shall be transported free.

Interurban railways shall have the right to operate into Des Moines over the lines of the Des Moines City Railway, as provided in the statutes of Iowa, and be given the right to haul freight upon the same terms as are granted to other interurban railways as near as practicable. Contracts for the entrance of interurban cars shall, however, be subject to the approval of the city. Freight trains shall consist of not more than two cars and freight shall be hauled only between the hours of 6 p. m. and 6 a. m. Places for the delivery of mail, express and freight shall be so located as not to interfere with regular traffic.

Open cars shall be operated only from April 15 to Oct. 15. All cars shall be equipped with hand and power brakes. Passenger cars shall be provided with push buttons for the convenience of passengers in signaling the conductor where to stop. All cars shall be equipped with fenders, and the heating and illumination of cars shall be subject to the approval of the City Council. Destination signs shall be illuminated at night. There shall be a motorman and a conductor to each car, and trail cars shall be operated only during rush hours. The headway of cars shall not be greater than that now maintained. Night cars shall be operated over lines fixed by the City Council, and between 12 o'clock midnight and 5 a. m. the company may double the ordinary maximum single fare on such cars. Differences between the company and its employees shall be arbitrated. Within five days of the receipt of a communication from a majority of its employees for arbitration of any question the company shall name an arbitrator and the men an arbitrator. If these two arbitrators do not agree within five days, they shall appoint a third arbitrator, and if they cannot agree upon the third member of the board, either side may apply to the Chief Justice of the Supreme Court of Iowa to appoint the third arbitrator. The finding of this board shall be binding, and the expense of the third arbitrator shall be divided equally between the company and the men.

The net receipts of the company, after paying all charges and setting aside not less than 1 per cent of the capital liabilities of the company for depreciation, shall be divided in the proportion of 55 per cent to the city and 45 per cent to the company. If the 45 per cent fund of the company is not sufficient to pay dividends on the stock of the company at the rate of 6 per cent a year, such portion of the 55 per cent fund of the city shall be used as may be necessary to insure the 6 per cent return on the capital of the company. The company is to certify that its stock outstanding does not exceed $1,305,000, its bonded indebtedness $2,907,000 and its floating debt $300,000.

As soon as legislation is enacted to permit the city to purchase the property of the company, and periodically thereafter every two years, the city, upon six months' written notice, shall have the right to purchase the property of the company at the value represented by the total capital liabilities of the company, less the sums carried to the sinking fund. The city shall be represented on the board of directors of the company by a man whom the Council shall name. The city shall have access to the books of the company, and an operating report shall be made to the City Council not later than the 15th of each month which shall cover the business of the company for the calendar month preceding. A complete inventory of the property of the company, made within 20 days after the passage of the ordinance, shall be filed with the superintendent of the department of accounts and finance of the city. Disputes between the company and the city shall be arbitrated by a board of three members, one of whom shall be chosen by the company, another by the city and the third by the other two.

As before stated, the ordinance is for 25 years, and if approved by the company is to be submitted to the voters of the city at the election in March, 1910, or at a special election for approval.

Transit Affairs in New York

To ascertain the growth in population along various rapid transit lines contiguous to rapid transit routes planned for early construction in New York, the Public Service Commission has completed a census showing the increase in the number of inhabitants along each route in the Bronx and Brooklyn for approximately half a mile on either side of the route which shows the population in 1909 as compared with the population in 1905. The routes covered are the branches of the Broadway-Lexington Avenue system in the Bronx; the White Plains Road Extension, also in the Bronx; the Fort Hamilton and Coney Island branches of the Fourth Avenue subway in Brooklyn, and the Eastern Parkway, Livonia Avenue and Nostrand Avenue routes in Brooklyn. The summary showing the population along the different routes for 1905 and 1909 follows:

	1905.	1909.
Broadway-Lexington Avenue subway, The Bronx, eastern branch from the Harlem River north to Pelham Bay Park	90,097	142,487
Broadway-Lexington Avenue line, The Bronx, western branch from 149th Street north to Woodlawn Road....	53,577	64,695
White Plains Road extension of eastern branch Broadway-Lexington Avenue subway, The Bronx.....	20,839	29,175
Fourth Avenue subway, Brooklyn, Fort Hamilton route..	48,171	63,446
Fourth Avenue subway, Brooklyn-Bensonhurst, Bath Beach and Coney Island route.....	30,653	49,593
Eastern Parkway and Livonia Avenue route, Brooklyn...	143,760	193,263
Nostrand Avenue route, Brooklyn, from Eastern Parkway south to Sheepshead Bay.....	27,122	40,383

The special committee, consisting of the Mayor, the Controller and the President of the Board of Aldermen, appointed by the Board of Estimate to confer with the Public Service Commission with a view to determining a definite transit policy, is to meet the commission very soon to consider transit facilities for the new Manhattan Bridge.

Annual Dinner of the A. I. E. E.—The annual dinner of the American Institute of Electrical Engineers will be held at the Hotel Astor, New York, N. Y., on Thursday evening, Feb. 24, 1910. Prof. Elihu Thomson, who is to receive the first award of the Edison medal, will be the guest of honor. The details of the dinner will be announced later.

Order for Filing Records in New York.—The Public Service Commission of the First District of New York has issued an order calling upon the railroads and street railways operating in the territory under its jurisdiction to file with the commission by Jan. 24, 1910, sworn copies of specified books, contracts, documents and papers of companies owned, leased, operated or controlled not heretofore filed with the commission.

Chicago & Oak Park Elevated Railroad Franchise.—The subcommittee of the local transportation committee of the City Council of Chicago, which is considering the franchise sought by the Chicago & Oak Park Elevated Railroad, has reported in favor of the grant. When this franchise is passed by the City Council the controversy over the elevation of the tracks in Austin will be ended as the company agreed to elevate the tracks as soon as the city would permit it to make the extension.

Statement by Richmond Company Regarding Franchise Application.—In connection with the petition which it submitted to the Council of Richmond, Va., on Dec. 6, 1909, for a new franchise, the Virginia Railway & Power Company has recently prepared for the benefit of the public a very full statement of the reasons for the application, in which the attitude of the company is expressed on such

subjects as changes in trackage and routes, new track, schedules, taxation, rates of fare, etc. Maps are presented of the present trackage and the proposed trackage.

Meeting of the New England Street Railway Club.—The regular monthly meeting of the New England Street Railway Club will be held at the American House, Boston, Mass., on the evening of Jan. 25, 1910. Dinner will be served at 6:45 p. m. The business session will be held at 8 p. m. Following the regular business meeting, C. A. Sylvester, general manager of the Boston & Suburban Electric Companies, and H. A. Faulkner, passenger agent of the Boston & Northern Street Railway and the Old Colony Street Railway, will address the club on the subject, "Street Railway Advertising Methods," which will be followed by a general discussion. Members of the club who propose to attend the dinner are requested to notify John J. Lane, secretary of the club, 12 Pearl Street, Boston, Mass., as soon as possible.

Utilities Commission Recommended for Providence.—Henry Fletcher, Mayor of Providence, R. I., in his second inaugural address, delivered on Jan. 3, 1910, recommended the creation of a commission with jurisdiction over railroad matters in that city. The Mayor referred to the work of the public utility commissions in several States, and concluded: "If Rhode Island had such a commission, the subject of franchise privileges in Providence, the need of proper transportation facilities for the East Side, and all defects of car service in general would properly be considered by it. In the absence of such a body in this State, however, questions of this nature as they arise in our city must be settled by other agencies. To the end that there may be an equitable adjustment of conditions governing the character of the service furnished by the street railway operating in the city's highways, I urgently recommend the creation of a special commission, with power to secure the services of suitable experts, to consider and report to the City Council upon a method of solving the East Side approach problem, and also to concern itself similarly with the general question of street car service throughout the city in its broadest application to the comfort, convenience and accommodation of the people of Providence."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Illinois.—Proposed forms of subway measures for Chicago and other cities of Illinois to be introduced into the Legislature and other matters relating to the street railway situation in Chicago were considered at recent meetings of the committees on local transportation and State legislation of the City Council of Chicago. On the matter of subway and harbor and terminal legislation, the committee on State legislation met jointly with the committee on local transportation, and the committee on harbors. The subway measure, drawn by Walter L. Fisher, special traction counsel, if enacted by the Assembly, will authorize any city in Illinois to construct, acquire or operate a subway, to be used for street railways, sewers, water, light and power, wire and gas main conduits, or any other purposes and to grant franchises to private companies or persons leasing the use of the subway when constructed. The bill requires a referendum vote on any franchise grant under the powers of the act, and limits franchises to 20 years, but does not require that frontage consents be secured.

Kansas.—As the result of a conference called by the Governor on Jan. 7, 1910, it is said that a special session of the Legislature will be called to enact a new law on bank guaranty, a public utilities law and a recall law. Governor Stubbs, Bank Commissioner Dolley, Speaker Pro Tem Hopkins of the House and Attorney-General Jackson and John Marshall, his assistant, attended the conference.

Massachusetts.—The report of the Railroad Commission and the Boston Transit Commission relative to postponing action to authorize the Boston & Eastern Electric Railroad to construct a tunnel and subways in Boston has been referred to the committee on metropolitan affairs. The special report of the Railroad Commission and the Boston Transit Commission relative to the consolidation of the Boston Elevated Railway and the West End Street Railway has been referred to the committee on street railways. The report of the Railroad Commission dealing with street railway questions has been referred to the committee on that subject. A bill has been introduced into the House for legislation to authorize the construction of additional subways in the West End of Boston. The object is to provide what is substantially a double terminal for the Cambridge subway at its Boston end, including both the Park Street and Scollay Square districts as outlets for Cambridge traffic. The bill has been referred to the committee on metropolitan affairs. The Senate has received the joint report of the Massachusetts Railroad Commission and the Boston Transit Commission relative to the construction of additional subways and tunnels in Boston. The principal recommendation is that the Transit Commission study a tunnel between Park Street and the South Station. A bill which has been introduced into the House to reduce the hours of street railway employees one hour per day has been referred to the committee on street railways. A bill has also been introduced into the House for the establishment of a Metropolitan Board of Commerce and Industry at Boston, with authority to construct elevated, surface or subsurface railways in any of the municipalities under its jurisdiction. A bill has been introduced authorizing the Boston Transit Commission to construct a combined railway and railroad station for steam and electric passenger interchange at Castle Street on the Washington Street tunnel route in the South End with a tunnel under Winter and Summer Streets and loop service from Castle Street to Park Street. A bill has been introduced into the House for legislation to provide a tunnel between the North and South Stations in Boston, for heavy railroad service between the Boston & Maine Railroad and the New York, New Haven & Hartford Railroad, trains in the tunnel to be operated by electricity.

Maryland.—The Legislature of Maryland convened on Jan. 5, 1910. In his message to the Legislature, Governor Crothers referred to the necessity for creating a public service commission, and it is said that the bill providing for such a commission which was prepared by the Attorney-General at the request of the Governor will take precedence over all others. This measure has been approved by the Governor's cabinet. Mr. Gorman was elected president of the Senate and Mr. Peeples speaker of the House. After the preliminaries had all been arranged, adjournment was taken until Jan. 10.

New Jersey.—The New Jersey Legislature convened on Jan. 11, 1910. The proceedings in the Senate were uninterrupted by the minority and that body finished its work in about an hour. In the House, however, the proceedings were long drawn out and that body adjourned at 4 p. m. until Jan. 17. In his message, Governor Fort referred to the failure to enact a public utilities bill at the last session, and urged again the extension of the powers of the railroad commission, saying that both parties pledged themselves to extend the powers of the railroad commission and that no excuse could possibly be advanced this time by members for avoiding the subject.

New York.—James S. Parker, chairman of the Assembly committee on railroads, has introduced the bills dealing with the Public Service Commission's control of railroads and transit lines which failed to pass the Senate last year. Of the many matters with which they deal the transfer problem is perhaps the most important. The bills do not, of course, include any new recommendations that have or may be made by the commissioners this year. The provisions dealing with the placing of telegraph and telephone companies under the control of the commissioners do not constitute a part of the railway committee's bills. Senator Wagner of New York has again introduced a bill providing for a 5-cent fare between the City Hall, Manhattan, and Coney Island, over the lines of the Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad. He has urged the passage of a similar measure at the last three sessions of the Legislature.

Ohio.—Representative Frank Woods, who is preparing a public utilities bill for introduction in the Assembly, has stated that the measure will not contain any provision that will curtail the rights of city councils to grant franchises. The bill will require a uniform system of accounting by public service corporations and will make it obligatory for companies which desire to issue stock or bonds to have the issues authorized by the commission.

Financial and Corporate

New York Stock and Money Market

January 18, 1910.

The stock market during the last week has been active but very weak in tone, despite the fact that the money market is comparatively easy and the banks are liberal in their accommodations. The tractions have suffered less than other more active issues. Interborough-Metropolitan continues to be very active. Third Avenue has lost a few points on moderate activity.

The financial condition appears to be good, both in this country and Europe. Quotations for money to-day were: Call, 3¼ to 4 per cent; 90 days, 4 to 4½ per cent.

Other Markets

There has been considerable pressure to sell Rapid Transit in the Philadelphia market and the trading has been of considerable volume. The price for the week has declined about 2½ points. Other tractions have been only moderately active at former prices.

In Chicago, the issues of the Chicago Railways have been less active and prices have receded fractionally. Metropolitan Elevated preferred is also slightly lower.

Massachusetts Electric shares continue to be fairly active in the Boston market. Prices, however, are practically unchanged, the fluctuations being within a single point. There have been a few sales of Boston Elevated at old prices.

There has been no interest in traction securities in Baltimore during the past week. Even the bonds of the United Railways Company, generally active, have been very quiet.

At the auction of securities in New York last week, 325 shares of Brooklyn City Railroad stock were sold at 198⅛.

Quotations of various traction securities as compared with last week follow:

	Jan. 11.	Jan. 18.
American Railways Company	a49	a49
Aurora, Elgin & Chicago Railroad (common)	a62⅜	a62
Aurora, Elgin & Chicago Railroad (preferred)	a95	a93
Boston Elevated Railway	134	133½
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	74	a76
Boston & Worcester Electric Companies (common)	a11½	a11½
Boston & Worcester Electric Companies (preferred)	a47	46
Brooklyn Rapid Transit Company	79	75¾
Brooklyn Rapid Transit Company, 1st pref., conv. 4s	86	84⅞
Capital Traction Company, Washington	a136½	134
Chicago City Railway	185	185
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a108	*108
Chicago Railways, ptcptg., ctf. 2	a33	31
Chicago Railways, ptcptg., ctf. 3	a17	*17
Chicago Railways, ptcptg., ctf. 4s	a9½	*9½
Cleveland Railways	a91½	*91½
Consolidated Traction of New Jersey	a77	*77
Consolidated Traction of New Jersey, 5 per cent bonds	a106	*106
Detroit United Railway	*63	*63
General Electric Company	159⅛	154¼
Georgia Railway & Electric Company (common)	a105½	a105½
Georgia Railway & Electric Company (preferred)	87½	a88
Interborough-Metropolitan Company (common)	25¼	23½
Interborough-Metropolitan Company (preferred)	62¼	60⅜
Interborough-Metropolitan Company (4½s)	82⅞	82⅜
Kansas City Railway & Light Company (common)	a36	*36
Kansas City Railway & Light Company (preferred)	a70½	*70½
Manhattan Railway	*138	137¾
Massachusetts Electric Companies (common)	a18½	a18½
Massachusetts Electric Companies (preferred)	80	80
Metropolitan West Side, Chicago (common)	a17½	*17½
Metropolitan West Side, Chicago (preferred)	a54¼	53
Metropolitan Street Railway	*20	21
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	81½	79½
Northwestern Elevated Railroad (common)	a17½	*17½
Northwestern Elevated Railroad (preferred)	a70	*70
Philadelphia Company, Pittsburg (common)	a52¼	a51
Philadelphia Company, Pittsburg (preferred)	a46	a45½
Philadelphia Rapid Transit Company	a27½	a25½
Philadelphia Traction Company	a89	a88½
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅝
Public Service Corporation, ctfs	a106	a106½
Seattle Electric Company (common)	a115½	a115
Seattle Electric Company (preferred)	a104½	a104½
South Side Elevated Railroad (Chicago)	a55	*55
Third Avenue Railroad, New York	18	16¼
Toledo Railways & Light Company	15½	13½
Twin City Rapid Transit, Minneapolis (common)	115	113¼
Union Traction Company, Philadelphia	a52½	a51
United Rys. & Electric Company, Baltimore	a14⅛	a14
United Rys. Inv. Co. (common)	42	39⅞
United Rys. Inv. Co. (preferred)	*71⅞	*71⅞
Washington Ry. & Electric Company (common)	a42¾	a42¼
Washington Ry. & Electric Company (preferred)	a90½	a90¼
West End Street Railway, Boston (common)	a94¾	a94½
West End Street Railway, Boston (preferred)	*106	*106
Westinghouse Elec. & Mfg. Company	79⅞	73¾
Westinghouse Elec. & Mfg. Company (1st pref.)	*130	*130

a Asked. * Last Sale.

Reorganization of Chicago Consolidated Traction Company Approved

The plan for the reorganization of the Chicago (Ill.) Consolidated Traction Company as the United Railways Company in accordance with terms proposed by Charles G. Dawes of the Central Trust Company, Chicago, Ill., was approved at a meeting of the representatives of the bondholders and the stockholders of the company held in Chicago on Jan. 7, 1910. As made public on Jan. 10, 1910, the reorganization plan provides for a first rehabilitation mortgage which may reach $6,000,000 to finance the reconstruction of the lines; a second mortgage of $3,123,000, to be issued in exchange for the underlying securities of the company par for par; a general mortgage of $717,500 to retire 10 per cent of the bonds and 100 per cent of the stock of the North Shore Street Railway, and participation certificates to be issued for the present consolidated bonds. More in detail the plan of distribution of the new securities follows:

To receive sinking fund mortgage bonds:

Chicago Electric Transit bonds	$1,097,000
North Chicago Electric bonds	868,000
North Side Electric bonds	155,000
North Shore Street Railway bonds	675,000
Chicago and Jefferson bonds	208,000
Evanston Electric bonds	130,000

To receive general mortgage bonds:

Ten per cent of North Shore bonds	67,500
North Shore Street Railway stock	650,000

To receive participation certificates:

All of the Consolidated bonds represented by certificates of deposit.

The extent of the bonds to be issued under the first mortgage is to be limited only by the amount needed for rehabilitating the physical property, and it is provided that no dividends shall be paid on the stock while the sinking fund mortgage bonds or the general mortgage bonds remain unpaid or shall be unprovided for by cash deposited with the trustee under the mortgage. All of the bonds of the United Railways are to bear interest at 5 per cent. Details as to the issue of stock are left to the reorganization committee. It is specified, however, that such stock shall be placed in the hands of trustees under a trust instrument.

The United Railways will ask for a franchise to run concurrently with the franchise of the Chicago Railways, which means a grant of 17 years. In order that the rights of the city may be protected and good service guaranteed, an operating agreement with the Chicago Railways will be presented to the Council at the time formal application is made to the Council for the new franchise.

The subcommittee of the local transportation committee of the Chicago City Council was appointed on Jan. 13, 1910, to draw up a tentative franchise for the Chicago Consolidated Traction Company. This franchise is to include features similar to those contained in the 20-year grant with provision for municipal purchase and a division of net receipts with the city, made to the Chicago Railways and the Chicago City Railway. It is understood that the majority of the local transportation committee is opposed to granting any street railway franchise that does not include an operating agreement between the United Railways and the Chicago Railways and Chicago City Railway.

Metropolitan Street Railway Sale Order Argued

Final argument was heard by Judges Ward, Holt and Hough of the United States Circuit Court of Appeals on Jan. 12 on the appeal of the Guaranty Trust Company, New York, N. Y., from the order of Judge Lacombe of the United States Circuit Court directing the sale under foreclosure of the property of the Metropolitan Street Railway, New York, N. Y. The Guaranty Trust Company, holder of a mortgage of $12,500,000, claims that its rights are not properly protected under the terms of the sale set forth in Judge Lacombe's order. Mr. Colles, of Davies, Stone & Auerbach, representing the Guaranty Trust Company, said that the mortgage should be recognized as a first claim upon the proceeds of the sale. He also objected to the plan to make the claims of the receivers of the Metropolitan Street

Railway and the New York City Railway a first lien upon the proceeds. In addition to the counsel for the Guaranty Trust Company, Bronson Winthrop appeared for the Morton Trust Company, J. Parker Kirlin for the Metropolitan Street Railway, both of whom are appellants, together with the Guaranty Trust Company, for the appellees. Mr. Masten, of Masten & Nichols, appeared for the receivers of the Metropolitan Street Railway; Mr. Byrne, of Byrne & Cutcheon, for the Pennsylvania Steel Company; Mr. Fleming, of Dexter, Osborn & Fleming, for the receivers of the New York City Railway; Morgan J. O'Brien, for the Contract Creditors' Committee, and Benjamin S. Catchings, for the Tort Creditors' Committee. At the close of the argument counsel submitted briefs and the court reserved decision.

American Light & Traction Company, New York, N. Y.—The directors of the American Light & Traction Company have declared dividends of the same amount as in October, 1909, namely, a 2½ per cent stock dividend, payable on the common shares on or before Feb. 15, 1910, to holders of record on Jan. 19, 1910, who will thus receive 2½ shares of new common stock on every 100 shares of common held by them, respectively, and the usual quarterly dividend of 2 per cent, payable on Feb. 1, 1910, to holders of record on Jan. 19, 1910.

Aroostook Valley Railroad, Presque Isle, Maine.—J. M. Robinson & Son, St. John, N. B., offer for sale $300,000 of first mortgage 4½ per cent gold bonds of the Aroostook Valley Railroad dated Aug. 1, 1909, and due Aug. 1, 1929, but subject to redemption on any interest day at the option of the company at 105 and interest. Coupons are payable February and August at the office of the Augusta (Maine) Transit Company, the trustee of the mortgage, or at the office of the Liberty National Bank, New York, N. Y.

Boston (Mass.) Elevated Railway.—Nehemiah W. Rice has resigned as a director of the Boston Elevated Railway.

Catskill (N. Y.) Electric Railway.—The property of the Catskill Electric Railway was purchased under foreclosure of a mortgage for which the Hamilton Trust Company, Brooklyn, N. Y., was trustee, on Jan. 12, 1910, for $33,000 by W. C. Wood, formerly president of the company, who is understood to represent local interests in Catskill. The road is 5.5 miles long and has 13 cars.

Chicago (Ill.) City Railway.—Ira M. Cobe, president of the Assets Realization Company, Chicago, Ill., says that papers are being drawn in accordance with the published plan of the merger of the Chicago City Railway, Southern Street Railway, Calumet & South Chicago Railway and the Hammond, Whiting & East Chicago Electric Railway as the Chicago City & Connecting Railway.

Clarksville Railway & Light Company, Clarksville, Tenn.—The personnel of the Clarksville Railway & Light Company has been changed by the election of the following officers: N. L. Carney, president; L. E. Fischer, Danville, Ill., vice-president and treasurer; George Burton, Peoria, Ill., secretary; A. C. Murray, assistant secretary and general manager. The directors of the company are: N. L. Carney, L. E. Fischer, George Burton, A. C. Murray and J. F. Gracey, who was formerly secretary and treasurer of the company.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—In the case of Newton J. Catrow against the Columbus, Delaware & Marion Railway, now in the hands of a receiver, Judge E. B. Kinkead has ordered that a suit be filed against John G. Webb, Springfield, Ohio, formerly president of the company, for an accounting regarding the construction of the road. The court has also ordered that suit be brought against the Prospect Electric Light & Power Company for the collection of money due for current furnished by the railway from April, 1907, to August, 1909.

Holmesburg, Tacony & Frankford Electric Railway, Tacony, Pa.—The time for the deposit with the Fidelity Trust Company, Philadelphia, Pa., of the first mortgage bonds of the Holmesburg, Tacony & Frankford Electric Railway expired on Jan. 10, 1910, and it was announced that more than a majority of the bonds had been deposited.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—The report of Charles L. Henry, receiver of the Indianapolis & Cincinnati Traction Company, for December, 1909, as filed in the Superior Court, shows that the gross receipts were $39,710; operating expenses, $28,930; net earnings, $10,780.

Los Angeles-Pacific Company, Los Angeles, Cal.—At a meeting of the stockholders of the Los Angeles-Pacific Company on Jan. 6, 1910, it was voted to issue $20,000,000 of bonds, $10,000,000 of which approximately will be used to defray the expense of building a 4-mile subway from Fourth and Hill Streets to Western Avenue, Los Angeles, and the remainder to be reserved to retire outstanding bonds of the company.

Louisville (Ky.) Railway.—It was proposed to submit a plan to authorize a blanket mortgage for $20,000,000 to the stockholders of the Louisville Railway at the annual meeting of the company on Jan. 19, 1910.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—E. A. Cudahy has been elected a director of the Omaha & Council Bluffs Street Railway to succeed Albert Strauss, New York, N. Y.

Pittsburgh & Westmoreland Railway, Pittsburgh, Pa.—W. M. Lindsay, Warren, Pa., acting for the Pittsburgh, McKeesport & Westmoreland Railway, purchased the Pittsburgh & Westmoreland Railway recently at receiver's sale for $2,000, assuming a mortgage of $335,000 to cover a bond issued. There is a floating debt of about $10,000. The line runs from McKeesport to Irwin, 6 miles. T. M. Evans and Manning Stires, the receivers, showed in their report that the gross earnings of the Pittsburgh & Westmoreland Railway for 1909 were $23,211. Following the purchase the Pittsburgh, McKeesport & Westmoreland Railway elected the following officers: Manning Stires, McKeesport, president; I. I. Robertson, West Newton, vice-president; George D. Cook, Philadelphia, treasurer. The company contemplates building a line from West Newton to Irwin and an extension from West Newton to Monongahela City. The purpose of the Pittsburgh, McKeesport & Westmoreland Railway is to issue bonds to the extent of $1,000,000 for extensions and improvements.

Railway & Light Securities Company, Boston, Mass.—The Railway & Light Securities Company has declared an initial dividend of 2 per cent on the $1,000,000 of common stock of the company, payable on Feb. 1, 1910, to stock of record on Jan. 15, 1910.

Third Avenue Railroad, New York, N. Y.—The committee of holders of the 4 per cent consolidated bonds of the Third Avenue Railroad consisting of James N. Wallace, Adrian Iselin, Edmund D. Randolph, Mortimer L. Schiff, James Timpson and Harry Bonner, has adopted the plan of reorganization dated Dec. 2, 1909. The plan will become binding upon all the depositing bondholders unless within 30 days after Jan. 29, 1910, one-third of the certificate holders shall file with the depositary written notice of their dissent. Further deposits of the bonds will be received without penalty at the office of the Central Trust Company, New York, on or before Feb. 18. Judge Lacombe, in the United States Circuit Court, has granted an order authorizing F. W. Whitridge, receiver of the Third Avenue Railroad, to pay $62,134, due to New York City for taxes and real estate owned by the Third Avenue Railroad.

Wilkes-Barre (Pa.) Railway.—Mention was made in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1909, page 1247, of the incorporation of the Wilkes-Barre Railway to lease the property of the Wilkes-Barre & Wyoming Valley Traction Company. In answer to an inquiry about the purpose of the company, T. A. Wright, vice-president and general manager of the Wilkes Barre Railway, replied under date of Jan. 14, 1910, as follows: "Briefly, the Wilkes-Barre Railway Company, of which Abram Nesbitt is president; T. A. Wright, vice-president and general manager, and C. W. Laycock, secretary and treasurer, is composed of people residing in Wilkes-Barre, and leased the property of the Wilkes-Barre & Wyoming Valley Traction Company and the Wilkes-Barre, Dallas & Harvey's Lake Railway for a long term of years, and began operating the property on Jan. 1, 1910. It is anticipated that some important improvements will be made during the coming year."

Traffic and Transportation

Report on Service in Springfield, Mass.

The report of the committee of 12 citizens appointed by Mayor Sanderson of Springfield, Mass., on Oct. 21, 1909, to study street railway conditions in Springfield and confer with the city authorities and the officers of the Springfield Street Railway has been presented to the Mayor. The committee met for the first time on Oct. 27, 1909. A communication received from L. E. Storrs, president of the company, by the committee at that time stated that he was sure that nothing but lasting good could come from the conscientious consideration of traffic conditions, and assured the commission that he would do everything in his power to improve the present congested conditions. In preparation for the next meeting the members of the committee went over the property and summarized its findings as follows:

"1. That roadbed was being put in first-class order.

"2. That 11 new, large cars, with illuminated signs, were almost ready for delivery, and 13 more to follow.

"3. That readable signs were in process of attachment to the old cars.

"4. That $70,000 worth of new powerful motors were being applied to cars.

"5. Upon a special visit to the power plant we found everything up to the latest date in dynamos and engines, so that there was ample power with a surplus of 100 per cent for power, heat and light."

The committee met again on Nov. 2, 1909, in the office of Mr. Storrs. All the members were present but one. The matter of schedules and the question of delays were considered. At this meeting it was stated that in 1900 the company had 89 cars, with carrying capacity averaging daily 2902 passengers; in 1909, 105 cars, with carrying capacity averaging daily 3602 passengers—an increase of 16 cars and of carrying capacity averaging 700, or 23 per cent. It was also reported that 11 new cars were being put in commission, adding 11 per cent additional carrying capacity, thus making an increased capacity averaging 34 per cent.

The third meeting of the committee was held on Nov. 9, 1909. All the members were present. Schedules and delays were again considered, and a report was received suggesting the installation of a telephone system at a cost of $20,000 to assist in regulating the schedules. Schedules, delays and other matters largely of local interest were also considered at meetings held on Nov. 16, Nov. 30, Dec. 6 and Dec. 14.

The sessions of the committee were concluded with the meeting on Dec. 14. At this meeting a record was presented of 7-days' observation of 16,694 cars, and it showed that from 5 a. m. to 5 p. m. less than 1 per cent of the cars was five minutes or more late; during the rush hours 2.4 per cent was late. The record for seven days shows the average for 18 hours for all cars five minutes or more late was 3 per cent; Dec. 5, 1 per cent delay; Dec. 6, 3.5 per cent delay; Dec. 7, 5 per cent delay; Dec. 8, 3.5 per cent delay; Dec. 9, 1.9 per cent delay; Dec. 10, 2.7 per cent delay; Dec. 11, 3.7 per cent delay; average all days, 3 per cent. The total number of cars, the number late and the average delay in minutes by days Dec. 5 to Dec. 11, inclusive, follows:

	Total cars.	Number late.	Average delay. Min.
Dec. 5	2123	22	9½
Dec. 6	2378	83	9¼
Dec. 7	2384	117	10¼
Dec. 8	2396	84	9¾
Dec. 9	2384	47	9
Dec. 10	2380	65	9
Dec. 11	2649	99	10

Three cars—Longest delay, 30 min. each.
Fifty-eight cars—Shortest delays, 5 min. each.
Four hundred and fifty-six cars—5 min. delay.

During the period from Dec. 5 to Dec. 11 the total of cars observed as to schedule time was 16,654, of which 517 were late. The causes of delay in order of importance follow: Heavy riding; could not make up lost time; held by other cars; held by South Main repair; took car late; miscellaneous; accident to car; held on account of extras; car slow; repairs; held at Carew Street; car off track; wire down; late starting; setbacks; steam roller; changing cars; account of new cars; accidents; poor power. The fewest number of delays was caused by crippled cars and wire trouble.

In its report to the Mayor the committee says that a long list of suggestions is before the company and will be acted upon as soon as practicable. The report is concluded as follows:

"While much is still expected of the company, there is much to be expected of the city in the way of trackage privilege, also less congestion of automobiles and vehicles at the white posts and freedom in Main Street from the arch to State Street of slow-moving vehicles; this will prevent delay to cars. Something is expected from the public—more rapid movement in the rush hours in getting on and off the car. It is the intention of the company to give publicity to the manner in which the public can assist."

Insurance Policies for Employees of West Penn Railways

The following statement by the West Penn Railways, Pittsburgh, Pa., to its employees, announcing the establishment of insurance policies for them by the company, was posted at the offices, shops and car houses of the company on Jan. 1, 1910:

"Regular employees of the West Penn Railways, Latrobe Street Railway, West Penn Electric Company and Westmoreland Electric Company who have been in the service of the company continuously for two years prior to Jan. 1, 1910, shall be eligible at the present time, and other regular employees shall be eligible from time to time as the two-year period of their continuous service is completed, to receive from the West Penn Railways the following sums: $100 in case of death during the first year from date the employee becomes eligible; $200 in case of death during the second year from date the employee becomes eligible; $300 in case of death during third year from date the employee becomes eligible; $400 in case of death during the fourth year from date the employee becomes eligible; $500 in case of death during the fifth year from date the employee becomes eligible.

"The death benefit shall be payable to the beneficiary designated by the employee, or to his heirs. Employees who have served the West Penn Railways, Pittsburgh, McKeesport & Connellsville Railway, Pittsburgh, McKeesport, Wilmerding & Duquesne Railway, West Penn Electric Company or Westmoreland Electric Company continuously 10 years, and who may be deemed to be superannuated by the officers of the company, shall be entitled to receive not less than $500, payable at the rate of $8.33 per month. In the event of the death of a superannuated employee prior to the completion of the payments at the rate of $8.33 per month, the portion which remains unpaid shall be paid to his or her beneficiary or heirs.

"The company will make the donations as set forth in the above schedule to the legal representatives or appointees of employees in the service of the company at the time of their death. In case of superannuated employees, the donations will be made as above provided. Donations in either case will only be made free from debts, contracts, and obligations of the employees.

"These voluntary benefits given by the West Penn Railways are to be forfeited by an employee in case his or her connection with the company is severed in any manner except by superannuation. This arrangement may be terminated by the directors of the West Penn Railways at any time deemed by them advisable, not, however, without incurring the liability for payment to the employees up to date of such discontinuance in the manner indicated and subject to the liability on the part of the employees to forfeiture on leaving the service of the company prior to death."

Draw Bridges and Traffic in Brooklyn

With the view of bettering the service on lines of the Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad, Brooklyn, N. Y., which cross drawbridges in Brooklyn, the Public Service Commission of the First District of New York, recently investigated the conditions governing the operation of the bridges to ascertain whether the present hours in which the draw bridges are closed could be increased. In the course of the investi-

gation, conferences were held by representatives of the commission with a committee representing the National Board of Steam Navigation and with the chief engineer of the New York City Department of Bridges.

It was shown that any change from present regulations would be inadvisable inasmuch as while long closed hours might benefit the street railways, they would impose greater hardship on the business interests which use the navigable streams crossed by the bridges. The representatives of the National Board of Steam Navigation suggested, however, that the streams near the bridges might be widened sufficiently to permit river traffic to accumulate and thus be in readiness to pass rapidly through as soon as the draw bridges were opened. This would involve the condemnation of considerable waterfront property and in the opinion of the representatives of the commission, the expenditure would be too large to be practicable.

Of the 10 draw bridges considered, five are closed for substantial periods during the day, and frequent car movement is maintained over them, the headway varying from one to two minutes. The Hamilton Avenue bridge is closed two hours in the morning and two hours in the evening during the time of heaviest traffic on the railways, and one hour at noon. The other four bridges are closed three hours a day; one hour each in the morning, at noon and in the evening. It was suggested that the closed hours be increased from five to seven, giving three hours in the morning, an hour at noon and three hours in the evening. It was found that the river traffic through the Flushing Avenue Bridge was very light and that the number of openings per day did not average 20 and interfered so little with car movement that the establishment of closed hours seemed unnecessary at the present time. Car movements over three of the bridges vary from four to six to 10 minutes and on account of the infrequency of the service the establishment of closed hours was held to be unnecessary at this time.

Boston Elevated Railway Increases Wages

The Boston (Mass.) Elevated Railway has announced a voluntary increase in the wages of its employees in the train and car service, about 5000 men being affected. The increase will amount to about $100,000 per year, or $20 per employee, and the new rates are to go into effect on Jan. 22, 1910. The following table shows the present and the increased wage rate for each class of employees:

	Increased wage. Cents per hour.	Present wage. Cents per hour.
Elevated motormen, highest grade	28.5	27.5
Elevated guards, highest grade	24.5	23.5
Elevated brakemen, highest grade	22	21
Surface conductors and motormen:		
Highest grade (15 years' service)	26	25
Next grade (11-15 years)	25.3	24.5
Next grade (6-10 years)	24.7	24
Next grade (3, 4 and 5 years)	24.1	23.5
Next grade (1 and 2 years)	23.5	23
Car house station masters, highest grade	30	29
Inspectors and starters, highest grade	28.5	27.5

Team Accidents

The recent heavy fall of snow in the East prompted F. W. Johnson, superintendent of the bureau for the prevention of accidents of the Philadelphia (Pa.) Rapid Transit Company, to issue the following special notice, headed "Team Accidents," to the employees of the company:

"Severe snow storms invariably are followed by conditions which rather favor the occurrence of certain types of accidents. By way of illustration, note the following:

"The going becomes heavy, as at present, we will say, and, like ducks taking to water, the drivers of teams hike for the trolley tracks. This, of course, means collisions—unless all hands exercise caution.

"Unfortunately we have never been very favorably impressed with the brand of 'caution' usually observed by the drivers of teams. They prefer to take chances, trusting to the judgment and skill of the motorman to avoid the collision. Such conduct carries with it its own condemnation.

"However, be that as it may, it is our intention to avoid mishaps whenever and wherever possible. Hence this cautioning:

"Keep a sharp lookout, particularly at night or in foggy weather, for the drowsy driver who plugs along, plumb in the middle of the track, without the faintest suspicion of a light upon his vehicle.

"He may be traveling along in the track right ahead of you, or he may be coming straight at you, sound asleep upon his seat.

"In passing teams, give the horse a chance to get clear of your track before you attempt to proceed. You may depend upon it that he will not delay you a moment longer than is absolutely necessary—provided only that his driver is equally fair-minded.

"If concerned in an accident of this sort, be sure to get the name and address of the driver, and also of any other person who may have been upon the wagon.

"Parting shot—No matter how slight an accident may seem to you at the time, secure your witnesses and make out your report. Then there can be no 'flare-back.'"

Passes for Illinois Traction System Employees.—Employees of the Illinois Traction System, Champaign, Ill., will hereafter be furnished with passes. For several years a rule has been in force which required employees when riding on cars when not on duty to show their badges.

Increase in Fares on Spokane & Inland Empire Railroad.—The Spokane & Inland Empire Railroad, Spokane, Wash., has announced that effective on Feb. 1, 1910, the round-trip fare between Spokane and Cœur d'Alene will be increased from $1 to $1.50, with corresponding increases in the rates to other cities along the route.

Stools for Motormen of Massachusetts Line.—The Western Massachusetts Street Railway, Westfield, Mass., has announced that hereafter motormen on the company's lines to Springfield and Huntington will be permitted to use stools while operating their cars. The Huntington and Springfield lines are the only lines on which cars equipped with air brakes are operated.

Increase in Traffic at Indianapolis During December.—Statements for December, 1909, made by the electric railways operating into Indianapolis show that the increase in the volume of business during the holidays averaged 15 per cent more than that of 1908. On some of the roads traffic increased as much as 22 per cent. On others the increase was not more than 8 per cent.

Car Step Heights in Chicago.—The daily newspapers of Chicago have been attempting to create a general agitation in favor of lowering the steps on the cars of the surface railways. No definite action has been taken by the railways other than that the matter is now under consideration by the Board of Supervising Engineers, Chicago Traction. The steps from the ground to the platform are now 17 in. and 14 in., with a 10-in. rise from the platform to the car floor.

Grain Elevators Along Lines of Illinois Traction System.—Edward Rising and Claude Lock, who propose to construct a number of grain elevators along the lines of the Illinois Traction System, Champaign, Ill., have obtained a site for the first elevators at Dallenbach Station, one mile west of Staley, and at Bondville, and will ship grain by way of the electric railway, the agreement of the Illinois Traction System with the Chicago & Eastern Illinois Railroad affording a ready means of transporting shipments to the seaboard. The Illinois Traction System will build several sidings and spurs in the spring to facilitate the transportation of grain and livestock.

Interurban-Steam Traffic Agreement in Indiana.—A traffic arrangement effective on Jan. 20, 1910, has been entered into by the Indianapolis, Columbus & Southern Traction Company and the Southern Indiana Railroad whereby tickets will be sold by the Indianapolis, Columbus & Southern Traction Company at its offices in Indianapolis, Greenwood, Franklin and Columbus to all points on the Southern Indiana Railroad from Seymour east to Westport and west to Terre Haute. Arrangements have also been made for the free transportation of baggage from the station of the Indianapolis, Columbus & Southern Traction Company at Seymour over the Southern Indiana Railroad.

Excess Fare Provision Not Applicable to Indiana Interurban Railways.—James Bingham, Attorney-General of Indiana, has expressed the opinion to the Railroad Commis-

sion of that State that the law passed in 1909 which enables railroads to collect an excess fare of 10 cents on all fares based on the 2-cents-a-mile rate when such fares are paid in cash on the train because the passenger has neglected to secure a ticket, does not apply to interurban railways. He says that while the act in question did not repeal the act of 1909 by specification, it repealed it by implication and is the only 2-cent fare law now in effect in the State. The question was raised by Commissioner McClure at the request of the interurban railways.

Increase in Wages in Los Angeles.—On Jan. 1, 1910, the Pacific Electric Railway, Los Angeles Railway and Los Angeles & Redondo Railway increased the wages of the motormen and conductors in their employ in accordance with the following scale: First year, 25 cents an hour; second year, 26 cents an hour; third year, 27 cents an hour; fourth year, 28 cents an hour; fifth year, 29 cents an hour; sixth year, 30 cents an hour. The scale formerly paid follows: First year, 24 cents an hour; second year, 25 cents an hour; third, fourth, fifth years, 26 cents an hour; sixth seventh, eighth years, 27 cents an hour; ninth, tenth, eleventh years, 28 cents an hour; twelfth, thirteenth, fourteenth years, 29 cents an hour; fifteenth year, 30 cents an hour.

Complaint Against Service of International Railway.—Residents of Lancaster and Depew have asked the Public Service Commission of the Second District of New York to instruct the International Railway to repair its tracks in Broadway, Buffalo, between the Lackawanna Railroad and the easterly line of Buffalo, and between Buffalo, Lancaster and Depew, and construct additional sidings or double-track the road. They have also asked that the company be instructed to establish a 15-minute service at a rate of speed that will enable cars to make the round trip in not more than 1 hr. and 30 min. and run cars between Lancaster and Depew in addition to cars between Buffalo and Lancaster to care for the local traffic between these villages. The time consumed in the round trip between the cities now is two hours. The petitioners claim that the rates of fare are out of proportion to the length of the route and should be reduced.

Rates for Milk on Buffalo Suburban Line.—Effective on Feb. 8, 1910, the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., will adopt the following rates per can for the transportation of milk in either direction between stations on the Dunkirk, Fredonia and interurban divisions: 5-gal. can, 10 cents; 6-gal. can, 12 cents; 8-gal. can, 16 cents; 10-gal. can, 20 cents; 12-gal. can, 24 cents. This is an advance of 2 cents on a 5-gal. can; 3 cents on a 6-gal. can; 4 cents on an 8-gal. can; 5 cents on a 10-gal. can; 6 cents on a 12-gal. can. On the same date the company will adopt the following rates per can for the transportation of milk in either direction between stations on the Hamburg and Dunkirk and Fredonia divisions: 5-gal. can, 10 cents; 6-gal. can, 12 cents; 8-gal. can, 16 cents; 10-gal. can, 20 cents; 12-gal. can, 24 cents. The advances to and from other stations are 2 cents on a 5-gal. can; 3 cents on a 6-gal. can; 4 cents on an 8-gal. can; 5 cents on a 10-gal. can; 6 cents on a 12-gal. can.

Service in Trenton.—Walter Madden, Mayor of Trenton, N. J., in his message to the Council of that city dated Jan. 1, 1910, said: "I would suggest that there should be a general investigation by a committee of the City Council to determine wherein our street car service is not meeting reasonable requirements, and, if necessary, an expert should be called in to determine just what is needed in the way of schedules, equipment, etc., to bring our street car service up to a proper standard of efficiency. Then ordinances should be passed and such other action should be taken as may be necessary to have this standard of efficiency established and maintained. This done it would seem to me that some department of the city should be specifically charged with seeing that all regulations with respect to street car traffic are lived up to. In this connection I would suggest that these regulations should extend to protecting our electric railway companies from unnecessary obstruction in the way of cars being blocked by wagons backed up against sidewalks, cars standing on railroad crossings, and open drawbridges, which so frequently, and not without some justification, are given as a reason for cars not being operated in accordance with their schedules."

Personal Mention

Mr. J. R. Davies has been appointed purchasing agent of the Chicago (Ill.) City Railway.

Mr. Gordon Campbell, vice-president and general manager of the York (Pa.) Railways, has been elected president of the company to succeed Mr. W. F. Bay Stewart, resigned.

Mr. A. Katterheinrich, auditor of the Ft. Wayne & Springfield Railway, Decatur, Ind., has also been appointed general freight and passenger agent of the company to succeed Mr. J. R. Fink, resigned.

Mr. E. C. Foster has resigned as second vice-president of the New Orleans Railway & Light Company, New Orleans, La., effective on Feb. 1, 1910, but will continue as a director of the company.

Mr. H. A. Pharo, chief electrician of the Pittsburgh (Pa.) Railways, has been appointed superintendent of overhead lines of the company to succeed Mr. F. J. Vinning, whose resignation is noted elsewhere in this column.

Mr. Edward Hungerford of the Brooklyn (N. Y.) Rapid Transit Company entertained representatives of the daily papers of New York and Brooklyn at a beefsteak party and vaudeville performance at Healy's, New York, on the evening of Jan. 13, 1910.

Mr. W. A. Smith, who has been treasurer and general manager of the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been elected second vice-president and general manager of the company. The office of second vice-president is a new one.

Mr. J. E. Osmer has resigned as master mechanic of the Northwestern Elevated Railroad, Chicago, Ill., and has accepted the position of superintendent of the locomotive shops of the Hicks Locomotive & Car Works. Mr. Osmer is located at Chicago Heights, Ill.

Mr. J. R. Fink has resigned as general freight and passenger agent of the Ft. Wayne & Springfield Railway, Decatur, Ind., and the passenger, freight and auditing departments of the company have been consolidated under Mr. A. Katterheinrich, auditor of the company.

Mr. C. E. Lenhart, whose resignation as master mechanic of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., was noted in the Electric Railway Journal of Dec. 4, 1909, has accepted a position as representative of the Holland Trolley Supply Company, Cleveland, Ohio.

Mr. R. J. Foulkes, master painter of the Chicago (Ill.) Railways, has been appointed general foreman in charge of the shops of the company to succeed Mr. Charles Schenck, who has resigned as superintendent of shops to become superintendent of the Elevator Supply & Repair Company.

Mr. D. L. Beaulieu, whose resignation as superintendent of the Northampton Traction Company, Easton, Pa., was announced in the Electric Railway Journal of Jan. 15, 1910, has accepted the position of Eastern representative of J. Frank Lanning & Company, Pittsburgh, Pa. Mr. Beaulieu will have his headquarters in Boston.

Mr. H. L. Sanders, for some time assistant purchasing agent of the Cincinnati (Ohio) Traction Company, has been appointed treasurer of the company, to succeed Mr. W. H. MacAlister, who has held the offices of treasurer and controller. Mr. MacAlister will continue as comptroller of the company.

Mr. F. L. Dame, formerly engineer of the Electrical Securities Corporation, New York, N. Y., has been elected vice-president of the Electric Bond & Share Company, New York, N. Y. Mr. Dame has also been elected vice-president and a director of the American Power & Light Company.

Mr. Sharp G. Moore, superintendent of the Willow Grove division of the Philadelphia (Pa.) Rapid Transit Company, has been appointed assistant general superintendent of the company to succeed Mr. M. F. Ryan, whose appointment as general superintendent of the company is noted elsewhere in this column.

Mr. L. C. Nash, who has been superintendent of transportation of the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been elected secretary and treasurer of

the company to succeed Mr. R. A. Leussler as secretary and Mr. W. A. Smith as treasurer. Mr. Smith and Mr. Leussler continue as general manager and assistant manager of the company, respectively.

Mr. M. F. Ryan, assistant general superintendent of the Philadelphia (Pa.) Rapid Transit Company, has been appointed general superintendent of the company, to succeed Mr. Walter Ellis. Mr. Ryan entered street railway service in Philadelphia in 1872. He has been successively a conductor, receiver and division superintendent at the Sixteenth and Jackson Streets depot. In 1908 he was appointed assistant general superintendent of the company.

Mr. F. J. Venning has resigned as superintendent of overhead lines of the Pittsburgh (Pa.) Railways to become superintendent of construction of city and interurban lines of the Cincinnati (Ohio) Traction Company. Mr. Venning began his street railway career in Pittsburgh in 1893 as chief electrician for the Citizens Traction Company. He has served that company and its successor, the Pittsburgh Railways, since then as foreman of shops, superintendent of maintenance of way and superintendent of overhead lines. About 200 employees of the Pittsburgh Railways held a smoker at the Park Way office of the company on the evening of Jan. 15, 1910, at which Mr. Venning was the guest of honor. Mr. Venning was presented during the evening with a case of silver as a token of esteem from his associates.

Mr. Charles Kirchhoff, who retired recently from the editorship of *The Iron Age*, was the guest of about 150 of his friends and associates in the iron and steel industry at a luncheon in the Engineers' Club in New York on Jan. 15, 1910. The speakers were Mr. Philip T. Dodge, president of the Engineers' Club; Mr. T. C. Martin, executive secretary of the National Electric Light Association; Dr. Rossiter W. Raymond, secretary of the American Institute of Mining Engineers; Mr. Geo. W. Cope, the new editor of *The Iron Age*; Dr. Henry S. Drinker, president of Lehigh University; Mr. John Fritz, founder of the Bethlehem Steel Company, and Mr. Kirchhoff. Mr. Cope, at the close of his address, presented Mr. Kirchhoff a bronze statute of an iron worker, by Picault. Mr. Kirchhoff expects to leave very soon for a cruise in the West Indies. Later he will visit Europe and study recent developments in the manufacture of iron and steel there.

Mr. W. F. Bay Stewart, who has been president of the York (Pa.) Railways, has resigned from the company and Mr. Gordon Campbell, who has been vice-president and general manager, has been elected to succeed him. Upon receiving the resignation the directors passed resolutions expressing regret that Mr. Stewart had resigned, and commending him for his ability while performing the duties of the office. Mr. Stewart has stated that he desired to retire from business, but it is reported that he may again be a candidate for Judge. The York Railways operates 72 miles of line and supplies electricity for lighting. Mr. Stewart has long been prominent in public affairs in York.



W. F. Bay Stewart

Mr. Charles Schenck has resigned as superintendent of shops of the Chicago (Ill.) Railways to become connected with the Elevator Supply & Repair Company, Chicago, Ill., as superintendent. Mr. Schenck was educated at the University of Illinois and from 1897 to 1900 he was in the engineering department of the Northwestern Elevated Railroad and the Chicago Union Traction Company. In 1908 he was appointed to the position from which he has just resigned. From 1900 to 1908, Mr. Schenck was connected with Lewis Institute, Chicago, as an instructor in mechanical subjects and as registrar for the night schools. While connected with Lewis Institute he worked in summer in the engineering department of the Northwestern Elevated Railroad and the Commonwealth Edison Company, Chicago. The shops of the Chicago Railways are now in charge of Mr. R. J. Foulkes, who has been advanced from the position of master painter to general foreman of the company.

Mr. Walter Ellis, general superintendent of the Philadelphia (Pa.) Rapid Transit Company, was relieved of the duties of that office on Jan. 15, 1910, at his own request on account of ill-health, but will remain in the service of the company as special attaché of the president's office. Mr. M. F. Ryan, assistant general superintendent of the company, will succeed Mr. Ellis as general superintendent and Mr. Sharp G. Moore, superintendent of the Willow Grove division, has been appointed assistant general superintendent to succeed Mr. Ryan. Mr. Ellis entered the employ of the People's Passenger Railway, Philadelphia, as a conductor in July, 1879. He was promoted successively to the positions of transfer agent, receiver, dispatcher and division superintendent at the Twenty-seventh Street and Girard Avenue depot. The Union Traction Company absorbed the People's Passenger Railway and in 1895 Mr. Ellis was appointed general superintendent of the Union Traction Company, and was continued in this office when the Union Traction Company was reorganized as the Philadelphia Rapid Transit Company.

Mr. Bernard Corrigan has resigned as president of the Kansas City Railway & Light Company, Kansas City, Mo. Mr. Corrigan was elected president of the company in 1902 following the retirement of Mr. W. H. Holmes as president of the Metropolitan Street Railway and Mr. C. F. Holmes as president of the Kansas City Electric Light Company and the organization of the Kansas City Railway & Light Company to succeed these companies. Mr. Corrigan is a civil engineer by profession and is about 50 years old. Up to about 1892 he was closely identified with street railway interests in Kansas City and was familiar with the railway and lighting properties in the city when elected president of the Kansas City Railway & Light Company. Mr. Corrigan also assisted in the construction of several steam railroads in the South and West. In announcing his retirement Mr. Corrigan issued a statement in which he said: "There is no particular reason for my resignation at this time—in fact, I cannot now name the exact day on which I will retire. I have desired for some time to relinquish my duties and tried to induce Mr. C. N. Black, now vice-president and general manager of the United Railroads of San Francisco, to remain with the company as my successor. I have no plans for the future except to take a much-needed rest. I am not going back to contracting work."

Mr. J. P. Pulliam, whose appointment as manager of the railway department of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and the Wisconsin Electric Railway, Oshkosh, Wis., and assistant general manager of the companies in charge in the absence of Mr. Clement C. Smith, was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910, is 35 years old. Mr. Pulliam began his railroad career as a telegraph operator on the Louisville Southern Railroad when 14 years of age. Subsequently he served the Kentucky & Indiana Bridge Company, Louisville, Ky., in various capacities for several years. During his connection with this company, the suburban service was converted from steam to electricity. He resigned from the Kentucky & Indiana Bridge Company to become chief clerk to the superintendent of the Louisville-St. Louis line of the Southern Railway, but after a year's service entered the employ of the Choctaw-Oklahoma-Gulf Railroad at Shawnee, Okla., in the stores department. Mr. Pulliam next engaged in commercial pursuits at Denver and Seattle for a year. He re-entered railroading in 1904, with the Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., as trainmaster under Mr. W. K. Morley, president and general manager, but resigned three years later to become superintendent of the Winnebago Traction Company, Oshkosh, Wis. Since the sale of the property of the Winnebago Traction Company to the Wisconsin Electric Railway in July, 1908, Mr. Pulliam has served both the Wisconsin Electric Railway and the Eastern Wisconsin Railway & Light Company as general superintendent in charge of operation.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Fort Smith, Van Buren & Interurban Light & Traction Company, Van Buren, Ark.—Chartered in Arkansas to build an interurban railway through Franklin, Johnson, Madison, Boone and Searcy Counties. Capital stock, $100,000. Officers: W. F. Keller, president; L. W. Burgett, vice-president; T. A. Bayley, secretary; S. A. Pernot, treasurer. [E. R. J., Jan. 15, '10.]

***Hammond, Chicago Heights & Southern Traction Company, Chicago, Ill.**—Incorporated in Illinois to construct an electric railway from a point on the State line contiguous to Hammond, Ind., in a southwesterly direction to Chicago Heights and thence to Stanne. Capital stock, $500,000. Incorporators: William S. Reed, Andrew Ward, Joseph Orr, and Edward R. Davis, all of Chicago, and Alfred Van Steenberg, Lansing, Mich.

***Egyptian Traction Company, Springfield, Ill.**—Incorporated in Illinois to construct a railway from Murphysboro, through the counties of Williamson, Saline, Gallatin and White to the Wabash River. Capital stock, $5,000. Incorporators: C. C. Leggett, Winchester, Ind.; John W. Murphy and S. W. Latham, Eldorado, Ill.; John D. Stayron, Texas City, Ill., and G. E. K. Hixon, Chicago.

***Piedmont Traction Company, Gastonia, N. C.**—Chartered in North Carolina to build a street railway in Gastonia. Capital stock, authorized, $100,000. Incorporators: W. S. Lee, L. C. Harrison, and F. I. Osborne, Charlotte, and C. E. Hutchinson, Mount Holly.

***Hanover & Plymouth Street Railway, Wilkes-Barre, Pa.**—Application will be made to the State Department on Jan. 31, 1910, by Lewis Edwards, Harry Chase, and Harry De Mun, for a charter for a 3-mile street railway in Luzerne County.

FRANCHISES

San Francisco, Cal.—The Board of Supervisors has granted a 25-year franchise to the United Railroads over Gough Street from McAllister Street to Market Street and Haight Street.

Atlanta, Ga.—The Atlanta, Griffin & Macon Electric Railway, which proposes to build an interurban railway between these points, has been granted an extension of 120 days to its franchise in which to begin work on its line in Atlanta. [E. R. J., Sept. 4, '09.]

Sullivan, Ill.—R. B. Starbuck, president of the Decatur, Sullivan & Mattoon Traction Company, Mattoon, has asked the City Council for a 2-year extension of its franchise in Sullivan. The company plans to build an electric railway from Decatur to Mattoon, 48 miles. [E. R. J., June 5, '09.]

Alexandria, La.—The Board of Aldermen has granted a franchise to the Alexandria Electric Railways on several streets to reach the new Union Station. The company has been allowed 30 days in which to accept one or all of the propositions.

Long Branch, N. J.—Application has again been made by the Atlantic Coast Electric Railroad, Asbury Park, to extend its street railway in Atlantic Avenue to Columbus Avenue. Hearing of the petition will be considered at a meeting of the City Council on Feb. 21.

TRACK AND ROADWAY

Edmonton (Alta.) Radial Railway.—This company expects to place contracts during the next six weeks for the construction of about 3 miles of single track and 1 mile of double track. Chas. E. Taylor, general manager.

Power, Transit & Light Company, Bakersfield, Cal.—This company will award contracts during the next two weeks for the construction of 4 miles of track. Harry A. Jastro, purchasing agent.

***Coalinga, Cal.**—S. W. Morshead is said to have interested San Francisco capitalists in a project to build an 18-mile electric railway from Coalinga to Orrs. Connections will be made with the Southern Pacific Railroad at Orrs.

Los Angeles-Pacific Company, Los Angeles, Cal.—At a meeting of the stockholders of the Los Angeles-Pacific Company on Jan. 6, 1910, it was voted to issue $20,000,000 of bonds, $10,000,000 of which approximately will be used for additions and betterments to the property of the company. Of this amount it is estimated that $2,500,000 will be required for the construction of the company's proposed 4-mile subway. The remainder of the bonds will be used to retire outstanding issues.

Oakland & Antioch Railway, Oakland, Cal.—This company has begun grading of its proposed railway from Oakland to Walnut Creek and Bay Point, with a branch to Martinez. The second section will extend to Antioch. It is the intention of the promoters to extend the railway eventually to Stockton. A. W. Malthy and S. L. Napthaly are interested. [E. R. J., Dec. 18, '09.]

Baltimore & Washington Transit Company, Washington, D. C.—Senator Raynor has introduced a bill in the Senate amending the act which authorized this company to enter the District, approved in 1896. The bill will allow the company to extend its lines from its present terminus to Thirteenth Street and Ohio Avenue northwest. The extension is to be completed in two years.

Chicago (Ill.) Railway.—This company advises that it expects to build 24 miles of new track during 1910.

Rock River Traction Company, Geneseo, Ill.—This company is reported to have awarded a contract to the Northwestern Construction Company, Milwaukee, Wis., for building its projected interurban railway from Sterling to Rock Island, Ill. The estimated cost is $1,240,000. Officers: Theo. Becker, Geneseo, president; Wm. W. Cole, Geneseo, general manager. [S. R. J., Dec. 29, '06.]

Sioux City Service Company, Sioux City, Ia.—During 1910 this company will build about 1½ miles of new track. H. B. Gregory, purchasing agent.

Brandon, Man.—E. J. Gifford, Brandon, confirms the report that he has applied for a street railway franchise in Brandon. The names of the parties backing Mr. Gifford will not be announced until the franchise is obtained. [E. R. J., Jan. 1, '10.]

Cia Electrica de Aguascalientes, Aguascalientes, Mex.—This company expects to award contracts during the next few weeks for the construction of 1.24 miles of single track. Leon Branger, general manager.

***Lansing, Mich.**—John W. Ewing, Grand Ledge, is engaged in securing right of way for a proposed electric railway which will connect Lansing and Grand Ledge.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—The board of directors of this company has voted $650,000 to provide for the construction of the first section of track from Minneapolis to Northfield, 45 miles. This sum will be used in the purchase of 4381 tons of 80-lb. steel rails, 14 steel cars, and 100,000 oak, tamarack and cedar ties. The entire line when completed from Minneapolis to Dubuque, Ia., will be 293 miles long. M. W. Savage, president, and F. G. L. Hunt, engineer in charge.

Cape Girardeau-Jackson Interurban Railway, Cape Girardeau, Mo.—This company expects to build 1½ miles of new track during 1910.

Nebraska Traction & Power Company, Omaha, Neb.—This company will construct 3 miles of new track during 1910. Wm. D. Crist, purchasing agent.

Elizabethtown (N. Y.) Terminal Railroad.—This company has applied to the Public Service Commission of the Second District for authority to issue a first mortgage for $175,000 and for permission to issue bonds to the amount of $150,000 and common capital stock to the amount of $50,000. The proceeds are to be used in the construction of its railroad from Westport to Elizabethtown, a distance of about 8 miles. [E. R. J., Nov. 6, '09.]

Third Avenue Bridge Company, New York, N. Y.—This company, which is a subsidiary company of the Third Avenue Railroad, has filed a certificate for change of route in New York and Queens Counties. A loop structure will be built in Manhattan from Second Avenue through Fifty-ninth Street and Sixtieth Street. After crossing Queens-

boro Bridge and traversing the Queens plaza the cars will swing around loop adjoining Jackson Avenue and return to Manhattan. [E. R. J., Aug. 21, '09.]

North Carolina Traction Company, Danbury, N. C.—At a meeting on Jan. 4 of the original projectors of this railway an organization was effected for the building of the proposed 80-mile line from Winston-Salem to Stuart, Va. The following officers were elected: E. Hillman, Aberdeen, president; J. W. Krafft, Indianapolis, Ind., secretary; E. L. Krafft, Indianapolis, Ind., general superintendent; Dr. H. P. MacKnight, Southern Pines, general manager; W. L. Law, president Law Engineering Company, Rock Hill, chief engineer. Work has already been begun on the line. [E. R. J., Dec. 11, '09.]

Goldsboro (N. C.) Traction Company.—This company will build at once 1¼ miles of new track. E. T. Oliver, purchasing agent. [E. R. J., Oct. 2, '09.]

Salem, Ohio.—Peter McCave, Route No. 1, Washingtonville, confirms the report that he is promoting a plan to organize a company for the construction of a 34-mile electric railway from Salem to Youngstown, via Albany, Gettysburg, Greenford, Calla and Loveland. [E. R. J., Jan. 1, '10.]

Toronto, Ont.—The ratepayers of Toronto, at the municipal elections on Jan. 1, by a vote of 19,268 as against 10,697, decided in favor of the city corporation making application to the Ontario Legislation for the necessary authority to construct and operate a system of municipal subway and surface railway lines in Toronto.

Allen Street Railway, Nazareth, Pa.—This company is completing the construction of 1200 ft. of pile trestle with a 30-ft. span Bethlehem girder bridge. The contract for this work is in the hands of M. P. McGrath, Easton.

Rochester & Mars Street Railway, Pittsburgh, Pa.—This company advises that it will begin construction within the next few weeks on its 17-mile railway which is to connect Rochester, Beaver and Butler. Capital stock authorized and issued, $100,000; bonds authorized, $500,000; issued, $250,000. Officers: J. H. Barrett, Fitzsimons Building, Pittsburgh, president; D. Hunter, Jr., vice-president; David Torrence, secretary; Wm. B. Boggs, treasurer; J. H. Barrett, chief engineer. [E. R. J., Aug. 29, '09.]

Renovo & Gleasonton Street Railway, Renovo, Pa.—This company advises that it expects to begin work April 1 on its projected 6-mile electric street railway from Renovo to Gleasonton, via Farwell and North Bend. Up to the present time franchises have been obtained from the borough and townships through which the line will pass. The location of the company's power plant and repair shops has not yet been decided upon. Two amusement parks will be reached by the line. Capital stock authorized, $30,000. Officers: E. W. Hess, Clearfield, president and chief engineer; J. H. Crissman, Dubois, secretary; W. B. Reilley, Renovo, treasurer. [E. R. J., Jan. 15, '10.]

Sioux City, Sioux Falls & Missouri River Railway, Parkston, S. D.—C. A. Magee states that preparations are being made by this company to begin work on its projected railway about March 10. The route as planned will be from Sioux City to Sioux Falls, Ia., to Yankton, 170 miles. It is expected that the company will incorporate in about 30 days. Application has already been made for a franchise in Sioux City. Capital stock, $1,500,000; bonds authorized, $975,000. Officers: C. A. Magee, Parkston, president and purchasing agent; M. J. Walker, secretary and treasurer. [E. R. J., Jan. 15, '10.]

Bryan, Tex.—The executive committee representing the citizens of Bryan, it is stated, has accepted the proposition of O. E. Gammill, Gueydan, La., to build the proposed electric railway from Bryan to College Station, a distance of 5 miles. Two routes have already been surveyed. J. T. Maloney, Mayor of Bryan, is interested. [E. R. J., Nov. 13, '09.]

Belton & Temple Traction Company, Temple, Tex.—This company will construct 2½ miles of new track during 1910.

Seattle (Wash.) Electric Company.—This company will construct 20 miles of new track in the city during 1910. E. C. Gaumnitz, purchasing agent.

Spokane, Walla Walla & Western Railway, Walla Walla, Wash.—E. M. Symonds, president, states that new surveys are being made and right-of-way secured for portions of this proposed railway which is to extend from Dayton to Wallua, 51 miles. [E. R. J., Aug. 28, '09.]

Morgantown & Dunkard Valley Railroad, Morgantown, W. Va.—This company will build during 1910 about 17 miles of new track to connect West Morgantown, Riverside and Randall. J. A. Martin, purchasing agent.

***Sheridan, Wyo.**—The Chamber of Commerce has appointed a committee to consider a proposal from E. F. Wheaton, secretary and general manager of the General Traction Development Company, Cleveland, Ohio, for the organization of a company to construct an electric railway between Sheridan and Buffalo, 40 miles south. Sheridan people are asked to subscribe for $10,000 stock.

SHOPS AND BUILDINGS

British Columbia Electric Railway, Victoria, B. C.—Announcement is made of the purchase, by this company, of a central site for suburban terminal uses.

Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.—This company is said to be preparing plans for the reconstruction of its former power station in Huntington into a paint shop and general repair plant; also to build an extension 50 ft. long where painting and running repairs may be handled. [E. R. J., Dec. 5, '09.]

New York State Railways, Rochester Lines, Rochester, N. Y.—This company will erect shelter stations at Rowlands and Padelford on its Rochester and Eastern division as soon as the weather will permit.

People's Railway, Dayton, Ohio.—This company has let the contract for the construction of a new car house on Polender Avenue to the Hall-Cronan Company. Work will be started as soon as the weather will permit.. [E. R. J., Aug. 7, '09.]

POWER HOUSES AND SUBSTATIONS

Power, Transit & Light Company, Bakersfield, Cal.—This company will purchase a 225-kw motor-generator set. Harry A. Jastro, purchasing agent.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company has awarded a contract to Charles C. Moore & Company, Seattle and San Francisco, for the erection of an auxiliary steam power plant at Vancouver. This improvement, it is stated, will involve an expenditure of $250,000. The company has placed an order with Allis-Chalmers Company for two 2000-kw, 1800-r.p.m., 60-cycle, 3-phase condensing steam turbo-generator units.

Worcester (Mass.) Consolidated Street Railway.—This company has engaged J. G. White & Company, New York, to prepare plans for a new power plant to have a capacity of 40,000 hp. The location of the station has not yet been decided upon. A number of new substations will also be built.

Cia Electrica de Aguascalientes, Aguascalientes, Mex.—This company is considering the purchase of a 3000-volt, three-phase, 60-cycle generator and a 230-hp, 180 r.p.m. Koerting gas engine, with necessary switchboard apparatus. Leon Branger, general manager.

Lincoln (Neb.) Traction Company.—This company is installing a 500-kw, 3600-r.p.m., 60-cycle, 3-phase, 2300-volt Allis-Chalmers condensing steam turbo generator. F. H. Brooks, purchasing agent.

Portland Railway, Light & Power Company, Portland, Ore.—This company has awarded a contract to the Pacific Coast Engineering Company for the construction of the foundation of a power plant to be erected on the river front at the foot of East Lincoln Street, Portland. [E. R. J., Dec. 18, '09.]

West Penn Railways, Pittsburgh, Pa.—This company has purchased the municipal electric light plant in West Newton. The company will enlarge the plant and will furnish street lights and serve private consumers. Power will be furnished for the extension of the company's railway from Scott Haven, Pa., to Hunkers, where it will connect with the main line running from Greensburg to Uniontown.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—It is stated that this company will issue $114,000 bonds for improvements to its system which will include the purchase of new additional apparatus for its power plant.

Manufactures & Supplies

ROLLING STOCK

Detroit (Mich.) United Railway, it is reported, will buy 100 more cars in the near future.

Kansas City, Ozarks & Southern Railway, Kansas City, Mo., expects to buy two semi-convertible combination passenger and baggage cars this year.

Humboldt Transit Company, Eureka, Cal., has just ordered four 33-ft. combination car bodies, two complete Westinghouse No. 92-A double motor equipments and six sets of Standard short wheel-base 0-50 trucks.

Rutland Railway, Light & Power Company, Rutland, Vt., mentioned in the Electric Railway Journal of Nov. 27, 1909, as contemplating the purchase of three open and two closed cars, will use these cars on an extension to be built by this company.

Third Avenue Railroad, New York, N. Y., mentioned in the Electric Railway Journal of Jan. 15, 1910, as having placed an order with The J. G. Brill Company for 100 pay-as-you-enter cars, has specified National Brake & Electric Company's air brakes for all of the new cars.

Lexington & Interurban Railways, Lexington, Ky., has placed an order with The J. G. Brill Company for two interurban cars. Mention that this order was contemplated was made in the Electric Railway Journal of Nov. 27, 1909. The company also contemplates buying three single-truck cars.

Union Street Railway, New Bedford, Mass., reported in the Electric Railway Journal of Dec. 25, 1909, as having ordered 12 cars from the Osgood Bradley Car Works, has only ordered 10 cars. They are to be 13-bench open cars, weighing 10 tons, and having a seating capacity of 65. Length over vestibules will be 43 ft.; length of body, 35 ft.; wheel base, 4 ft. 6 in., with wood body and underframe.

TRADE NOTES

Wonham, Magor & Sanger, New York, N. Y., received an order from the Third Avenue Railroad, New York, to equip 100 new cars to be built for that road with "H.B." life guards.

Crocker-Wheeler Company, Ampere, N. J., announces that all correspondence for the company in Ohio should be addressed to 912 New England Building, Cleveland, Ohio, the company having discontinued its Columbus office.

W. R. Kerschner, Allentown, Pa., has moved his offices to New York City, where he will occupy Suite 1882 in the Hudson Terminal Buildings, 50 Church Street. Mr. Kerschner, in addition to second-hand car equipment and electrical machinery, will continue to handle the products of the Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y.; Catskill Foundry & Machine Works, Catskill, N. Y., and the Traction Equipment Company, Brooklyn, N. Y.

Western Electric Company, Chicago, Ill., closed its fiscal year on Nov. 30, 1909, with total sales of approximately $46,000,000. Gross earnings for 1909 compare with previous years as follows: 1909, $46,000,000; 1908, $33,000,000; 1907, $53,000,000; 1906, $69,000,000; 1905, $44,000,000; 1904, $32,000,000; 1903, $30,000,000; 1902, $29,000,000; 1901, $24,000,000; 1900, $24,000,000. The total for the 10 years is $384,000,000. The year 1909 shows a recovery from 1908 of approximately 40 per cent. The company reports that its business in foreign countries is increasing from year to year.

Allis-Chalmers Company, Milwaukee, Wis., recently received from the Portland (Ore.) Railway, Light & Power Company, which is increasing the capacity of its hydro-electric plant, an order for a 3750-kw, water-wheel type, 11,000-volt, 60-cycle, three-phase, 360 r.p.m. alternator. This will be of the same general design as the two 2500-kw, 11,000-volt, 33-cycle alternators already supplied by the same company, and will be semi-enclosed. A 50-kw, 120-volt exciter will be direct-connected to an extension of the alternator shaft.

J. Frank Lanning & Company, Pittsburgh, Pa., announce that D. L. Beaulieu has been appointed to handle their Eastern sales department, with headquarters at Boston, for the sale of the "Howard" composite journal bearing brass. Mr. Beaulieu is an experienced operating man, having worked on electric railways both in Massachusetts and Pennsylvania. He has resigned as superintendent of the Northampton Traction Company after serving six years in that office in order to sell the Howard bearing after having seen its performance in every-day railway service.

Peter Smith Heater Company, Detroit, Mich., has opened an office in suite 517-519 Hudson Terminal Buildings, 30 Church Street, New York, N. Y., and has secured the services of Reginald M. Campbell, who will act as the company's Eastern sales manager, covering the States of New York, New Jersey, Pennsylvania, Maryland, Delaware and Virginia, Eastern Canada and New England. Mr. Campbell is well known throughout the railway field and has a host of friends among the railway and railway supply men of the Eastern States. For the past five years he has acted as district sales agent for the Ohio Brass Company in the New York and New England territories. For six years previous to the time he entered the service of that company he was in the employ of the Western Electric Company, latterly in charge of overhead railway material sales for the United States. Mr. Campbell is also well and favorably known because of the leading part he has taken in years past in the annual Supplymen's Vaudeville Show which is held during the convention of the American Street & Interurban Railway Association.

ADVERTISING LITERATURE

A. Gilbert & Sons Brass Foundry Company, St. Louis, Mo., is distributing a small card advertising its special bronze journal bearings for railway cars.

Hart & Hegeman Manufacturing Company, Hartford, Conn., has issued a new pamphlet and several circulars covering its latest switches and accessories.

Pettingell-Andrews Company, Boston, Mass., in the January issue of its house organ, *Juice*, describes a number of new electrical devices for which it has obtained the sales agency in New England.

Railway Equipment Company, Portland, Ore., is sending out a large wall calendar for 1910, on which is advertised the fact that the company sells all kinds of new and second-hand railway equipment and supplies.

John A. Roebling's Sons Company, Trenton, N. J., has issued a folder entitled "How About Bonds?" in which these questions are asked: Do your galvanized bonds rust? Do your copper bonds break? Are your copper bonds stolen? The application of copper-clad bonds to a joint is illustrated, and the statement is made that copper-clad bonds outlast the rails.

Graphite Lubricating Company, Bound Brook, N. J., in a circular dated Jan. 15, 1910, says in part: "We are silent on every subject except machinery bearings. Our knowledge and years of experience in making the genuine 'Bound Brook' graphite and bronze bearing to run without oil or grease prohibits us from keeping silent on that subject. We are positive that we are experts in our line. We are furnishing the genuine Bound Brook bearings to the largest manufacturers in this country, and we have a very nice little booklet descriptive of the large range of work to which they can be adapted, and we would be pleased to send it to you upon your request."

General Electric Company, Schenectady, N. Y., has issued bulletins No. 4703-A, entitled "Variable Release Air Brake Equipments;" No. 4706, entitled "Curve-Drawing Ammeters and Voltmeters—Type CR;" No. 4707, entitled "Gasoline-Electric Plants for Lighting and Power;" No. 4711, entitled "Small Plant Alternating Current Switchboards;" No. 4712, entitled "An Exhaust Steam Turbine Installation;" No. 4713, entitled "Type F, Forms K-2 and K-4 Oil Break Switches." Bulletins No. 4703-A and 4712 are of the greatest interest to street railways. In the first the company describes its variable release air-brake equipment, with which it is possible to handle a long train with nearly the same facility as single cars equipped with the straight air-brake system. The bulletin goes into considerable detail in describing this equipment, and shows cross sections of the valve in different positions. In the second bulletin the subject of a non-condensing engine plant with exhaust-steam turbines is considered in detail.

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Transportation of United States Mail

The portion of the report of the Second Assistant Postmaster-General relating to the transportation of mail by cable and electric cars for the fiscal year ended June 30, 1909, as published in abstract in last week's issue, was of special interest. Unfortunately, the amount paid by the Government for electric mail transportation is not divided in the report between closed pouch service and postal car service. Nevertheless, it is interesting to note that the average payment made to the steam railroads per mile traveled is about twice the average payment to the street railways. Mr. Stewart refers to the demand made by the electric railways for higher rates for service, says that in some cases it will be found desirable to substitute automobile service for that of electric cars and asks for authority to expend $100,000 of the street railway mail appropriation for screen or motor-wagon service. Street railway companies do not have much to fear from competition of this kind. The larger cost of automobile operation is so well known that we do not believe that the electric railway companies will suffer in any fair comparison of like service.

Limiting Number of Passengers on a Car

Rigid limitation of the number of passengers on a car has proved unsatisfactory to the public in Albany, N. Y. The plan, which was undoubtedly of fully as much interest to the traveling public as to the railway, was given a thorough trial as the result of an order of the Public Service Commission, Second District, limiting the number of passengers to be carried on the cars of the Pine Hills line of the United Traction Company. Public dissatisfaction aroused by the experiment has led the commission to direct the abandonment of the scheme and the return to the old method of operation. The rule requiring limitation of the number of passengers on a car, as tried in Albany, was passed by the commission on March 30, 1909, after a hearing called to consider a complaint regarding the service on the Pine Hills line. Various expedients were suggested at this hearing, but the final decision of the commission was that the company should limit the number of passengers to 40 on cars with a seating capacity of 26 and to 35 where the seating capacity was 24. The testimony presented at the hearing on Jan. 12, which followed the experiment of nine months, as published elsewhere in this issue, shows that the attempt to regulate the question in this way not only did not solve the problem, but that it aroused a measure of public dissatisfaction greater than that which had existed under the previous plan of operation. Various citizens testified about the length of time they were compelled to stand on street corners in inclement weather when car after car passed having available standing space which they could have occupied except for the limiting order. The position which they took is unquestionably the prevailing American point of view on a question

of this character. If people want to stand in a car which has no available seats, they do not like to be prohibited. The problem of accommodating the rush-hour travel is a most serious one in American cities, but a rigid limitation of the loads to a little more than seating space does not constitute the solution.

Raising Fares on Interurban Roads

The theory that low rates build up profitable traffic on interurban lines was a popular one in the early days of long-distance electric transportation, but its fallacy is becoming apparent as the cost of operation steadily rises. Increased costs of labor and material, depreciation and higher taxes have created an imperative need for higher fares commensurate with the true cost of the service rendered. The problem which faces every company when considering fare increases is how to apportion the higher rates so as to cause the least immediate falling off in traffic and to distribute them equitably between all communities and classes of patrons. The major part of the receipts of interurban roads is derived from the sale of one-way and round-trip tickets at ticket offices and the collection of cash fares paid on cars. Nearly all systems of passenger fares are built up from a basic rate per passenger-mile. An increase in revenue may be secured either by raising arbitrarily the basic rate and proportionately all of the derived traffic in previous use, or by readjusting the relations between the one-way, round-trip and cash-fare rates so as to raise the cash fares and materially lower or abolish altogether the reductions on round-trip tickets.

If the basic rate is already low the first method is probably the least difficult to pursue and to justify before the public. All patrons are treated exactly alike and there can be no outcry over alleged discrimination. On the other hand, it may violate one cardinal principle of rate making, namely, that of fixing rates primarily on the basis of what the traffic will stand. A pro rata increase of even a small amount might affect seriously and permanently the largest and most profitable, because most cheaply handled, class of traffic.

The other alternative is that of readjusting the round-trip and cash-fare tariffs without materially changing the standard one-way ticket fares, and where the practice exists of making such reduction, we believe that the revenue per passenger will often be secured by the abandonment of the plan without seriously affecting the volume of traffic. It has been the general experience of interurban railways, both in competitive and non-competitive territory, that low rates have less effect on the promotion of traffic than the frequency, comfort and convenience of the service rendered. At the same rates or in some cases at lower rates the steam roads have not been able to compete with the interurbans for traffic carried moderate distances of, say, less than 50 miles. This being true, there is little to be gained in selling round-trip tickets to competitive points at reduced rates in order to insure the return trip being made by trolley. It is reasonable to suppose that the inducements offered by the electric line for the going journey will be equally effective in diverting the passenger from the competitive road on the return journey. For journeys to non-competitive points nothing whatever is gained by offering round-trip tickets at reduced rates. The ordinary reduction on a single round-trip ticket is an inheritance from steam railroad practice and is an application of the principle of wholesale discounts to retail trade. One of the largest railroad systems in the East, the New York, New Haven & Hartford, abandoned it some years ago. Put the one-way ticket tariffs on a satisfactory basis and the round-trip business will take care of itself with profit to the railway company and without hardship to the traveling public.

The advisability of charging cash fares collected on the cars in excess of the one-way ticket rates depends very largely on the character of the traffic. Where the traffic is principally between towns some distance apart the practice is both justifiable and expedient. It increases the revenue and encourages the purchase of tickets at stations where the receipts can be audited accurately.

The question of fares, tickets and methods of selling and collecting are so intimately related to the character of the traffic to be handled that generalizations admittedly are of small value in suggesting a possible solution of the problems of any particular road. Nevertheless, we believe that it is well worth while to give careful consideration to the matter of round-trip and cash fare rates in studying means of increasing fares.

Stopping a Car Short of Its Destination

Where a passenger on a street railway car is entitled by his contract to be carried to a certain point, and the railway company breaks the contract by turning the car back at a point short of the destination, the passenger's right of action for damages for breach of contract is complete. He has remedy in civil action, but if he elects to remain on the car for its return journey he must pay for his ride. He may include this amount in his damages, but he is not entitled to remain on the car without payment of fare. This is the gist of a decision last summer by the New Jersey Court of Errors and Appeals in Wright vs. Orange & Passaic Valley Railway Company. As cases occasionally happen where obstinate passengers remain on a car, it will be interesting and instructive to refer briefly to this New Jersey decision.

The plaintiff boarded a car displaying the sign "Eagle Rock," but, owing to the condition of the tracks at the time, cars had for some days been stopping about a mile away from Eagle Rock. This the plaintiff probably well knew, for he was a daily traveler on the road. On the day in question the car was turned about a mile away from Eagle Rock, and Wright was told that it would proceed no further. The plaintiff then demanded to be carried to the end of the line, and when this was refused, declined to leave the car or pay his fare for a return trip. He was thereupon ejected. He brought suit for ejectment, but made no claim of serious injury.

Upon the trial the issue was narrowed to the determination of the question whether the ejection of the plaintiff from the car was wrongful. The company met this claim by insisting that after Wright was requested to pay his fare and refused he became *ipso facto* a trespasser, and when he declined to alight, the right inured to the company, through its conductor, to eject him. The plaintiff did not claim that he was entitled to be carried back free to his starting point, but stood upon a right, as he claimed to the conductor, "to stay on that car until it went to Eagle Rock."

The court held that it was immaterial in this action whether the plaintiff was warned when he got on the car that it would not go through to Eagle Rock. Such negligence, if com-

mitted, would under the circumstances have justified an inference that the company had contracted to carry the plaintiff to Eagle Rock, but his remedy for breach of that contract was an action for damages, and not the trespass action which was then under consideration. According to the court:

"He had his election, when the car came to the end of its actual trip, to leave and sue for damages, or to make a new contract for carriage on the return trip, and add its cost to his damages, subject, of course, to the rule which requires one to minimize his damages. He chose the latter alternative. Having done so, he became bound to pay his fare to the conductor, who had no authority to carry him free. * * * The plaintiff was entitled to stay on the car until he knew that the defendant had finally determined not to run it to Eagle Rock. As soon as the company so determined, and started the car on its return trip, his right of action was complete; but his right was a right to damages merely, not a right to occupy the car indefinitely. The right claimed by him would, in effect, deprive the company of the management of its own car, and make the plaintiff a tenant in common. The law of self-help has never been extended as far as that; and, in contemplation of law, damages are a sufficient redress for a private wrong."

Judge Minturn's brief and able opinion cites many authorities. He says that in Kansas, where a passenger remained on a train for an unreasonable time after it reached its destination, it was held that he thereby ceased to be a passenger, but became a trespasser. This is shown by cases cited in the courts of Wisconsin, New Jersey and Arkansas.

It is, perhaps, elementary that every owner whose property is unlawfully invaded has the right, after reasonable demand, to eject therefrom the tort-feasor.

The Seat-Mile Unit

The suggested widespread use of the seat-mile unit, in a communication by Horatio A. Foster, published elsewhere in this issue, follows the action of the New York Public Service Commissions in prescribing the adoption of this unit for electric railways under their jurisdiction. We agree with Mr. Foster that the car-mile, and, indeed, all of the units now employed in comparisons of electric railway operations, are not entirely satisfactory for all conditions, but if the seat-mile is to be used we would much prefer for clearness its employment under that name rather than its multiple, the "kilo-seat-mile," for which Mr. Foster suggests the name "traffic unit." "Seat-mile" indicates to everyone exactly what is meant, just as car-mile, car-hour, ton-mile and passenger-mile do, whereas the proposed term might prove confusing and its exact meaning be forgotten by those who did not regularly employ it in railway work. Perhaps an anaylsis of the objects of some of the more common units will help to an understanding of their relative value.

There are, of course, a great many points of difference between the character and daily performances of different cars on different lines, but the most important of them are distance run per day and the speed, weight and capacity of the car. There would be no need of any more complicated unit than the car-day if all cars were alike in these points. It is because this condition does not hold true that various units have been employed, and while each is designed primarily to compensate for one lack of equality between the performance of different cars, none is so comprehensive as to equalize all of the points of divergence. The car-mile primarily eliminates the difference in lengths of run per car per day, and for this reason is a fairly satisfactory unit for use in obtaining averages in car expenses and performance where the cars compared do not differ greatly in speed, weight and carrying capacity. It is also convenient as a general unit for those expenses which vary approximately with the distance run. It fails, however, with all statistics which are seriously affected by speed, weight and carrying capacity, the three principal factors which are not taken into consideration by the car-mile.

The largest single item of the operating expenses is labor, which varies, of course, not with the distance run, but with the time spent on the road, hence upon the speed of the cars. It was, of course, to meet this difficulty that recourse was had to the car-hour, which cancelled the main discrepancy in comparing wages, but was less desirable than the car-mile for the items of expense which vary with the distance run and no more desirable for still other items like power which may be assumed for present purposes to vary with weight of the car and distance run. Nevertheless, as the wages constitute, as a rule, considerably more than half of all operating expenses, the advantage of the car-hour as a primary or auxiliary unit for reckoning total operating expense is apparent.

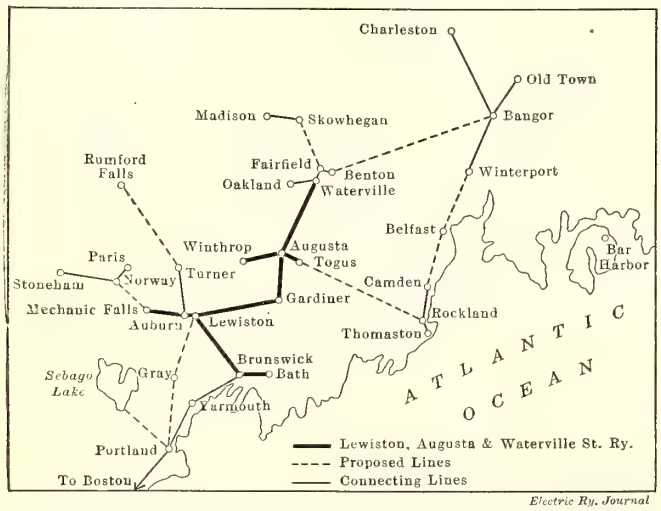
The seat-mile takes some account of the weight of the cars operated, but not so accurately as the ton-mile, so would be less accurate than the latter for power statistics, and as it also disregards entirely the number of cars run, it is less valuable as a guide for platform expenses, and hence for total operating expenses, than even the car-mile. None of the units is very satisfactory for gaging car maintenance. In order of relative undesirability we should probably group them in the following order: Car-hour, seat-mile, ton-mile and car-mile. For car body maintenance the latter would be the best, for track maintenance the ton-mile, and for truck maintenance probably the wheel-mile. We believe, therefore, that the seat-mile will not displace the older established units for these, the principal items in operating expenses, but that it will be used, if adopted where it is not required by law, only to supplement existing statistics. The question then would be as to the value of the information which the new unit would add to that made available by the use of the present measures.

This is answered by the statement that the seat-mile affords a closer measure of the service on a given line or a given property than is possible by any of the other units which we have been considering. If, for instance, a company shows its seat-mileage for comparative periods, a discrepancy would indicate fairly well, except for total interruptions of service, whether the service has been increased or decreased, whereas similar statistics based on car-mile returns would not take into account the fact that changes might have resulted from the substitution of cars of another size or type from those operated previously. Of course, in any such use the fact should be borne in mind that the seat-mile is not an accurate gage of the extent of variations in the carrying capacities of the cars, because it rates on the same basis the cross-seat and the longitudinal seat car having an equal number of seats.

As Mr. Foster says, the public service commissions in New York specified last year that the returns from companies within their jurisdictions should give the number of seat-miles run in each case, and possibly the full text of their forthcoming reports will permit further analysis regarding this unit.

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY

A notable addition to the transportation facilities of south-central Maine has been in operation during the past year, as a result of the establishment of through service in November, 1908, by the Lewiston, Augusta & Waterville Street Railway Company over a 54-mile line connecting the cities named in the company's title. Through the consolidation of the Lewiston, Brunswick & Bath Street Railway Company and the Augusta, Winthrop & Gardiner Street Railway with itself, the Lewiston, Augusta & Waterville Company operates a system



Maine Electric Railways—Map of the Lewiston, Augusta & Waterville System and Connections

of 140 miles of track, extending from Waterville on the north to Bath on the southeast, and controlling substantially all the electric railway service in the Androscoggin and Kennebec valleys. The completion of the new line to Waterville establishes continuous electric railway facilities from that point southward to Brunswick, Portland, Portsmouth and Boston, and opens to easy access a portion of the lake region of Maine hitherto attainable only by infrequent and roundabout steam railroad service or by private conveyance. Under the executive and financial administration of a syndicate headed by John R. Graham, of Bangor, the Lewiston, Augusta and Waterville lines have been welded into a strong and unified system, providing fast and frequent interurban service in the territory, establishing flexible and short headway facilities in the cities and towns of larger size, furnishing the rural sections an entirely new method of overcoming distances, and inaugurating plans for an extended development of electric express and freight business throughout the communities served.

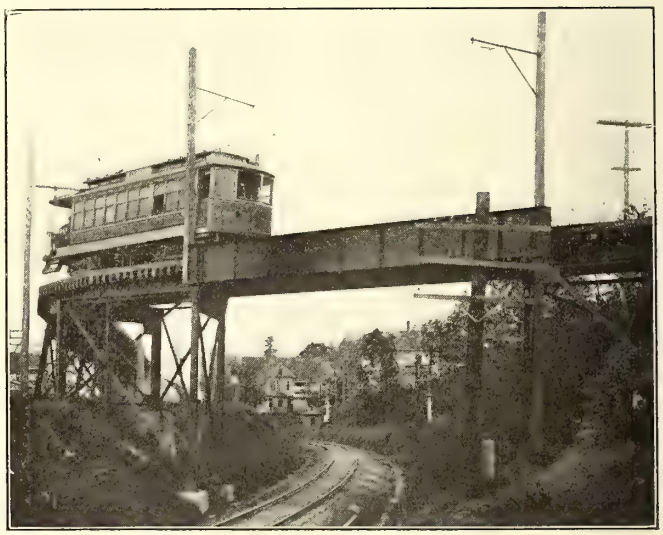
The Lewiston, Brunswick and Bath lines of the company were described in the Street Railway Journal at the time of their completion, several years ago. The lines centering about Augusta and Gardiner have been in service for many years, and are of interest only in their relation to the through and local service of the present organization. The later work which has brought all these separate systems into a single corporate management is well illustrated by the construction of a 20-mile line from Sabbatus to Gardiner and the building of a line from Augusta to Waterville, 21 miles in length—the two filling the gaps previously existing between the present ends of the system; and the construction of a 9-mile extension of the system westward from Auburn to Mechanic Falls. In addition to the establishment of the new lines, considerable reconstruction has been done upon the older portions of the system; tracks and roadbed have been improved, rolling stock brought up to date, repair shop facilities centralized and the supply of power from different sources co-ordinated. In addition, the schedules throughout the territory have been harmonized to provide closer connections at transfer points.

TERRITORY

The accompanying general map of the system indicates the relation of the new route to the points served and their present proposed connections with other parts of the State. Augusta, the capital of Maine, is now connected by trolley with the entire southeastern section of the State. Bangor and Rockland are now the centers of operating systems, but are not connected either with each other or the Waterville lines. It is probable that future extensions will connect Augusta with Rockland via Togus, and possibly Rockland with Bangor via Camden, Belfast and Winterport. Another proposed extension connects Waterville with the Bangor Railway & Electric Company's system, via Benton, although this line is not considered an immediate possibility.

The company operates in approximately 25 cities and towns, having a total population of about 120,000, according to the census of 1900. The most important points served and their population are: Lewiston, 23,761; Bath, 20,330; Auburn, 12,931; Augusta, 11,683; Waterville, 9,477; Brunswick, 6,806, and Gardiner, 5,501. The system is divided into two parts one division including the Lewiston and Bath lines, and the other the Augusta and Waterville lines. The normal schedule calls for 36.64 cars per day on an 18-hour basis, 10 cars being run on the Augusta division, in the interurban service there given, and the remainder being operated on the Lewiston and Bath division which has more city lines within its limits. The headquarters of the company are in the heart of the Lewiston business district. All cars pass the offices, and a commodious waiting room is available here on the ground floor for public use, with well-furnished quarters for car service employees in the basement. The offices of the general manager, electrical engineer and treasurer are on the upper floors. There are about 450 persons in the service of the company.

The new line between Lewiston and Waterville includes about 41 miles of recently constructed track, lying between the terminus of the old city system of Lewiston at Sabattus and Gardiner, and between the outskirts of Augusta and Waterville. The greater part of the route is on a private right-of-way, 70-lb. T-rails with Weber joints being used. The ties are of cedar, laid in gravel ballast obtained near the right-of-way. The rails are bonded with one No. 0000 American Steel & Wire twin terminal bonds at each joint, painted dark to escape attention. Every 1000 ft. the track is cross-bonded with 72 in. of No. 0000 copper cable. The right-of-way has an average width of 50 ft., and the maximum grade on the new work is 5 per cent.



Maine Electric Railways—Steel Girder Bridge over the Maine Central Railroad

POWER SUPPLY AND TRANSMISSION

The power supply of the system is mainly drawn from hydro-electric stations, with a relatively small reserve capacity in

steam auxiliary equipment. The normal generating capacity and its location on the system are as follows:

Location of Station.	Normally Available.	Notes
Brunswick	750 water power	Double current generators.
Lewiston	300 steam power	Direct current.
Deer Rips	750 water power	Alternating current.
Hallowell	650 steam power	Alternating current and direct current.
Winslow	1,500 water power	Alternating current.
Total	3,950 kw.	

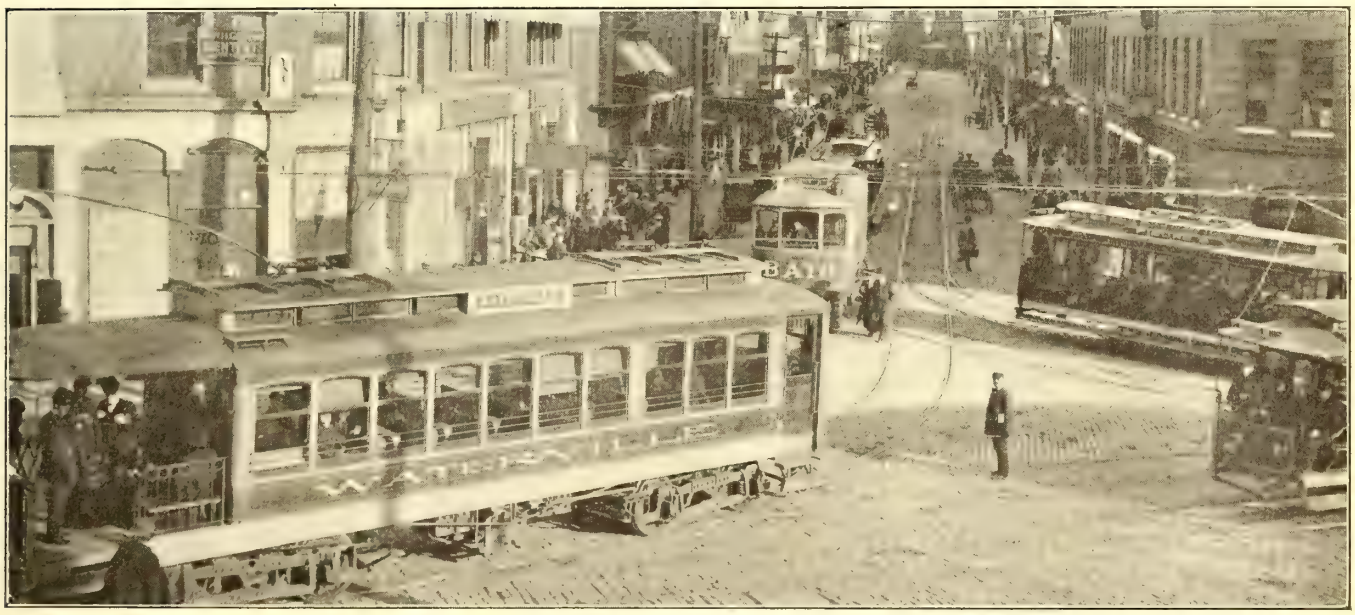
In general, alternating-current power from these generating plants is transmitted to step-down rotary converter substations for reconversion into 650-volt direct current for use on the trolley lines. Substations are located at Bath, Lisbon Falls, Lewiston, Day's Corner, Hallowell, Winthrop, Webber Pond and Winslow. The Lewiston and Bath Division of the system is supplied with 60-cycle current, and the Augusta and Waterville lines with 25-cycle service. A physical separation of the two electrical supply systems is made at Sabattus.

The power plant at Brunswick was built in connection with the construction of the Lewiston, Brunswick & Bath line. It is operated by the Androscoggin River under a normal head of 18 ft., and contains four 250-hp Holyoke and Globe-Dayton horizontal turbines driving three 250-kw, double-current generators. One side of each generator delivers current at 550 volts d.c., and the other at 330 volts, three-phase, for transformation to 10,000 volts for transmission to the Bath and Lisbon Falls substations. There are two banks of three-phase transformers in the Brunswick station, both transformers and generators being of Westinghouse manufacture. The turbines are controlled by two type B Lombard governors. An emergency transmission line connection is made from the Brunswick station to the substation in Lewiston, continuing the Lisbon Falls line. From Brunswick to Lisbon Falls the line is of No. 1 copper, and from the latter point to Lewiston of No. 3 copper. The Bath line is of No. 6 copper, the distance being 9 miles. From Lewiston to Brunswick the line is 19 miles long. In ordinary operation the line is not used beyond Lisbon Falls. The Brunswick power station also supplies current to the Freeport substation of the Portland & Brunswick Street Railway Company over a 9-mile transmission line. The line is built of cedar poles from 30 ft. to 35 ft. long, with an average spacing of 115 ft, and porcelain insulators are used. The plant is operated in three eight-hour shifts of one man each, the line being kept alive 20 hours a day. The d.c. sides of the generators are employed to feed the trolley service in the vicinity of the plant. The railway company does not own the water wheels in this station.

The Lewiston power plant is located at the company's main car house, near the center of the city, and is used only as an auxiliary in times of low water. It contains two 200-hp B. & W. water-tube boilers, a 400-hp Westinghouse horizontal compound condensing engine and a 300-kw, 550-volt d.c. belted General Electric railway generator. At this point a substation consisting of six 200-kw single-phase step-down transformers supplying current to two 500-kw, 600-volt three-phase Westinghouse rotaries, and also a battery consisting of a set of 270 cells from the Electric Storage Battery Company and a Western Electric booster. The one-hour discharge rate of the battery is 240 amp, and is controlled by an automatic carbon regulator of the company's standard design. This substation is connected with the Deer Rips plant by a 10,000-volt three-phase line of aluminum, having a section equivalent to No. 1 copper. The battery is operated in parallel with the rotary converters in the substation, and was installed to facilitate the handling of peak loads. The Deer Rips line is 5 miles long.

The railway company has also installed a line battery in a wooden building, with concrete floor and asbestos roof, on its recently completed extension to Mechanic Falls. This installation consists of 204 Gould cells, having a one-hour discharge of 160 amp., and connected in parallel with the cars, so as to float upon the line in service. The battery is located about 8 miles west of Lewiston. The Deer Rips power plant is owned by Libby & Dingley, of Lewiston, proprietors of the electric lighting and power company operating in Lewiston and Auburn. The station is located on the Androscoggin River, and is purely hydro-electric. The railway company has reserved for its normal use in this station 750 kw in machinery, but additional power can be obtained in times of need.

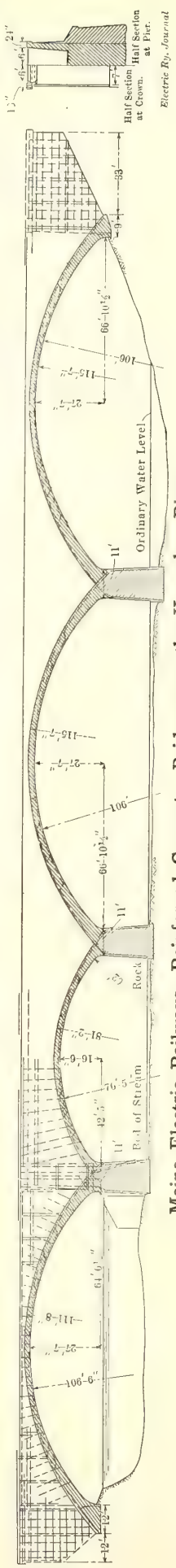
The Hallowell power station is an old plant, formerly used to operate the Augusta, Winthrop & Gardiner Street Railway, and is now utilized as a steam auxiliary station, with a substation in the same building. The power equipment consists of three 150-hp horizontal return tubular boilers, a 600 hp cross-compound Corliss engine direct-connected to a 300-kw, 350-volt three-phase Westinghouse alternator; a similar 300-hp engine which is at times belted to a 200-kw General Electric rotary converter, and a 200-hp simple Russell engine belted to a 150 kw, 550-volt General Electric d.c. railway generator. This station is ordinarily operated by two attendants, a watchman also being provided. Firemen are employed as needed. The



Maine Electric Railways—A Scene on Lisbon Street, Lewiston, Showing in the Foreground an Interurban Car with Observation Platform.

Lewiston plant is ordinarily operated by one day man and one night man, a third being called in when the steam plant has to be started in service. The Hallowell substation contains two three-phase, 200-kw, 650-volt, 25-cycle General Electric rotaries and one 150-kw Westinghouse rotary. The transformer equipment of this station includes three 145-kw sets, which raise the potential to 19,100 volts for transmission to the substations of the new through line to Augusta and Waterville, and a compensator which enables current at 11,000 volts to be transmitted to the Winthrop substation, about 7 miles from Hallowell. Each of the transformers is provided with a double secondary winding and a single set of primary coils, so that either of the rotary converters in the substation can be independently operated, although each rotary delivers direct current to the same positive busbar. By this plan an extra investment in transformers is saved, and the a.c. sides are independent of each other. The windings of the transformers are designed for future operation at 33,000 volts, if desired. All but one of the rotaries on the 25-cycle system are started on half-voltage taps. Any or all of the rotaries in the Hallowell substation can be operated from the 300-kw alternator if desired in case of low water, and one of the rotaries, as stated above, can be run as a generator by a belted engine in case of necessity. Under normal conditions the steam plant is shut down at Hallowell, and the rotaries are run off the transmission line from the Fort Halifax water-power station in Winslow.

The Winslow, or Fort Halifax, generating and substation is located at the northern end of the Waterville line, on the Sebasticook River, near its junction with the Kennebec. Exterior and interior views of this station are shown in the accompanying illustrations. The plant is owned by the Fort Halifax Power Company. The power house is a brick building with concrete cornice and "ferroinclave" roof. The floors are of concrete, laid on "ferroinclave." A hollow concrete dam with a 350-ft. spillway has been built on a ledge crossing the river at this point, with one end extending to a heavy abutment rising 13 ft. above the level of the spillway and extending well into the clay which forms the bank of the river. The other end of the dam extends to an abutment tied into a flume wall, forming a continuation of the dam, which is carried throughas the wall of the generator room of the station. The station contains two horizontal turbine units set in open concrete flumes, the walls of which are carried up to the same height as the abutments of the dam. Each hydraulic unit consists of four 42-in. horizontal turbines, each set being capable of developing 1400 hp under 20-ft. head and about 2000 hp under 24-ft. head. From the flumes the shafts of the water wheel units pass through steel bulkheads set in the wall of the generator room, and connect directly to two 750-kw, 25-cycle, 400-volt, three-phase revolving field alternators. One of the generating units is provided with a separate 60-cycle revolving field and armature, which can be used for local lighting service if desired, and to act as a frequency changer between the system of the local central station at Waterville and the railway plant. The main operating room of the station is located on the walls of the generator room and 25 ft. above the latter, to avoid danger of interruption from freshets backing up from the Kennebec River. In the operating room are located water wheel governors, motor-driven exciters, three Fort Wayne water-cooled, 250-kw, step-up transformers to raise the potential to 19,000 volts for transmission to the railway substations, high-tension and substation equipment. The latter includes a 200-kw General Electric 650-volt rotary converter for supplying direct current to the trolley line in the vicinity of the station. The high-tension circuit breakers and lightning arresters are on a gallery 12 ft. above the main operating room floor, and space is reserved in the station for the future installation of a duplicate bank of transformers. A hand-power traveling crane is installed in the operating room, and by removal of traps the heavier parts of the equipment in the wheel room below can be handled readily. The outgoing line from this station is carried across the Sebasticook River on a span of 367 ft., the wires being 9 ft. 8 in. apart at the dam, and terminating on steel poles, as shown in the exterior view.



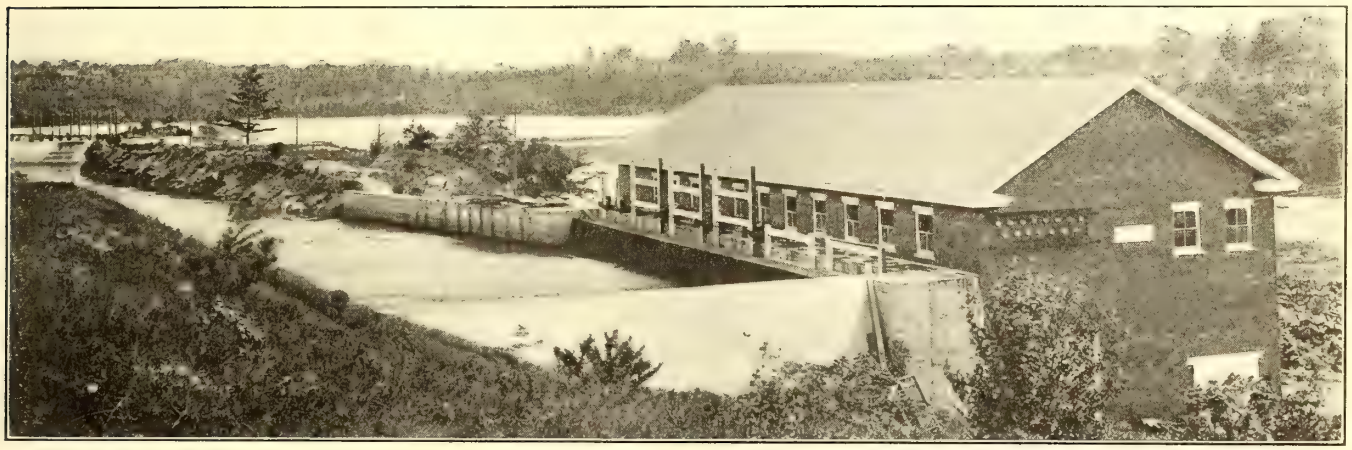
Maine Electric Railways—Reinforced Concrete Bridge over the Kennebec River

In the new work of the company the high-tension wires are carried on 35-ft. to 50-ft. cedar poles set 5 ft. 6 in. in the ground, and 18 in. in diameter at the butts. The wires are carried on Thomas 33,000-volt, triple-petticoat porcelain insulators. The entire line construction was carried out with the expectation of raising the potential to 33,000 volts when the load requirements necessitate it. The insulators are spaced on 48-in. equilateral triangles, one insulator being carried on the top of the pole and the other two on a 5-ft. spruce cross-arm fitted with braces at the pole diameter. At the tops the poles are 7 in. in diameter. Below the high-tension wires are located two railway telephone wires spaced 20 in. apart vertically. Two No. 00 trolley wires are carried on 9-ft. brackets on the transmission poles. The three-phase line is transposed every half-mile, with one complete turn every 1.5 miles. When on the transmission poles the telephone line is transposed every 1.5 miles, the construction for the communicating service being of No. 10 galvanized iron carried on side brackets. Telephones are located on all turnouts. Special care was taken to secure accurate spacing of the telephone wires. This was accomplished by the simple expedient of driving two nails into a stick which could be fitted against the under side of the cross-arm, the nails being just 20 in. apart. When the stick was placed in position a scratch was made on the pole and the side brackets for the telephone service nailed in place by the marks. A hook was attached to the end of the stick for convenient handling.

The 19,000-volt line consists of three seven-strand aluminum wires. The cross-arms were treated with carbolineum before being placed in service, and the cost of each insulator was $1.50. The insulators are attached to wooden pins, the latter being bolted to the cross-arms and ridge iron of the pole by 5/8-in. steel bolts. The poles on the line cost on the average from $3 to $4 each in the rough, and about $7 erected. About 40 miles of line were erected in connection with the building of the Augusta and Waterville extensions, 28 miles of the transmission service being carried on the trolley poles and the balance across the country.

All the trolley construction was insulated for 650 volts. The trolley wires are of grooved section, supported by 2-in. pipe brackets with 1½-in. braces. The yokes have strain insulators at each end, the wire being attached to the yokes by cap screws connected with the ears. Each cap screw is provided with a lock washer to prevent its jarring loose, and the trolley wires are anchored every 17 poles in two directions.

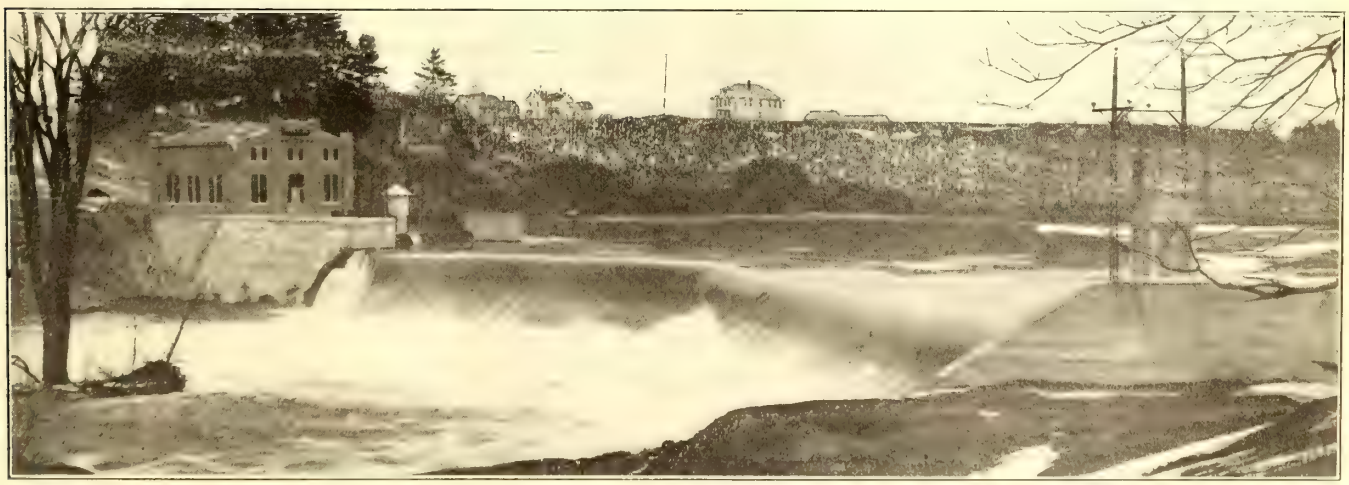
The Bath substation is located in the outskirts of the city, and contains two 200-kw Westinghouse 550-volt rotary converters of the 60-cycle type, supplied with current through three 75-kw single-phase transformers per rotary, each being of the oil-cooled type and wound for 10,000 volts on the primary and 330 volts on the secondary side. The regular operating force of this station consists of two men, who take shifts from 6 a. m. to 6 p. m., the night force in the local car house looking after the rotaries at other times. The Lisbon Falls substation contains one 200-kw Westinghouse 550-volt rotary supplied with current through three single-phase 75-kw transformers. The operating conditions are similar to those at Bath, a local car house providing for night service when the day shifts are over.



Maine Electric Railways—General View of Power House and Dam on the Androscoggin River near Lewiston

The substations at Day's Corner, in the town of Monmouth, and at Webber Pond illustrate the latest type of construction which the company has put in service. An interior and an exterior view of the Day's Corner substation are shown. Each of these substations contains at present one 200-kw, three-phase, 25-cycle, 650-volt General Electric rotary converter, supplied through three 75-kw, oil-cooled, single-phase General Electric transformers, reducing the potential from 19,000 to 400 volts. 19,000-volt service, but the oil switches and transformers are designed for 30,000-volt operation when desired. At the Day's Corner substation there are two d.c. feeder panels, each equipped with an ammeter, circuit breaker, potential plug and single-pole knife switch, and also a d.c. machine panel, carrying a recording wattmeter, ammeter, field rheostat, circuit breaker and generator switch. Thomson astatic instruments are used. There is also an a.c. rotary panel containing an oil switch handle and tripping relay, acting automatically in case of overload, and a phase ammeter of the edgewise type. The 650-volt wiring for the railway service is carried under the floor from the switchboard and out of the building to the trolley and rails at the opposite side from which the high-tension service enters. Space is reserved in each substation for a second rotary and its attendant transformers and switching equipment. The Webber Pond substation is a duplicate of the one at Day's Corner, except that the former is an intermediate and the latter a terminal substation, the high-tension line being carried no further southward. Each substation is operated by two men, the shifts being 12 hours in length.

The Winthrop substation supplies current to a branch of the old Augusta, Winthrop & Gardiner Street Railway, about 15 miles in length, running westward from Augusta. It contains a 150-kw Westinghouse 25-cycle rotary converter, supplied with current through two 90-kw, 11,000 to 400-volt transformers. The substation is operated by two men in 12-hour shifts. The rotary is started by an induction motor, and, as indicated above, the service of this substation is derived from a 150-kw compensator in the Hallowell substation.



Maine Electric Railways—Hydro-Electric Power House and Dam at Winslow

Each substation is a brick building with concrete floor and timber supported roof of hard pine, with an extension at the rear for the reception of the high-voltage wires. Lightning arresters and oil switches are installed in a separate compartment at the rear of the substation building, and from the latter place the leads are carried through the wall to the transformer primaries. The transformers are located in the operating room, behind the switchboard, and the rotary in each substation stands in front of the latter, with a clear space at each side of the machine. The lightning arresters are built for

PROPOSED IMPROVEMENTS IN POWER AND ROADWAY

The new line has not as yet been equipped with d.c. feeders to any considerable degree. Two No. 00 and a single No. 0000

feeder divide the distance southward from the Hallowell substation to a point 3 miles south of Gardiner in order to overcome the effects of comparatively heavy grades on the line, which reach a maximum of 4 per cent near Tacoma Lake. From Hallowell a No. 0000 feeder is carried 4 miles toward Winthrop. A grade of 11 per cent is encountered on the old Augusta, Winthrop & Gardiner line near the center of Augusta, but this is near the Hallowell substation, and no feeder is as yet in service for this work. The new line to Mechanics



Maine Electric Railways—Interior of Hydro-Electric Plant at Winslow

Falls, out of Auburn, is equipped with two No. 00 trolleys and a No. 0000 feeder (copper equivalent) of stranded aluminum, carried through to the Mechanics Falls end of the route. At the bottom of the heavy grade in Augusta is a grade crossing with the highway and the Maine Central Railroad. Plans are under way for the elimination of this, the estimated cost being $100,000. The State of Maine is to pay 25 per cent; the city of Augusta and the Lewiston, Augusta & Waterville 15 per cent each, not to exceed $15,000, and the Maine Central the



Maine Electric Railways—Substation at Day's Corner

balance. During the next five years the company plans to spend at least $10,000 per annum on its roadbed. In connection with the new line the company rebuilt the tracks between Gardiner and Augusta, replacing the old 50-lb. rail in service by 70-lb. T-rail, with Weber joints and new ties and ballasting. In Auburn the company has put in about 1½ miles of 9-in. girder rail, section No. 222, Pennsylvania Steel Company, and ¾ mile of this rail in Lewiston.

BRIDGES

The most interesting feature of the company's roadbed work is found in the construction of a new bridge by it for the exclusive use of electric cars across the Kennebec River and about 54 ft. above it between Waterville and Winslow. A drawing of this bridge is shown in an accompanying cut. The bridge is a reinforced concrete structure, designed by D. B. Luten, of the American Bridge Company, Indianapolis. The contractors were Fred T. Ley & Company, Springfield, Mass. The bridge is asserted to be the second longest electric railway bridge in the country the only one surpassing it being over the Maumee River at Waterville, Ohio. The bridge is built in four spans, with a total length of about 580 ft. Its width is 12 ft. It was necessary to design the structure so that the piers of the new bridge should go directly downstream from the granite piers of the old highway bridge, which still is in service beside the location of the new structure. Three spans from 130 ft. to 133 ft. in length were put in, with an 85-ft. span in the middle of the bridge, which makes the structure a trifle unsymmetrical, but in a river subject to ice and log jams, as is the Kennebec, this was considered to be the wisest arrangement. In general, 1-in. transverse steel rods were used for the reinforcement, from 24 ft. to 32 ft. long. The longitudinal reinforcement consists in the main of 1-in. rods placed 6 in. apart on centers and 171 ft. long on the average. The ends of the transverse rods are bent up into spandrels. At the piers the structure is reinforced by diagonal rods of 1-in. steel placed



Maine Electric Railways—Exterior of Day's Corner Substation

6 in. apart on centers, and from 24 ft. to 27 ft. in length. The plans for the bridge were submitted to Prof. George F. Swain and Prof. L. E. Moore, of Boston, before construction was begun, and were approved in detail, with the single suggestion that the longitudinal reinforcement bars be installed on 6-in. centers instead of on 9-in. spacing, as at first planned. The gravel used in the bridge was obtained from a pit owned by the railway company.

At Winslow the company has also built a steel girder bridge of about 30-ft. span over the Maine Central line to avoid a grade crossing. The approach to this bridge is over an incline on a private right-of-way, and the track construction involved several difficult curves at this point. On the rest of the line there are three other steel bridges over small streams or gullies, the maximum span being about 40 ft. The bridges on the line have a car capacity of 70 tons each.

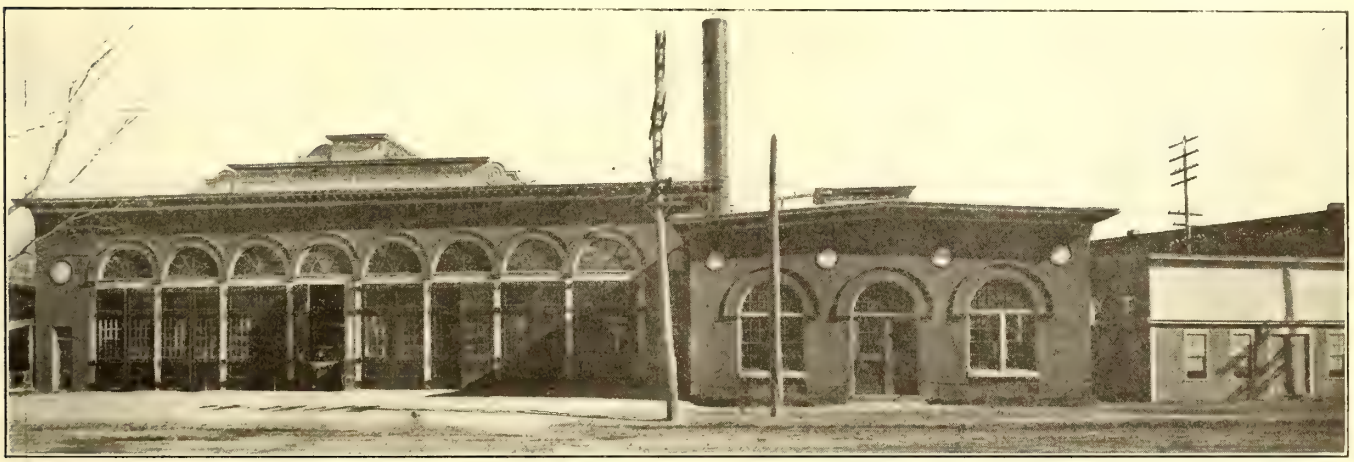
ROLLING STOCK

The company has 114 cars on its entire system. There are 27 closed motor cars, single and double-truck type; 41 open motor cars, single and double-truck; 18 semi-convertible Brill cars, 16 of which have observation platforms; 4 flat cars equipped with automatic air brakes but without motors; 2 flat cars equipped with both air brakes and motors; 5 express motor cars equipped with four GE-202 motors each; 10 snow plows equipped with GE-80 motors and GE-67 motors; 1 parlor car and 6 construction cars. Briggs, Newburyport and Laconia

trucks are used. The GE-67 and GE-80 motors used on the snow plows are transferred to the open cars during the summer season.

The new line between Lewiston and Waterville, 54 miles, requires six cars running on an hourly schedule. These cars are 40 ft. 6 in. long over all and seat 45 passengers. Although of a type used for three years past on the Bath line, they are attracting general attention in the territory through which they operate. At the rear is an observation platform with seats facing the center passageway. The cars are single-ended, and the motorman is provided with a compartment separated from the rest of the car body. Heating is accomplished by hot water under 5 lb. steam pressure. The interiors are finished in natural wood, and the exteriors are painted chrome yellow with red trimmings, the company's standard colors. Pressed-steel wheels 33 in. in diameter are used, and each car is equipped with National air brakes, K-35 control and four GE-202 motors, geared for a maximum speed of 30 m.p.h Without passengers, the cars weigh about 23 tons each. Two smaller cars of the single-truck type are required to maintain a half-hourly intermediate service between Augusta and Gardiner.

The company now has under construction five express cars, two of which will be equipped with four GE-202 motors each, the other three being flat cars for trailer service. The two express motor cars will each be 36 ft. over all, 7 ft. 6 in. wide inside, and fitted with the Westinghouse "A M M" automatic air-brake equipment. The controllers are to be of the K-35 C type. Four sliding doors will be provided on the inside of each car, 6 ft. 3 in. wide and 6 ft. 6 in. high. The sills are to be of hard pine, 10 in. x 10 in. on the sides; the underframing will be of the same material, 6 in. x 10 in., and the bolster of white oak, 10 in. x 10 in. in cross-section. Two trolleys are to be provided, and the roof frames are to be of 2-in. x 4-in. hard pine, with ⅝-in. beaded sheathing. The roof covering is to be of two-ply canvas, and the trucks are to be of the Standard Motor Truck Company's Diamond H pattern, with 33-in. wheels. Three front vestibule windows and two side windows are to be provided at each end. Each locomotive car will weigh about 19 tons light. The company's snow plows are of Wason, Taunton and Russell manufacture, including one rotary outfit. The rolling stock also includes a 2000-gal. sprinkler car equipped with two GE-80 motors, and designed to spray from curb to curb. The flat cars which the company is building are to be equipped with stakes and pockets to enable lumber to be carried.



Maine Electric Railways—Combined Car House, Power House and Rotary Converter Station at Lewiston

MAINTENANCE FACILITIES

The principal repair shop of the road is located in Lewiston, with an auxiliary shop for temporary repairs at Augusta. The Lewiston shops are combined with the substation and auxiliary steam plant mentioned above, and car house storage facilities are also available here. In the car house are four repair tracks and four storage tracks. Pits are provided in each of the repair tracks, and a 3-ton hydraulic jack will shortly be installed to facilitate the replacement of wheels and trucks. The shops are located at the east end of the car house, and there is a Schaffer 125-ton wheel press in the car house proper to expedite the rapid handling of this class of work. Sign painting facilities are also provided in the car house, which is lighted by a central monitor affording an ample supply of daylight illumination for the most careful work. The machine shop occupies an extension of the car house 45 ft. long by 25 ft. wide. It contains the usual lathe, forge and drilling equipment, all driven by a 15-hp motor, supplied with power from the trolley circuit. There are two forges with motor-driven air supply, one shaper and planer, two upright drills, two belt machines, a 20-in. and a 16-in. lathe and a Niles boring machine for wheels. A trip-hammer is also in service in the shop and the home-made crane with a 15-ft. hard pine boom illustrated. The stockroom is 42 ft. x 13 ft., and has a mezzanine floor 25 ft. long. A motor-driven elevator is in service between the machine shop and a small armature room on the floor above.

The company makes its own axles, winds its own coils and manuafctures its own special rolling stock. The woodworking equipment includes a band saw driven by an independent motor and a large number of hand tools. The company is endeavoring to standardize its axles at 4½ in. diameter, with a 4½-in. motor fit, a 5½-in. gear fit and a 5⅝-in. wheel fit. Solid gears and steel-tired wheels are now in its general service. Metal lockers are provided for all shop and car house employees.

The Augusta shop contains a small blacksmith shop, with motor-driven forge blower, a lathe and hand tools. A modern sprinkler system is installed at this point.

Car houses are located at Augusta, Lewiston, Bath (light repairs are also made here), Hallowell, Lisbon Falls and Topsham. The average mileage per car per day is 210 miles in 18 hours. The highest run per car a day is 334 miles.

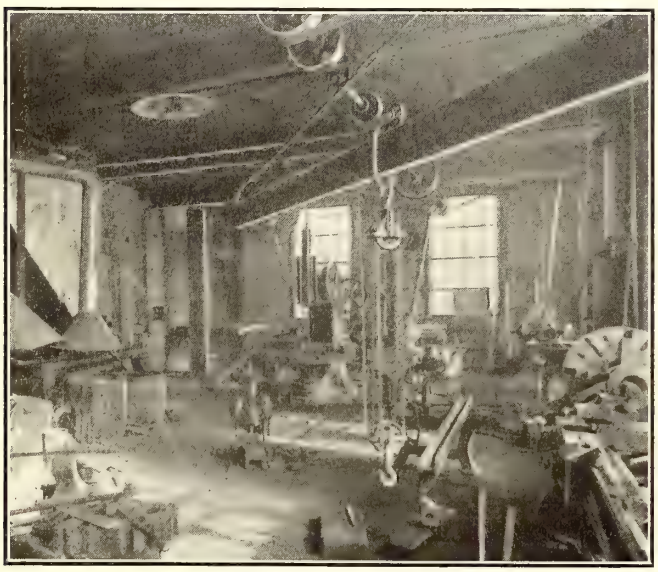
GENERAL

The running time between Lewiston and Waterville is now three hours. The fare is $1, the division being 60 cents from Lewiston to Augusta and 40 cents from Augusta to Waterville. The standard cash fare of the system averages 2 cents per mile. Over the entire system 11 tickets are sold for 50 cents, each ticket being acceptable as single fare by conductors. The company also maintains a half-fare pupil's ticket, applicable to public school children on school days only. Transfers are issued with a limited zone in Auburn, Lewiston, Bath and Augusta. The conductors are instructed to take a passenger's total fare to any point if desired, issuing an indentification check in return.

The company is planning to develop an extensive trolley freight and express business throughout its territory. It is now able to take foreign cars from the Maine Central Railroad and to handle them between the latter and the premises of individuals and organizations located on its lines. Depots will be established for two round trips per day on all

parts of the system. Lumber, cordwood, potatoes, apples and corn are moved in large quantities in this territory at present, but the time of transit by steam lines, the numerous changes necessary and the roundabout mileage cause great delay compared with the average speed which will easily be possible on the electric railway lines. The time of delivery from wholesale and retail establishments in the cities and towns on the system to suburban and rural customers will be greatly shortened, and the company expects to make this class of work one of its most profitable activities.

The company operates several parks on its lines during the summer season. At Lake Grove, in Auburn, a tract of 8 acres is available for pleasure parties, including an open-air theater, skating rink, boating, cottages and fishing privileges. A 5-cent fare applies from Lewiston and Auburn, the distance being 3½ miles. At Merrymeeting Park, between Brunswick and Bath, a theater, lake and casino are available. At Tacoma Inn, 17 miles from Lewiston, there is a chain of five attractive lakes, and a tributary population of 75,000 people within the radius of a 30-cent fare. Other points of attraction are Island Park, in Manchester, the 10-cent fare zone from Augusta, where a theater and hotel are available; Cobbossecontee Lake, China Lake and the National Soldiers' Home at Togus, near Augusta. Effective advertising of these attractions was done last season by the use of posters attached to the seat handles.



Maine Electric Railways—Interior of the Machine Shop at Lewiston

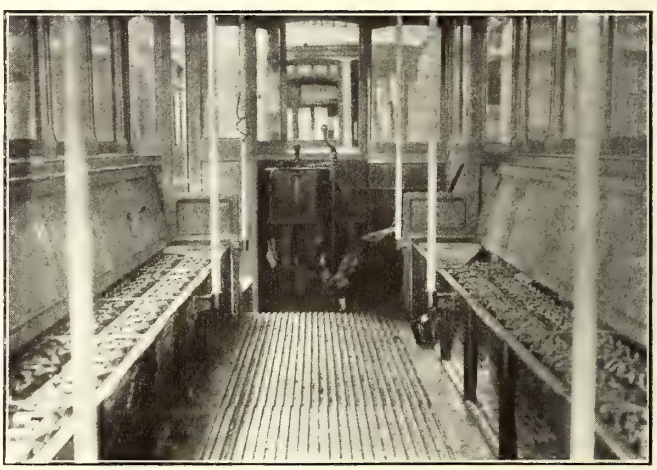
The officers of the company are: President, John R. Graham, Bangor; vice-president, Herbert L. Clarke, Philadelphia; vice-president, Frank Silliman, Jr., Philadelphia; treasurer, D. S. Hahn, Lewiston; general manager, Harry B. Ivers, Lewiston. Directors: Messrs. Graham, Clarke, Silliman, Ivers and John A. Hill, Augusta; Thos. A. Lynch, Augusta, and W. H. Newell, Lewiston. The civil engineer of the line was John A. Jones, Lewiston; the electrical engineer is Walter G. Parker, Lewiston, and the master mechanic, W. J. Ivers, Lewiston. W. G. Bowie is superintendent of transportation of the Lewiston division and L. F. Taylor is superintendent of the Augusta division.

Montevideo, the capital of Uruguay, is now supplied with street railway service by two companies, one called the Transatlantica and the other the Sociedad Comercial. The first system is about 75 miles long, has 160 motor cars and 25 trailers, and has 1028 employees, receiving total annual wages of $350,000. It is capitalized at $2,500,000 and carried 20,000,000 passengers in 1908. The second system operated 215 motor cars and 50 trailers for 6,022,100 car-miles, and carried 25,900,000 passengers. This company is capitalized at $6,000,000, of which $2,000,000 is in stock. Its gross earnings were $1,093,870.

NEW STORAGE BATTERY CAR

During the past week a number of experimental runs has been made in New Jersey with a single truck car equipped with the new Edison nickel-iron storage batteries of the A-4 type described in the Electric Railway Journal of Jan. 22, 1910. These batteries have already been in use for several years in automobile service, but it has only been during the past two years that a car body and truck were developed to secure the maximum advantage from this type of battery. This has been made possible by designing these parts more along the lines of automobile practice than that of street railways.

The car body is 18 ft. long between the posts and has vestibuled platforms at each end 4 ft. long. The width of the car at the sills is 6 ft. 6 in. and at the drip rails 7 ft. 3 in. The underframe is composed of two 3-in. x 6-in. longitudinal ash sills and nine 3-in. x 6-in. ash cross sills. The understructure is firmly bound by steel truss rods on each side. The roof is made of two flat arches each composed of one sheet of three-ply veneer held in place by seven steel-plated carlines, the ends of the roof plating resting on the bulkheads. The outer veneer of the roof has the usual canvas covering. The weight of the roof is only 250 lb. There are no side ventilators in this car, the ventilation being obtained by using adjustable end sash. The hydrogen and oxygen discharged by the batteries are drawn off through perforations under the seats. The car body is furnished with vertical drop sash. There are no body end doors,



Interior of Storage Battery Car, Showing Cells Under Longitudinal Seats

but the vestibules have been completely enclosed instead. Hand rails of white enameled steel are installed as shown to serve in place of straps, to help to carry the roof and to hold the lighting fixtures. It has been found that eight 10-cp 12-volt tungsten lamps are sufficient for satisfactory illumination. All of the lighting wires are run in the steel tubes mentioned so that no lighting fixtures are carried from the extremely light roof.

The car body is mounted on a single four-wheel truck of 6-ft. 6-in. wheelbase. The truck frame is of steel shapes welded at all joints by the oxyacetylene process. The journal housing and all castings are of steel. The bearings are of the ordinary railway type, but were ground with extra care to obtain a longer life by reducing friction. The truck axles are of 2½-in. diameter steel and are divided in the center, a steel aligning sleeve being provided to permit the free rotation of each wheel with respect to its mate, as in automobile designs. It is believed that considerable power will be saved by using this form of axle. The wheels are of steel 28 in. diameter. Telescope steel spring seats as illustrated are provided between the truck and the car body, thereby giving a free upward movement, but confining the side and end swaying to within ⅛ in. This reduction in the side and end movement has also greatly simplified the braking mechanism.

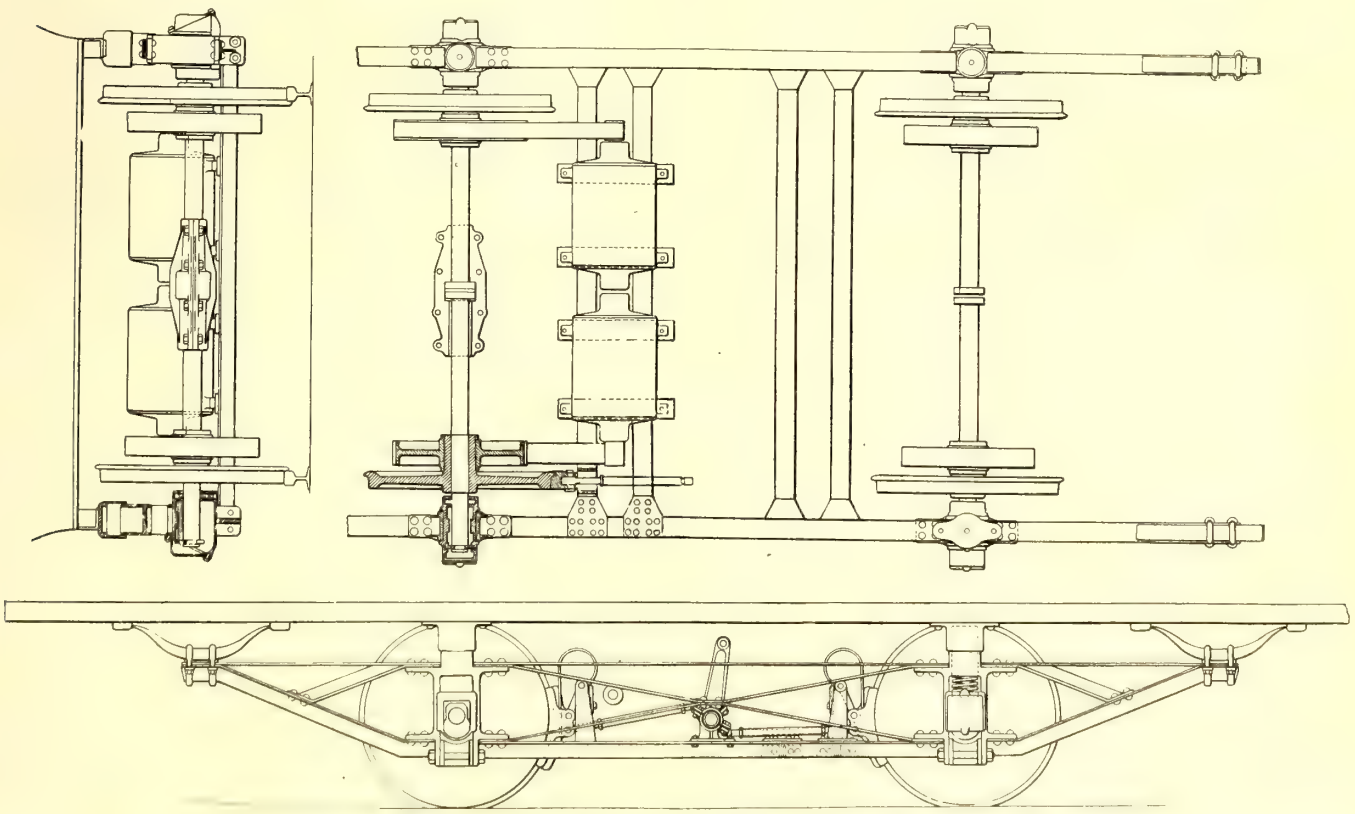
The batteries are placed under the longitudinal seats in a

lattice steel electrically-welded girder frame weighing 153 lb. The frame on each side forms a box for the batteries, a support for the side posts and a firm bracing for the entire car. Each frame is bolted to the adjacent cross sills, side sills, side posts and end bulkheads, and through its connection with the vertical hand rails it helps to carry the roof. It has been found that, as a result of this novel construction, there is only a deflection of .003 in. when the car body carries a load of two tons in the center.



End and Side Views of Storage Battery Car

The storage battery consists of 200 type A-4 cells for traction and 10 cells for lighting. These cells are separately connected when working, but are in series when they are being charged. This arrangement keeps the lights immune from variations in voltage when the car is running. The capacity of the battery is such that it can run the car for 150 miles without recharging. The charging periods may vary as discussed in the article published on page 159 of the ELECTRIC RAILWAY JOURNAL of Jan. 22. The motor equipment now mounted on the truck consists of two 5-hp 110-volt motors of Northern Electric manufacture, capable of attaining a maximum speed of 15 m.p.h. and a scheduled speed of 8 m.p.h. when there is an average of 14 stops per mile. The motors are connected to opposite axles by Renold chains. The accompanying drawing of the truck shows that it can be used to carry four motors driven independently, one for each wheel. The controllers are of the Cutler-Hammer type arranged as follows: First step, batteries in multiple at 50 volts, motors in series; second step, batteries in multiple at 100 volts, motors in series; third step, batteries at 100 volts, motors in multiple. It will be understood that no fixed resistances are used as the voltage is built up through cell combinations. The power consumption of this car when accelerating at 1 m.p.h.p.s. is about 3½ kw and when running about 1½ kw. The weights of the several parts are as follows: Car body, 3500 lb.; truck and electrical equipment, including two motors, 3500 lb.; batteries, 3000 lb. Adding the weight of 26 seated passengers at 150 lb. each, gives the equipment a total weight of 13,900 lb.



Details of Single Truck for Storage Battery Car

The car body truck and equipment were designed by Ralph H. Beach, of the Edison Storage Battery Company, New York. The body was built by J. P. Sjoberg & Company, New York. The wheels and axles were furnished by the Taylor Iron & Steel Works, High Bridge, N. J.

ANNUAL MEETING OF WISCONSIN ELECTRICAL ASSOCIATION

The first annual meeting of the Wisconsin Electrical Association was held on Jan. 19 and 20 at the Pfister Hotel, Milwaukee, Wis. About 200 members and guests were present. The membership of this new association is composed of two classes: Class A members are "companies engaged in the manufacture of electricity for railway, lighting and power use." Class B members are "individuals who are engaged in the electrical business or the sale of electrical appliances." The Class B members pay annual dues of $5 each and an initiation fee of $10.

The first session was opened with a few remarks by Ernest Gonzenbach, president. John S. Allen, secretary and treasurer, read the minutes of the meeting held at Waupaca, Wis., in the spring, at which time the Northwestern Electrical Association and the Wisconsin Electric & Interurban Association were united to form the new Wisconsin Electrical Association.

George B. Wheeler, Chippewa Valley Railway, Light & Power Company, chairman of the membership committee, described a successful campaign for new members which had brought excellent results during the past six months. Care had been taken to appoint as members of the committee those whose homes were scattered throughout the entire State. The territory in the association's field was subdivided systematically, and the names of the non-member companies were apportioned among the members of the committee for careful solicitation.

Mr. Allen next presented the report of the secretary-treasurer, which showed that the new association had wiped out the financial obligations of the constituent associations and had started on a substantial financial basis.

PRESIDENT'S ADDRESS

Ernest Gonzenbach next presented the annual address of the president. An abstract of this address follows:

"That there is and has been an urgent need of an active association to protect the interests of the electrical industry in Wisconsin there can be no doubt. About a year ago an agitation was started by some members of the Northwestern Electrical Association looking toward a consolidation with the newer and younger, as well as more active, Wisconsin Electric & Interurban Railway Association. This consolidation was voted down in open meeting by the Northwestern Electrical Association. It so happened that several of the officers of the Northwestern were also officers of the Wisconsin Electric & Interurban Railway Association. A joint meeting of the two associations was called at Waupaca in June, 1909. The two associations held independent meetings and consolidation plans were discussed in detail. The members present of both associations voted for their adoption. Thereby a new association—the Wisconsin Electrical Association—was formed, and the two old associations were dissolved. This is the first regular meeting of that association.

"There is an enormous amount of work ahead of us. There are operating problems, financial difficulties and political obstacles, all of which are hurdles in the path of success to electric railway and lighting enterprises. It is not the purpose of an association to discuss operating problems only, although they are important and take up the greatest portion of our program. Other problems need attention. I do not recollect ever having heard a discussion at any of our former meetings on such questions as fire, accident and liability insurance, the premium paid and the best means of reducing the premium and getting greater protection. Neither would it be out of place to discuss ways and means of raising the standing of electric lighting and railway securities in the eyes of the investing public, and plans and methods for marketing securities so as to save the middleman's commission are entirely within the range of our sessions.

"To some extent politics enter into our business. Our franchises, unfortunately, are of political origin, and it is a lucky company that can stay out of politics outside the limits of its franchise. Our business is exposed to political leeches, as no other business in the world is. Not only are our franchises full of the pet theories, hobbies and impractical fancies of the original grantors, but prohibitive legislation, punitive ordinances and annihilating laws have been hurled at us so much that it must indeed be a dead one in our ranks who has not yet been aroused to the danger threatening us from political incompetence. Wisconsin has a Railroad Commission which in personnel and organization is superior to any other commission in the United States. If its rulings chafe, the fault is not with the commission, but with the law. The law gives the commission an undue and unjust jurisdiction over affairs into which it is fundamentally beyond the rights of any commission or any law to inquire. The money which is uselessly and foolishly spent for the frills and fancies which are the requirements of the law and the commission could, in most cases, be more advantageously spent for the purpose of adding to the facilities and the services of the company itself. The money which should go into rolling stock and the money which should be used for providing better service has gone for the purpose of street paving, which we do not wear away nor use, and for a thousand and one requirements of Municipal Councils, city administrations, Legislatures, Senates, Tax Commissions and Railroad Commissions, who dictate to us how our business shall be conducted.

"The burdens of taxation with which public service corporations have been overwhelmed of late has been added to by the national Government, for, with the object of hitting the largest corporations, laws have been placed on the statute books which penalize every public service corporation in the country. The extra burden placed upon us is rather small, compared to the other great ills which we must suffer, at least in the case of public service companies in the State of Wisconsin, for if proper allowance is made for depreciation, sinking fund and interest, there are very few of us who will be hard hit, and those who are, are to be congratulated.

"For the good of the association, I recommend that the first vice-president be advanced to the presidency, the second be made first vice-president, and the third, second. This will only leave one office, that of third vice-president, to be filled every year. It will insure that the president's office will always be filled by some one thoroughly acquainted with the policy and work of the association."

INVENTORIES

W. R. McGovern, engineer, Wisconsin Telephone Company, presented a paper descriptive of methods followed in taking accurate inventories of telephone plants in Wisconsin. Work of this nature, he said, was subdivided into a field survey and an office compilation. In determining the value of land, the methods followed by the State Tax Commission were used. The field survey work included a careful count and measurement of the lines, fixtures and plant. The height, size and material of each pole, the number of cross-arms and other fittings and the observed condition of the poles were all recorded on charts, according to the year of installation. The length of all copper wire and cable was measured with a steel tape line. The length of iron wire was found by scaling a chart. All furniture, office fittings and construction and operation supplies were actually counted. After a detailed count and measurement of all property comprised in each local plant as obtained in the field survey had been made the office compilation was carried forward by extending prices according to a set of basic cost units determined after a thorough study. In determining the units of value the element of time was considered carefully. No depreciation was allowed on stores and supplies for current use. In estimating the present value of a plant the scrap value was deducted first, and then after the depreciation had been subtracted from the original value, the scrap value was added to obtain the present value. To cover the depreciation of tools, 2 per cent of their cost value per month of use was subtracted. Mr. McGovern exhibited the schedules of basing costs used in the valuation work.

DEPRECIATION

C. N. Duffy, comptroller, The Milwaukee Electric Railway & Light Company, was called upon to discuss the paper. Mr. Duffy made particular reference to the 3-cent fare case of the city of Milwaukee against The Milwaukee Electric Railway & Light Company. This case was reported in this paper during 1909. In the consideration of such a case the elements of the value of the property and the return on the investment were vital. When the Milwaukee property was valued by the State Tax Commission no recognition of a sinking fund was made, and the value as determined was about 70 per cent of the total capitalization. Mr. Duffy told how the depreciation charge of 10 per cent of the gross earnings was obtained for his company some years ago. John I. Beggs had then just undertaken the administration of the property, which was in very poor financial condition. Estimates showed that a certain sum must necessarily be set aside from the gross earnings if the property was to be kept intact against the inroads of depreciation. It happened that this sum was practically 10 per cent of the gross earnings for the year, and so to provide for each month contributing its just proportion to the depreciation fund, the charges were made on the basis of 10 per cent of the gross earnings.

Mr. Duffy said it was necessary to define maintenance and depreciation in order that the funds set up under these names might be properly handled. The Milwaukee Electric Railway & Light Company, in distinguishing between maintenance and depreciation, considered maintenance charges as those for regular repairs, renewals and replacements. Reconstruction work and extraordinary renewals and replacements were charged against the depreciation fund. Based on inventories of The Milwaukee Electric Railway & Light Company's properties made by the State authorities, and according to his personal judgment, Mr. Duffy held that 10 per cent was not one-half the amount which properly should be set aside for depreciation. His company set aside only 10 per cent of its gross earnings because that was all that could be thus reserved and not unduly work a hardship on the investors.

When questioned why the depreciation reserve was set aside according to a percentage of gross earnings rather than capitalization, Mr. Duffy said that the scientific determination of the depreciation of a property would necessarily include a consideration of age, effect of the elements, wear, conditions of use, obsolescence, inadequacy, public requirements and other factors. However, the problem must be handled practically, rather than theoretically, and Mr. Duffy did not believe it possible for a public utility company to be able to measure with utmost accuracy the rate at which the value of the property was disappearing while it was being used. Another argument for taking care of depreciation out of earnings was that of simplification of accounts, so that each could specifically represent a certain factor of the problem. Moreover, a close relationship existed in two ways between gross earnings and depreciation; an increase in gross earnings naturally would call for a greater use of the property, and this use increased the wear and tear. Again, the only money available for maintenance, operation and the settling up of funds had to come from the gross earnings.

Mr. Duffy spoke of the present electric railway situation in Detroit. In 1899 men of high personal and technical standing employed by the city of Detroit had valued the street railway property at $14,000,000. Now, 10 years later, the same railway had just been revalued for franchise purposes by a commission made up of men of high standing and broad experience. The total value as now given was less than $12,000,000, and although the franchise value was not considered in the last appraisal, the management of the road had shown that $6,000,000 worth of property had been added in the intervening 10 years. Thus from a value of $20,000,000, $8,000,000 had disappeared, and Mr. Duffy said that the public owed this difference to the company in the consideration of the present Detroit situation. Speaking of depreciation funds in general, Mr. Duffy held that it mattered little just what means was used in setting aside the fund, so long as this was done. The detail methods of handling could largely be placed at the discretion of the management.

T. Commerford Martin, executive secretary, National Electric Light Association, who was an invited guest at the convention, said that the association which he represented was considering the matter of depreciation as it affected electric light plants, but that those representatives of the association who had the matter under advisement felt that the National Electric Light Association should not undertake the definition and recommendation of depreciation and depreciation funds alone. Therefore, joint committees of this and other national associations, including the American Street & Interurban Railway Association, had or would shortly be appointed to act jointly with a view to the determination of some satisfactory solution of the depreciation question, and particularly as it might be considered in regard to its bearing on the corporation tax.

W. H. Winslow, Superior Water, Light & Power Company, said that the company which he represented made a depreciation charge which amounted to 16.66 per cent of the gross revenue of its lighting property.

ELECTRIC RAILWAY FARES

Papers of interest to electric lighting men were presented at the afternoon session of the first day, as follows:

"Electric Automobiles," by O. M. Rau, electrical superintendent, The Milwaukee Electric Railway & Light Company; "Handling Complaints and Enforcing Discount Dates," W. R. Putnam, superintendent, Menominee-Marinette Light & Traction Company. Following a discussion of electric lighting subjects, J. P. Pulliam, manager railway department, Wisconsin Electric Railway Company, read a paper on "Electric Railway Fares." This paper is presented on page 195.

In introducing the discussion of his subject, Mr. Pulliam said that according to the law of the State which established the Railway Commission as a regulator of service, a railway could make new rates and put them into effect 30 days after the commission had been notified, provided no objections were made by patrons of the road within that time. If the objections were presented later, a hearing was held by the commission. When no objections were made during the 30-day period the rates went into effect without the formal approval of the commission. The rate situation and the reasons for increasing the rates on the Wisconsin Electric Railway were set forth in the ELECTRIC RAILWAY JOURNAL, Jan. 8, 1910, page 87.

The sale of reduced rate tickets on one of the city lines of this property was discontinued. Normally, about $40 a day had been received for these tickets, but on the day preceding the withdrawal of the sale of the tickets $1,500 worth were sold. Contrary to the wishes of residents of a rural district served by one interurban line of the Wisconsin Electric Railway Company, the fares had been increased. It was shown that on this line, which was thought to be typical of many interurbans, 70 per cent of the business was between the cities, the farmers at the way stations contributing but 30 per cent of the receipts.

COMPLIMENTARY SMOKER

The manufacturers' representatives attending the annual convention of the Wisconsin Electrical Association tendered a complimentary smoker to the representatives of the railway and lighting properties. An especially interesting program, including a number of excellent professional vaudeville acts, was followed by a Dutch supper and singing. The exhibitors' committee which had this entertainment in charge was H. P. Andrae, chairman, Julius Andrae & Sons Company, Milwaukee; W. R. Pinckard, Westinghouse Electric & Manufacturing Company, and F. G. Bolles, Allis-Chalmers Company. C. N. Duffy, comptroller, The Milwaukee Electric Railway & Light Company, made an interesting speech, fittingly expressing the appreciation of the guests.

SECOND DAY SESSIONS

W. H. Winslow, secretary, Superior Water, Light & Power Company, presented a discussion of "Profit Sharing by Public Service Corporations" during an executive session. In the

open sessions a paper on "Cooking and Heating by Electricity" was read by W. B. Voth, general superintendent, Sheboygan Light, Power & Railway Company. Following the discussion of this paper Mr. Martin spoke of the work of the National Electric Light Association in furthering the interests of its members. The association now has a membership of 4500, of which 1200 members have been gained in the last three months. It is quite probable that the next annual convention of the National Electric Light Association will be held in St. Louis in May. Mr. Martin emphasized the possibility of the great mutual good which was to be had by co-operation between the national bodies and the State associations. He called attention to the policy of the American Street & Interurban Railway Association in inviting the co-operation of State and district electric railway associations.

WHEELS AND AXLES

A general discussion on wheels and axles was introduced by Mr. Gonzenbach, who told of the desirability of good specifications for these important parts of a railway equipment.

E. W. Olds, superintendent of rolling stock, The Milwaukee Electric Railway & Light Company, recalled interesting steps in the history of the standardization of equipment on the Milwaukee properties. When Mr. Olds became connected with the property, 14 years ago, 17 different kinds of trucks and even a greater variety of axles were in use. The wheel treads were 1¾ in. wide and the flanges 9/16 in. high by ¾ in. thick. Now there is one standard axle each for city, suburban and interurban work, and the wheel treads are 2¾ in. wide with flanges ⅞ in. high and 1 3/16 in. thick. Mr. Olds spoke of the standards of the American Street & Interurban Railway Engineering Association and the specifications which that body had and was recommending. His company used the standard axles and journals of the association for all new city equipments.

Regarding the life of axles, experience had shown that a 4-in. axle in city service had a life of about three years. After that period it was doubtful whether or not crystallization and its resultant cracks had not taken place next to the gear fit. Since the Milwaukee property introduced hammered steel axles four years ago not one had broken, and thus this step in standardization had greatly reduced maintenance costs.

Mr. Olds spoke of the growing use of steel wheels for city as well as interurban cars. Rolled steel wheels on interurban cars of The Milwaukee Electric Railway & Light Company had given an average life of 160,000 miles to date, and should be available for an additional service of 50,000 miles. One reason why some small city railways had not yet begun to use steel wheels was because of a lack of facilities for re-turning the treads. To a considerable extent the need for a wheel-turning lathe could be obviated by the use of wheel-truing brake shoes. It was, of course, necessary for the wheel inspector to watch closely the treads and flanges. In inspecting a pair of wheels, one of which had a thin and the other a thick flange, it would be found that the diameter of the wheel with the thin flange would be smaller than that of the thick flange. Then if a wheel-truing brake shoe was put on the larger wheel, the diameter of that wheel and the excess metal in the flange would be reduced so that the tendency for wedging the other wheel, with the thin flange, against the rail would disappear, and the unbalanced wear be reversed.

Mr. Olds laid especial emphasis on the desirability of designing cars and car parts with careful regard to saving weight. Various companies had estimated the power cost for hauling 100 lb. of weight at from $3 to $7 per year. So if cast-iron wheels to be safe must weigh approximately 100 lb. more than steel wheels, their use on an eight-wheel car might bring about an extra power cost of $24 per year per car. Any saving in weight consistent with strength would make available for maintenance a recognizable sum.

W. H. Evans, assistant superintendent of rolling stock, in charge of new shop construction and building, The Milwaukee Electric Railway & Light Company, was introduced as the former chairman of the standardization committee of the American Street & Interurban Railway Engineering Association. Mr. Evans spoke of the need for adopting the standards now recommended by the national association, and consistently following them. He also called attention to past experience with wheels and axles. For several years the car axle was a source of trouble, due largely to the lack of appreciation of the stresses put on the wheel by the load of the car body and the transmission of the torque from the motor to the wheel. Such stresses were highest in the axle at the inner end of the hub close to the gear fit. The new engineering association standards recognized this concentration of stresses by specifying an axle with large wheel and gear fits. The engineering association had appointed a committee to study the heat treatment of steel axles, and it was expected that very good results would be obtained by including heat treatment in the process of axle manufacture. Standardization of car parts was especially desirable on the score of reducing repair stocks and prices.

Mr. Evans called particular attention to the standards of the national association as representing the combined efforts of railway and manufacturing companies. He pointed out that the present recommended standards were chosen only after full discussion by many representatives of all parties interested, and that these discussions had extended over a period of several years. The adoption of the wheel and axle standards should greatly reduce the cost of maintenance.

Mr. Gonzenbach emphasized the need and value for standardization on small roads. He spoke also of the need for reduction in car weights. His company was operating interurban cars with 40-hp motors under service conditions which were the same as those on many roads using 70-hp motors. This practice gave a reduction of weight at the sacrifice of some motor and field coils. The net result, however, was a considerable saving in operating costs.

Dudley Montgomery, vice-president and superintendent, Southern Wisconsin Railway Company, inquired for a good method by which flaws in axles could be detected. Mr. Olds said that it was hardly possible to find a crystallized or cracked axle until it had been removed from the trucks. In Milwaukee the axle after removal was wiped clean, and a flaw might be noted by the dirt remaining in a crack after the axle had stood for a minute; a line of black grease would ooze out of the crack, and this could be found with a magnifying glass, if not with the naked eye. Should there be any doubt, the axle would be hung up and given several blows to cause it to vibrate. This would force grease out of the crack, and thus indicate the location of the cracks. Defects of this kind were usually found in defective axles near the keyway or shoulder. The men had instructions not to use an axle if there was the least doubt about its being perfect.

Speaking on the reduction of car weights, Mr. Olds said that street railway passenger cars varied in weight from 1400 lb. per passenger down to 800 lb. and less per passenger. In scaling weights the safety of the passenger could not be forgotten, because of the duty which the railway owed to the public. Collisions were inevitable, and a car should be designed so that it could withstand bumping stresses. The new city cars in Chicago had seats for 44 passengers, and ranged in weight from 52,000 lb. to 54,000 lb. The Milwaukee city cars of the same seating capacity weighed between 40,000 lb. and 41,000 lb. It was recognized that the design of prepayment cars reduced the seating capacity slightly, and thus increased the dead weight per seated passenger. The most recent design of passenger car for the Milwaukee company was built with a steel floor framing which extended up to the window sill. It was thought that this design gave maximum strength with minimum weight. New cars of this type were 50 ft. long, seated 50 passengers and weighed 48,000 lb. The windows were arranged to raise straight up, and thus the walls could be reduced greatly in thickness, permitting increased length of seats and wider aisles. The over-all width of the cars was 8 ft., and the walls were only 1¾ in. thick. Drop windows would require that the walls be made 5 in. or 6 in. thick. Therefore, an effective additional width of car interior of about 8 in. was gained.

Mr. Olds, to illustrate the strength of a car of this design with its steel bottom, told of a collision of one of the new cars with a steam locomotive, which had occurred in a driving snowstorm. The bumper of the car met the locomotive squarely, and, of course, the vestibule was slightly crushed, but it was of great interest to learn that the body was totally uninjured, and that not even a single side window or transom had been broken.

Referring to defective axles, Mr. Evans said that if the shop department of a railway would cut off the fractured part of each broken axle for saving, and keep a record of the number of the car and the time of service, there would result a collection the inspection of which should make possible improvements that would greatly reduce axle trouble.

Mr. Olds said, when questioned, that there was no doubt but a cold axle would break under much less strain than it would when at blood heat. A crack in an axle often could be found if the clean surface about the suspected location were covered with white lead; then the grease in a possible crack would define a clear line.

E. F. Berger, Midvale Steel Company, Chicago, presented data regarding the qualifications of heat-treated steel axles made according to the specifications of the Interborough Rapid Transit Company.

INDETERMINATE PERMITS

The afternoon session of the last day was devoted to a discussion of the indeterminate permit which a company under the public utility law of Wisconsin may accept in lieu of its existing franchise. Several companies had given up their franchises for indeterminate permits. One member, whose company had surrendered its franchise, had been advised to do so by its attorneys, who were financially interested in the company, and it was also this member's personal opinion that the acceptance of the indeterminate permit was advantageous to the company. When operating under the permit competition was prohibited so long as the public utility was satisfying the needs of the public. The association members generally held that if the Supreme Court should declare the indeterminate permit to be unconstitutional, then the old franchise terms would automatically come into effect again.

George B. Wheeler, Eau Claire, called attention to several reasons why it was good policy to accept an indeterminate permit. One was that thereby the public service company would show its good faith to the community and a law-abiding attitude to the State and city. Mr. Wheeler held the opinion that the State never would retrograde by repealing the public utilities act and withdrawing the indeterminate permit feature.

E. R. Bowler, attorney, Sheboygan, Wis., thought that no company would be the loser by accepting an indeterminate permit. Later, if the indeterminate permit should be declared unconstitutional, and if the courts did not give back to the company its rights according to the original franchise, then the Legislature of the State would take a hand and force the municipality to return these rights. The acceptance of the indeterminate permit and its preclusion of municipal competition largely eliminated political wire pulling.

Clement C. Smith, president, Wisconsin Electric Railway Company, expressed doubt as to how the franchise valuation would be considered by the Railroad Commission, and whether a railroad operating under an indeterminate permit would be permitted to earn a fair rate on its total value, including franchise value, or only on the physical property. He held that the losses due to obsolescence should be recognized. All public utilities in Wisconsin should carefully consider the indeterminate permit, bearing in mind that the real value of a property on which it should be permitted to earn a reasonable rate should include its just, tangible assets.

Mr. Bowler thought that possibly any part of a property which could not be appraised might not be recognized in determining the price for purchase by a municipality.

Mr. Duffy recalled that in the 3-cent fare case earlier mentioned, the attorney of the city of Milwaukee, arguing in favor of the indeterminate permit, held that the building up of an amortization reserve should not be charged against the cost of service. Nevertheless, Mr. Duffy said that the classification of accounts promulgated by the Wisconsin Railroad Commission actually included an amortization fund account.

Mr. Winslow quoted from the public utility law a statement that if a municipality should take over a public service property operating under an indeterminate permit that company should receive "just compensation." This phrase had been inserted because, according to a decision of the United States Supreme Court, it had a definite legal meaning, which was that it included all elements of value that existed.

Mr. Wheeler said that the public utility law was the hardest blow ever given municipal ownership in the State of Wisconsin. Before the law was passed a public utility corporation had little protection from municipal competition or purchase. The law was a step toward State regulation as a substitute for municipal ownership. It was a wise law for both the communities and the companies, because it stopped needless competition. "Regulation" was now on trial in Wisconsin. The session closed with a general discussion of various interpretations of the public utility law of Wisconsin.

NEW OFFICERS

The following officers were elected for the ensuing year: President, Clement C. Smith, Milwaukee, president, Wisconsin Electric Railway; first vice-president, George B. Wheeler, Eau Claire, secretary and general manager, Chippewa Valley Railway, Light & Power Company; second vice-president, Irving P. Lord, Waupaca, president, Waupaca Electric Railway & Light Company; third vice-president, W. H. Winslow, Superior, secretary, Superior Water, Light & Power Company; secretary and treasurer, John S. Allen, Lake Geneva Electric Light Company.

ANNUAL BANQUET

The annual banquet of the Wisconsin Electrical Association was held on Jan. 20. C. N. Duffy officiated as toastmaster, calling upon several members of the association for short remarks in advance of the speaker of the evening. Harold Almert, engineer of examinations, H. M. Byllesby & Company, Chicago, in his remarks called attention to the necessity on the part of the smaller roads for recognition and more complete knowledge of the difference between "apparent" profits and "real" profits. George B. Wheeler set forth the reasons which justified the organization of the association. Briefly, these were the need for co-operation, protection, association and uniformity of rates, wages and methods of doing business. T. Commerford Martin spoke of the growth of the electrical industry, and complimented the new association upon the evidences of its substantiality. John I. Beggs, president, The Milwaukee Electric Railway & Light Company, called the attention of the operators of the smaller properties to their responsibilities. He spoke a word of caution regarding existing low rates. It was the duty of the administrator of each property, large or small, to give the public the best service practicable. Each operator should seriously study the conditions surrounding his property, so that he could best assure the public of good service and the stockholders just returns on an undiminished investment.

Shailer Mathews, dean of the divinity school, University of Chicago, and editor of *The World To-day*, was the speaker of the evening. His subject was "The Remaking of Public Opinion." Public opinion was held by Mr. Mathews to be the most potent element of all undertakings. Public opinion induced and controlled all important action. At the present time, the speaker said, the dynamic attitude of mind (public opinion) was going through a most remarkable change. It was not a static force. The process of remaking public opinion so that out of a community there should come effects for the good of that community was a great problem, and one in which each member of the community should take an important part. The chief molders of public opinion were held to be the press, the theater, the school and the pulpit. It was most wise for any public utility corporation to insist that its local press did not misrepresent actual conditions. This could be done in an honorable way.

GENERAL MANAGER'S OFFICE CAR OF THE ILLINOIS TRACTION SYSTEM

A well-designed and completely equipped office car has been built by the American Car & Foundry Company for H. E. Chubbuck, general manager of the Illinois Traction System. Illustrations are presented showing the floor plan and interior and exterior appearance of this car. The general manager of the Illinois Traction System, in addition to his duties as the head of an interurban railway system extending over a territory 225 miles long with an extreme width of 90 miles, also is responsible for the operation of 30 public service utilities located in cities reached by the interurban lines. The manager's office of the system is at Peoria, the transportation and traffic department office is at Springfield and the engineering office at Decatur. New work is in progress at many points along the road, the largest projects being the erection of a bridge across the Mississippi River leading into St. Louis and a 28,000-hp power station in Venice at the eastern end of this bridge. These require frequent visits and if the regular interurban cars were used by the general manager it would necessitate the sacrifice of much time while traveling.

The new car here described furnishes comfortable traveling accommodations for the general manager of the Illinois Traction System and his secretary, and for any officials of the road or business acquaintances which the general manager may desire to have accompany him. A large amount of the general manager's office work is done in this car while he is traveling over the lines to keep appointments in different cities. It is in use day and night for an average of five days each week. Comfortable sleeping accommodations are provided so that the passengers may stay late into the evening at one point and be carried while asleep to any point on the interurban lines in time for business in the morning. A completely equipped kitchen is a feature of the car.

One of the accompanying illustrations shows the attractive exterior appearance of the car body. This view was taken while the car was mounted on freight trucks ready for shipment. The body is 62 ft. long over all and 8 ft. 6 in. wide. It is mounted on two heavy M.C.B. type trucks built by the American Car & Foundry Company. These trucks carry four GE-205 commutating pole motors having type M control. Westinghouse automatic air-brake equipment is used. The motors are geared for a speed of 60 m.p.h.

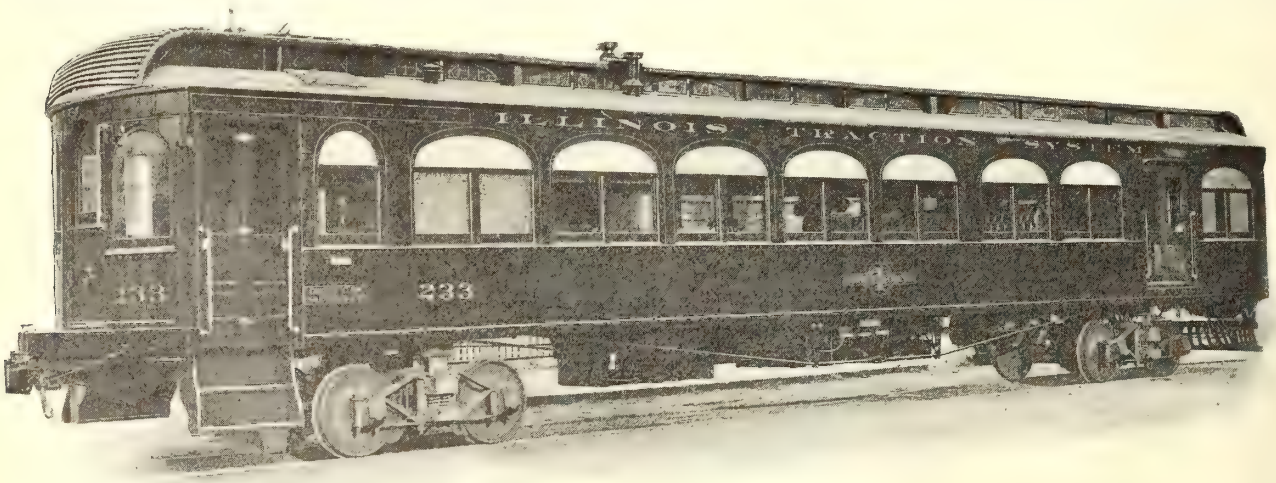
The subdivision and arrangement of the interior fittings of the car were carefully planned. It is subdivided into three main compartments; a forward observation end about 17 ft. long; a middle section, used as an office and dining room, 36 ft. long, at the rear of which are the kitchen and toilet room; and the rear observation platform 7 ft. long. Sleeping accommodations are provided for seven people as follows: One 6-ft. 1-in. pull-out sofa at the forward end which forms a lower berth; four pull-out seats which form four lower berths near the center of the car; a second pull-out sofa to form a lower berth in the center compartment just forward of the kitchen, and a pull-out seat on the enclosed rear platform to form a full-sized berth for the porter. In the daytime all of these berths are converted into heavily cushioned leather-covered seats.

The furniture in the car is upholstered in green Spanish leather. Each of the pull-out berths when closed in the daytime resembles a Pullman seat. At night the seat cushion is pulled forward and the two upholstered back cushions pulled down into a horizontal position, making a berth with deep springs. Hair mattresses are provided for each berth. By means of an ingenious arrangement of silk-covered cords, which are stretched between the deck rails at night and removed in the daytime, green silk curtains are hung to completely enclose each berth. Bedding similar to that used in regular Pullman service, but marked with the special monogram of the Illinois Traction System, is provided for each berth. The interior trim of the car and the movable furniture, such as the dining-room table and smaller side tables, are of Honduras mahogany.

The only entrance to the car for passengers is by way of the

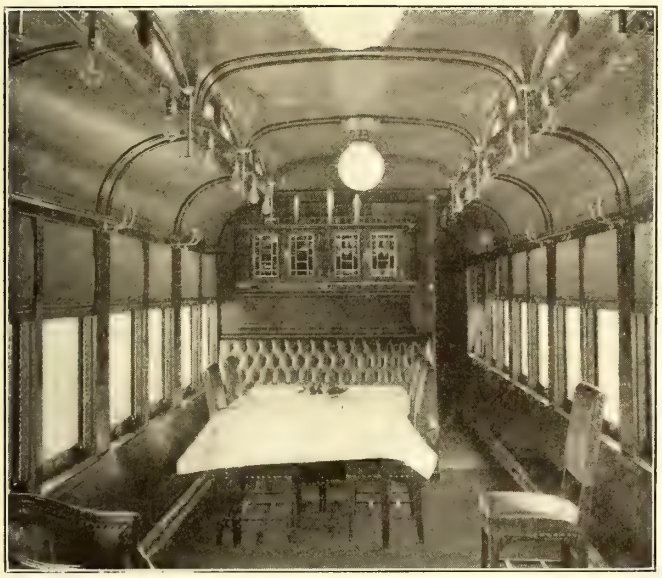


Illinois Traction System Office Car—Looking from Forward Compartment toward Dining Room



Illinois Traction System Office Car—Exterior View

rear platform. Doors are provided on either side and each step opening normally is covered with an Edwards trap door. A rear-end vestibule door covered with sheet steel will facilitate passage between this car and a private car now in course of construction, whenever it may be desired to operate the two cars as a train. With the rear doors closed the rear observation platform makes a comfortable sleeping room for the colored porter. The car is heated by a No. 2 Peter Smith hot-water heater installed on the rear platform opposite the porter's

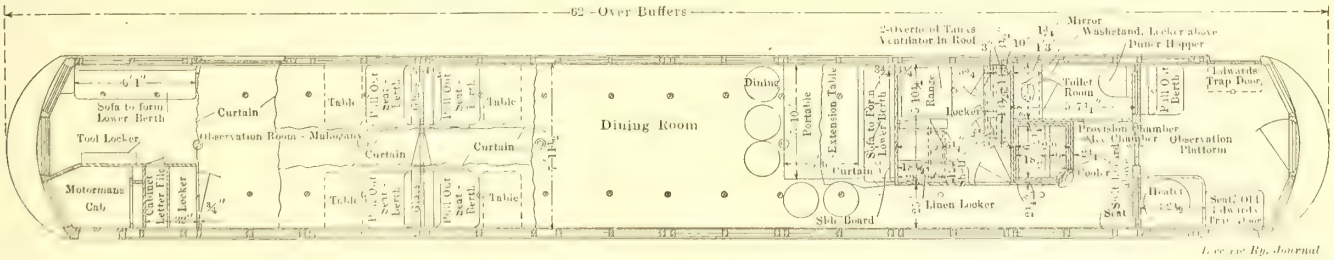


Illinois Traction System Office Car—Middle Section, Looking Toward Kitchen

berth and enclosed in a steel-lined compartment. When the door of the compartment is open sufficient heat is radiated to warm comfortably the rear platform space.

A door from the rear platform leads to a corridor extending past the toilet room and kitchen. This arrangement of toilet room and kitchen is very satisfactory because the odors are all at the rear of the car. The toilet room is 2 ft. 6 in. wide by 5 ft. 7 in. long and is fully equipped with standard Pullman fixtures, including a Duner hopper. The washstand is heavily nickel plated. Above the washstand a plate-glass mirror fills the end of the toilet room and underneath the washstand a large locker is provided for soiled linen.

The kitchen is next to the toilet room and occupies a space 5 ft. 6¼ in. x 5 ft. 10½ in. The interior equipment includes a coal range with a coal box underneath, a charcoal broiler mounted above the range, a warming oven, a sink and a complete installation of drawers and lockers for dishes and food supplies. The sink is made of nickel-plated metal and the space



Illinois Traction System Office Car—Floor Plan, Showing the Locations of the Observation Room, Sleeping and Working Quarters, Dining-Room, Lockers, Etc.

underneath is occupied by lockers and drawers and a special small icebox for butter and milk. The main icebox is subdivided into an ice chamber, 9 in. x 36 in., and a provision chamber, 18 in. x 36 in. This provision chamber may be reached through a door opening into the kitchen. An icebox door, opening directly in line with and but 3 ft. away from the rear door of the car body, facilitates the handling of ice and provisions into the car without entering the main body of the car. A drinking-water cooler is located in a corner of the main ice chest. Supported in the clerestory above the kitchen are two 40-gal. tanks in which water for kitchen use is carried.

A corridor alongside the kitchen, 25 in. wide, leads from the rear observation platform to the dining room or main compartment of the car. Office work is carried on in the middle compartment. The dining table is of ample size to seat eight persons at mealtime and to serve for office use at other times. An ornamental china closet for glassware and dishes is built over the end sofa at the rear of the dining room.

The partition between the dining room and forward observation room is filled with clear glass and a center double-swing door. Curtains are provided on both sides of the glass in this partition so that each of the sleeping compartments may be made private. The sofa at the forward end of the observation room is built along the side wall from where a clear view ahead of the car is obtained. The motorman is entirely enclosed in a compartment at the left forward end of the observation room. A creep door is provided between the cab and the interior of the car body, but this need be used only in emergency, because the motorman at the front end and the conductor at the rear of the car may converse through a speaking tube. The motorman's cab also has an outside door.

In the forward section at the rear of the motorman's cab is a cabinet and set of drawers subdivided for the use of the secretary who accompanies the general manager on the car and handles the correspondence. This cabinet includes three vertical letter files and cupboards for office supplies. At the rear of the cabinet is a locker in which the mattresses for the seven berths are hung during the daytime. Above the mattress locker and the cabinet is a compartment used for storing bed linen.

On a large mahogany panel in full view from the central part of the car is a number of indicating instruments. These include a warmer speedometer made especially for this car, direct reading ammeter, voltmeter and air gages to indicate the train line, storage and auxiliary air tank pressures. An annunciator system includes push buttons at every second window post and an indicator box in the kitchen. General illumination of the car is by four enclosed arc lamps with opalescent globes, and local illumination is supplied by tungsten lamps mounted underneath the deck rail on 3-ft. centers in the forward portion of the car, and spaced about the rear of the car to suit local needs. The lighting switches are located in a panel box above the corner seat at the rear of the corridor leading to the kitchen. To provide against intending passengers mistaking the office car for a regular passenger car special signs exhibiting the words "Office Car, No Passengers" were placed at each corner. These signs have special illumination.

Practically all of the features included in this car have been especially designed for the purpose. In building the car no attempt was made at ornamentation, but every detail was designed with a view to providing a substantial working equipment which could do service throughout the entire year and always be presentable for the use of the management in transacting regular daily business or in showing committees or special parties over the road. The car was built under the supervision of J. M. Bosenbury, superintendent of motive power and equipment, and acknowledgment is made to H. E. Chubbuck, general manager, for courtesies extended in preparing this description.

CENTRAL ELECTRIC TRAFFIC ASSOCIATION WORK

At the annual meeting of the Central Electric Traffic Association at Columbus, Ohio, on Jan. 26, A. L. Neereamer, the chairman, submitted his report for the year ended Dec. 31, 1909. Mr. Neereamer said in part:

"At the annual meeting held in Indianapolis on Jan. 27, 1909, the work of this association for the preceding year was canvassed and as full a report as could be made was submitted. The Traffic Association is now about able to stand on its merits and its past history can be likened to that of a young child, who first crawls before it can walk. After it is put upon its feet it needs the support of a strong hand to keep it there and guide it. The association is now upon its feet, but it needs the support of many strong hands to assist it in walking alone. From the outlook at present, it will be able to stand upon its own feet and, if the interest during the coming year is as great as that displayed in the past, it will be the helping hand that will make the future an assured success.

"During the past year the tariff covering the interchangeable 1000-mile ticket has been revised, including more lines and making some changes in the exceptions.

"A uniform baggage tariff complying with the laws of Indiana, which are different from those of the other States, as well as the regulations of the other States, has been compiled and is now effective. This tariff, which contains a great many rules governing the transportation of baggage, has eliminated many of the difficulties of our members in the transportation of that commodity and in some cases has placed them in a position to interchange passenger traffic with steam lines.

"Uniform and official forms of tickets and baggage checks have been adopted by the association and are now used by many of its members. These forms have simplified the checking of train earnings and agents' accounts in the various accounting departments and the handling of passengers by conductors. But the year's greatest work has been the publication of Joint Passenger Tariff No. 3, Interstate Commerce Commission No. 4. So far as the chairman has been able to learn, this is not only the largest publication of its kind in the country, but the only territorial joint passenger tariff published by interurban lines. Criticisms and compliments on this publication have been received, not only from interurban men, but from steam railroad men all over the country. By its use the work of the agent and accounting department has been made easier. The traveling public has been able to secure more reliable information as to rates and routing than it has had heretofore. You who have been engaged in the work of compiling and checking this publication need no further comment on the volume of labor which was necessary to put this before the public. The rates between the important points quoted in this tariff have been equitably apportioned between the lines interested, thus enabling early and satisfactory settlement of interline passenger accounts.

"Arrangements have been made with a paper manufacturer to make a special safety paper bearing the water-mark of this association to be used on stock for tickets ordered by our members. This will give the member lines a mark of distinction in this, the pioneer electric traffic association of this country, for not only is this the only electric traffic association in the United States, but it is the first time that any organization of electric lines has been considered of enough importance to interest a manufacturer in making a special paper for it. This paper will be available on Feb. 15. The work, however, is not yet completed. There is still considerable to be done in the territory for the benefit of interurban lines and the chairman will only dwell on two or three matters which he considers are the most important.

"The first is the milk traffic. This may appear to be a small item, yet on some of the interurban lines it is the basis of considerable revenue. The rules, regulations and rates governing the transportation of milk are in the same condition that those governing the transportation of baggage were one year ago; that is, no two roads have the same mode of handling this commodity. The chairman has been requested by several members to bring this matter up and, if possible, have a uniform basis and rules adopted. A number of steam lines are willing to place their tariffs on milk on the same basis as any uniform tariff adopted by this association.

"The freight traffic is another proposition that deserves a great deal more consideration in the future than it has received in the past and the publication of joint freight tariffs, minimum sheets, etc., will greatly assist in increasing the revenue derived from the transportation of freight on member lines. This class of traffic is increasing from day to day and has passed the experimental stage and has become a staple stock in trade. It is no small item when it is to be considered that on some of the lines in this territory the freight earnings are about 30 per cent of the gross receipts. There is also a demand for joint tariffs covering excursion and party rates, which would enable your solicitors to contract for long-distance trips. The chairman thinks that during the coming year the subjects mentioned particularly should be given considerable attention.

"In conclusion, I desire to thank the members of the association for the hearty support and co-operation which I have received in endeavoring to carry out your desires and orders. Without this support the work of the past year would have been in vain and nothing would have been accomplished, but as it is, your association now stands first and foremost in the interurban field, the pioneer electric traffic association, for other organizations are now preparing to follow your example."

REPORT OF SECRETARY NEEREAMER TO CENTRAL ELECTRIC RAILWAY ASSOCIATION

The annual report of A. L. Neereamer, secretary and treasurer of the Central Electric Railway Association, was presented at the annual meeting at Columbus, Ohio, on Jan. 27. Mr. Neereamer said in part:

"The year just ended has been the most prosperous one during the existence of the association. The railroad membership now consists of 47 lines, representing a total mileage of 3531 miles, an increase of 4 lines and 130 miles over the preceding year. There is a membership of 88 in the supply men's department, an increase of 18 over the same period of last year.

"The association is now upon a practically sound basis, and can be operated, if economy is practised, successfully. A great deal of credit for the present financial condition is due to the untiring efforts of the vigilance and membership committee, as well as to the hearty support in securing additional membership that was given by the management of several member companies. There are still a great many lines in the territory covered by this association and possibly would if the lines connecting with them would assist the secretary in endeavoring to bring them into the fold.

"That this association is doing good work is beyond any doubt. No further explanation on this subject could be made than the calling of your attention to the fact that letters are received from lines and other associations in this country, located at various places from the Pacific to the Atlantic, and from the Gulf to the Lakes, asking for information and advice. It is evident from this that we now have a national reputation and are becoming a factor in interurban work.

"The investigations and reports made by the various committees have been of great value to our members, and those which have been made public have started our friends in other territories to thinking about and working out the same problems. It appears to your secretary, after looking over the situation, that the old catchline used by some commercial advertisers, 'We lead, others follow,' is very appropriate to this association.

"There is still a great deal of work which could be done for the benefit of our members; different problems to be investigated and worked out, and what benefits one line usually benefits all in this respect. In conclusion, I wish to thank the members of this association, both railroad and supply men, for the support they have given me in carrying out my duties and to give them credit for their share in this most successful year."

EXPERIMENT OF LIMITING NUMBER OF PASSENGERS ON CARS, ABANDONED IN ALBANY

After an experiment of over nine months, the New York Public Service Commission, Second District, has rescinded its rule requiring the United Traction Company of Albany to limit the number of passengers carried on each car on the Pine Hills line. The withdrawal of the rule followed a public hearing on Jan. 12, at which citizens urged the withdrawal of the restrictions against loading the cars with more than a prescribed number of passengers.

The order of the commission was issued on March 30, 1909, and directed the company to limit the number of passengers on the Pine Hills line as follows: 20-ft. body car, seating 26 passengers, 40 passengers; smaller type of car, 35 passengers. It was also provided that when any cars carried the maximum number of passengers, the motorman should not stop to take on passengers until the number in the car was reduced below the maximum. The terms of the order also stipulated that the conductors should not allow passengers to enter the car when the maximum load was carried and that the company should make and promulgate proper and sufficient rules and regulations to carry the order into effect. The instructions of the company to trainmen on this subject were issued directly after the receipt of the order and were as follows:

"NOTICE TO CONDUCTORS

"On and after Monday, April 5, 1909, and until further notice, the following orders are issued in relation to the cars running on the Pine Hills line:

"Conductors must not allow more than 40 passengers on the '400' type of box car at one time, or not more than 35 passengers on the smaller type of box car at one time.

"Whenever a car has the above number of passengers the conductor will give 'two bells' to the motorman after the car is started, which shall be the signal to the motorman that he is not to stop for passengers, and to stop only on signal from conductor. If, when the car stops to discharge passengers on signal from conductor, additional passengers get on the car to the requisite number, the conductor must again give the signal 'two bells' after the car is started. If the motorman does not receive 'two bells' after starting his car he will stop for passengers at regular stations, as usual.

"No passengers must be allowed to ride on the rear platform of any Pine Hills car while this order is in effect."

"CHARLES H. SMITH.
"April 2, 1909. Superintendent."

Public dissatisfaction with the service under the new rule developed rapidly, although at first the interest in the experiment was widespread. H. C. Eddy, secretary of the District Electric Railway Commission, Washington, D. C., wrote letters of inquiry concerning the experiment to Edgar S. Fassett, general manager of the United Traction Company, and John S. Kennedy, secretary of the Public Service Commission. Extracts from their replies were published in the Washington daily newspapers in July, 1909, and said in part:

Mr. Fassett: "The Public Service Commission thought that by limiting the passengers on any car it could properly distribute the passengers over the whole number of cars. Our cars, which have a seating capacity of 26 passengers, were limited to 40 passengers, and those which have a seating capacity of 24 were limited to 35. The observations of the company on this service are not favorable. It means that the ends of the lines are properly accommodated, while the intermediate parts are not. This to a very large extent stops the short riding, which is really the only profitable riding to street railways. It seems almost impossible to stop overcrowding during rush hours. If the companies could pay additional interest on the additional equipment necessary to take care of this travel it would still be impossible to obtain men to work from two to three hours a day. On our system in the city of Troy, at 6 o'clock at night from 5000 to 6000 collar girls stop work and they have to be taken care of in 20 minutes. You can readily see that it would be impossible for us to have cars enough to prevent crowding in such a case. The factories start at 8 o'clock in the morning and we have something of the same rush at this time."

Mr. Kennedy: "In all fairness, it must be said that there is a difference of opinion as to the successful operation of this plan, although the commission feels that up to the present time it has worked reasonably well."

When complaint was made to the commission recently regarding the limitation rule notice thereof was served upon the company and a date fixed for a hearing. In its response to the notice of the complaint the company said that ever since the issue of the order it had operated its cars on the Pine Hills line in obedience thereto. The number of cars operated daily on the line was sufficient for the number of passengers carried, the company stated. During the rush hours cars were operated on a 2½-minute headway and during the rest of the day on a 5-minute headway. During the greatest rush cars were run on less than a 1-minute headway on three-quarters of a mile of track on State Street and Washington Avenue Hill, with joint occupation with other lines, constituting 25 per cent of the entire Pine Hills line, and if it were possible to operate an additional number of cars over the line during the rush hours and to earn enough to pay interest on the cost of such additional equipment it would be extremely difficult if not impossible, the company declared, to employ men to operate cars for only two, three or four hours a day. Figures were submitted by the company showing an average load of only 30 passengers per car on the Pine Hills line from 5 to 7 p. m.

HEARING BEFORE THE COMMISSION

At the hearing on Jan. 12 the United Traction Company was represented by Edgar S. Fassett, general manager, and John E. MacLean and Patrick C. Dugan, attorneys. Walter E. Ward represented citizens interested. Charles S. May and Augustus S. Downing, complainants concerning the restrictions placed on operation of the Pine Hills line, were present. Seneca S. Smith represented the Pine Hills Association and James F. McElroy and other citizens were present.

Mr. Ward stated that when, at the previous meeting, the commission issued an order limiting the number of passengers to be carried on the cars of the Pine Hills line, the association did not object because it was supposed that the experiment would not last over a month or two months at the most. However, the experience with the rule had been very unsatisfactory. It was a common occurrence for the cars to pass people when more standing passengers could have been accommodated. What the association asked when this order was issued was larger cars and better lighting. Limitation of the number of passengers had not helped the matter at all. It had made the matter worse and so the association asked that the rule be rescinded. The people would rather be packed as solid as sardines than stand on the corner and watch the cars pass one after another.

Chairman Stevens said that there was a difference of opinion on the part of the traveling public in reference to the rule. He read a letter asking that the order be continued in force.

Mr. Ward said it was inconvenient to be left on a corner in inclement weather when one was in a hurry to catch a train or for any other reason, and if larger cars could not be secured the people would prefer to take chances of being crowded.

Mr. Downing had stated in his complaint to the commission certain days on which a number of persons had been not only seriously inconvenienced, but really placed in danger of sickness from the delay. He specified one stormy night when, with sleet falling and the streets covered with slush, he with a number of others, waited 30 minutes, during which seven Pine Hills cars passed without stopping. The standing space in at least one-half of the cars was not occupied, as the passengers were crowded together in the rear ends of the cars. A few days later a similar experience was had. Car after car passed without taking on passengers, although there was plenty of standing room and the passengers on the cars were not seriously inconvenienced. He had ridden on the line from two to three

or four times a day during the last 14 years, and he realized the condition that prevented the company from operating too many cars up State Street hill. On the evenings when he was forced to wait he saw West Albany and other cars, with full loads. He therefore complained against the abnormal rule which had been issued for the Pine Hills line, discriminating against the people who used it. He had been delayed at times as long as an hour and a quarter for his dinner. He considered that the limitation rule was outrageous treatment of the people who lived in the Pine Hills section. He would be glad enough if larger cars that would carry more people could be put on, but if the present cars had to be continued on the line, they were abundantly able to carry more people and he asked that this be allowed and the infamous rule rescinded.

Chairman Stevens asked if Mr. Downing's position was that the company should be allowed to carry as many passengers as could crowd on the cars.

Mr. Downing said that if the people wanted to board a car, he would let them do as they did before the rule was issued. If they did not want to board a crowded car they could stand and wait.

Chairman Stevens asked about the rights of those who boarded the car before it was full and wanted to pass through the standing crowd in order to alight.

Mr. Downing said that those passengers were entitled to the same sympathy as all fellow mortals. They were entitled to more than sympathy, if by giving more there was no trespass upon the rights of a great many people.

Chairman Stevens said that the Pine Hills association was not satisfied to have it that way. The members were not agreed on what they wanted. They insisted that the company should be compelled to put on larger cars and give everybody a better show for life. Some thought they had a right to a seat and if they did not get it, an enormous amount of discomfort resulted.

Mr. Downing said that these people were asking for something that it was absolutely impossible to secure at certain times in the day. It was a mistaken notion that he was paying for a seat. He paid for the transportation. If the number was to be restricted to the seating capacity, why not prohibit any standing passengers?

Chairman Stevens said the position of the association was that with the small type of car the company could not operate enough cars to accommodate all the people and that therefore larger cars should be used.

Mr. Downing said he understood that the company could not afford to substitute larger cars.

Chairman Stevens said the company was abundantly able to do whatever was required. The commission wanted to get the views of everybody concerned. It was trying to do what was best for the people and for the company.

Mr. McElroy added his request that the rule be rescinded. He had lived in Albany for 20 years and he had always found that, whatever might happen, if he could reach the lines of the United Traction Company he could get to his destination promptly until this rule was established. He had seen 15 people waiting at one point. Undoubtedly they would have been accommodated if it had not been for the rule.

Chairman Stevens said that a great many observations were made and there were not enough cars to accommodate the people if say 60 were to be crowded in a car.

Mr. McElroy then presented a petition of the Woodlawn Improvement Association asking that the rule be rescinded.

Chairman Stevens said he wished that those who objected to the rule would keep in mind that it was adopted by the commission very largely in consequence of the statement of the company that the service was adequate and that the cars supplied were sufficient to take care of the people, but that the people bunched themselves in certain cars, and that if they would equalize between the cars the overcrowding would be overcome. The rule was adopted to see whether or not that was so. The association had asked for more cars and the company had said it furnished enough cars but that the fault was with the people who unnecessarily crowded the first car. According to the statements made, either more cars would have to be operated or more people permitted to ride in a car.

ADDITIONAL CARS OPERATED

Some discussion regarding the service followed and Mr. Fassett said that after the rule was established additional cars were operated in order to handle the crowds in the morning. No cars were added in the evening because it was impossible to operate more cars up the hill during the rush hour.

Mr. Smith said that aside from the letter read by Chairman Stevens, favoring the rule, he had never heard of but one person who approved it. The rule was obnoxious and un-American. People in this country generally took the car that made the closest connection and under this rule it was impossible to get home with any degree of regularity.

Various citizens then testified. William C. Rogers said that the rule had been a great convenience, so far as comfort in travel was concerned, for people who rode from one extreme end of the line to another, but it was not convenient for most of those who rode during the rush hours. He had waited 40 minutes on one occasion, and another time eight cars passed him and finally the first of these, on its second trip, took him on board. One day, when he was sick, he was forced to wait an hour and five minutes. If he had been well and the walking had been good, he could have walked to his home in about 28 minutes.

Chairman Stevens said that the rule was adopted simply as an experiment and that it was entirely obvious that it had failed to work out the solution of the problem and the commission would therefore announce that the rule was revoked.

The request of the association for larger cars was then urged.

Mr. Fassett said that the largest type of car that could be used with safety on the hill was a single-truck car with 20-ft. body, some of which were in use now on the line. The best service that could be given on a line 3 miles long was a quick service with the smaller cars. The other lines in the city were operated without complaint with practically the same types of cars. It was impossible for any railway to handle the people without crowding at certain times. If the company had all the money in the world to buy the equipment and pay interest on the cost it could not avoid crowding at times. It could not get men to operate the cars even if it had enough equipment to avoid any crowding. It was limited in hours of labor by the State law. It could not get men who would work for three hours a day at 25 cents an hour and it could not hope to pay them a day's wages for three hours' work. The same condition existed in every city in the United States. If the hours when people went to and from their work were divided it would relieve the situation.

Further discussion brought out the fact that the limitation rule had apparently reduced the gross revenues of the Pine Hills line, which averaged 22.97 cents in December, 1909, as compared with 23.04 cents in December, 1908.

Chairman Stevens said that to place 40 persons in a car of the type used did not accommodate the traveling public. It might be unavoidable. He was not saying that in criticism of the company. He was speaking about a fact that prevailed elsewhere as well as in Albany.

Mr. Fassett suggested that it might require a fare of 10 cents instead of 5 cents.

Chairman Stevens said, in conclusion, that it was impossible for the commission to make any order for relief at this time. It was but just to say that the suggestion of the limiting order did not come from the association and that it was acquiesced in by the association with some degree of reluctance at the time it was made. The commission will make a study of the Albany situation.

According to a consular report, there has recently been placed in service at Karachi, India, a pioneer gasoline car installation composed of 46-passenger coaches driven by 25-hp engines.

DAILY INSPECTION AND UP-KEEP OF ROLLING STOCK*

BY H. H. BUCKMAN, MASTER MECHANIC, LOUISVILLE & NORTHERN RAILWAY & LIGHTING COMPANY

To obtain a systematic and orderly system of inspection, it is highly essential to give the shop forces and inspectors a definite course of instruction as to the best methods of doing their work; they should understand the importance of inspection and feel that they are responsible for the lives of patrons while riding in our cars, and for the future welfare of the company. As great care should be taken in getting new men and apprentices as in getting new machines, etc.

Most traction companies do not give enough attention to the men who inspect their cars. They seem to think that almost any man can fill the position of inspector. This is a mistake. For example: a man is hired to clean cars; in a short time he is made an inspector's helper, and in less than one year's time he is given the position of inspector at a smaller salary than the displaced inspector received. Of course, the new man is well pleased with his rapid promotion, and no doubt tries his best to do the work, and the company thinks it is making a saving. The pay-roll will look better by using this class of inspector. But what about the risk? This man probably had little or no instructions, and surely not enough experience. He had learned to adjust brakes, change brushes and brake shoes, etc., by watching others. in fact he could get along nicely for some time, but it would surely lead to bad results. There are too many important parts to be looked after on electrical equipments of to-day to use this class of inspector.

It takes years of experience for some to become skilled inspectors, and some never become skilled. This unskilled inspector, who was made in less than a year, fails to detect a flaw in a wheel; to see a brake pin nearly worn in two; to see that the bolts which hold together the top and bottom halves of the motor are loose, or he might fail to detect other defects which might be the cause of a disastrous wreck. After such a wreck, and the car is a mass of splinters and twisted iron and steel, it would be hard to determine the cause of the wreck, when really it was the fault of the rapidly promoted, unskilled or careless inspector. Despite this, the chance that a wreck may occur is the nightmare of every operating man and the bug-a-boo of every investor in railway securities. When it occurs the operating heads of the road are apt to lose their positions and reputations, and the surplus earnings are wiped out for many months; all owing to this class of inspector.

Electric railways have increased the size of cars, motors and trucks, their speeds and the number of controlling devices, and more skilled, up-to-date and careful inspection is required than a few years ago.

Ask the ordinary inspector, after he has inspected a car, if he is sure there is no flaw in some of the minor parts of the equipment, such as the air governor, etc. If he is honest, he will acknowledge that he is not sure about it; possibly he cannot declare that there is no screw or bolt projecting above the floor to cause some one to trip and fall. Inspectors are instructed to look after the vital parts of the equipment first. This is all right, but after this is done and the car is found to be in condition to run, the minor parts are often passed over. The inspector should inspect the motors first, look at the conditions of commutator, for open circuits in the armature, and burned-out coils at armature clearance, whether there is a band loose or that has started to unwind, examine pinions and gear wear and the tightness of bolts and keys. While inspecting motors the condition of motor leads would first be examined. After this is done the inspector should start at the end wheel and inspect trucks and wheels all the way around on the outside. Then he should start at the draw bar under the car and inspect everything from one end of the car to the other, including air compresser, brake adjustment, etc. Next the body should be inspected, including doors, steps, floors, seats, curtains, sash catches, glass, etc. The roof and trolley, then the control, circuit breakers and rheostats should follow. Trucks should be inspected carefully as to cracks in frame, loose bolts, side bearing clearances, etc. Brakes should be tested as to piston travel. The air compresser should be inspected the same as any other motor, and in addition to show that it has plenty of oil; it should be pumped up, and the inspector, if trained properly, can detect by sound whether the suction and discharge valves are working right, or whether there is a loose crank shaft bearing or connecting rod. The inspector should also know the condition of the compressor by the time it requires to pump up. Car bodies should be inspected for leaky roofs, which ruin ceilings. Bolts, nails and screws, if projecting from the floor or any part of the wood work, result in torn clothes, passengers falling, etc. Bad steps and platforms also cause accidents.

If a regular system is established for the inspector he cannot fail to see every bolt, or other parts that he should see, and when he is through inspecting a car he can say, and be absolutely sure, that the car is all right in every respect. Railway shop men should be made to understand that the two most important things they should learn, if they want to advance in their trade, are that careful inspection and good repair work are the foundations upon which effective and economical maintenance and operation are based.

The purchase of supplies is a very important matter in the "up-keep of rolling stock." A cheap grade of material is not always the most economical and will, in most cases, prove to be the most expensive. A failure due to a poor grade of iron, steel, babbitt, brasses, insulation and other materials may cost the railway company many times the price of high-grade material. The mechanical department should be prepared to show which material is the best and cheapest.

Cleaning cars has its part in the "up-keep of rolling stock." It is a well-known fact that, unless cars are kept clean, attractive and comfortable, the service will not be pronounced satisfactory by the public; even the car crews lose their pride and therefore do not render as good service as they would if the cars were kept clean. Clean, attractive and comfortable cars go a long way toward increasing business. One of the best methods for keeping cars attractive, and at the same time of practicing economy, is to overhaul the car body each year, and when overhauled it should be thoroughly cleaned, rubbed down, touched up and varnished. By this method the varnish can be kept in good condition, car cleaning could be done more cheaply and easily, and the car would not have to be painted for several years.

I believe a regular system should be established for overhauling and repairing once a year. Operating men generally agree that under average conditions the practice of "shopping" cars yearly is the most economical and decreases liability for accidents. As complicated as most of the equipments are today, a thorough examination cannot be made with all parts assembled. A regular system of overhauling ought to improve the company's case in court, in the event of accident claims. Trucks can be overhauled yearly, in many cases, at the same time as the car body, thereby causing fewer cars to be put out of service. Considering economical maintenance, a truck that is overhauled each year will cost less to maintain than if allowed to run longer. The truck could be out of square with excessive lost motion in brake rigging, pedestals, etc., which, if allowed to continue, would increase flange wear, rail wear, power consumption and motor maintenance. A truck that has excessive play between pedestal and journal boxes, or lost motion in the brake rigging, will have its brake shoes adjusted tightly against the wheels in order to brake the car properly; the results are that the car cannot run freely, requiring the motors to carry heavier currents and for longer periods, causing flash-overs, high motor temperature, burn-outs, etc. As the old saying goes, this is "the straw that breaks the camel's back." It will also break pocket-books. As we well know, where motors are worked beyond their capacity both trouble and expense multiply rapidly.

Well instructed and trained motormen are of great im-

*Abstract of paper read before the Central Electric Railway Association, Columbus, Ohio, Jan. 27, 1910.

portance in the "upkeep of rolling stock." They should be compelled to pass a strict examination on the electrical equipment so as to be able to show how to run a car at the least expense and what to do in the event of failure of any part of the equipment. The best organized shop force, the best possible workmanship and the best materials can be used; in fact, the best of everything can be had and still trouble, pull-ins, and high-maintenance costs will be experienced if the cars are operated by unskilled, poorly instructed or careless motormen. Most motormen believe that all that is required of them is to run the car on schedule time and to take in and let off passengers and avoid collisions, never giving the car or equipment a thought; to keep on time regardless of how the car is used is principally in mind. I believe it is possible for a motorman, more than any other employee, to save for the company or to cause it to spend more money. It would be surprising to know the amount of power that could be saved by a single motorman. It has been shown, by using meters, and offering prizes to the motorman that used the least power, that some use about one-half the amount they had been in the habit of using. At this rate the cost of motor and other electrical maintenance undoubtedly was less. Take for example a car blowing the circuit-breaker or fuse, caused by some small defect, such as a broken brush spring, or a burst band on the armature. Either one could be repaired for a few cents, but the motorman does not pay any attention to it and continues to blow the breaker or fuse; he sometimes stops and either puts in a double fuse or plugs the circuit-breaker. There is about as much reason in this as there would be if an engineer were to plug the safety valve on his engine. The motorman continues with the car until it refuses to run at all; then he has to cut out the bad motor in order to move. It is too late then, as the armature and possibly the fields and brush holders are ruined, costing probably $50 to $150, which at the start could have been saved in 50 seconds by cutting out the motor with the burst band or broken brush spring.

Another example: if a car is running 10 or 15 minutes late and the motorman is told to make up the time he does everything he can to do so, taking chances by running at high speed over switches and other places where he should run slowly, forcing heavy loads one over the other on the motors until they become overheated and are burned out or their life shortened to such an extent that they will burn out in a short time. Possibly the damage would reach $75 to $100, not including accidents he might have during that time. The question is, did the motorman know he was spending that amount of money to gain a few minutes' lost time? I know of companies that have paid many times that amount for considerably less time. Time is not worth that amount to any company, and the motormen should be so instructed as to avoid overworking the equipment.

I would say that all our motormen, before being allowed to operate a car on our lines, are required to pass a rigid examination by the master mechanic or his assistant, and to answer correctly all important questions concerning the mechanical and electrical operation of their cars. They are shown at the shop the different parts of the car and how to handle them. The shop force is instructed to answer fully any question which the motormen may ask. The close relations existing between the motormen and shop force have been found, in the past, to have saved many hundreds of dollars. A motorman with a knowledge of the equipment also makes a good witness in court when damages are claimed.

The importance and need of active co-operation between the operating and mechanical departments should not be overlooked; unless the operating department sees that the motormen do not abuse or overwork the equipment, the mechanical department is powerless to lessen troubles, pull-ins and cost of maintenance. When a car fails in service the motorman will report to the operating department that it was the fault of the mechanical department; the repair man, or inspector, will report to the mechanical department that it was the fault of the motorman. It is time then for the two departments to get together and clear up this difference. Nothing will cause trouble more quickly between these two departments than to have a motorman find fault with almost every car he runs. This class of motormen will make careless inspectors and cause the two departments to pull against each other. I have found in my experience that cars have been turned in by motormen when nothing was wrong.

No doubt at some time or other every superintendent and manager, while riding in the vestibule with a motorman, has seen the motorman run past a stop. The motorman will then say that the brakes are in bad order and that he had reported them. If this man runs into something and causes a damage suit and is discharged, he will most likely testify in favor of the plaintiff that the brakes were in bad order and that he had so reported them at the shops.

The only way to stop this kind of thing is to have a good report and record system, one that will put a check on the car crews, the inspectors and the repair men.

The report and record system of our company has covered all of these troubles and more. By keeping mileage records we have the information desired as to the quality of materials and a basis upon which the cost of maintenance is determined. Records are kept of every part of the equipment and car body. A separate book is kept for every car. When repairs are made the fact is entered in this book. When the car is damaged in an accident a full account thereof is entered in this book, with the place of the accident, the name of the motorman and the full extent of the damage. At different dates the mileage is recorded. This enables us to see at a glance the amount of repairs that has been made between the different entries of mileage.

When wheels are removed from a car an impression is taken of flange and tread by hammering a piece of lead over it. The lead is then traced on paper, and over this tracing a templet of the correct pattern is placed and traced; the measurement is then taken of the circumference of the wheel with a steel tape made for that purpose. The mileage is marked on this paper, which is then placed on file.

When an armature is removed a tag is filled out and attached to it stating the car from which it came and the cause of removal. When it is repaired the man making the repair writes on the tag what repair is made and signs his name. When the armature is placed in a car the tag is turned into the office, giving the date, number of car and motor. Each car has an armature tag file and a glance over the files shows the repairs made and by whom for any length of time past on any armature.

A record is kept of all pull-ins and car troubles on the road. In each case the motorman's name is given.

All motormen and conductors are required to fill out a report as to the condition of the car when they have finished the run. The report is dropped in a box provided for that purpose at each barn. They are required to mark the time of receiving the car, time of leaving it, condition of car and to sign their names, giving badge numbers. These reports are looked after by the foreman inspector of each barn. He is held responsible for them until they are turned over to the master mechanic's office. If he finds a report against a car he gives it to the inspector that takes care of the class of work that is reported. If the inspector repairs the car he marks the report "repaired," signs his name and returns the report to the foreman inspector. If he cannot repair it he returns the report to the foreman inspector and reports that he is unable to make the repair. The car is then shopped. The foreman inspectors of each barn turn in a report each morning giving the number of cars inspected, the number reported in trouble, the numbers of cars oiled and cleaned, the repairs made and the cars remaining in trouble. When all these reports are in a trouble-sheet is made out from the foreman inspector's reports and posted on the bulletin board in the shop, in order to complete in the shop the repairs that were not made by inspectors. Each repair man, knowing the class of work he is to repair, reads the trouble-sheet and if anything for which

he is responsible is out of order he repairs it without being told, returns to the sheet, marks the repairs made and signs his name opposite the trouble reported. This sheet remains on the board until all cars have been repaired. It is then placed on file in the office.

Crews are checked up at the end of each day and if any have failed to put in a report, either good or bad, they are reported to the superintendent, who requires them to make out the report for that date. These reports are placed on file and kept for one year and if at any time a crew denies a report the report with signatures can be shown. By the use of this method of reports and records, a trouble once reported cannot be overlooked or forgotten, and it is possible to learn easily who made the repairs in case a trouble develops a second time.

Carhouse men are instructed not to take any verbal reports from crews as to the condition of cars, unless in explanation of one that was reported on a regular report. Crews are checked up at the end of the day and if a broken glass is found, a step damaged, a sear on the side of the body, broom missing, etc., and if they did not so report they are promptly reported.

At the end of each month a review report is made of all car troubles that have been experienced during the month and this is posted on the bulletin board in the barn. This enables the barn men making the different repairs to see how their classes of work stand. As duplicates of all reports are sent to the superintendent, he is able to see at a glance the amount of trouble that was experienced during the month. Car troubles are all numbered and all trouble records and reports, except the trouble sheet posted in the shop for the repair men, are made out by numbers, which greatly simplifies the work.

There are many other items to be looked after which are of less importance, but are too numerous to mention in this paper and I have, therefore, described what I believe to be the most important in the "up-keep of rolling stock."

ELECTRIC RAILWAY FARES*

BY J. P. PULLIAM, MANAGER RAILWAY DEPARTMENT, WISCONSIN ELECTRIC RAILWAY COMPANY

The railway promoter generally arranges conditions so that the difficulty of operation of the property is greatly increased. In his eagerness to secure the franchise he is willing to place the tracks before every alderman's door if desired, furnish a 10-minute service and agree to furnish his transportation at bargain rates. After the newness wears off the property it dawns upon those holding the bag that the conditions imposed make it impossible to furnish the service and maintain the property.

Five cents seems to have been the high-water mark fare for city transportation. Six rides for a quarter, workingmen's tickets at 3 cents and transfers galore have been placed in franchises as a matter of course. Now the traction lines are being investigated by competent commissions and the mistakes of the past are being corrected. In several instances, particularly in Massachusetts, the local companies have asked for and received permission to advance their city rates from 5 to 6 cents, and all over the country the transfer problem is receiving attention.

Our Oshkosh franchise requires neither six rides for a quarter nor 3-cent workingmen's tickets, but some generous soul in the past started the practice. On the 15th of this month we discontinued the sale of the six rides for a quarter or 25 for $1 tickets, as we had sold them. We still continue to sell workingmen's tickets at eight rides for a quarter, good on working days only, and then between 6 and 7 a. m. and 6 and 7 p. m. The most of this traffic is handled by special cars and is disposed of quickly. It is questionable, however, if it is advisable or profitable. Special service of any kind is hazardous, and I do not believe in performing it at bargain rates.

At Fond du Lac we sell six rides for a quarter, but issue no transfers. We have a steady traffic between Fond du Lac and North Fond du Lac, made possible by North Fond du Lac being the division point of two large railroads. Special cars are furnished at regular hours of each day to assist in taking care of the traffic, and are well patronized. At this point we have no crosstown lines; the ticket returns are better than at Oshkosh.

Interurban rates and service have been established about in line with city experience. Some one figured that not only could interurban cars be operated every hour between all points, but the rates should be about one-third of those charged by steam lines, with bargain rates for picnics, gatherings of all kinds and chartered cars. I suppose the theory was that inducements of this nature were necessary to attract traffic. As a matter of fact, the frequency of the service and the convenience to the traveling public secure the patronage for interurbans. There are no good reasons why our rates should be lower, but many why they should be higher than steam roads. We have had good experience along these lines.

Our Omro interurban line originally charged 15 cents for a 11.17-mile ride. The rate was increased to 20 cents May 1, 1905. The year previous to the change we handled 129,676 passengers; the year following, 129,405 passengers. This rate was reduced to 15 cents March 4, 1908. The year previous to the change we handled 138,665 passengers, the year following 157,836. So it is seen that when the fare was increased we handled about the same number of passengers as before, and had received the increased revenue.

On our Neenah interurban, with a mileage of 15.58, the original fare was 20 cents. The rate was increased to 25 cents May 1, 1905. The year previous to this change we carried 281,148 passengers; the year following the change, 287,805 passengers, more passengers by 6600 under the increased rate. The rate on this line was reduced to 20 cents March 4, 1908. The year previous to the reduction we carried 293,835; the year following, 298,636. The receipts for the year on this line showed a decrease of $4,500, despite the fact that the number of passengers carried increased. Our farmer friends doubtless took advantage of the decreased fare, but there were not enough of them to offset the loss in the through traffic.

The original rates on the two lines were about right, and should have been maintained. Effective Jan. 15, 1910, the original rates were again restored, and despite the threats of our farmer friends to put us out of business by "hitching Old Dobbin to the shay," we do not notice any falling off in patronage.

We have had some experience with merchants' excursions. An enterprising merchant at Oshkosh arranged with our company to turn over our lines to him on given days, generally one per month for nine months. He would advertise to carry all passengers from Neenah to Oshkosh or Omro to Oshkosh for 10 cents. Each passenger would be given a coupon which, when presented at the merchant's store, would entitle the holder to free return transportation. The merchant would guarantee the company the average daily receipts per car. Our conductors made the 10-cent collection and the total applied on the day's guarantee.

On a line ordinarily requiring two cars we would use four to six cars on excursion days. The cars were crowded; regular traffic was driven to the steam road or teams, and dissatisfaction generally resulted. Merchants at other towns complained, and, after taking into account the loss of business preceding and following the date of the excursion, the railway company found that the scheme was impracticable. Finally the State commission ordered that the excursions be abandoned.

Maintaining the service, keeping cars well painted, clean, properly ventilated, on scheduled time and with courteous trainmen, are the best inducements for interurban traffic.

*Abstract of paper read before the Wisconsin Electrical Association, Milwaukee, Wis., Jan. 19 and 20, 1910.

When these are done we can secure our share of the business at rates equal to those for steam roads. There is no demand for bargain rates, and their continuance is foolish.

ADVERTISING DISCUSSED AT THE NEW ENGLAND STREET RAILWAY CLUB

A meeting of the New England Street Railway Club was held at the American House, Boston, Mass., on the evening of Jan. 25, and after the dinner, the subject of street railway advertising methods was discussed. Two papers were presented on this subject, one by C. A. Sylvester, general manager of the Boston & Suburban Electric Companies, and the other by H. A. Faulkner, passenger agent of the Boston & Northern Street Railway.

MR. SYLVESTER'S PAPER

Mr. Sylvester discussed the results which could be accomplished by a publicity bureau, industrial bureau, or, as he said he might term it, a "boom bureau," the function of which was to develop business. The bureau should create intimate relations with boards of trade, the public and prospective newcomers, and the head of the bureau should be keenly alert for suggestions as to improvements in the service. Practically every steam railroad west of the Mississippi River has a bureau of this kind known as the industrial department. The function of this department is to promote the growth of industries along the line of the railroad. The head of the bureau first makes himself absolutely familiar with the territory his line serves. In the farming sections he has an expert agriculturist examine the soil and if this report is favorable he spreads it broadcast. In the mining sections, he obtains a report from a mineralogist and advertises the possibilities of that region. In the manufacturing districts, he features the advantages of the district from a manufacturing standpoint and exploits them. Mr. Sylvester said that he had heard recently the industrial agent of the Illinois Central Railroad describe what his bureau was doing. Among other significant statements was one that 80 per cent of the business handled by his road was produced in territory tributary to its lines. The existence of many of the flourishing towns in the West can be laid directly to the activity of the industrial agent.

There are possibilities for the same kind of service among the electric roads. It is reported, for instance, that the New England Investment & Security Company was planning in the near future to operate a car over its lines near Springfield to interest farmers in making their lands more productive. The car would be an agricultural college in a small way.

It is very important for railway men to become closely identified with the boards of trade in the cities and towns reached by them. These organizations are in a position to take action on anything which pertains to the welfare and development of the place in which they are located and as the city or town develops, the railway company gains an advantage. There is perhaps no better way of getting the public to realize that its interests and the railway interests are identical than to form such a close alliance with the town officials and prominent business men.

The industrial agent should take the initiative in this matter and convince the public that the railway company will help in this movement of development. He should show them that one of the largest factors of success is that the town should have proper facilities for transportation. He can also indicate by figures the financial interest which the railway company has in that town, the amount of taxes paid, the amount of the pay-roll, etc. These are convincing facts, and if presented properly, will have their effect.

The speaker discussed the method of promoting new industries under three headings: (1) Transportation facilities; (2) organization of the board of trade; and (3) co-operation.

The railway representative, through the board of trade or otherwise, can describe to the promoter of new industries the transportation facilities which are under consideration. If the board of trade becomes inactive, as it sometimes does, caring more for social distinction than for industrial expansion, the industrial agent can work toward a reorganization of the board. His object should be to instill commercial optimism and enthusiasm among the active members. After securing the co-operation of the board of trade, he can often offer inducements to a new industry which would be impossible if he worked alone.

The speaker then described the work of this kind carried on by his own company. The general manager has personally joined every board of trade, commercial club, improvement association, etc., that exists within his territory. The various superintendents have joined these same associations within their districts. This gives an opportunity for the management to announce its intentions and policy in regard to the present or anticipated service. It also offers a splendid opportunity to become directly associated with those who are most active in promoting the growth of the towns and are in a position to make valuable suggestions. The officers of the company have also become believers in the territory which they serve. They are optimists, not pessimists. They have co-operated with the real estate men in publicity campaigns. One day last week, they suggested a "boom day" to the holders of some real estate in an outlying district and offered them a car free of charge to carry people out to a tract in which these dealers were interested. The company estimates that a new house occupied means about $50 a year to the railway company.

The company is also getting out through its publicity bureau statistics of the territory served. For instance, in one town the following type of the bulletin has been prepared:

"The finest manufacturing city in the State; 15 sq. miles; population, 25,000; 150 acres in parks; 40 acres of river; 16 miles of street railway; 10 miles of steam railroad; 3500 homes owned individually; 35 factories; 17 churches; 18 schools; healthy and high good soil, good air, every advantage, some very desirable factory locations and building lots left. Help us grow. Join us now. This is just a sample; our aim is to get everyone talking Boom and Growth. We want every single soul optimistic."

The speaker especially disclaimed any intention of discrediting the present advertising methods, but wished to increase their effect by calling attention to the phase which he had particularly discussed.

MR. FAULKNER'S PAPER

An abstract of the paper of H. A. Faulkner, passenger agent, Boston & Northern and Old Colony Street Railway companies, follows:

"The up-to-date street railway man realizes that there are so many people who will use his line anyway, but also, and which is equally important, there are a whole lot more who will use his line if he advertises. He also realizes that the cost of running a car full of passengers during the less busy hours of the day is no more than it is to run that car half or quarter full, or if there is a difference it is so infinitesimally small as to be entirely negligible. He also realizes that advertising is one of the most potent of all business getting forces to-day, that advertising of an intelligent character produces great returns in every other known business and that it will in his.

"The question really before us is, 'How are we to apply this intelligent advertising to our business? How are we going to advertise so as to fill up those empty seats?' That is a problem that has not been fully solved, and probably never will be to its greatest ultimate development, but there are many of us who are trying and who have accomplished something along the way.

"Primarily, we must get pretty close to human nature. We are sometimes prone in operating street railways, as well as advertising them, to consider that what we do and think is absolutely correct. Many times it undoubtedly is, but in the long run in advertising it pays to bear very strongly in mind what the other fellow thinks. Try to put yourself in the place of the man you are trying to reach, try to get the other fellow's viewpoint.

"Advertising has been defined in many ways, but for our especial purpose it may be said to be anything that attracts attention, tells a story and holds the attention long enough to impress the story so strongly that business, extra business, will be induced.

"Conditions govern a great deal of advertising unbendingly. What will do well for one road will be barren of results for another. What will fit well with one section of a large system will need entire revision in another. No advertising man can prescribe infallibly. I certainly cannot. I can simply assist in answering the question by telling you some of our experiences.

"We believe thoroughly in a very broad-minded policy. We believe in inculcating in the minds of the public that the trolley is the best way to travel for business, for health, and for pleasure, and if that doesn't cover the situation, for any other purpose that can be suggested.

"In making it easy for people to trolley you must give them all the information possible in the simplest possible way. We have found that one of the first essentials is a good map. With the map should be a folder telling as concisely and clearly, how far, how long and how much it costs to go to various points. These facts are the first that inquirers want. Then they wish to know where they must change cars. Descriptive matter is of great value as are cuts showing intersecting places on the lines, if you have the space and can afford them. Last year our companies issued 235,000 booklets with inserted map as a general folder and several smaller folders. In this folder we sacrificed beauty somewhat to facts. The cover design was the result of a contest. We offered prizes to the pupils in the drawing classes of the 60 or 70 high schools in our territory for the best designs submitted.

"Outside of the general advertising literature we have tried a multitude of mediums for specific purposes. The newspapers stand at the top in many ways, either through advertisements of parks, or special features, or in stories of interesting trips and the hundred and one things that may be furnished them which, properly written from a newspaper point of view, may be both news and of assistance to the company.

"For some specific advertising purpose there is nothing better than to use our own cars by putting poster signs upon the dashers. Long oblong cards, 9 in. by 29 in., printed on both sides and suspended in the centers of the cars we have found to be among the best sources of advertising.

"The Tri-State Tourist, a monthly publication issued during the months of the warmer season, has been found of value in promoting business and good will among our employees as well as the public. We send letters to schools, churches and other organizations calling their attention to the fact that it is the proper season for outings and that the best places were on our lines. We keep an eye on conventions and write to committees, sending them folders and suggesting many ways by which they can give the delegates a good time—by trolley. We send out our maps, framed on request, to schools. We distribute our maps and literature in insurance and other offices which have agents covering our territory. We have used bill boards to some extent, but have found other methods generally better. We have baby shows, balloon ascensions, ticket hunts, children's animal hunts, fall produce hunts, have been interested in merchants' carnivals, keep track of battleships in the harbor and other sights that might attract riding, and, in fact, try every way that our town or anybody else's mind can conceive to produce riding, with what we feel has been a measure of success."

DISCUSSION

A. E. Stone, general auditor of the Boston & Worcester Street Railway Company, stated that his road had found newspaper advertising very advantageous in bringing a new service or schedule to the public notice. Last year the company spent about $2000 on newspaper advertising, and it placed this with papers as far distant as Woonsocket, R. I., Springfield and Fitchburg, Mass. A test advertisement was placed in a Worcester paper on a summer Saturday, covering a 3-in. space across the front of the paper, or 8 columns in width. The cost was about $45. The advertisement stated that extra cars would leave Worcester for Boston and its resorts the next morning at 5:55 a. m., and when the day arrived the cars were packed, bringing a revenue of about double the cost of the advertisement. The company takes advantage of all large conventions, lets the public know of new limited trips, etc., notably to baseball games in Boston. After the regular limited trips were started last year the through riding increased from 10 to 20 per cent. Two hundred new dwelling houses were put up along the line last year.

George Sabin Brush, Boston Elevated Railway Company, spoke of the lower cost of securing lithographed posters from Europe compared with the United States prices, including the duty. He emphasized the need of giving a satisfactory service in backing up a campaign of advertising.

C. W. Ketterman, Ohmer Fare Register Company, Dayton, Ohio, cited a case where round trip passes were given to public school teachers in the vicinity of Philadelphia. Each teacher brought a dozen or more children who paid fares.

H. F. Eaton, Brockton & Plymouth Street Railway Company, spoke of the revenue gained by his road by supplying service to the military maneuvers in that section last summer.

PROGRAM OF THE MID-YEAR MEETING

At the time of going to press with this issue the mid-year meeting of the American Street & Interurban Railway Association had commenced.

The executive committee of the American Street & Interurban Railway Claim Agents' Association met on Wednesday morning. Those present were E. C. Carpenter, Anderson, Ind., chairman; M. Spillane, Boston, Mass.; H. K. Bennett, Fitchburg, Mass.; H. V. Drown, Newark, N. J., and B. B. Davis, Columbus, Ohio. The principal work of the committee was to hear the report of the committee on subjects and to arrange a program for the coming year. Different claim agents have been assigned to read papers, and when they have accepted their appointments an announcement will be made.

The classification committee of the American Street & Interurban Railway Accountants' Association also held its first scheduled meeting on Wednesday. The following were present: W. F. Ham, Washington, chairman; F. E. Smith, Chicago; H. L. Wilson, Boston; W. H. Forse, Jr., Anderson, Ind.; W. B. Brockway, New York, N. Y.; F. W. Sweney, special examiner, Interstate Commerce Commission, was also present. The committee began the consideration of about 100 cases involving interpretation of the standard classification of accounts. These questions have been raised since the publication of cases Nos. 1 to 58.

All of the sessions of the midyear meeting are being held in rooms in the United Engineering Societies Building, 29 West Thirty-ninth Street, New York. A program of the entire meeting follows:

WEDNESDAY, JAN. 26

10 a. m.

Classification committee, Accountants' Association.

Executive committee, Claim Agents' Association.

2:30 p. m.

Classification committee, Accountants' Association.

Executive committee, Claim Agents' Association.

THURSDAY, JAN. 27

9:30 a. m.

Executive committee, Accountants' Association.

10 a. m.

Subjects committee, American Association.

Public relations committee, American Association.

Interstate Commerce Commission affairs committee, American Association.

Revision of associate membership committee, American Association.

Compensation for carrying United States mail, American Association.

Classification committee, Accountants' Association.
Executive committee, Transportation & Traffic Association.
City rules committee, Transportation & Traffic Association.
Executive committee, Manufacturers' Association.
State and sectional associations.

2 p. m.

Executive committee, American Association.

FRIDAY, JAN. 28

10:30 a. m.

General conference, American Association.

2:30 p. m.

General conference, American Association.

7 p. m.

At 7 p. m. the visiting delegates will be tendered a banquet by the Manufacturers' Association at the Hotel Knickerbocker. The speakers scheduled for the banquet are:

Hon. James F. Shaw, president of the association, on "The Association."

Hon. John W. Griggs, of New Jersey, former Attorney-General of the United States, on "Electric Railways and the Public."

George A. Post, of New York, president Railway Business Association, on "Railways, Public Opinion and the Equipment Industries."

Dr. Charles W. Colby, of Toronto, professor of history, McGill University, on "Apropos of Canada."

COMMUNICATIONS

ONE THOUSAND SEAT MILES AS A TRAFFIC UNIT

DETROIT, MICH., Jan. 8, 1910.

To the Editors:

I want to propose a new unit to be used in connection with street railways in place of car-miles. I will put forward for discussion the "Traffic Unit," equal to 1000 seat-miles.

All who have had to do with the handling of street railways have recognized the difficulties arising from the use of the car-mile unit, which can only be useful in comparisons on one property and then becomes untrue when double-truck car-miles are compared with single-truck lines. In most cases the income per car-mile for those lines using double-truck cars will be high in comparison with the income of the single-truck cars, while the operating expense will be recorded as the same, although the power used cost more, and the platform expense is less. Another item counting against the power is the fact that some roads seem to take much pleasure in the use of enormously heavy cars, much to the detriment of the track, and adding to the cost of power.

Now the use of the "Traffic Unit" 1000 seat-miles in place of a car-mile takes into account the differences in the seating capacity of cars, and it is seating, or carrying, capacity that brings in the income. Most cars have comparatively the same ratio of seating capacity to carrying capacity; therefore, it is not necessary to use other than the known unit, seating capacity. Someone has suggested the unit ton-mile, but this would be useful only in calculating the relative cost of power. The weight or ton-mile could be compared with the seating capacity or "Traffic Unit" to determine the ratio, from time to time, of dead weight that was being dragged about.

It is when compiling statistics regarding operating income and cost that the full benefit of the use of the "Traffic Unit" is brought out. This unit would be very easily calculated on almost all roads, as schedules are more or less permanent, and the extra time taken to reduce the car-miles to seat-miles and then point off three figures, would be very small indeed.

In studying the service, the "Traffic Unit" per mile of track would give the rate of car service, and in comparisons would show the growth. This can be done with the car-mile, but if car-miles with double-truck cars are counted as equivalent to the same unit with single-truck cars the comparison is misleading; whereas, with the new unit the use of cars with different seating capacities would make no difference.

Again the "Passengers per Traffic Unit" would show the true passenger density and after a few comparisons this would show what number gave the limit of loading cars. When it was being approached, more cars could be provided.

The cost per "Traffic Unit" would take into account the difference in carrying capacity of the cars, so that all lines could be compared, whether in one city or in several. The mere fact that one set of cars was heavier than another would only change the cost per "Traffic Unit." In these days when managers find their equipment consisting of over-heavy cars, a comparison of ton-miles per "Traffic Unit" would be useful also when studying each other's statistics.

I am aware that W. B. Brockway has mentioned the seat-mile in his book on railway accounting, and doubtless others have done the same. B. J. Arnold used seating capacity in his diagrams illustrating the capacity and use of the New York Subways; and only lately Mr. Whitten, librarian of the Public Service Commission, First District, New York, in a very interesting article comparing the results of operation of the New York and Paris Subways, has used seat-miles and passenger-place-miles, the official loading capacity of the Paris cars and the capacity of the New York cars being based on the same official space per passenger. In no other way could Mr. Whitten have shown the results so closely and the only change that I could suggest in connection with his article would be to have divided the seat-mile by 1000, thus making direct use of the proposed "Traffic Unit." The New York Public Service Commissions of both districts evidently see the advantage of the seat-unit basis for comparisons, for in their standard classification of accounts they prescribe it for all companies coming under their jurisdiction. Why not ask for "Traffic Units?"

If this article will only provoke discussion I shall feel that it has fulfilled its purpose to a great extent.

HORATIO A. FOSTER.

WELDING MOTOR CASES BY THERMIT

GOLDSCHMIDT THERMIT COMPANY
NEW YORK, Jan. 24, 1910.

To the Editors:

We note in your issue of Jan. 22 a paragraph on the cost of welding motor cases by the thermit process. This is exceedingly interesting, as it shows clearly the economy which may be effected in repairing broken motor cases in this manner.

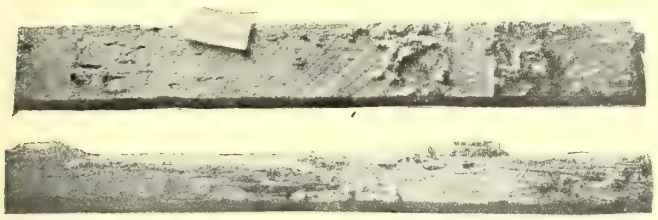
We are inclined to believe, however, that in the majority of cases the cost would run a little higher than your figures indicate. Our experience has shown that the majority of motor case welds require nearer 40 lb. than 30 lb. of thermit, which would make the cost of thermit alone in the neighborhood of $10 for the weld. To this amount should be added the cost of labor, molding material, depreciation on crucible and welding appliances, gasoline and compressed air for preheating, machining finished weld, etc. Were these all kept track of accurately it would probably be found that $13 is too low an estimate for the complete cost of the weld. It is nevertheless a fact that even though the cost be higher than set forth in your paragraph the saving effected by using the process is very great.

GOLDSCHMIDT THERMIT COMPANY,
per W. R. Hulbert.

Moscow, Russia, which has a population of about 1,500,000 and covers 40 sq. miles, is now equipped with a complete electric railway system. The lines have been under construction for the municipality since 1902, among the contractors being the Westinghouse Electric & Manufacturing Company, Brush Electric Company, Dick, Kerr & Company, Brown, Boveri & Company, the Allgemeine Company, and Siemens & Halske. The tramways now extend over a length of 40 miles, and embrace 300 motor-cars and 400 trailers, aside from 600 horse cars rebuilt for trailer service. The motor-cars seat 26 passengers each. The fare is 2½, 4, 5 and 7½ cents. The fare of 2½ cents carries a passenger about 1½ miles; 4 cents is charged for approximately 2½ miles, and 5 to 7 cents for longer distances.

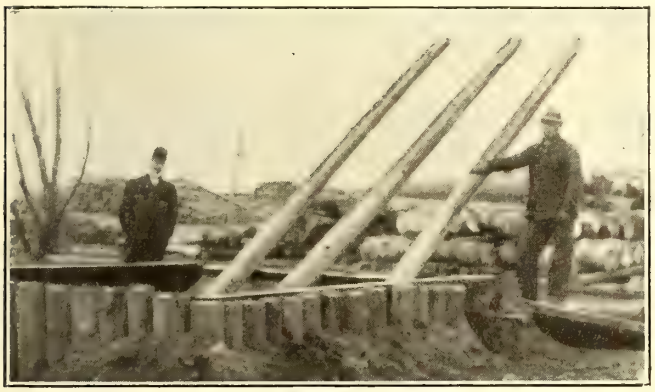
WOOD PRESERVATION BY THE SUPERFICIAL METHOD

Many who have heard of the superficial method of timber preservation suppose that the process means no more than a scant brush treatment. While it is true that the superficial method requires no expensive apparatus, it is essential to exercise due care, both in the selection and application of the



Treated and Untreated Ties from Denver

preservative to insure successful results. It may be of interest, therefore, to present some particulars of the results secured by several Western railway companies with the "C. A. Wood Preserver" as made by the C. A. Wood Preserver Company, Austin, Texas.



Dipping the Butts of Poles

This preservative is a germicide whose preservative action is due to the presence of antiseptic high-boiling (above 300 deg. C.) coal tar oils which remain in the timber while low-boiling oils would either evaporate or leach out. At 300 deg. C. it has a liquid coal tar residue of at least 92 per cent, according to the method of analysis used by the United States Forest Service. It is said to be absolutely free from petroleum residue, the presence of which might mislead the chemist on account of its influence on the specific gravity and the amount of distillate at 300 deg. C. It is possible to obtain a lower distillate than 8 per cent, but such an oil would be unfit to use for timber preservation because it would solidify on cooling or when it reached a normal temperature.

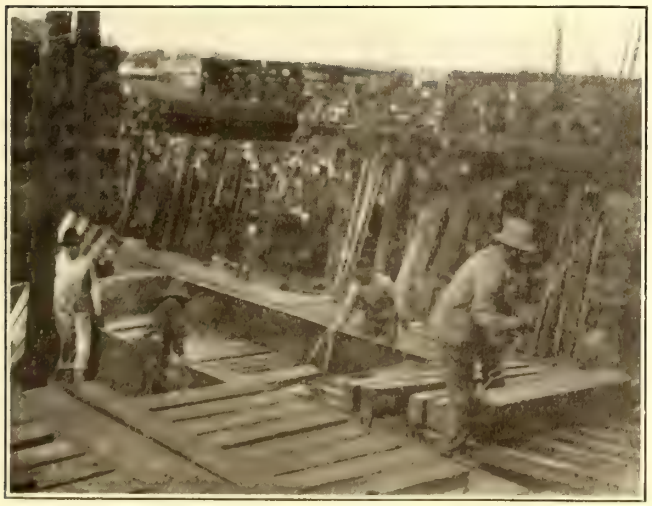
One of the most important railways using C. A. Wood Preserver is the Denver City Tramway Company which has treated about 200,000 ties as well as a large number of poles. In September, 1904, the company laid its first ties treated according to this method. For purposes of experiment, it also installed a number of untreated ties under the same conditions. In 1909, specimens of both ties were removed by the management and presented to the preservative company for exhibition at the October convention of the American Street & Interurban Railway Association and very clearly showed the beneficial effect of the preservative.

In treating its ties, the Denver company uses a tank about 9 ft. wide, 12 ft. long and about 4 ft. deep. The preservative is kept heated at about 200 deg. F. by a slow wood fire under the tank. Yellow pine ties are permitted to remain immersed about 10 minutes, during which period they absorb about ⅓ of a gallon each. The ties are handled to and from the tank with long hooks. This tank method is the most common method of handling pieces of timber. Poles, of course, are dipped only for a certain distance along the butt.



Treating Ties in Metal Tank

Among other companies which have used this treatment for eight years or longer are the Dallas (Tex.) Consolidated Electric Street Railway Company and the Austin (Tex.) Electric Railway Company. On both roads good results have been secured.



Tie-Treating Plant in Denver



Superficial Treatment Applied to Installed Pole

The cost of treatment varies according to the cost of the labor in the location where the treatment is carried on. It has been found, however, that the average long-leaf yellow

pine tie can be treated for 18 cents to 20 cents a tie. In no case has the cost exceeded 20 cents when treating standard 6 in. x 8 in. x 8 ft. ties even for quantities less than 10,000.

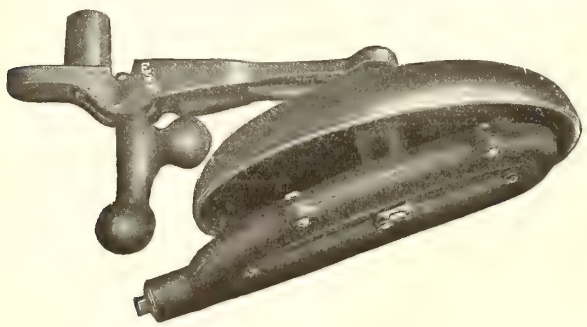
A very interesting point about this superficial treatment is that it has been found possible to arrest the decay of untreated poles which had begun to give way after several years' service. Thus in the summer of 1904, the Memphis (Tenn.) Telephone Company, finding that a number of its poles were rotting at the ground line, had the earth around the poles excavated to a depth of 18 in. and applied two coats of preservative with a brush. The manager of the telephone company is quoted as stating that this treatment would prolong the usefulness of the poles about 10 years.

The preservative is manufactured in Germany and shipments are made direct from the principal American seaports.

NEW AIR VALVES AND BELL RINGER

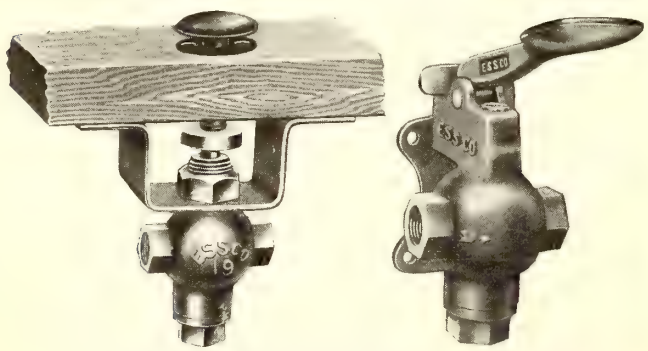
In a description published a short time ago of the 328 cars which the Chicago Railways Company is converting to prepayment service there was a short note in regard to the Keystone pneumatic bell ringer, the foot valve for operating it, and the Keytone pneumatic sander with leakless hand valves. Further particulars of these devices are now available.

The pneumatic bell ringer is made for attachment to either a 10-in., 12-in. or 14-in. standard gong shell, and when installed



Pneumatic Gong with Treadle

will not in any way affect the customary operation of the gong. It is extremely simple in construction, consisting of specially designed castings bolted together, in which a steel ball travels through a raceway impelled by air pressure. The air drives the ball forcibly through the straight portion of the raceway and causes a vacuum in the curved portion. This vacuum draws the ball back to its starting point. The movement of the ball in the raceway is continuous and can be regulated by the operator so that the gong may be given only a few taps or can be



Leakless Air Foot and Sander Valves

operated like an alarm bell, producing a clear, loud, continuous ring. The illustration shows the gong also equipped with a foot treadle.

The Keystone leakless air foot valve, also illustrated, was designed especially for the pneumatic operation of the bell ringer just described. It is placed under the platform out of the way, and is held securely in place by means of a heavy steel support, which is bolted direct to the underside of the platform. The valve is operated by a slight pressure of the foot upon an ordinary metal foot plunger, such as is used with standard foot gongs, which acts directly upon the brass plunger, the latter opening the valve. The leakless feature is accomplished by a double valve seat—one closing when the other opens on every operation, thus preventing loss of air.

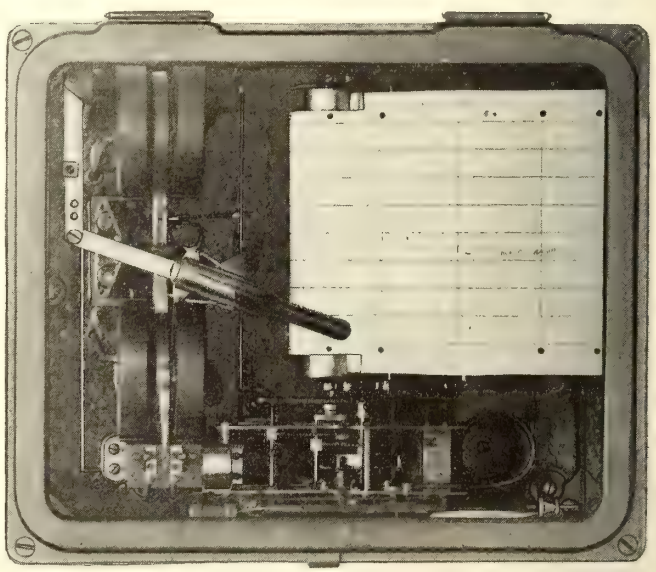
In the design of these valves the manufacturers faced a dilemma because if only a little packing around the stem was used there was considerable leakage of air, while the use of considerable packing required a powerful spring to reseat the valve against friction on the plunger stem, thus making the operation of the valve very difficult. The trouble was finally overcome by introducing an auxiliary valve on the plunger with a corresponding seat in the guide. This auxiliary valve closes when the main valve opens, thereby preventing the escape of air around the plunger. The valve can be placed wherever most convenient for the motorman.

The Keystone leakless air sander valve shown in the final illustration is of the same interior construction as the foot valve already described. In the Chicago Railways cars it is placed directly to the right of the engineer's valve. The design of the valve is such that it cannot be tampered with or operated except by means of the handle supplied with it.

All of these pneumatic devices are manufactured by the Electric Service Supplies Company, of Chicago, Philadelphia and New York.

REDUCTION IN GENERATING EQUIPMENT MADE POSSIBLE BY GRAPHIC METER ANALYSIS OF SUB-STATION LOAD

An example of the value of the graphic recording meter for analyzing power loads was recently shown in a sub-station which supplies power to the terminal yards of a large railroad system. In this instance it was found possible to reduce the capacity of the machines operating by more than half. The sub-station referred to contains one 37½-kw and two 25-kw motor generator sets. These supply direct current at 250 volts to three turntables and one small crane. Each of the turntables is driven by a 22-hp series motor with rheostat controller, and is capable of turning a locomotive 180 deg. in one



Graphic Recording Meter

minute. The crane is about 5 tons capacity, and subject to very intermittent service, so that its operation has little effect on the total station load.

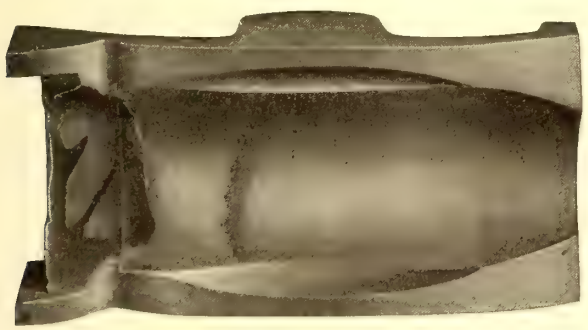
The turntables are held ready for service at all times. A locomotive to be turned goes to the nearest unoccupied table, and in this way it rarely happens that two turntables are started at once, although two or three may be in operation at the same time.

Before the study of the actual load conditions had been begun, it was customary to operate all three motor-generator sets during the rush hours. At these times the violent oscillation of the needles of indicating meters on the generating panels, striking against the stops, seemed to indicate that more generating capacity was needed. To determine this latter question definitely, a Westinghouse graphic recording meter was obtained and inserted in the main feeder. The tests covered a week's careful study, during which time the load on the station was continuously recorded. A rush-hour record shows that the average peak encountered during the starting of a turntable is 120 amp. This drops to a value of from 50 amp to 70 amp during operation, after the table has been accelerated. The maximum peak noted was about 180 amp at the time of starting two turntables simultaneously. As the full load current of the 37½-kw motor generator set alone is 150 amp, it is clear that the existing station capacity is ample to handle the present service besides a large future increase.

Since the tests it has been found necessary to operate only the one largest unit, and the former practice of running all three sets has accordingly been discontinued. The result has been improved operating economy, efficiency and load factor. This example is an instance where, in spite of a suspected insufficient station capacity, it was demonstrated that less than half the equipment already installed was needed for the existing demand. The graphic indicating meter is equally impartial in showing up overloaded apparatus, and often performs valuable service in indicating unsuspected load conditions which give rise to excessive heating and impaired regulation and efficiency, the cause of which cannot otherwise be traced.

COMPOSITE BRASS FOR JOURNAL BEARINGS

J. Frank Lanning & Company, Pittsburgh, Pa., have brought out for electric railway journal bearings what they term the "Howard" composite brass. It is asserted that the arrangement of the special babbitt and special brass in alternate rows makes a hot box practically impossible. Even if no oil reaches the journal, there would be no damage because the babbitt will run out. If oil or grease is put into the box, the slots worn in the bearing become lubrication cups and thereby permit operation to be continued. The fact that oil ways are formed throughout the lining insures a thorough distribution of the lubricants over the entire face of the journal. The manufacturer states that this composite brass never touches sand in its making, so that there is no possibility of a hot box from this source.



Composite Journal Bearing After a Run of 124,000 Miles

The accompanying cut shows a journal composite bearing which is reported to have made 124,000 miles on a Peckham No. 14 B-6 double truck carrying a 20-ton, 44-passenger car of the Northampton Traction Company, Easton, Pa. The journal was cut from 3½ in. to 2 15-16-in.; the bearing surface on the front end was 1 in. and on the back end 4¼ in., leaving 2¼ in. without any bearing surface. Among the companies using this composite brass are the Lehigh Valley Transit Company, Allentown, Pa.; the Central Pennsylvania Traction Company, Harrisburg, Pa.; Interstate Railways, Philadelphia, Pa., and the Houston (Tex.) Electric Company.

WOOD PRESERVATION

An account of the early sessions of the annual meeting of the Wood Preservers' Association, held at the Auditorium Hotel, Chicago, on Jan. 18, 19 and 20, was published last week.

In relation to the treatment of timbers with crude petroleum, C. Marshall Taylor reported that two railroads, the National Lines of Mexico and the Santa Fé, have undertaken the use of this method. This kind of treatment is radically different from all others. Heretofore it has been considered essential to have in the preservative medium an element that was either germicidal or antiseptic in its nature, but the crude oil treatment depends upon an entirely new conception of preservation and that is the elimination of air and moisture, proceeding on the theory that in order that fungi may thrive there must be present three essential conditions, moisture, air or oxygen and the proper temperature. Timbers treated with crude oil have been used in an experimental railroad track near Pelican, Tex., for over three years, and some ties taken out of that track recently for examination were found to be entirely free from all indications of decay. As yet pine has been the principal wood used in the experiments, and there is apparently no difficulty in impregnating thoroughly all the sap wood of the different species of pine. The success of the treatment depends upon the thorough impregnation of the sap wood with all the oil that it is possible to force into it.

R. L. Allardyce had a paper relating to the amounts of various antiseptics required per cubic foot to obtain good results. In the creosoting process the speaker recommended a treatment of from 12 to 15 lb. to the cubic foot for telegraph and telephone poles. For ties he advocated a 10-lb. treatment, unless protected by tie plates. Then a heavier treatment was advisable. In the zinc and oil method he suggested a solution of zinc chloride, using about a half-pound of dry salts to the cubic foot, making practically a 4 per cent solution; then an injection of from 3 to 4 lb. of oil. For the straight zinc or burnettizing process, the same amount of dry salts to the cubic foot is suggested, but in the ratio of a half-pound of dry salts to 15 lb. of water, making practically a 15-lb. treatment to the cubic foot.

"Inflammability of Treated Timber" was the subject of H. M. Rollins. He confined himself to two processes, burnettizing and creosoting. The former is a treatment with zinc chloride, and the presence of this preservative in the timber not only does not increase its inflammability, but, on the other hand, to a great extent fireproofs it; any attempt to burn timber treated with a solution of zinc chloride will demonstrate that it is less inflammable than a similar piece untreated. In relation to creosoting or treating timber with the dead oil of coal tar, there has been considerable prejudice, due to the impression that the timber so treated is very inflammable, but Mr. Rollins is quite clear that creosoted material becomes, after a short time, less inflammable than similar wood untreated. Timber freshly treated with creosote is more inflammable than untreated material, but its degree of inflammability decreases gradually as it grows older, until after a certain length of time, which is variable, it is no more inflammable than untreated material; from that time on it becomes less inflammable than untreated material, and finally reaches a point where a great deal of heat is necessary to ignite it. This is due to the gradual vaporization of the inflammable constituents of the oil. The speaker gave the result of a test on an electric light pole which had been treated with 11 lb. of oil per cubic foot four years before the test. It was compared with an untreated pole of slightly larger diameter than the one treated. Fires were kindled around the bases of two poles in exactly the same manner. The two poles ignited about the same time, and in a few minutes were blazing freely for about 5 ft. above the ground. After the poles were burning the coals around the bottoms were removed and the poles allowed to continue to burn. The creosoted pole continued to burn for about 10 minutes, when the fire ceased, and the only damage was a surface charring about ¼ in. deep, reaching as high as the fire on the

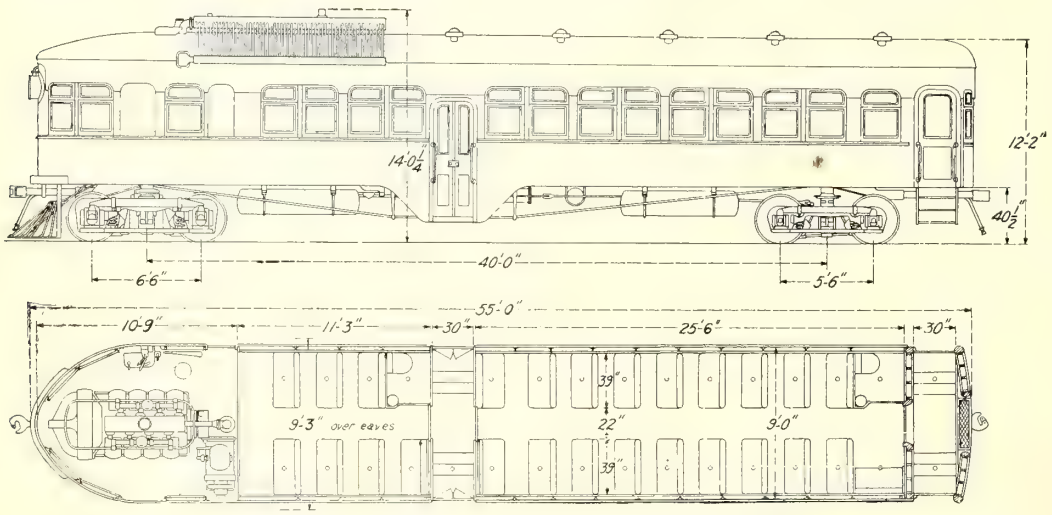
ground from the pile of kindling reached. Above that point as high as the flames reached the pitch-like coating was burned until it had the appearance of lampblack. The untreated pole continued to burn at a point near the ground, and fell after burning for 2½ hours, burned completely in two. This test seems to demonstrate that it would be impossible to burn a well-seasoned, creosoted pole with a grass fire, as sometimes happens with untreated poles.

The officers of the association were elected as follows: President, Walter Buehler, St. Louis; first vice-president, C. W. Berry, Laramie, Wyo.; second vice-president, David Allerton, Madison, Ill.; third vice-president, C. E. Chanute, Chicago; secretary and treasurer, F. J. Angier, Galesburg, Ill. Chicago was selected as the place of the next annual meeting.

GASOLINE-ELECTRIC CARS FOR SOUTHERN RAILWAY

The accompanying cut shows the plan and elevation of the gas-electric motor cars recently purchased by the Southern Railway Company from the General Electric Company, and now under construction. These cars have been designed with special reference to traffic conditions in the South. The car is divided by a center entrance. The seating capacity forward of this entrance is 14 and to the rear is 38, making a total seating capacity of 52 passengers. A rear entrance is also provided, thus completely dividing the forward and rear passenger compartments.

The car body is 55 ft. long over bumpers, and of this space the engine compartment will take up 10 ft. 9 in., leaving the balance for passengers and platforms. The car will be constructed of steel framing and sheathed with steel plates. The interior trim will be of mahogany. The truck under the engine compartment will have a wheelbase of 6 ft. 6 in. and will be equipped with M.C.B. 33-in steel wheels. On each axle of this truck will be mounted a 100-hp, 600-volt box-frame, commutating pole, railway motor, type GE-205, thus giving the car a motor capacity of 200 hp.



Gasoline-Electric Car for the Southern Railway

There will be in the engine compartment a direct-driven gas-engine generator set, the engine being of the eight-cylinder "V" type, with each cylinder 8 in. diameter by 8-in. stroke. An eight-pole, 600-volt interpole generator will be direct-coupled to this engine. This set will be mounted on a cast-iron base, and all parts will be above the floor line and readily accessible. Current from the generator will be supplied to the motors through a controller, the function of which is to place the motors progressively in series and parallel, and to vary the resistance in the shunt field of the generator by numerous steps, thereby varying the impressed voltage on the motors. The engine ignition is furnished by a low-tension magneto and magnetic spark plugs. The carburetter is of the overflow type and hot-water jacketed. Compressed air is used for starting the engine by being supplied to the several cylinders in succession through a distributing valve. The compressed air is furnished from a pump direct-driven by the main crankshaft. A small auxiliary gas engine will drive an auxiliary pump to supply compressed air to the main reservoirs when necessary. This gas engine is also direct-connected to a car-lighting generator. A radiator is placed on the roof of the car to provide means for cooling the engine on the thermo-siphon principle. During the cold weather hot water from the engine circulating system will be by-passed through the passenger compartments. Combined straight and automatic brakes will be used besides an auxiliary ratchet and hand brake.

As there is no mechanical transmission between the engine and the axle, the speed of the engine is not a function of the speed of the car; consequently the gas engine may be operated to give its maximum output irrespective of the speed of the car, a characteristic of great value in emergency or heavy work.

NEW TELEPHONE SYSTEM FOR CHICAGO & MILWAUKEE ELECTRIC RAILROAD

The Chicago & Milwaukee Electric Railroad Company is constructing a new telephone system for handling its train dispatching and company business. Formerly the Bell telephone lines were principally used for this service. Now a 20-drop switchboard will be installed in the office of the superintendent at Highwood and will be in charge of a train dispatcher. About 500 miles of wire, the larger part of which is No. 10 B. & S. gage bare copper, are being strung for the telephone circuits. From Highwood the circuits will extend north and south, connecting Evanston and Milwaukee, and west on the Libertyville division. A running form of transposition is used. Transpositions are spaced every 500 ft. About 50 telephone instruments will be installed at once. Five-bar generators will be used in the instruments on the line for calling the dispatchers, who will work in three tricks of eight hours each and will use a headpiece so that they can listen in on the line at all times. A standard dynamotor ringing outfit will be installed to furnish ringing current for the dispatcher to use in calling outlying stations. A simplified ringing code is to be adopted.

The new lines are being installed in duplicate on all branches, and each telephone will be arranged so that it may be connected to either line. It is expected that the whole system will be in operation about March 1.

According to statistics on collisions with other vehicles, as furnished to the Vereins Deutscher Strassenbahn und Kleinbahn-Verwaltungen (German Street & Interurban Railway Association) by 145 companies, there was one collision for every 24,040 car-km (14,905 car-miles) operated in 1907. In 62.5 per cent of all cases it was admitted or proved in court that the drivers of the foreign vehicle were at fault, and in only 9.4 per cent of all cases that the motorman was to blame. It is interesting to note that in 1900 the motormen were responsible in fully 15.3 per cent of all cases.

The American Consul-General at Hamburg, Germany, reports that the use of steel ties is increasing rapidly. In 1888 Germany used 123,600 tons of metal for ties, but in 1907 it used 494,500 tons for this purpose.

News of Electric Railways

Resolution Passed Continuing Committee of Fifty in Detroit

At the meeting of the City Council of Detroit, Mich., on Jan. 18, 1910, the following resolution, drawn by Mayor Breitmeyer, asking that the Committee of Fifty reconvene to consider the reports of the sub-committees, now in the hands of the Council, and make recommendations therefrom, was passed:

"Resolved, That the Committee of Fifty appointed by his honor the Mayor to investigate the street railway question be and is hereby requested to continue its organization and hold itself in readiness to take up for consideration any part of its report which may be disputed by the Detroit United Railway, afford the said company hearings thereon, take such evidence as may be offered on the matters under dispute and report its findings and opinions to the Common Council; and be it further

"Resolved, That the committee be and is hereby requested to adopt its report and make a recommendation."

An ordinance introduced by Alderman Koenig, as drafted by Corporation Counsel Hally, provides for a 3-minute service on the lines of the Citizens' Railway between 6:30 a. m. and 8 p. m., with the exception of 6:30 a. m. to 8 a. m. and 5 p. m. to 6:30 p. m., when it is stipulated that a 1-minute service shall be maintained south of the Warren Avenue intersection on the west and Forest Avenue on the east side. On Saturdays a 3-minute service only is outlined between 5 p. m. and 6:30 p. m. and on Sundays and holidays the company is expected to maintain sufficient cars to handle traffic expeditiously. Between 6.30 p. m. and midnight each day a 5-minute service is stipulated. The ordinance has passed second reading.

A resolution providing that a public meeting be called by the committee on franchises to consider the terms of the Codd-Hutchins settlement, which was originally drawn in 1905 and which J. C. Hutchins, president of the Detroit United Railway, says can not now be accepted, as referred to in the ELECTRIC RAILWAY JOURNAL of Jan. 22, 1910, page 161, was passed by the Council.

A resolution was also introduced that all matters touching the street railways settlement be taken from the joint committee on ways and means and franchises which now has them in hand and referred to the Council as a whole. This resolution was laid on the table without discussion.

Newton D. Baker, city solicitor of Cleveland under Mayor Johnson, has replied as follows to an inquiry from the Committee of Fifty of Detroit regarding the question of computing unexpired franchises as part of the capitalization on which a return must be allowed:

"It seems to me that the question whether or not franchise values are to be included in the amount of investment upon which the Detroit United Railway should be allowed 6 per cent return is comparatively simple.

"To the extent that the company now has unexpired franchises at a rate of fare higher than would be necessary to pay operating expenses and interest, the privilege thus granted to the company is not only a valuable privilege, but one which must be assumed to have been granted in compensation for some burden assumed by the company. The paving obligations, for instance, which the company assumed called for an extensive capital expenditure which must be amortized at the end of the grant.

"Now the amortization fund must come from the net earnings above operating expenses, taxes and interest, and therefore from franchise value. Development expenses, the costs of experimentation, contingencies in construction, casualties, financing and such other general charges as must be met by a company constructing a property do not become a part of the permanent value of the property, but rather are in the nature of initial expense. They, too, for the most part, if not entirely, should be amortized at the end of the grant. So that the franchise value granted by a city must in theory be deemed the fund provided by the city for the amortization of these charges. If this view is sound it follows, quite naturally, that whatever unexpired franchise value the company now has should be allowed to it in undertaking to estimate the present value of its property.

"As I have said, this is, confessedly, a moderate view, and does not state the public side as strongly as it is possible to state; for if the public preferred to wait until the expiration of a grant it would no doubt be able to force a settlement upon a basis that would not recognize the assembled value of the property, but would be just enough above its scrap value to dissuade the company from scrapping its plant. I incline to a liberal policy, recognizing the public need of continued service, and in a sense forgetting and forgiving past misconduct on the part of such companies, so that the new start can be made with a general good feeling and an assurance on the part of the public that they have been more than just to the company."

Cleveland Traction Situation

With the approval of Judge R. W. Tayler, Warren Bicknell, receiver of the Municipal Traction Company, has decided to request authority from the City Council to continue to operate all the lines on which franchises expired on Jan. 26, 1910, at a 3-cent fare, under the conditions in force on lines of the Forest City Railway, which include the payment by passengers of 1 cent for a transfer, which sum is rebated when the transfer is taken up by the conductor. Judge Tayler deemed this the wisest course pending the vote on the general franchise on Feb. 17, 1910. The St. Clair Avenue, Superior Avenue, Payne Avenue, Scovil Avenue and Clark Avenue and the 105th Street, West Twenty-fifth Street and Ontario Street lines are affected. The franchise will become operative 10 days after the election if it is approved. If the ordinance is defeated another franchise will have to be drawn.

The operation of cars in Cleveland was seriously interfered with on Jan. 21 and Jan. 22 by a snowstorm which was accompanied by a high wind. It is said that as many as 14 cars were derailed at one time. The company employed all the men it could secure to clean the tracks, but on Jan. 23 was compelled to abandon service temporarily on the St. Clair Avenue line and on one or two others. One of the features of the work of keeping the lines open on Jan. 23 was the use of large automobiles for towing stalled cars out of drifts. Several automobiles equipped with ropes were kept in readiness, and on receiving calls would go to aid the stalled cars. It is said that they failed in only a few instances to move the cars.

The City Council at its meeting on Jan. 17, 1910, repealed the grants made to the Cleveland Underground Rapid Transit Company by the Johnson administration. W. R. Hopkins, of the company, said that the action was illegal because the company had accepted the grants. Neither of the grants has ever been completed, however. On one the count of the referendum vote was stopped by injunction and the same action was taken when the second grant, practically a duplicate of the first, was advertised. In order to test the matter, it is probable that petitions will be circulated for a referendum vote on the second grant, which now stands repealed. Should the grant be defeated, the matter would be settled. The Council repealed the grant on the ground that a better offer may be secured than the company made, and because the grants would prevent any other company from building a subway, even if the Cleveland Underground Rapid Transit Company does not make use of its grants.

Transit Affairs in New York

The contract under which the platforms of the subway are to be lengthened has been placed before the corporation counsel by the Public Service Commission. Frank Hedley, general manager of the Interborough Rapid Transit Company, says that as soon as the contract is signed work will be started. It is estimated that the work will take one year to complete. It will increase the passenger

capacity of the subway by one-fourth. The lengthened platforms will accommodate 10-car express trains instead of 8-car trains, and the local platforms 8-car trains instead of 5-car trains as at present.

Mayor Gaynor has approved the resolution of the Board of Estimate and Apportionment fixing Feb. 4, 1910, as the date for a public hearing on the petition of the Manhattan Bridge Three-Cent Line for a franchise.

New subways built with money derived wholly or in part from assessments on property benefited by additional transportation facilities as a possible alternative to taking the funds from the city treasury were suggested by George McAneny, president of the Borough of Manhattan, in an address on Jan. 10, 1910. Mr. McAneny said: "The city has reached a point where we find a stone wall ahead of us in the new constitutional debt limit. Many betterments needed have been proposed, but at an expense of millions of dollars, which the city has not in hand and cannot borrow. We cannot produce ideal conditions. I ask tolerance in viewing what we are about to try to accomplish."

The Public Service Commission has sent to the Tax Department a statement showing that the present subway, with its extensions to Brooklyn and Van Cortlandt Park, had cost up to Dec. 31, 1909, $52,254,468. In addition, the Manhattan portion of the so-called Brooklyn loop lines, connecting the three downtown bridges, cost up to date $6,931,954, making a total for all subways thus far constructed of $59,206,423.

It was announced recently that the Public Service Commission had communicated with the city authorities, asking for definite information regarding the city's rights in those streets in which it is proposed to construct subways. Under a recent decision of the Court of Appeals the city apparently does not own the fee in many Brooklyn streets and will have to pay damages to property owners for the easements taken in subway building. Work is to be begun at once by the Tide Water Building Company on the Fifth section of the Fourth Avenue subway.

Southern Pacific Railroad Electrification

The Southern Pacific Railroad has announced that it is proposed to operate cars by electricity between San José, Meridian Corners, Monte Vista, Los Altos, Mayfield and Palo Alto. The line from Mayfield to Los Gatos will be affected, as steam trains will hereafter use only the east track of the double-track line between Mayfield and Congress Junction, the west track being turned over to the Peninsula Railways, which is now equipping the line for operation by electricity to Monte Vista, where the tracks connect with those of the Cupertino line to San José. Five multiple-unit cars for the new service have already been received from the St. Louis Car Company. The construction of the substation and power house at Los Altos and the installation of the machinery remain to be completed.

J. Kruttschnitt, vice-president and director of maintenance and operation of the Southern Pacific Railroad, who in August, 1907, announced the appointment of Frank J. Sprague and Allen H. Babcock, electrical engineer of the company, to study the question of electrifying the Sacramento division of the Southern Pacific Railroad from Rocklin to Sparks, a distance of 83 miles, is quoted by the *Wall Street Journal* as follows: "Eastern critics may be inclined to the opinion that we are dallying with this matter. We have found that it pays well to make haste slowly with regard to innovations. No road other than the Great Northern has done much with electrification as a solution of the mountain problem. The Great Northern Railroad's only important piece of electrification so far is through the 14,000-ft. Cascade tunnel, 100 miles east of Seattle, where the grade is only 1.7 per cent. Over the Sierras the Central Pacific Railroad must conquer a grade of 7000 ft. either way in a total distance of 110 miles, or a grade of almost 2.5 per cent. Electrification for mountain traffic does not carry the same appeal that it did two years ago. Oil-burning locomotives are solving the problem very satisfactorily. So well pleased were we with the behavior of the two compound consolidation Mallets mentioned in the last annual report of the Southern Pacific Railroad that we ordered 16 more, the last of which are being delivered. Each of these locomotives, having in excess of 3000 hp, hauls as great a load as two of former types, burns 10 per cent less fuel and consumes 50 per cent less water."

Pacific Claim Agents' Association.—The meeting of the Pacific Claim Agents' Association has been postponed to May 20 and 21, 1910, at San Francisco, Cal.

London & Port Stanley Railway to Consider Electrification.—The directors of the London & Port Stanley Railway, London, Ont., Can., have decided to appoint a committee to report on the advisability of electrifying the line as a means of competing with the Southwestern Traction Company, which operates from London to St. Thomas and Port Stanley, a distance of 30 miles.

Public Utilities Tribunal Recommended for San Francisco.—The committee appointed by Mayor Taylor of San Francisco in October, 1908, "to investigate and report on the causes of municipal corruption in San Francisco, as disclosed by the investigation of the Oliver Grand Jury, and the prosecution of certain persons for bribery and other offenses against the State," has reported in favor of a judicial tribunal for the determination of charges for public utilities.

Railroads Object to Excessive Proportionate Cost of Grade Elimination in Wilkes-Barre.—The four steam roads entering Wilkes-Barre, Pa., and the Wilkes-Barre & Wyoming Valley Traction Company, Wilkes-Barre & Hazleton Railway and the Lackawanna & Wyoming Valley Traction Company have informed the city of Wilkes-Barre that they cannot agree to the city's proposition that they bear 85 per cent of the estimated cost of $7,000,000 for eliminating all grade crossings within the city limits. They contend that the city should bear more than 15 per cent of this cost.

Employees' Entertainment in Brooklyn.—The annual entertainment of the Brooklyn Rapid Transit Employees' Benefit Association was held in the main building of the association on Jamaica Avenue, Brooklyn, N. Y., from Jan. 17 to Jan. 22, 1910, inclusive, in the afternoons and evenings. The program of events included selections by the band composed of the employees of the company and a vaudeville bill of 14 numbers which embraced songs, comedy sketches and acrobatic feats. As usual, the time for the attendance of the employees of the different divisions of the company was designated in advance and tickets to the entertainment, which included transportation to and from the club rooms, were distributed by the heads of the departments to the employees and their families. George W. Edwards, secretary of the association, reports that approximately 10,000 people attended the 12 performances, and that at each performance officers from the various departments of the company were present. A feature of the program, which elicited many favorable comments, was the excellent performance of the band composed of the employees.

Resignation of Bernard Corrigan.—In an editorial in the *Kansas City Journal* recently, the following tribute was paid to Bernard Corrigan, whose resignation as president of the Kansas City Railway & Light Company, Kansas City, Mo., was announced in the Electric Railway Journal of Jan. 22, 1910: "The retirement of Bernard Corrigan from the presidency of the Metropolitan Street Railway is an announcement that will cause universal regret in Kansas City. Always active in all of the city's affairs, Mr. Corrigan has been one of the most pronounced factors in the city's development. During all the years of his life here his personal and business reputation has been irreproachable. Even those who held interests antagonistic to him acknowledged Mr. Corrigan's fairness and justice in all things. His loyalty to the city has been demonstrated in a hundred ways. Mr. Corrigan retires to devote more time to his private interests and the estate of his brother. The people of Kansas City, without regard of politics, race or color, will unite in wishing him many years of well-earned ease in the full knowledge that he occupies a high eminence in the respect, the confidence and the affection of his fellow citizens."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—A bill has been introduced in the House to provide for half fares on street and elevated railways to pupils of normal schools and business colleges. A bill introduced by Mr. Henebery, of Worcester, foreshadows a struggle between municipalities and electric railways in con-

nection with the granting of franchises to allow street railways to carry freight. Under the existing law all electric railway freight and express franchises are of an unlimited character, and in a recent appeal before the Railroad Commission in connection with a franchise desired by the Old Colony Street Railway in Weymouth, the commission expressed doubt about its authority to approve the grant of a limited franchise as desired by the Selectmen. The companies do not feel like making the investment necessitated to establish an express service unless some assurance can be had of permanency. A bill to allow the New York, New Haven & Hartford Railroad to acquire the Berkshire Street Railway brings up again the questions of steam railroad control of electric railways. The measure also permits the New York, New Haven & Hartford Railroad to acquire or construct electric railways west of the Connecticut River in Massachusetts. If authority is granted the New York, New Haven & Hartford Railroad to acquire the Berkshire Street Railway, the stockholders of the Berkshire Street Railway who desire to sell their holdings are to be granted the right to ask the commission to appraise their holdings, and the New York, New Haven & Hartford Railroad is to be required to purchase the stock at the valuation fixed by the commission. The New York, New Haven & Hartford Railroad is pledged to expend $2,000,000 in constructing new lines and extending those already operated by the Berkshire Street Railway, subject to the approval of the commission. In 1909 the question of the control of the Berkshire Street Railway by the New York, New Haven & Hartford Railroad was referred to the 1910 session, in order to avoid complicating the problem of the merger of the Boston & Maine Railroad and the New York, New Haven & Hartford Railroad in the Boston Railroad Holding Company. This merger has since been accomplished. Former Representative Kiley has filed a bill to abolish the present Boston Transit Commission, Massachusetts Railroad Commission and Massachusetts Gas & Electric Light Commission, and create two public service commissions, one to include Boston and the metropolitan district, and the other the balance of the State. The salary of each commissioner would be $8,000. Bills have been introduced on behalf of the Selectmen of Hyde Park and Dedham to authorize the granting of locations to the Boston Elevated Railway in these towns, and to lease to the Boston Elevated Railway or the West End Street Railway the lines of the Old Colony Street Railway within these municipalities; to permit the Springfield Street Railway to purchase the Suffield Street Railway; to authorize steam railroads to electrify their systems within the Boston metropolitan district.

Ohio.—The public utilities bill prepared by Representative Frank W. Woods for introduction in the House on Jan. 24, 1910, provides for a commission of three members at a salary of $5,000 per year each, only two of which may belong to the same political party. The appointments to the commission are to be made by the Governor and are to be confirmed by the Senate. This body will be known as the Public Utility Commission of Ohio. It will have jurisdiction over steam and electric railroads, express, telegraph, telephone, sleeping car, freight line, electric light, gas, natural gas, pipe line, waterworks, messenger signal, union depot, water transportation, heating and cooling companies, but it cannot take away from a municipality any of the franchise rights or powers with which a city is vested by other laws. The commission is given authority to decide the question of the reasonableness of charges for service furnished by companies under the jurisdiction of the commission. All public utilities are required to file with the commission a complete schedule of its charges for service, but the right is reserved to the companies to appeal to the Common Pleas Court from the finding of the commission within 30 days after an order has been issued by the commission. The burden of proof rests with the plaintiff in all actions of this kind. Special rates, rebates and the issuance of passes are prohibited. All public utilities are required to report to the commission, and the commission is authorized to appraise the properties of the companies. The stock of all public utility companies are to be sold at par and bonds are not to be sold for less than 75 per cent of their face value.

Financial and Corporate

New York Stock and Money Market

January 25, 1910.

Since the collapse of the Columbus & Hocking pool stocks have been weak and lower, although the trading has been active. To-day the market declined from 1 to 5 points, due primarily to alarm over the threats of corporate prosecutions and restrictive legislation. The traction stocks have shared in the general depression. Interborough-Metropolitan, in very active trading, has sold off several points, while Brooklyn Rapid Transit and Third Avenue are both much lower.

The money market continues to be fairly easy, with rates surprisingly low for the market condition. Quotations today were: Call, 3 to 3½ per cent; 90 days, 3¾ to 4 per cent.

Other Markets

In rather active trading in Philadelphia the shares of the Electric Storage Battery Company declined from 62 to 56 and closed to-day at 57¾. Tractions have been dull with insignificant price changes.

In the Chicago market, tractions have been almost entirely out of the trading. Series 1 and 2 of the Chicago Railways Company, which were active a fortnight ago, share in this stagnation.

In the Boston market, Massachusetts Electric continues to be active, but prices are practically unchanged. Boston Elevated and Boston Suburban have both been in the market in a small way.

There is no trading in traction securities in Baltimore, except in the bonds of the United Railways which are active, although there is no material change in prices.

Quotations of various traction securities as compared with last week follow:

	Jan. 18.	Jan. 25.
American Railways Company	a49	a47½
Aurora, Elgin & Chicago Railroad (common)	a62	*62
Aurora, Elgin & Chicago Railroad (preferred)	a93	*93
Boston Elevated Railway	133½	132½
Boston & Suburban Electric Companies	a16	*16
Boston & Suburban Electric Companies (preferred)	a76	*76
Boston & Worcester Electric Companies (common)	a11½	a11
Boston & Worcester Electric Companies (preferred)	46	45
Brooklyn Rapid Transit Company	75¾	71½
Brooklyn Rapid Transit Company, 1st pref., conv. 4s	84⅞	83
Capital Traction Company, Washington	134	a135
Chicago City Railway	185	185
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	*108	a105
Chicago Railways, ptcptg., ctf. 2	31	a30
Chicago Railways, ptcptg., ctf. 3	*17	a17
Chicago Railways, ptcptg., ctf. 4s	*9½	*9½
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	*77	a77
Consolidated Traction of New Jersey, 5 per cent bonds	*106	a106
Detroit United Railway	*63	*63
General Electric Company	154¼	150½
Georgia Railway & Electric Company (common)	a105½	105½
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	23½	20¼
Interborough-Metropolitan Company (preferred)	60⅝	55
Interborough-Metropolitan Company (4½s)	82⅜	80½
Kansas City Railway & Light Company (common)	*36	*36
Kansas City Railway & Light Company (preferred)	*70½	*70½
Manhattan Railway	137¾	136¾
Massachusetts Electric Companies (common)	a18½	a18
Massachusetts Electric Companies (preferred)	80	a81
Metropolitan West Side, Chicago (common)	*17½	a17
Metropolitan West Side, Chicago (preferred)	53	a54
Metropolitan Street Railway	21	*21
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	79½	76¼
Northwestern Elevated Railroad (common)	*17½	a18
Northwestern Elevated Railroad (preferred)	*70	a68
Philadelphia Company, Pittsburg (common)	a51	a50½
Philadelphia Company, Pitsburg (preferred)	a45½	a45¼
Philadelphia Rapid Transit Company	a25½	a25½
Philadelphia Traction Company	a88½	a88
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs	a106½	a106
Seattle Electric Company (common)	a115	*115
Seattle Electric Company (preferred)	a104½	*104½
South Side Elevated Railroad (Chicago)	*55	a54
Third Avenue Railroad, New York	16¼	15½
Toledo Railways & Light Company	13½	11
Twin City Rapid Transit, Minneapolis (common)	113¼	111
Union Traction Company, Philadelphia	a51	50¼
United Rys. & Electric Company, Baltimore	a14	a13½
United Rys. Inv. Co. (common)	39⅞	a33
United Rys. Inv. Co. (preferred)	*71⅞	a56½
Washington Ry. & Electric Company (common)	a42¼	a40
Washington Ry. & Electric Company (preferred)	a90¼	a88⅝
West End Street Railway, Boston (common)	a91½	a95
West End Street Railway, Boston (preferred)	*106	*106
Westinghouse Elec. & Mfg. Company	73¾	71
Westinghouse Elec. & Mfg. Company (1st pref.)	*130	120

a Asked. * Last Sale.

Report of Interborough-Metropolitan Company

A statement of the earnings of the Interborough-Metropolitan Company, New York, N. Y., for the calendar year ending Dec. 31, 1909, was presented to the stockholders of the company at the annual meeting on Jan. 18, 1910. The surplus balance of income account on Dec. 31, 1908, as given in the report, was $767,943. The total receipts for the year ending Dec. 31, 1909, were $4,110,524 and the total disbursements were $3,372,216, leaving a surplus income of $738,308. The assets as given in the balance sheet as of Dec. 31, 1909, were $211,102,105, and the liabilities $211,102,105. The report as presented to the stockholders follows:

RECEIPTS.

Dividend of 2¼ per cent on 339,128 shares of Interborough Rapid Transit Company capital stock—		
For the quarter ended March 31, 1909		$763,038
For the quarter ended June 30, 1909		763,038
For the quarter ended Sept. 30, 1909		763,038
For the quarter ended Dec. 31, 1909		763,038
		$3,052,152
Interest on bank balances, loans, etc		290,429
		$3,342,581
Surplus balance of income account, Dec. 31, 1908		767,943
Total		$4,110,524

DISBURSEMENTS.

Interest on $67,825,000 Inter-Met. 4½ per cent collateral trust bonds for 9 months ended Sept. 30, 1909	$2,289,094	
Accrued interest thereon for 3 months from Oct. 1 to Dec. 31, 1909	763,031	
		$3,052,125
Administration and general expense account	$215,839	
Taxes	104,252	
		320,091
		$3,372,216
Surplus income		$738,308

The general balance sheet of the company as of Dec. 31, 1909, follows:

ASSETS.

Interborough Rapid Transit Company capital stock, at cost in securities of this company		$104,563,042
Metropolitan Street Railway capital stock, at cost in securities of this company		68,684,455
Metropolitan Securities Company capital stock, at cost in securities of this company		28,329,695
Metropolitan Securities Company, loans secured by three-year 5 per cent improvement notes and stocks and bonds of subsidiary companies as collateral		8,281,204
Office furniture and fixtures		6,902
Engineering, in suspense (additional subways)		100,152
Metropolitan Securities Company stock, full paid		36,773
Cash and accounts receivable		1,099,882
Total		$211,102,105

LIABILITIES.

Capital stock—common	$100,000,000	
Reserved against outstanding stocks not acquired.	6,737,808	
		$93,262,192
Capital stock—preferred	$55,000,000	
Reserved against outstanding stocks not acquired.	9,260,000	
		45,740,000
Collateral trust 4½ per cent bonds	$70,000,000	
Reserved against outstanding stock not acquired.	2,175,000	
		67,825,000
Notes payable		2,749,400
Accrued interest for three months to Jan. 1, 1910, on Interborough-Metropolitan 4½ per cent bonds (covered by dividend of Interborough Rapid Transit Company, paid Dec. 31, 1909)		763,031
Accounts payable		24,174
Income Account, surplus		738,308
Total		$211,102,105

In presenting the report to the stockholders, Theodore P. Shonts, president of the company, said:

"As an evidence of the rapid growth in value of your equity in the property of the Interborough Rapid Transit Company, represented by the surplus earnings of that company, your attention is called to the following results from operations for the last fiscal and calendar years.

"The surplus earnings of the Interborough Rapid Transit Company, after the payment of the regular 9 per cent dividend, for the fiscal year ended June 30, 1909, were $1,439,823, an increase over the previous fiscal year of $889,163. For the calendar year ended Dec. 31, 1909 the surplus earnings were $2,630,641, an increase over the previous calendar year of $2,092,194, which is being more than maintained.

"The Metropolitan Street Railway System is still being operated by the receivers.

"The administration expenses of your company for the year ended Dec. 31, 1908, were $190,641.48, and for the year ended Dec. 31, 1909, $104,803.08, a reduction of $85,838.40."

American Railways, Philadelphia, Pa.—R. D. Apperson, president and general manager of the Lynchburg Traction & Light Company, Lynchburg, Va., and president of the Roanoke Railway & Electric Company, Roanoke, Va., has been elected a director of the American Railways to fill a vacancy. The purchase of a controlling interest in the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company by the American Railways was noted in the Electric Railway Journal of Jan. 15, 1910, page 126.

Burlington County Railway, Mt. Holly, N. J.—Suit was filed in the Chancery Court at Trenton, N. J., on Jan. 19, 1910, by the Mt. Holly Safe Deposit & Trust Company to foreclose the first mortgage of the Burlington County Railway dated 1904. The complaint states that holders of $260,500 of first mortgage bonds of 1904 have deposited them with the Burlington County Safe Deposit & Trust Company under a bondholders' agreement and have created I. Snowden Haines, Burlington; S. A. Atkinson, Mount Holly, and William A. Stokes a committee to take steps to protect the interests of the bondholders, and that the holders of $213,000 of the bonds have deposited them with the West End Trust Company, Philadelphia, Pa., as depositary for the Taylor committee.

Chicago (Ill.) Consolidated Traction Company.—As a step in the reorganization of the Chicago Consolidated Traction Company, the Chicago United Railway Company has been incorporated with a nominal capital stock of $2,500, by Charles G. Dawes, E. K. Boisot, George P. Hoover and Andrew Cooke, to succeed the Chicago Consolidated Traction Company in accordance with the terms given in the Electric Railway Journal of Jan. 22, 1910, page 164.

Chicago (Ill.) City Railway.—Clarence H. Venner, New York, N. Y., has brought suit in the Circuit Court at Chicago to enjoin the merger of the Chicago City Railway, Southern Street Railway, Calumet & South Chicago Railway and the Hammond, Whiting & East Chicago Electric Railway as the Chicago City & Connecting Railway. Mr. Venner holds 200 shares of stock of the Chicago City Railway.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Eli M. West, receiver of the Columbus, Delaware & Marion Railway, will pay on Feb. 1, 1910, interest due on the $915,000 of consolidated mortgage bonds of the company, the coupons of which were defaulted Aug. 1, 1909.

Gettysburg (Pa.) Railway.—The exceptions to the sale under foreclosure of the property of the Gettysburg Transit Company have been disallowed by the Adams County Court. The Gettysburg Transit Company has been succeeded by the Gettysburg Railway.

Hudson Companies, New York, N. Y.—Arthur B. Westervelt and P. G. Bartlett have been elected directors of the Hudson Companies to succeed the late Dumont Clarke and to fill a vacancy.

Interborough-Metropolitan Company, New York, N. Y.—At the annual meeting of the Interborough-Metropolitan Company on Jan. 18, 1910, E. E. Starbord, who is connected with the office of Theodore P. Shonts, president of the company, was elected a director to succeed John B. McDonald.

Interstate Railways, Philadelphia, Pa.—At a meeting of the reorganization committee of the Interstate Railways, of which George H. Earle is chairman, on Jan. 21, 1910, arrangements were made to urge bondholders by letter to pay the reorganization charges on their bonds in order to avoid foreclosure. It was stated at the meeting that the question of whether the semi-annual interest due on Feb. 1, 1910, would be paid or be deferred would be decided by the directors of the company at a meeting on Jan. 27. It is said that negotiations are under way for leasing to the duPont interests the property now controlled by the Interstate Railways in Wilmington at a minimum annual rental of $125,000.

Johnstown (Pa.) Passenger Railway.—New directors have been elected for the Johnstown Passenger Railway as follows: J. J. Sullivan, H. H. Weaver, W. R. Thomas, W. F. Harrity, W. H. Shelmerdine, H. J. Crowley and C. L. S. Tingley. Control of the company passed recently to the American Railways.

Metropolitan Street Railway, New York, N. Y.—The sale of the property of the Metropolitan Street Railway under foreclosure, which was set for Jan. 22, 1910, has been postponed indefinitely pending the discussion of Judges Ward, Holt and Hough of the United States Circuit Court of Appeals who have before them the appeal of the Guaranty Trust Company, New York, N. Y., from the order of Judge Lacombe of the United States Circuit Court that the claims of the receivers of the Metropolitan Street Railway and the New York City Railway be made a first lien upon the proceeds of the sale. The Guaranty Trust Company claims that the mortgage should be recognized as a first claim upon the proceeds. The hearing on the motion before Judge Lacombe for the segregation of the Fourth, Seventh, Eighth and Ninth Avenue lines of the Metropolitan Street Railway was postponed until Jan. 28, 1910. The receivers of the company have asked Judge Lacombe for instructions in regard to the payment of special franchise and other taxes levied against the company since 1901. They state that the taxes with interest to Dec. 31, 1909, amount to $5,234,972, and they claim that if payment can be made now and the amount deducted from gross earnings in order to ascertain net earnings, a large amount will be saved to the company. The suit of W. W. Ladd, receiver of the New York City Railway, instituted against the Metropolitan Securities Company and the directors of the company charging a conspiracy to defraud the New York City Railway out of $2,797,200 for the benefit of the Metropolitan Securities Company and seeking the recovery of that amount came up for final argument before Judge Ray of the United States Circuit Court on Jan. 24, 1910.

New Hampshire Electric Railways, Haverhill, Mass.—David A. Belden, president of the New Hampshire Electric Railways, has been appointed receiver of the Portsmouth & Exeter Street Railway on application of the New York Trust Company, trustee under the mortgage of the Portsmouth & Exeter Street Railway. The New Hampshire Electric Railways is said to own most of the $185,000 stock of the Portsmouth & Exeter Street Railway and the $145,000 first mortgage 5 per cent bonds of the company.

New York, Westchester & Boston Railway, New York, N. Y.—The agreement of consolidation of the New York & Port Chester Railroad with the New York, Westchester & Boston Railway with $5,000,000 stock, was filed on Jan. 18, 1910, in the office of the Secretary of State at Albany, N. Y. The officers and directors are: Leverett S. Miller, New York, president; Thomas D. Rhodes, East Orange, N. J., vice-president; Augustus S. May, Bridgeport, Conn., treasurer; John G. Parker, New Haven, Conn., secretary; Leverett S. Miller, George M. Miller, J. Pierpont Morgan, Lewis Cass Ledyard, William Rockefeller, New York, N. Y.; Thomas D. Rhodes, East Orange, N. J.; Charles F. Brooker, Ansonia, Conn.; Charles S. Mellen, James S. Hemingway, A. Heaton Robertson, New Haven, Conn.; John H. Whittemore, Naugatuck, Conn., Edwin Milner, Moosup, Conn., and Robert T. Taft, Providence, R. I., directors.

Northern Electric Street Railway, Scranton, Pa.—It is stated that interests identified with the Northern Electric Street Railway propose to organize a company to be known as the Scranton & Binghamton Traction Company to take over the Northern Electric Street Railway and extend the lines of that company from Factoryville to Binghamton, N. Y., a distance of more than 45 miles. According to preliminary plans the Scranton & Binghamton Traction Company will be incorporated by T. J. Foster, president of the International Correspondence Schools; W. L. Connell, who has recently been elected secretary and treasurer of the Northern Electric Street Railway; F. W. Wollerton, T. A. James and C. P. Hagenlacher.

Toledo & Indiana Railway, Toledo, Ohio.—At the second sale of the property of the Toledo & Indiana Railway under foreclosure in Toledo, Ohio, on Jan. 18, 1910, S. C. Schenck, formerly president of the company, bid in the property for $1,058,500 in the interest of the bondholders. He outbid G. J. Cable, who acted in the interest of the Ohio Electric Railway and who at the sale of the property on Nov. 27, 1909, which was set aside, bid $1,004,500. Mr. Schenck's bid was $138,500 in excess of the appraised value of the property.

Traffic and Transportation

Order for Increase in Service Considered Unreasonable

Adrian H. Joline and Douglas Robinson, receivers of the Metropolitan Street Railway, New York, N. Y., have replied as follows to the Public Service Commission of the First District of New York regarding the order from the commission directing the company to increase service on its 116th Street crosstown line, mention of which was made in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1910, page 128:

"We desire to acknowledge the receipt of your letter of Jan. 7, 1910, transmitting a certified copy of final order issued in Case No. 1194, also a copy of the opinion which you state was rendered upon the adoption of the final order to which reference is made above, and which relates to the service on the 116th Street crosstown line.

"Before you adopted this final order you were in possession of the information which we transmitted in our letter of Dec. 27, 1909, and you are therefore fully aware of the probable consequences of your order with reference to the distribution of cars and the diminution of service on other lines from which the cars must be withdrawn to meet the requirements laid down by you with regard to the service on 116th Street.

"We shall endeavor to comply with the requirements of the final order in Case No. 1194, and, as we advised you in our letter of Dec. 27, 1909, the equipment necessary for increasing the service on 116th Street will be withdrawn from the lines not already covered by your service orders.

"We have received letters of inquiry from you regarding the service on various lines not as yet covered by your orders. It must be clearly manifest to you what the outcome will be if you persist in pursuing, with reference to other lines in the system, the same policy that you have followed with regard to the service on 116th Street.

"We are not seeking to raise another issue with you, but it is apparently your policy to force the situation. For that reason we desire to place on record our protest as to the unreasonable requirements of the provisions of Order No. 1194, and to state that our action in agreeing to attempt to operate the 116th Street crosstown line in accordance with the provisions of Order No. 1194 is taken without prejudice to our right subsequently to raise the questions as to the reasonableness, necessity or propriety of the order in question.

"We are advised by our operating department that it is impracticable to make a timetable which will provide for the operation of the same number of cars in the morning as in the evening, without involving the payment of a large sum of money to men whose services will be required on the cars for only about 20 per cent of the time for which they must be paid, and who will spend the remaining 80 per cent of their working day on the waiting list.

"The application of such a principle of operation to the entire Metropolitan system would mean an expenditure of between $125,000 and $175,000 per year to men whose services on the cars would actually be required for only one-fifth of the time for which they were paid. The expense, of course, would be even greater in the event that the men were assigned to cars and sent out on the road during the four-fifths of the working day for which their services would not be needed. It is estimated that this expensive and unnecessary service outside of the rush hours would involve an annual expenditure of nearly $400,000.

"In the last analysis the situation resolves itself into a question as to the ultimate interests of the public. At the present time the issue is whether the public interests are better subserved by the standing, during the morning rush hours, of a comparatively small number of persons for a relatively short time, or whether, in order to do away with this situation and save a few persons from standing for a short distance, it is better to place this heavy increased operating expense on this property.

"We cannot see how the application of the latter course can fail to produce results most detrimental to the public interests, and out of proportion to the relatively small advantage to be secured.

"We are advised that there is no large city transportation surface system in this country where standing passengers are not carried on the cars, and in the present financial condition of the Metropolitan Street Railway any attempt to operate its lines in such a manner as has been suggested would serve only to produce a further disintegration of the system, with the consequent curtailment of the transfer privilege, at the same time rendering much more difficult the improvement of the property, for which purpose nearly $9,000,000 has been expended by us since our appointment. A large part of this money has been paid from earnings, and much more money must be expended to complete the work of rehabilitation.

"Therefore, viewed in the light of public interest, it would seem to be a most inopportune time now to undertake to make what is at best a costly experiment of doubtful value, when such a course would prevent the expending of money for the improvement of the property and the placing of it in a condition to render service which the public is reasonably entitled to receive."

No-Seat-No-Fare Ordinance in Trenton, N. J.—The City Council of Trenton, N. J., has passed and is attempting to enforce an ordinance requiring the New Jersey & Pennsylvania Traction Company and the Trenton Street Railway to carry passengers free who are not provided with seats.

Inquiry Into Subway Service.—The Public Service Commission of the First District of New York ordered the Interborough Rapid Transit Company to show cause, at a hearing on Jan. 27, 1910, before Commissioner Eustis, why an order should not be entered requiring it to increase service in the subway.

First Pensioner in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company will retire its first employee on Feb. 1, 1910, under the pension system announced on Jan. 1, 1910. The man who will be retired is 67 years old and has served the company and its predecessors for 55 years. He will receive $20 a month.

Abandonment of Portion of Route Authorized.—The Public Service Commission of the Second District of New York has given its consent to the Bennington & North Adams Street Railway, Hoosic Falls, N. Y., to abandon a portion of its route in Hoosic Falls. The proposed abandonment was contested by residents of the locality affected at the outset, but an amicable agreement has since been arranged, so that the service which the company will now give after the abandonment of the line in question will be satisfactory generally to the residents of Hoosic Falls.

Service Out of Portland, Ore.—The Railroad Commission of Oregon has issued an order requiring the Portland Railway, Light & Power Company, Portland, Ore., to operate at least 18 passenger trains a day between Portland and Canemah during daylight hours from April 1 to Oct. 1 each year, and at least 14 trains during the same hours of each day the remainder of the year. The commission has also ordered that all other passenger trains between Portland and Oregon City shall be operated as far south as Canemah Park. The company is given 45 days in which to comply with the order.

Service in Jeffersonville, Ind.—At a public meeting in Jeffersonville, Ind., recently, at which the question of taking steps to compel the Louisville & Northern Railway & Lighting Company, New Albany, Ind., to issue transfers good on city lines in Jeffersonville was considered, M. J. Insull, general manager of the company, stated that the company could not afford to do this, as it took the earnings for five months of the year to pay the bridge tolls and other charges made by the Louisville Railway for power on the Kentucky side of the river. Out of the earnings of the other seven months all other fixed charges must be paid. He also stated that the lines in Jeffersonville have not paid for the last two years.

From San Francisco to Stockton and Lodi.—The Central California Traction Company, Stockton, Cal., and the California Navigation & Improvement Company have issued a circular entitled "By Sail and Rail," in which attention is called to the convenience and economy of the combined service of the companies between San Francisco, Stockton and Lodi. Illustrations are presented of the steamers used in the service and of scenes along the electric railway. The time of the departure of boats from both San Francisco and Stockton is given, also the time of the arrival of the boats and the schedule on the Stockton-Lodi division of the Central California Traction Company. There is also a table of one-way, round-trip, commutation and school fares.

Proposed Traffic Association for New York, Pennsylvania and Ohio.—A meeting of officials of a number of electric railways in the territory between Ohio points, Meadville, Jamestown and Buffalo, was held in Erie, Pa., on Jan. 11, 1910, for the purpose of taking steps to organize a traffic association to promote, regulate and systematize interline traffic. The meeting resulted in the adoption of certain resolutions embodying the sentiment of those present and the secretary of the meeting was directed to send copies of the resolution to a designated officer of each company which would be affected by the association, asking for his approval of the movement. As soon as replies to these letters are received a meeting will be called at which each company will be requested to have an accredited representative in attendance for the purpose of forming a permanent organization for which the name has been suggested New York, Pennsylvania and Ohio Traffic Association.

Order Regarding Signs in the New York Subway.—The Public Service Commission of the First District of New York has issued an order directing the Interborough Rapid Transit Company not later than Feb. 1, 1910, to maintain on every subway car two destination signs, similar to those now in use, one to be placed at each end and on opposite sides of the cars. This will enable persons on island platforms as well as on side platforms to see a destination sign on the forward end of each car as it approaches. The order further requires that the new style of signs, with large black letters on a white ground, is to be installed at all stations not later than April 1, 1910. The express stations will be equipped with several additional signs, and local stations will be equipped after the manner of Spring Street, where large signs indicate the station before it is reached. The order further requires that a map of the subway system, indicating the streets near every station, shall be displayed near the ticket window at all stations.

Instructing Student Trainmen.—Under date of Jan. 12, 1910, J. F. Roach, chief dispatcher of the Oregon Water Power Division of the Portland Railway, Light & Power Company, Portland, Ore., addressed the following communication to the employees: "When students are assigned to you it is only fair to assume that you will fully realize that they may be entirely unfamiliar with local conditions, even though they are experienced men from other cities. A man may on account of his experience be able to handle a car or train to perfection, but if he is not acquainted with all of the operating features and details of the particular line on which he is to work, he is far from being a competent man. It is very necessary that you go fully into details with your students, and assure yourselves that they thoroughly understand the information you have imparted to them, before endorsing them as fit to operate alone. Remember that these men may be called at any time to operate with you, and your safety and that of passengers and equipment depend largely on their competency; therefore, you should beware of signing their certificates prematurely."

Letter to Philadelphia Employees on Deportment.—On Jan. 7, 1910, C. O. Kruger, president of the Philadelphia Rapid Transit Company, addressed the following communication to the employees: "We want your co-operation in the more effective enforcement of our rules against the use of intoxicants by motormen and conductors. A man who works on a street car should never, on duty or off duty, be even slightly under the influence of liquor. A motorman who has been drinking, even if he reports in an apparently sober condition, may endanger the lives of hundreds of passengers. Heretofore we have permitted drinking men to sign a pledge; we have given them 'another chance.' Many of these men prove to be backsliders, and it may be necessary to make a first offense of this kind cause for dismissal. There is also a rule against drinking in uniform. This rule must be more strictly regarded; it will be rigidly enforced against all offenders. Many 'grievances' come to us from or on behalf of men who have been dismissed for

intoxication. This is one reason why this communication is issued. Such men will not be reinstated. Instead of pleas for drinking men we should have the support of the whole body of employees in our efforts to rid the system of such men. We also expect from all men who have the safety of passengers in their charge not only strict adherence to rules, but the practice of good habits at all times and under all conditions."

NEW PUBLICATION

Report of the London Traffic Journal of the Board of Trade. Published by Eyre & Spottiswoode, London. 192 pages. Price, 2s. 1d.

This report was submitted to Parliament through the secretary of the Board of Trade by Sir Herbert Jekyll, Oct. 30, 1909, and is just available in printed form. It represents the researches during the past year of the London traffic branch of the Board of Trade, which is a standing commission established to carry out the work initiated by the Royal Commission on London Traffic. The report contains a great many interesting statistics in regard to local traffic in London. Thus in the section devoted to the omnibus service, it gives the rise and variations in the number of motor buses in London which increased rapidly through 1906, fluctuated in 1907, reached its highest point (1097) in October, 1908; fell to 926 in March, 1909; almost attained the previous maximum in July, 1909, and fell to 960 in October, 1909. The early history of the motor bus service was unfortunate, but the amalgamation of various omnibus companies has been beneficial, both to the proprietors and the public. The opinion is expressed that motor omnibuses are likely to become more formidable as rivals to the tramways than they have heretofore been, as the mechanical efficiency of the motor bus has been increased.

Sir Herbert Jekyll says that, as an instrument of locomotion, the omnibus is in its infancy, whereas the tramway has reached its maturity. The statistics of the tramway service in London are elaborate and show a constant increase in passengers carried. The ordinary fares on these lines vary from one half-penny to fourpence; the average distance covered by the 1 penny fare, which is by far the most common, varies from 1.16 to 2.18 miles. Considerable space is given in the report to the suburban service conducted by the steam railroads, which have been losing traffic through the tramway and motor-bus competition. The underground railway lines as a whole are increasing their traffic. Steam railroads are awaiting with great interest the experiments of the electrical equipment of the South London line of the London, Brighton & South Coast Railway. The report concludes with an interesting comparison by W. H. Dawson of the traffic facilities of London and Paris. Valuable statistics on the tramways and railways of both cities are contained in the appendix.

Andrew Nance, general manager of the Belfast City Tramways, has issued a report to the members of the corporation giving details of 10 new tramways and tramways extensions at a total estimated cost of nearly £500,000. The most important of these proposals is the Cavehill and McArt's Fort line, which involves an estimated outlay of £111,550. Ben Madighan, now called the Cavehill, 1188 ft. above sea level, is the most prominent of the range of hills surrounding the city, and at its summit is situated the fort of McArt, which is a popular tourist resort. It is proposed to make a roadway at the expense of the tramways, from the point where the Cavehill and Antrim Roads meet to McArt's Fort. This roadway will be more than 3 miles in length, and will be 120 ft. wide for the greater portion of the way. The width will include a footpath on each side 15 ft. wide; next to each footpath a 20-ft. strip of grass, with trees planted at regular intervals along the whole length of 3 miles; and in the center a macadam roadway 50 ft. wide, with a paved double line of tramway. The gradient of the tramway will be about 1 in 16 for about 1½ miles outward from Cavehill Bridge to McArt's Fort. It is also proposed to construct a promenade at the Fort tramway terminus 1½ miles in length. The cost includes the following items: Construction, £56,400; equipment, £20,300; machinery, £5,150; and road-making, £29,700—a total of £111,550.

Personal Mention

Mr. E. W. Winter, president of the Brooklyn (N. Y.) Rapid Transit Company, will sail on Feb. 2, 1910, for a trip to the Mediterranean. He expects to be gone about three months.

Mr. Lyman Beecher Stowe has been appointed secretary to Mr. William McCarroll of the Public Service Commission of the First District of New York. Mr. Stowe was graduated from Harvard in 1904, and has recently been engaged in newspaper work in New York.

Mr. Charles Sigler has resigned as electrical engineer and master mechanic of the Winona Interurban Railway, Warsaw, Ind., and on March 1, 1910, will assume the duties of superintendent of motive power of the Salt Lake & Ogden Railway, Salt Lake City, Utah, a 55-mile steam railroad which has been equipped with electricity as described in the ELECTRIC RAILWAY JOURNAL of Oct. 2, 1909, page 523.

Mr. J. F. Reardon has resigned as general superintendent of the Lehigh Valley Transit Company, Allentown, Pa. Mr. Reardon became connected with the Lehigh Valley Transit Company in the fall of 1907. He was born in Northern Michigan about 37 years ago and entered street railway work about 20 years ago with the Twin City Rapid Transit Company, Minneapolis, Minn., and remained with the company for 10 years. After leaving Minneapolis, Mr. Reardon became master mechanic of the Everett Railway, Light & Water Company, Everett, Wash., and later was made superintendent of that company. He resigned from the Everett Railway, Light & Water Company to accept the position of superintendent of the Lehigh Valley Transit Company.

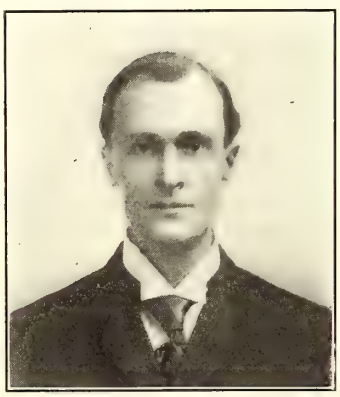
Mr. John F. Collins has resigned as general manager and superintendent of the Saginaw & Bay City Railway & Light Company and as general manager of the Saginaw Valley Traction Company, Saginaw, Mich., to become assistant general manager of the Toledo Railways & Light Company, Toledo, Ohio, of which company he was formerly superintendent. Mr. Collins began his railway career with the Indianapolis Street Railway when 18 years of age and was advanced until he became assistant superintendent of the company. In 1890 Mr. Collins was appointed superintendent of the Toledo Traction Company, and a year later, when the Everett-Moore syndicate obtained control of the Toledo Traction Company, he was promoted to the position of superintendent of railways. In July, 1907, Mr. Collins was made manager of railways of the Toledo Railways & Light Company, with authority over the city lines and those of the Maumee Valley Railways & Light Company. He was also made vice-president and manager of the Toledo, Ottawa Beach & Northern Railway, and during his connection with the properties at Saginaw he has continued as vice-president of the Toledo, Ottawa Beach & Northern Railway. Mr. Collins expects to assume his duties at Toledo on April 1, 1910.

Mr. G. E. Miller, whose resignation as superintendent of the railway department of the Chattanooga Railway & Light Company, Chattanooga, Tenn., was announced in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1910, has been appointed superintendent of the Lehigh Valley Transit Company, Allentown, Pa., to succeed Mr. J. F. Reardon, whose resignation is announced elsewhere in this column. Mr. Miller was born in Pottsville, Pa., in 1869, and has had more than 20 years' experience in electric and steam railroading in various parts of the country. For eight years he was superintendent of the yards of the Philadelphia & Reading Railroad at St. Clair, and subsequently was in the electric light business at Port Carbon, Pa., for five years. After leaving Port Carbon he became superintendent and master mechanic of the Chattanooga (Tenn.) Traction Company, with which company he remained for two years. He then became general superintendent of the Dubuque Light & Traction Company, Dubuque, Ia., where he remained for five years. After resigning from the Dubuque Light & Traction Company, Mr. Miller accepted the position of superintendent of the Chattanooga (Tenn.) Railway, and when this company was consolidated with the lighting properties at Chattanooga as the Chattanooga Railway &

Light Company, Mr. Miller was made general superintendent of the railway department of the new company.

Mr. Gordon Campbell, who, as announced in the Electric Railway Journal of Jan. 22, 1910, has been elected president and general manager of the York (Pa.) Railways and the Edison Electric Light Company, York, Pa., to succeed Mr. W. F. Bay Stewart, resigned, is a native of New York State and comes of Scotch ancestry. His grandfather, Mr. Archibald Campbell, came to this country in 1798 and settled at Albany, N. Y., and Mrs. Mary Campbell, Mr. Archibald Campbell's wife, came from Glen Lyon, Scotland. Of Mr. Archibald Campbell's seven sons, three were prominent civil engineers, pioneers in American railroad construction. Mr. John Campbell, the father of Mr. Gordon Campbell, entered the army and served with distinction through the Mexican and Civil Wars and became brigadier-general. Mr. Gordon Campbell was the second of six sons and was graduated as a mechanical engineer in 1886 from Stevens Institute, Hoboken, N. J. He then entered the service of the Union Pacific Railway as a draftsman at the Denver shops, and subsequently acted as superintendent of the Colfax Electric Railway, Denver, Col.; purchasing agent and master mechanic of the North Jersey Street Railway, Newark, N. J.; general superintendent of the railways in Providence, R. I., now operated by the Rhode Island Company, and purchasing agent of the Washington Railway & Electric Company, Washington, D. C., and vice-president and general manager of the York (Pa.) Railways. Since becoming connected with the York Railways, Mr. Campbell has done much towards improving and systematizing the railway and lighting departments of the company. He has decided recently to do away with the parcel system in the freight department and introduce a classified weight system.

Mr. Clement C. Smith was elected president of the Wisconsin Electrical Association on Jan. 27, 1910, at a meeting of the association in Milwaukee. Mr. Smith was largely instrumental in forming the Wisconsin Electrical Association, which is a consolidation of the Wisconsin Electric & Interurban Railway Association and the Northern Electrical Association. Mr. Smith was born in Cleveland, Ohio, in 1867, and began railroad work as assistant engineer of construction of the Great Northern Railroad in 1887. In 1890 he became connected with the Minneapolis (Minn.) Street Railway as assistant engineer, and later was appointed chief engineer of the company. In 1891 Mr. Smith was appointed chief assistant engineer of the Milwaukee (Wis.) Street Railway in charge of construction. In 1893 he was appointed chief engineer in charge of the construction of the La Crosse (Wis.) City Railway and in 1894 acted as chief engineer of the Milwaukee (Wis.) Street Railway. Entering the employ of the Chicago (Ill.) City Railway in 1895, he served that company in 1895 and 1896 as chief engineer. From 1896 to 1901 Mr. Smith was connected with the Falk Company, Milwaukee, Wis., first as general superintendent and later as first vice-president. In 1901 he organized and was elected president of the Columbia Construction Company, Milwaukee, Wis., which was engaged in constructing and operating electric railway, lighting and gas properties. At the present time Mr. Smith is president of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., president of the Wisconsin Electric Railway, Oshkosh, Wis.; president of the Citizens' Gas Company, Kankakee, Ill.; vice-president of the Lee County Lighting Company, Dixon, Ill.; vice-president of the Sterling, Dixon & Eastern Electric Railway, Sterling, Ill.; president of the Columbia Construction Company, and vice-president of the Fidelity Trust Company, Milwaukee, Wis. The headquarters of all of the public service companies mentioned are located in the Stephenson Building, Milwaukee, Wis.



C. C. Smith

Mr. W. F. Bay Stewart, whose resignation as president of the York (Pa.) Railways, was announced in the Electric Railway Journal of Jan. 22, 1910, was born in Chanceford Township, York County, Pa., on Feb. 25, 1849, of Scotch-Irish parents. Mr. Stewart attended the public schools until he was 17 years old and then entered Pleasant Grove Academy, Lower Chanceford. Subsequently he attended York County Academy in Erie, Pa. After teaching in the public schools for two years and at York Academy, Mr. Stewart began the study of law with Colonel Levi Maish, member of Congress from the York, Adams and Cumberland district, and was admitted to the bar on Nov. 3, 1873. Two years later he formed a partnership with Mr. John Blackford, district attorney of the county, which was continued until Mr. Blackford's death in 1884. On Oct. 1, 1884, Mr. Stewart, Mr. H. C. Niles and Mr. George E. Neff formed a partnership which was continued uninterruptedly until Mr. Stewart was elevated to the bench in 1895. He was judge of the courts of York County for 10 years. Mr. Stewart is president of the Security, Title & Trust Company, was formerly a member of Baugher, Kurtz & Stewart, is president of the York Card & Paper Company; president of the York Knitting Mills Company, organized and was president of the Norway Iron & Steel Company, was one of the organizers and was vice-president of the York Haven Water & Power Company, is a member of the York Haven Paper Company, and is president of the Valdez-Yukon Railway in Alaska. Mr. Stewart became president of the York Railways on April 1, 1906. Perhaps the most important work carried out during his service with the company was the construction of the single-phase line of the York Railways between Center Square, York, and Center Square, Hanover, at a cost of about $650,000. This installation was described in the Street Railway Journal of April 25, 1908, page 683. Mr. Stewart has had the degree of master of arts conferred upon him by Ursinus College.

OBITUARY

John Farson, of Farson, Son & Company, Chicago and New York, who died in Chicago on Jan. 18, 1910, was interested in many public service corporations, among the electric railways being the South Chicago Electric Street Railway and the Rockford & Interurban Railway. Mr. Farson was born in Union County, Ind., in 1855, and began work as an apprentice to a tailor in 1877. Later he became a bank messenger and studied law. In 1881 he was admitted to the bar. Soon thereafter he was appointed manager of the bond department of Preston, Kean & Company. After this firm was dissolved Mr. Farson entered into partnership with Mr. S. A. Kean. Subsequently he established the firm of Farson, Leach & Company. In 1906 he organized Farson, Son & Company.

Edward Payson Bryan, formerly president of the Interborough Rapid Transit Company, New York, N. Y., who was spending the winter with his son in Porto Rico, died of apoplexy at San Juan on Jan. 23, 1910. Mr. Bryan was born at Windsor, Ohio, on July 2, 1850, and was educated in the public schools at Granville, Ohio, and at Denison University. He studied telegraphy at the age of 16 and took a position with the Louisville & Nashville Railroad at Lebanon, Ky., where he remained until December, 1895. During his connection with the Louisville & Nashville Railroad, Mr. Bryan occupied various positions from telegraph operator to superintendent. Upon severing his connections with the Louisville & Nashville Railroad, Mr. Bryan accepted the position of vice-president and general manager of the Terminal Railroad Association of St. Louis and retained this position from Dec. 1, 1895, until May 1, 1902, when he was elected vice-president of the Interborough Rapid Transit Company. He was later elected vice-president of the Subway Construction Company. As vice-president of the Interborough Rapid Transit Company, Mr. Bryan organized the operating force and placed on a working basis the entire engineering force which equipped the lines of the company, including the power house, cars, interlocking block signal system, etc. Mr. Bryan was elected president of the Interborough Rapid Transit Company in 1907. He also served as a member of the board of directors of the New York & Long Island Railroad and the New York & Queens County Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Link Belt Railway, San Francisco, Cal.**—Incorporated in California to construct a broad-gage railway in Placer County. Nominal capital stock, $1,000. Incorporators: L. T. Kitt, E. D. Kitt and W. S. Fox.

***Decatur Southern Traction Railway, Decatur, Ill.**—Chartered in Illinois to build an electric railway to connect Decatur and Pana. Capital stock, $25,000. Incorporators: William S. Carter, George H. Winsor and Henry B. Davis.

***Big Blackfoot Railway, Missoula, Mont.**—Incorporated in Montana to build an interurban electric railway to start in Missoula County and terminate at the north line of Powell County. Capital stock, $250,000. Directors: John Gillie, C. F. Kelley and L. O. Evans, Butte, and John R. Toole and Kenneth Ross, Missoula.

***Oklahoma City & Fort Smith Traction Company, Oklahoma City, Okla.**—Chartered in Oklahoma to build an electric railway to connect Oklahoma City to Fort Smith, Ark., a distance of about 200 miles. Capital stock, $100,000. Directors: V. S. Bath, P. M. Mowry, G. L. Wood and A. M. Gaston, all of Oklahoma City.

***West Pittston Street Railway, Wilkes-Barre, Pa.**—Application will be made to the Governor on Feb. 1 by Joseph L. Dunn, Thomas J. Connelly and Edward J. Loughran for a charter for a street railway, 2 miles long, in West Pittston Borough.

***Scranton & Lake Shore Railway, Scranton, Pa.**—Chartered in Pennsylvania to build a 3-mile electric railway in Scranton. Capital stock, $18,000. Incorporators: W. F. McGee, R. F. Foote, Meredith Jones, P. J. Regan and W. S. Hasler, all of Scranton.

***Gulf Coast & Provident City Railway, Houston, Tex.**—Incorporated in Texas to build an interurban railway about 35 miles in length to connect Pierce and Provident City. Principal office, Houston. Capital stock, $50,000. Incorporators: Louis H. Schurlock, Emil Reinhold and T. J. Cougtin, Kansas City, Mo.; Carey Shaw, James T. Reaves, Houston.

FRANCHISES

***Griffin, Ga.**—H. H. Bass and J. P. Nichols, Griffin, and C. M. Preston and D. A. Aiken, Macon, have applied to the Council for a franchise for an electric railway in Griffin. This is part of a plan to build a railway from Griffin to Macon.

Danville, Ind.—The Town Council has granted the Capital Circuit Traction Company, Indianapolis, an extension of its franchise to 1913. This company proposes to construct a railway 146 miles long, belting Indianapolis, passing through seven counties and fourteen incorporated towns. [E. R. J., Jan. 15, '10.]

Nicholasville, Ky.—The Central Kentucky Traction Company, Frankfort, Ky., has been granted an extension of 90 days on its original franchise in which to complete the projected railway from Lexington to Nicholasville, 12 miles. John B. MacAfee, president. [E. R. J., June 26, '09.]

***North Adams, Mass.**—The Taconic Street Railway will soon ask the City Council for a franchise to build an electric railway which is to connect North Adams, Braytonville, Williamstown, Greylock, South Williamstown, Pittsfield, Hoosick Falls, and eventually continuing on to Troy, there to connect with extensive systems in that section. The names of the backers of this project have not been disclosed.

***Pittsfield, Mass.**—The Berkshire Street Railway has petitioned the Aldermen for four franchises for extensions of its lines within the city limits.

Laurel, Mont.—The City Council has granted a 50-year franchise to the Eastern Montana Electric Railway, Billings, to build a street railway over certain streets of Laurel. The franchise was later submitted to the people of Laurel at a special election called for that purpose and passed. The railway, as projected, will extend from Laurel to Billings, and west from Laurel to Red Lodge, thence to Bear Creek, returning to Laurel by a loop that will cover the entire Clark Fork Valley. Daniel D. Gile, 27 William Street, New York, N. Y., vice-president. [E. R. J., Nov. 27, '09.]

Clairton, Pa.—The Peters Creek Street Railway, which is to connect Glassport, Coal Valley, Wilson, Blair and Clairton has petitioned the County Commissioners for a perpetual franchise over the county road in Jefferson Township between Wilson and Clairton Boroughs. W. G. Wilson, Dravosburg, president. [E. R. J., May 1, '09.]

***Tarentum, Pa.**—The Tarentum, Brackenridge & Freeport Street Railway has been granted a perpetual franchise by the Borough Council to build an interurban electric railway in Allegheny County.

Chattanooga, Tenn.—The Rhea County Court has granted D. J. Duncan a franchise for a trackless trolley line over the main valley road from Hamilton County line to Rhea Springs. The Hamilton County Court also granted Mr. Duncan an extension of time on his former franchise, and the Council of Dayton recently granted him a right-of-way through the corporate limits of that town. [E. R. J., Nov. 6, '09.]

***Dallas, Tex.**—E. L. Lancaster and associates are reported to be interested in a plan to build an electric railway from Dallas to the Mt. Auburn addition, a distance of 2 miles.

***Orange, Tex.**—The Orange Electric Railway has applied to the City Council for a franchise for an electric street railway in Orange. James E. Smith is interested.

San Angelo, Tex.—The City Council has granted a 35-year franchise to the Angelo Power & Traction Company for an extension of its lines on the principal streets of the city. Material is on hand for the construction of the first section to East San Angelo.

Bellingham, Wash.—It is stated that the Nooksack Valley Traction Company will ask the City Council for an extension of the franchise to use certain streets in the city for railway purposes. [E. R. J., Oct. 9, '09.]

Chehalis, Wash.—The City Council has granted the Twin City Light & Power Company an extension of time until July 10, in which time the company must have cars running and operating or else the company forfeits its rights to any of the streets in the city. [E. R. J., Jan. 1, '10.]

Piedmont, W. Va.—The Council has extended the franchise of the Potomac Valley Street Railway for thirty days in which to begin work on its line in Piedmont. J. Benter, Edgewood, president. [E. R. J., Nov. 20, '09.]

TRACK AND ROADWAY

Pacific Electric Railway, Los Angeles, Cal.—This company has begun the work of installing a four-track system on its northern division from the Indiana Village junction near the city limits to El Molino station, on the Monrovia line. On the Long Beach division preparations are also being made for the installation of a four-track service. Rights of way have been secured between Pomona, Claremont and Upland. It is expected that this local system will connect with the main system before April 1.

Norwich, Colchester & Hartford Traction Company, Norwich, Conn.—This company announces that plans have been perfected for construction of its proposed railway which is to extend from Norwich and connect the Connecticut Company lines in Glastonbury. The directors have voted to issue $400,000 preferred stock, and it is said that over half the amount has been sold. [E. R. J., Aug. 14, '09.]

***St. Petersburg, Fla.**—It is stated that the Bayboro Investment Company is considering plans for the construction of a street railway from Central Avenue to Bayboro.

Rock River Traction Company, Geneseo, Ill.—At the annual meeting of the company it was announced that active construction work will be commenced this month between Sterling and Prophetstown. The following officers were

elected: Hugh W. Cole, president and general manager; J. H. O'Brien, first vice-president; W. E. Tuller, second vice-president; Fred W. Cole, Prophetstown, secretary; C. F. Luther, Geneseo, treasurer. [E. R. J., Jan. 22, '10.]

Indiana & Northern Traction Company, Lafayette, Ind.—G. A. H. Shiedler, president of this company, announces that bids will be received early in the spring for the construction of an electric railway from Monticello to Rensselaer. [E. R. J., Nov. 20, '09.]

***Cynthiana & Paris Railway, Cynthiana, Ky.**—Official announcement is made that this company is preparing to begin work in the early spring on its projected 15-mile railway from Cynthiana to Lexington, via Paris. A 20-year franchise has been granted to the company in Paris. It has not been definitely decided whether to operate electric or gasoline motor cars. Robert H. Reed, Cynthiana, is the engineer in charge of all preliminary matters. Wade H. Lail, acting secretary. Other officers have not yet been elected. Capital stock, authorized, $500,000.

Louisville, Lincoln Farm & Mammoth Cave Traction Company, Glasgow, Ky.—Charles Van den Burgh, Glasgow, Ky., promoter of this railway, is quoted as saying that a company has not yet been incorporated, but it is proposed to build a line of about 60 miles from Glasgow via Buffalo and Lincoln Farm to Hodgenville, Ky. Two bridges will be necessary, one over Beaver Creek, with about 50 ft. span, and another with about 60 ft. span over Green River. Connection will be made at Hodgenville with the Illinois Central Railroad and at Glasgow with the Louisville & Nashville Railroad. [E. R. J., Dec. 25, '09.]

***Eastern Traction Company, Bangor, Maine.**—W. H. Waterhouse, Old Town, one of the directors of this cofpany, advises that the project of building its railway is still in a promotion stage. The Railroad Commissioners have taken under advisement the petition of the company for an extension of its charter. The route of the proposed railway is from Bangor to Dexter, Stetson, Exeter, Garland, Herman and Levant. Capital stock, authorized, $500,000. Officers: H. F. Bailey, Old Town, president; F. J. Dow, Bangor, vice-president; F. J. Martin, Bangor, secretary; E. B. Weeks, Old Town, treasurer.

Worcester & Providence Street Railway, Worcester, Mass.—William E. Horne, a director of this company, states that work on the construction of this projected railway will be undertaken as soon as the weather permits. The route of the line follows practically the Douglas pike through North Providence, Smithfield, North Smithfield and Burrillville into Massachusetts. The Bay State section of the line will connect Douglas, Sutton, Millbury and Worcester. [E. R. J., May 15, '09.]

***Caldwell, N. J.**—Preliminary steps have been taken by John Ottenheimer for the formation of a company to construct a street railway to the suburbs of Caldwell, which at present have no transportation facilities. It is the intention of the promoters to equip the line with Edison storage battery cars.

South Shore Traction Company, Patchogue, N. Y.—This company has filed its bond for $10,000 with the Board of Trustees of Rockville Centre, as a guarantee of its intention to construct the line. Work will be begun in Rockville Centre as soon as weather conditions permit. The company has recently placed an order with the Pennsylvania Steel Company for 500 tons of steel rails.

Brooklyn, N. Y.—Work on the fifth section of the Fourth Avenue subway will be begun this week by the Tidewater Building Company, the section being from Tenth Street to Twenty-seventh Street. The Public Service Commission has directed the company to proceed with construction from Tenth Street to Eighteenth Street. The contract calls for completion of the work within two years from the date of the signing of the contract, Nov. 9, 1909. [E. R. J., Dec. 18, '09.]

***Wolcott, N. Y.**—It is stated that George Tater, Wolcott, is securing rights-of-way for an electric railway from Red Creek to Wolcott to connect at Wallington with the New York State Railways. Rights-of-way are also being secured from Port Byron to Red Creek, the railway to run from Port Byron to Wallington via Plainville, Meridan, Cato, Victory, Westbury, Red Creek, Wolcott, North Rose and Alton. The Beebe interests are said to be back of this proposed railway.

Piedmont Traction Company, Gastonia, N. C.—This company has surveyed the route for the 13-mile railway which is to connect Mount Holly and Gastonia besides traversing the streets of these towns. Rights of way have been secured except one stretch in Mount Holly. A contract for the construction of about 1½ miles of track has been awarded to P. R. Huffstetler, Gastonia. T. C. Lee is engineer in charge of entire enterprise. A steel bridge, 35 ft. long, will be constructed across South Fork, half a mile above McAdenville. [E. R. J., Jan. 22, '10.]

***Whiteville Light & Power Company, Whiteville, N. C.**—This company has been organized to build a street railway and power plant in Whiteville. Right of way has been secured and work is expected to be begun by April 1. Among those interested are W. T. Carrington, J. R. Williamson and P. J. Hufford, Vineland, N. C., to whom all communications should be addressed.

Shawnee (Okla.) Electric Railway.—This company has recently increased its capital stock from $100,000 to $1,300,000. The company proposes to build an electric railway to connect Shawnee, Prague, Okmulgee, Muskogee, Dale, McLoud, Harrah, Choctaw City, Spencer and Oklahoma City. C. T. Edwards, president. [E. R. J., Dec. 25, '09.]

***Ashtabula (Ohio) Street Railway.**—This company is said to have awarded a contract to the New York Construction Company for the building of its proposed street railway in Ashtabula. The contract specifies that work should be started within 60 days. The route of the new line extends from the south end of the city to the harbor. Ties and rails have already been contracted for by the company. The cost of the railway, it is estimated, will be $200,000. It is proposed to operate six cars. Charles E. Wallin, president.

***El Reno, Okla.**—Press reports state that the Commercial Club has accepted the proposal of the Leads Construction Company to build an interurban railway from El Reno to Anadarko and Chickasha, the city to furnish right of way for 10 miles and subscribe $40,000 bonus. It is reported from Chickasha that an equal amount has been subscribed there to the Caddo Development Company to build the line, which is being promoted by farmers.

***Muskogee, Okla.**—R. N. Eggleston, H. B. Spaulding, C. W. Turner, A. C. Trumbo and Will Robertson, all of Muskogee, are said to be promoting a plan to build an electric railroad from Muskogee to Tulsa and Glen Pool. The line will be 66 miles in length. Two bridges will be required, one over the Arkansas River and the other over the Verdigris River.

Oregon Coast Railway, Astoria, Ore.—This company announces that work will be begun during the year on an electric railway from Astoria which will connect Warrenton, Columbia Beach, Gearhart Park, Seaside and around Tillamock Head to Tillamock. This summer, it is expected to complete the road to Columbia Beach, 8 miles, by July 1, and to Seaside by Sept. 1. The Kelly Lumber Company, Warrenton, it is stated, has secured a contract for 2,000,000 ties. [E. R. J., June 17, '09.]

Indiana County Street Railway, Indiana, Pa.—This company has completed its line between Blacklick, Josephine and Blairsville. Through service will now be given from Indiana to Blairsville, 75 miles.

Phœnixville, Valley Forge & Stafford Street Railway, Phœnixville, Pa.—This company has increased its capital stock from $60,000 to $350,000, and will also issue bonds to the amount of $600,000 for the purpose of building the chartered route and the Bridgeport-Norristown extensions. An ordinance granting franchises will be asked for at the next Council meeting of the Boroughs of Phœnixville and Bridgeport. Thomas E. O'Connell, West Chester, president. [E. R. J., Dec. 25, '09.]

***San Benito (Tex.) Interurban Railway.**—S. A. Robertson, San Benito, Tex., is said to be at the head of a plan to build an interurban railroad from San Benito to the Rio Grande. Preliminary surveys have been made and con-

struction is to begin when all bonus contracts are signed. It will connect with the St. Louis, Brownsville & Mexico Railway. Gasoline motor cars will be operated.

Richmond & Henrico Railway, Richmond, Va.—This company announces that construction work will begin on its line during the next few weeks. The Pennsylvania Steel Company has been awarded the contracts for 8 miles of track. The contract for ties has been awarded to the Burton Construction Company. [E. R. J., Dec. 25, '09.]

***Valley Railroad & Power Company, Seattle, Wash.**—This company states that surveyors are now going over the route of the proposed electric railway between Kent, Orillia, O'Brien and Renton. Capital stock will be probably $300,000. Officers: H. B. Madison, Kent, president; Robert Bridges, O'Brien, vice-president; Isaac Calhoun, Kent, secretary; Lee Monohan, Renton, auditor; A. T. West, Seattle, general manager.

Milwaukee Western Electric Railway, Milwaukee, Wis.—The capital stock of this company, which is projecting an interurban line from Milwaukee to Green Lake, has been increased from $200,000 to $1,000,000. An amendment also has been made to the articles of incorporation to cover an extension of the line from Beaver Dam to Green Lake, 25 miles. The railway will be 81 miles, including this extension. W. E. Elliott, general manager. [E. R. J., Dec. 25, '09.]

SHOPS AND BUILDINGS

Albia (Ia.) Interurban Railway.—Contracts will be placed by this company during the next 10 weeks for the erection of a car house and repair shop. W. E. Gant, general manager.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company is said to be considering the moving of its repair shops from Richmond to Greenfield which is nearer the middle of the division and where the car houses are located. [E. R. J., Jan. 1, '10.]

Springfield (Mass.) Street Railway.—Two new storage car houses, located in Westfield Street, were recently completed for this company by F. T. Ley & Company. Each car house has a capacity of 20 double-truck cars.

Saginaw Valley Traction Company, Saginaw, Mich.—This company plans to erect a new passenger station and freight depot at Franklin Street and Germania Street, Saginaw.

POWER HOUSES AND SUBSTATIONS

Los Angeles (Cal.) Railway.—This company is preparing plans for a substation to be located on De Soto Street, Boyle Heights. The structure will be one-story high and will cost $7,500.

Oskaloosa Traction & Light Company, Oskaloosa, Ia.—This company will purchase a 250-hp boiler next summer. H. W. Garner, purchasing agent.

Wichita Railroad & Light Company, Wichita, Kan.—This company is said to be considering plans for the erection of a power station in Wichita. The plant is to be located near Second Street and Riverview Street, and it will be 140 ft. x 125 ft. It will have a capacity of 4000 hp. and is estimated to cost $300,000.

Worcester (Mass.) Consolidated Street Railway.—In reply to a letter asking for such details as might be available regarding the new power plant for the Worcester Consolidated Street Railway, of which mention was made in the ELECTRIC RAILWAY JOURNAL of Jan. 22, 1910, the company says: "Our present plans are not far enough along to give out any information as to what we will do in the way of building a power plant in Worcester."

Holmesburg, Tacony & Frankford Electric Railway, Tacony, Pa.—This company will begin work in April on an addition to its boiler house. It is the intention to purchase and install one 500-hp water-tube boiler and two boiler-feed plunger pumps. Henry Glazier, general superintendent.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—This company expects to build a power plant and a 50-ft. concrete dam on the Red Cedar River at Cedar Falls. The plant will be equipped with four 2000-kw generators.

Manufactures & Supplies

ROLLING STOCK

Niagara Gorge Railroad, Niagara Falls, N. Y., expects to buy eight cars.

Pittsburgh (Pa.) Railways is reported to plan to purchase 100 cars for early delivery.

Public Service Railway, Newark, N. J., it is reported, will build six or eight freight cars in its shops.

Boston & Northern Street Railway, Boston, Mass., has placed an order with the John Stephenson Company for 40 cars.

Hamilton (Ont.) Radial Railway has ordered nine pay-as-you-enter cars from the Ottawa Car Company for spring delivery.

Winona Interurban Railway, Warsaw, Ind., will be in the market for passenger and express cars during the next four weeks.

Worcester (Mass.) Consolidated Street Railway is in the market for 10 12-bench, open cars complete with trucks and motors.

Beaver Valley Traction Company, New Brighton, Pa., has placed an order with Allis-Chalmers Company for six sets of air brakes.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn., a proposed railway, will purchase 14 steel cars.

Georgia Railway & Electric Company, Atlanta, Ga., will build 12 single-truck closed cars and six double-truck closed cars in its shops during 1910.

Emigration Canyon Railroad, Salt Lake City, Utah, will order a double-truck motor car, a trail car and 10 gondola freight cars within the next six weeks.

Los Angeles (Cal.) Railway, is remodeling 26 cars in its shops for pay-as-you-enter service, and, it is reported, will be in the market for a number of cars in the near future.

British Columbia Electric Railway, Vancouver, B. C., it is reported, will build 100 freight cars, about 200 passenger cars and five electric locomotives in its New Westminster shops during 1910.

Cincinnati (Ohio) Traction Company is having the 50 new cars recently ordered from the Cincinnati Car Company, built for pay-as-you-enter operation under license of the Pay-As-You-Enter Car Corporation.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has purchased six sets of trucks from the Standard Motor Truck Company for use under interurban cars which are being built at the company's shops.

Columbus, Delaware & Marion Railway, Columbus, Ohio, mentioned in a recent issue of the ELECTRIC RAILWAY JOURNAL as contemplating the purchase of five cars, has ordered these cars. They will be mounted on Curtis trucks.

Faulkenau Electrical Construction Company, Chicago, Ill., is reported to be drawing specifications for several new cars. It is not yet announced where these cars are to be used, but it is understood they are to be purchased for use on a line which will be electrified.

Albany (N. Y.) Southern Railroad, reported in the ELECTRIC RAILWAY JOURNAL of Dec. 11, 1909, as contemplating the purchase of two cars, has decided to buy two double-truck cars 54 ft. long, some time this spring. J. G. White & Company, New York, N. Y., will place the order.

Oregon Electric Railway, Portland, Ore., reported in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1910, as having ordered two observation trail cars from the Niles Car & Manufacturing Company, through W. S. Barstow & Company, New York, N. Y., advises that the cars will be motor cars, 61 ft. 2 in. long. Barstow & Company have since placed an order with the Niles Car & Manufacturing Company for the three combination baggage and passenger cars whose contemplated purchase was mentioned previously in these columns. The combination cars will be 57 ft. 8 in. long over buffers. The cars will all be equipped with GE-73 motors and Westinghouse air brakes and Baldwin trucks.

The electric locomotive has not yet been ordered. Three trail cars of the company will be equipped with G. E. motors.

TRADE NOTES

World Signal Company, New York, N. Y., has opened an office at 170 Broadway, in charge of J. H. Wisner.

American Bridge Company, New York, N. Y., lost its Milwaukee plant by fire on Jan. 3, 1910. The damage is estimated at $200,000.

C. Drucklieb, New York, N. Y., has moved his office from 132 Reade Street to 178 Washington Street, where he will continue to sell his sand-blast device.

Pressed Steel Car Company, Pittsburgh, Pa., has elected O. C. Gayley vice-president in charge of the sales department to succeed J. W. Friend, deceased.

Beach Manufacturing Company, Grand Forks, N. D., has been incorporated with a capital of $50,000 to make steel culverts, bridges and road-working machinery.

Wagner Electric Manufacturing Company, St. Louis, Mo., announce the opening of a district office in the Union Trust Building, Detroit, Mich., in charge of A. B. Hoffman.

Lynch Railway Automatic Brake Company, Kansas City, Mo., has been incorporated in Missouri by James Lynch, G. A. Dehaven and W. H. England, with a capital of $100,000.

Modoc Company, Philadelphia, Pa., has opened an office at 109 Chestnut Street, Philadelphia, and installed several new machines at Fernwood for the manufacture of car cleaner and soap powder.

Crocker-Wheeler Company, Ampere, N. J., reports that its recent sales aggregate more than 5000 hp in d. c. motors and approximately 2000 kw in d. c. generators and 2000 k.v.a. in a. c. generators.

Perry Ventilator Corporation, New Bedford, Mass., reports that ventilators have been delivered to the American Car Company, St. Louis, Mo., for the new cars being built at that plant for the Oklahoma Railway.

Standard Coupler Company, New York, N. Y., has elected Geo. A. Post, Jr., a director to succeed J. E. French, who is also chairman of the board of directors of the Railway Steel Spring Company, New York, N. Y.

Rockwell Furnace Company, New York, N. Y., has appointed J. W. Coyle, recently connected with the Best American Calorific Company, New York, N. Y., as a specialist of oil and gas furnaces for railway work.

Crane Company, Chicago, Ill., announces the death on Jan. 4, 1910, of Edwin Richardson, superintendent of the malleable department of the company. Mr. Richardson was 57 years old, and had been connected with this company for 39 years.

Chicago Car Heating Company, Chicago, Ill., has elected J. E. Buker first vice-president, with offices beginning Feb. 1, 1910, at the Railway Exchange Building, Chicago, Ill. Mr. Buker was formerly superintendent of the car department of the Illinois Central Railroad.

National Lumber & Creosoting Company, Texarkana, Ark., is rebuilding its creosoting plant which was burned in September, 1909. The new structure will be fireproof, and will have about 50 per cent greater capacity than the old plant, or about 2,000,000 ties per year.

Chicago Bearing Metal Company, Chicago, Ill., has appointed Walter D. La Parle sales manager. Mr. La Parle has been in the railway supply business for 20 years. He has been connected with the Verona Tool Works, Pittsburgh, Pa., for 11 years, and organized the Solid Steel Tool Company, which has been succeeded by the Western Tool & Forge Company, Brakenridge, Pa. The company's offices are located in the Old Colony Building.

Massachusetts Chemical Company, Walpole, Mass., reports an exceptional increase during 1909 in the use of Armalac, particularly for the insulation of armatures. It is claimed for Armalac that it remains plastic under repeated heating and cooling, and that coils on which it is used resist moisture after years of service because the compound has for its base a black paraffin wax, the melting point of which is raised permanently by a process known only to the Massachusetts Chemical Company.

Bridgeport Brass Company, Bridgeport, Conn., moved its sales offices on Jan. 22, 1910, from New York to Bridgeport, where a new office building has been erected in which the general offices of the company will be located. The works of the company are at Bridgeport, and it was felt that centralizing the departments in that city would make it possible for the company to serve its customers to better advantage and more promptly than in the past. The company will, however, maintain a branch office in the Postal Telegraph Building, Broadway and Murray Street, New York, N. Y., where its sales department was formerly located.

Stone & Webster, Boston, Mass., announce that they have opened offices in the Hanover Bank Building, 5 Nassau Street, New York, N. Y., to deal in securities of the electric railway, lighting, power and gas companies which are under their direct management. The Stone & Webster Engineering Corporation, which does a general engineering and construction business, will also be represented at these offices. The former New York offices at 45 Cedar Street will be closed. The New York office hereafter will be in charge of John W. Hallowell and T. T. Whitney, Jr. G. E. Tripp, of Stone & Webster, who is chairman of the reorganization committee of the Metropolitan Street Railway, will make his headquarters in the new office. The Stone & Webster Engineering Corporation had at the first of the year $11,341,000 of construction in progress, divided as follows: Water powers, $4,140,600; interurban railways, $2,607,700; street railways, $777,700; steam power stations, $940,000; buildings, $2,495,000; miscellaneous, $380,000. This work is largely in the Far West and in the South.

ADVERTISING LITERATURE

MacGovern, Archer & Company, New York, N. Y., have issued their list of electrical and steam machinery, powerhouse equipment, cars, etc., dated February, 1910.

Western Electric Company, Chicago, Ill., has issued Bulletin No. 5270 describing its type "T" transformers. The features of design and construction of the transformers are illustrated.

Wheeler Condenser & Engineering Company, Carteret, N. J., has issued a pamphlet on the general theory of jet condenser construction, but with particular reference to its rain-type condenser.

Elastic Tip Company, Boston, Mass., has issued a circular in which are shown its various shapes and styles of soft-rubber car-seat bumpers, actual size, and its car sign or ventilator stick rubbers.

Jeffrey Manufacturing Company, Columbus, Ohio, has issued Booklets Nos. 33 and 34, both dated December, 1909. In Booklet No. 33 the company's conveyors are described and illustrated and in Bulletin No. 34 its elevator buckets are described and illustrated.

General Fire Extinguisher Company, Providence, R. I., has printed in the November, 1909, issue of the Automatic Sprinkler Bulletin, which it publishes, a history of automatic sprinklers and a fire record from June, 1909, of places where Grinnell sprinklers were installed.

American Engine Company, Bound Brook, N. J., has just issued a pamphlet entitled, "Arrangement of Engine Cylinders to Produce Uniform Torque." This pamphlet contains typical indicator cards taken from the company's angle compound engine, and also a derived crank effort diagram which shows that this type of engine produces a torque which is nearly as uniform as that given by steam turbines.

H. W. Johns-Manville Company, Cleveland, Ohio, has issued the first number of the "J. W. Packing Expert," a four-page publication devoted to the packing industry. The foreword is entitled "The Story of Asbestos" and will be continued in the February issue of the publication. In an article entitled "Great Oaks from Little Acorns Grow" the company tells of the progress made by it recently in Ohio, Kentucky, and West Virginia, where its business was at one time taken care of by correspondence and by traveling salesmen. In 1898, however, it became necessary to open offices in Columbus to care for the territory mentioned.

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Rounding Out the Motorman's Instruction

The Brooklyn Rapid Transit Company's elaborately equipped instruction car for elevated service, described elsewhere in this number, shows the length to which operators of modern heavy electric railway equipment go in training their men in the careful operation of their trains. It is true that many managers believe that the motormen of city surface railway cars need know little more about their equipment than how to cut out a defective motor or to replace a fuse. But the conditions are different with frequent high-speed service, whether elevated or subway, and the trend of practice is toward giving the men a thorough education at considerable expense. This means that the instruction of several weeks in the regular schedule operation of a train must be supplemented by lessons on a specially equipped instruction car, where the student can see more than the covers of his apparatus. The prospective motorman seldom has any technical knowledge either of the electrical or braking equipment, and it is therefore essential that their details should be explained to him in a thorough manner. The experience of the Brooklyn company with this method of instruction has been so satisfactory that the elevated trainmen and the yard attendants also have been taken into the course. As a result, the management can feel confident that no matter where an emergency may arise in its elevated service at least one competent substitute will be on hand to take care of the train.

Publicity Through Civic Boards

Mr. Sylvester's paper on electric railway advertising presented at the Jan. 25 meeting of the New England Street Railway Club and abstracted in our issue of Jan. 29 contains some excellent suggestions on cultivating the good will of the public through the medium of commercial clubs, boards of trade and similar organizations. Every railway company certainly ought to be represented in such local bodies because the latter are so frequently the source from whence many complaints arise against the traction service. Some of these complaints are bona fide, but others are brought up by chronic kickers or by individuals who have some axe to grind. In either event, it is well to have some one on hand at the meetings to present the railway's side of the case, if necessary, before false impressions can take hold. By belonging to bodies of this kind also, it is possible for railway managements to gage accurately the quality of their membership and the extent of their influence. Often an organization with a most grandiose title is composed of nothing more than half a dozen real estate speculators. In one instance, the same individuals who were posing as a group of public-spirited citizens desirous of ridding their district of an abandoned power station actually had organized for no other purpose than to force the railway company to sell its

property to them at a sacrifice. On the whole, however, civic societies offer an excellent field for publicity as they are generally composed of representative tax-payers in the community. One of the largest railways in the East is now planning an illustrated lecture campaign whereby every prominent body of this kind will be familiarized with the daily problems confronting this electric railway in satisfying the needs of its patrons. In the past three or four years this company's president or manager has delivered an address on traction matters at the annual banquets of the more important organizations and it is hoped that the new plan will be even more successful in promoting good feeling between the company and the public.

The Central Electric Railway Association

The Central Electric Railway Association was organized Jan. 25, 1906, by the amalgamation of the interurban railway associations of Ohio and Indiana. The annual meeting of the association held last week in Columbus, Ohio, therefore marked the completion of the fourth year of its existence. It must have been most gratifying to the members to learn that the year just ended had been a prosperous and satisfactory one in every sense. The financial report showed a comfortable surplus in the treasury with no outstanding bills, in spite of heavy expenses incurred in carrying on the diversified work of the parent association and its offspring, the Central Electric Traffic Association. The membership now includes 47 companies with an aggregate of 3531 miles of track and interest in the work of the association shows no signs of lagging.

The value to its members of such a strong organization as this has grown to be cannot be measured in words. The interests of all the interurban roads in the Middle West are becoming each year more closely identified as connecting lines are built and new avenues of through traffic are thrown open. The problems of one road are the problems of its neighbors and the association meetings are the clearing house for the interchange of knowledge and experiences. If there had been in the last four years no tangible or intangible result of its work other than the launching of the Central Electric Traffic Association the members might still be proud of their organization. There have been other results of great benefit to all, among which could be named the adoption of uniform operating rules and standards of equipment, the formulation of equitable rules for interchange of cars, and, of most importance, the creation of a harmonious spirit of co-operation in all matters of common interest.

The Central Electric Railway Association is not in any sense a rival of the American Street & Interurban Railway Association. Nearly all of its members are also identified with the national body. The presidents of three of the four national associations affiliated with the American Association, and the first vice-president of the latter body, are associated with companies which have always taken an active interest in the work of the Central Electric Railway Association. The latter, like the other sectional and State organizations, has its own problems to solve, and as its membership is made up of a smaller number of companies, with less diversified interests than the national body, it can undertake work entirely outside of the scope of the latter organization. The members of the Central Electric Railway Association who have given it their loyal support are to be congratulated upon the accomplishments and standing of the organization, and we extend to them our best wishes for its continued success.

Midyear Meeting of the American Association

The plan of holding a midyear meeting in New York of the American Street & Interurban Railway Association proved so successful last week that undoubtedly the association will continue the practice next year and in the future. The attendance was good and equal to, if not larger than, those at the annual meetings of the association. The discussion was well maintained and we believe that all those present will carry away new ideas and a clear conception of the viewpoints of other managers on questions of policy which will far more than repay them for the time required to be present. In the committee meetings of the previous day, of which altogether 12 were held, action was taken on work to be pursued during the coming year.

Probably the most important feature of popular interest at the midyear meeting was the address of President Shaw at the banquet Friday evening, when he emphasized his well-known views on the future policy of the association and illustrated his remarks by referring to various recent events of street railway interest.

According to President Shaw the conditions now surrounding the average city railway property are such as not only to discourage the investment of capital for extensions and improvements, but even to militate against the supply of good service. Concurrently with a rapid increase in the cost of materials and labor during the past few years there has been almost as rapid a decrease in the receipts per passenger-mile, on account of the wider use of transfers and the longer rides furnished. In many instances the margin now between receipts on the one hand and operating expenses plus fixed charges on the other is so small that it is only by the most rigid economy that the properties can be kept solvent, while in a still larger number of instances the return paid on the money actually invested on the properties is so small as to discourage any further development of the street railway facilities. This is a condition which is desirable neither for the companies nor for the cities in which they are located. President Shaw outlined the remedies possible, but he stated that practically they could be applied only in communities where their justice and necessity are recognized by a majority of the intelligent electorate. Hence he advocated a policy by which electric railway companies would welcome an impartial examination of their affairs by those interested and concerned in the welfare of the communities in which these companies operate. Brief sketches of recent street railway history in Kansas City, Cleveland, New York and Massachusetts were given to illustrate the force of these remarks.

In one sense, the situation, so far as the railway companies themselves are concerned, is improving. The policy heretofore actuating practically all companies has been to build extensions liberally into unprofitable territory, to keep up with the population and with the hope that ultimately they will prove valuable additions to the system. But if this plan is no longer followed, the traffic on most systems will increase with the natural growth of the population, and where the congestion is not too great and the average length of ride not too long, this additional traffic will be profitable. But this is not a condition consistent with the proper development of the community nor is it a desirable one for the railway company itself except where no other plan is practicable. Its interests, broadly speaking, lie with those of the community which it serves, and, to obtain the best results for both city and company, each should gain as the other prospers.

Transportation and Urban Development

A goodly number of interurban electric roads have been projected recently in territory already well occupied, and their rights to a place in the world of transportation naturally hinges upon the question of their public utility. This point is vigorously claimed by their promoters and as vigorously denied by every steam railroad whose lines traverse the territory it is proposed to occupy. Now, the essential point of the whole controversy seems to us to be the following: whether by the building of the proposed road the collective John Smith, so to speak, will be the more readily able to go about his business, and whether his property will through greater accessibility become desirable for homes for others of his kind.

If one examines carefully a map of almost any section of the country he will readily see that while in many districts steam railroads have done admirable service in opening up the country, they touch immediately a comparatively small extent of territory. A given railroad line, be it steam or electric, does not open up a broad area even under the most favorable circumstances; not even in interurban territory, let alone suburban. The ordinary steam road, with its customary line of stations, practically serves a residence space only from one to two miles in width, or rather a series of overlapping or adjacent circles, half a mile to a mile in radius. In almost any suburban territory the effect of placing these stations is evident by the growth of a series of villages, each of comparatively small extent. These towns, strung like beads along the railway line, extend out radially, because about most American cities belt railways are of rare occurrence, and between these lines there is often a great deal of desirable but undeveloped territory surprisingly near to the urban center of population.

The fast interurban line has done sterling service in extending the hour radius, if one may so call it, within which it is feasible to live and do business in the city. This extension is due to the speed, and brings into availability much added territory by linear expansion, so to speak, even though the strip served still remains comparatively narrow. It seems logical to expect that our cities are to keep on growing rapidly, and they absolutely need more territory into which to expand. Residence area is absolutely necessary in order to keep down living expenses, and if it cannot be had by existing steam lines, it seems highly important that it should be obtained by the expansion outward given by fast electric service. A steam road, once established through a given territory, may reasonably expect to keep up its traffic earnings if it keeps up its service, for it has already pre-empted the territory naturally tributary to it. If it does not keep up its service it certainly has no right to demand the suppression of proposed lines to make up for its deficiencies.

The experience of some years shows that population follows the trolley out into suburban districts, and this tendency ought certainly to be encouraged by the supply of the best facilities for transportation which can be made available. Moreover, interurban lines, where the terminals are reasonably large, so as to give suburban as well as through service, have very generally made good from a financial standpoint, and there is every reason to expect that they will continue to do so. Investors are not risking their money for fun in roads which are unlikely to pay, and in most cases it seems to us that if investors wish to invest in an interurban line in the belief that it will be profitable, no hindrance should be put in the way of their desire. The mere fact that some of the steam roads are afraid of losing their less favorably situated traveling public is not really a thing which would weigh heavily against the desire of the public for better facilities.

Tracing the effect of interurban and suburban roads on population and property values shows plainly that transportation facilities such as they afford are a good thing for the community at large, and their building should therefore be encouraged at every reasonable opportunity. American cities are growing, not through normal increase of population, but through an extraordinary rapid aggregation, and no theories based on normal increase from census to census bear any definable relation upon the probable traffic that can be gathered by well-designed and carefully operated transportation systems.

Stealing Railway Property

Some interesting experiences were related at the Columbus meeting of the Central Electric Railway Association last week, of the theft from interurban cars in the Middle West of different portable articles. The ingenuity displayed by dishonest persons in sequestrating such property belonging to the company as lanterns, brooms, brasses, camp stools, shackle bars and even rear doors would have brought delight to the heart of Mr. Fagin, were that worthy gentleman now alive. Electric railways in all parts of the country have long suffered from the depredations of copper thieves and many of them undoubtedly have undergone losses from thievery of car supplies and equipment which when perpetrated on the scale described constitutes a larger loss than that from purloined bonds. Many of the articles which disappear have little or no intrinsic value as junk or second-hand material, yet the very articles which have the least value are most frequently missing. It is next to impossible to keep brooms on cars, and thermometers, feather dusters, water buckets and switch irons vanish like thin air.

All of the checking schemes which have been devised attempt to put the responsibility for loss on the crew which had the car in charge when the article or articles disappeared, but it is hardly fair always to place the blame or the burden of making good the value of the missing equipment entirely on them. Employees may occasionally appropriate some of the company's property to their own use, but in the vast majority of instances the crews are no more to blame than the general manager. They cannot see everything going on inside and outside of the car nor can they search every alighting passenger to make sure that he is not concealing a feather duster up the back of his coat or a camp stool in his suit case. One company in Western Ohio discovered, merely by chance, that a regular passenger on its cars made a practice of entering the lavatory just before the car passed his home and throwing out of the window the broom and feather duster which were hung inside on hooks. This is petty thievery, but severe measures to break it up are warranted. It is worth while to spend $100 to prosecute to the limit a thief who steals a 25-cent broom or brass fitting if just for the moral effect. A few convictions would go farther toward stopping the practice than attempting to put everything movable on a chain or under lock and key. The junk dealers who buy parts stolen from electric railway cars need to be warned by one or two severe lessons quite as much as the traveling public. They have long since ceased to buy steam

railroad junk because they know it is dangerous to be caught with the goods, and with the exercise of the same vigilance and determination to stop thievery on the part of electric railways, we believe the trouble would soon almost entirely cease.

Apprentice Courses for Transportation Positions

Elsewhere in this issue an account is published of a course which has been followed on the Boston Elevated Railway with the idea of training men for the transportation department, and as this was the first phase of the work considered by the committee on education of the American Association, and as several companies have since adopted regular courses leading to this end, an account of the plan followed in Boston will be of interest. The course has been taken by but one student, and the trial is too recent to give an idea of its general success, although the experiment has extended now over somewhat more than three years. The fact, also, that one young man has gone through a schooling and has profited by it does not necessarily mean that others would do so any more than the reverse would be the case. The ultimate value of the plan must be determined by results secured by a good many cases, although the experience in other lines of work is a sufficient indication that in its main principles it is correct.

Success in the establishment of any apprentice course of this kind depends largely upon both the apprentice and the company taking a broad view of the conditions. In a sense, each is making a sacrifice. The apprentice devotes three years or more to work in which the hours are long and more or less broken, and for which the pay is small, with the sole object of laying a foundation for his future career in railway service. If, before beginning the work, he has taken a college course, he will probably be 25 years of age or over before beginning his life work, so far as financial returns are concerned. Moreover, his expenditure of time and money will be largely thrown away if, during or after his course, he is compelled to abandon the work for more remunerative employment.

On the other hand, the expenditure made by the company is even greater and more speculative than that made by the student, because it has no guarantee that his opportunities will be grasped, or if taken to heart will be used later to the advantage of the company conducting the course. While the railway company pays the student the regular workman's wage it is not getting full value for its money. He is continually a beginner and is, like all beginners, an expense in material and equipment and in time spent by more experienced men teaching him. The student no sooner learns the work and begins to be an asset than he is removed to start learning some other branch. Thus both parties give time and capital to the other, and if either or both are too intent on profit each will suffer a loss and force a loss upon the other.

If the company persists in paying a low salary to the man after he has been educated he will be driven through necessity to seek employment elsewhere. This may tend, if he continues in street railway work, to broaden him and make him of more value to the first employer later in life, and if he has been diligent and has acquired a good knowledge of electric railway practice he will serve as a fine example of the company's methods. But such a course would be more apt to result in the student taking up some entirely different line of work and losing his investment of time as well as the company losing its investment of money. On the other hand, if the student is too persistent in his demand for higher salary he will force the company into dispensing with his services.

In carrying out a plan of this kind the higher officials of the company should give the student or students personal attention and allow the course to have enough elasticity to provide for different temperaments and capacities. They must win the respect as well as the gratitude of the student. They must exercise great care in the selection of men, so that those unfitted for the course may save attempting it to their mutual loss.

The student taking a course like this must enter it with a full understanding of the effort entailed and the possible results. He must realize the position of the company and what it is doing for him, and must have the firm intent of proving worthy of the trust and effort made in his behalf. He must be willing and able to sacrifice a purely financial gain and content himself with a moderate return. Above all, he must not look on this sort of a plan as an easy road to high positions, but must appreciate the fact that his continuance and progress with the company depend wholly on his own efforts, and that he is morally bound to excel all men with whom he comes in contact in his work.

Individual Accident Policies and Damages

The effect of a settlement by an insurance company with whom an injured motorman had an individual accident insurance policy was passed upon last year by the United States Circuit Court of Appeals in a case against the Puget Sound Electric Railway Company brought by a motorman named Van Pelt. His duties required him to ride in a small motorman's compartment, and, by the explosion of a fuse, he received serious injuries to his eyes, for which a jury awarded him $2,000.

On the trial evidence was offered by the company tending to show that at the time of the accident the motorman's policy provided that the insurance company should be liable to the insured, in case of permanent disability arising from such an accident, for a period of 12 months' total disability. The company also sought to show that two months after the accident the plaintiff freely and voluntarily settled with the insurance company in consideration of a sum equal to what he would have been entitled to receive under his policy for four months' total disability and two months' partial disability. The trial court refused to receive this evidence, and it was contended on appeal that this exclusion constituted reversible error. The Federal Appellate Court held, however, that no error was committed. While there was a dissenting opinion, it does not discuss this particular point, so the decision may, in this regard, be looked upon as unanimous.

While it is true, the court said, that if Van Pelt, in his settlement with the insurance company, made admission of any fact which would tend to contradict the allegations of his complaint against the railway company, evidence on this point would have been admissible, but it considered that a settlement made two months after the accident on the terms of which proof was offered and excluded, did not contradict in any degree the averments of the complaint, filed nearly four months after the accident, as to the serious character of the injury. While the verdict was sustained on other grounds as well, this point is of general interest because of the large number of employees who carry accident policies and recover benefits from them as well as from their employers.

The Latest Cleveland Ordinance

The ordinance granting a renewal of the franchises of the Cleveland Railway Company, on which citizens of Cleveland will vote on Feb. 17, contains a number of terms differing in important respects from the measures which have been under consideration previously in connection with the negotiations for a settlement of the street railway situation in Cleveland.

The preamble to the ordinance recites that it is agreed that a complete readjustment of the situation should be made upon terms that will secure to the owners of the property security of their investment and "a fair and fixed rate of return thereon," and will secure to the public the largest powers of regulation and the best transportation at cost "consistent with the security of the property and the certainty of a fixed return and no more." This statement underlying the new ordinance represents clearly the ideas of Judge Tayler, of the United States Circuit Court, who, as arbitrator, has directed the main terms of the measure to be placed before the public of Cleveland for acceptance or rejection.

The primary provision of the ordinance is that it grants the company a renewal of rights until May 1, 1934. It has been pointed out in previous issues of this paper that the ordinance which has been drawn to embody the ideas forming the present basis of settlement is founded upon a predetermined schedule of fares in which there is some room for revision downward, an arbitrary valuation somewhat similar in method and results to the last preceding valuation and a rate of dividend which, although fixed definitely at 6 per cent per annum, is subject to penalty by temporary reduction in the event of failure of the company to abide promptly by the decision of a board of arbitrators upon any point which may be in controversy.

It is in accordance with these fundamental provisions of the settlement that the ordinance recites that "for the purpose of fixing from time to time the rate of fare to be charged by the company and the return to the company for the service rendered by it to the public" and for the further purpose of fixing the price at which the property may be purchased, the capital value is declared to consist of various items, which are specified in detail. These values, aggregating $24,091,049.53, include bonded indebtedness of $8,128,000, floating indebtedness as of Jan. 1, 1908, of $1,288,000, and the balance of $14,675,049.53, to which $550.47 was added in order to equalize the stock value, making for the residue of the capital value $14,675,600.

To this amount additions may be made from time to time in accordance with sections of the ordinance providing for increase of the capital account under certain restrictions. Various provisions, however, regulate the terms upon which the securities may be issued. The stock may not be sold for less than par. Bonds may be sold for less than par with the consent of the city. Floating debt may not be increased except as may be necessary to capitalize the debt enumerated in the ordinance or to provide for such extensions, betterments or permanent improvements as the terms of the ordinance contemplate shall become a part of the capital value. No restriction is placed upon the company if it chooses to sell its stock or increase its bonded or floating debt without the consent of the city, but no such increase shall be considered a part of the capital value under the ordinance unless made in pursuance of its provisions.

Wide latitude downward is stipulated in the section of the ordinance regulating the rate of fare, but the maximum possible is 4 cents, with seven tickets for 25 cents and 1 cent for a transfer without rebate, while the possible minimum rate of fare runs as low as 2 cents with 1 cent for a transfer and 1 cent rebate when the transfer is redeemed. To regulate transfer abuse it is provided that the company shall not be required to furnish a round trip for a single fare. The rate of fare is to be regulated according as the sum in an "interest fund" remains above or below $500,000.

The "interest fund" of $500,000 is to receive all earnings of the company after the payment of the allowances for operating expenses, depreciation, renewals and maintenance. Interest and dividends will be charged against the funds. Any surplus remaining in the fund above $500,000 is to constitute a fund to be absorbed in the reduction of fares.

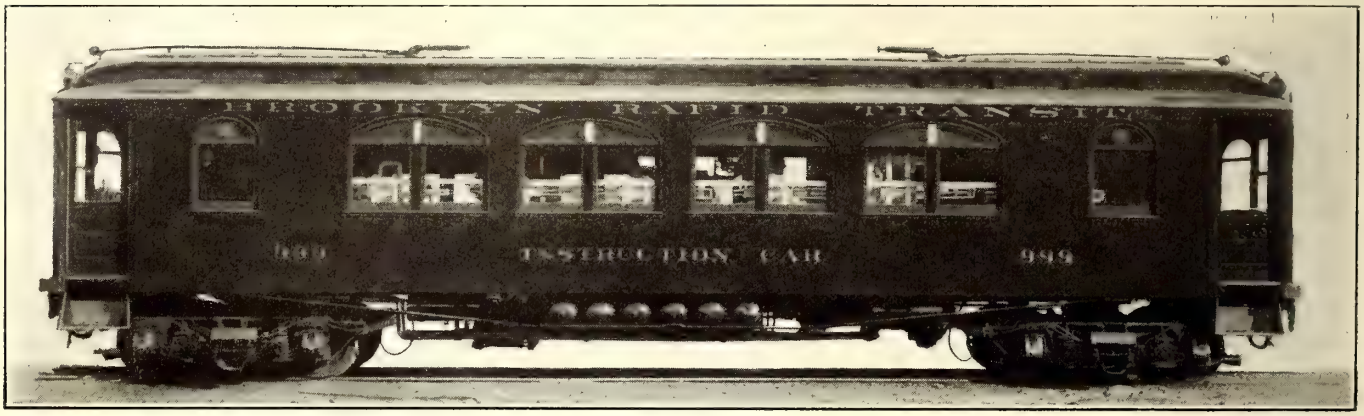
For current operating expenses the ordinance allows 11.5 cents per motor car-mile and 60 per cent of this figure, or 6.9 cents, per trailer car-mile. In addition to these sums, fixed deductions are to be made from gross revenues each month, which shall be placed to the credit of the maintenance depreciation and renewal account. In January, February, March, April, May and December 4 cents per car-mile is to be allowed. In November 5 cents per car-mile, in June, July, August, September and October 6 cents per car-mile. If not needed for immediate maintenance or renewals, this sum shall be accumulated and may be invested from time to time in the bonds of the company or in payment of floating debt, provided that such debt forms part of the capital value of the company. These allowances may be increased or decreased by agreement between the city and the company so as to enable the expenses of operation, including the costs of insurance, accident and damage claims, to be met.

Supervision on behalf of the city is to be exercised by a city street railroad commissioner, who, with broad powers, is to act as a technical adviser to the Council in all matters affecting interpretation of the ordinance and all actions affecting the service, the cost thereof, or the rate of fare.

While there are various other provisions affecting the terms of operation, some of which are not dissimilar from many other ordinances, the principal additional section is that relating to the possible purchase of the property by the city or by another firm, person or corporation. In the event of purchase by the city the price shall be the capital value plus 10 per cent. The right to purchase may be exercised at any time when the city has the legal power, upon six months' notice. After Jan. 1, 1918, the city may designate any firm, person or corporation to purchase the property upon the same terms, except that the licensee in this event shall agree to accept a return by at least one-quarter of 1 per cent smaller than the 6 per cent permitted on the stock by the ordinance under consideration. In case of expiration of the grant without the exercise of the foregoing provisions for purchase, the city reserves the right to purchase at such price as may be agreed with the company or upon failure to agree, then for such price as may be determined by a board of arbitration. The price which the city would pay in this case would be the value of the property for street railroad purposes. The cost of reproduction would be estimated and a reasonable amount deducted for depreciation. To the total valuation of the physical items, as thus determined, 10 per cent would be added.

RE-EQUIPPED ELEVATED INSTRUCTION CAR OF THE BROOKLYN RAPID TRANSIT SYSTEM

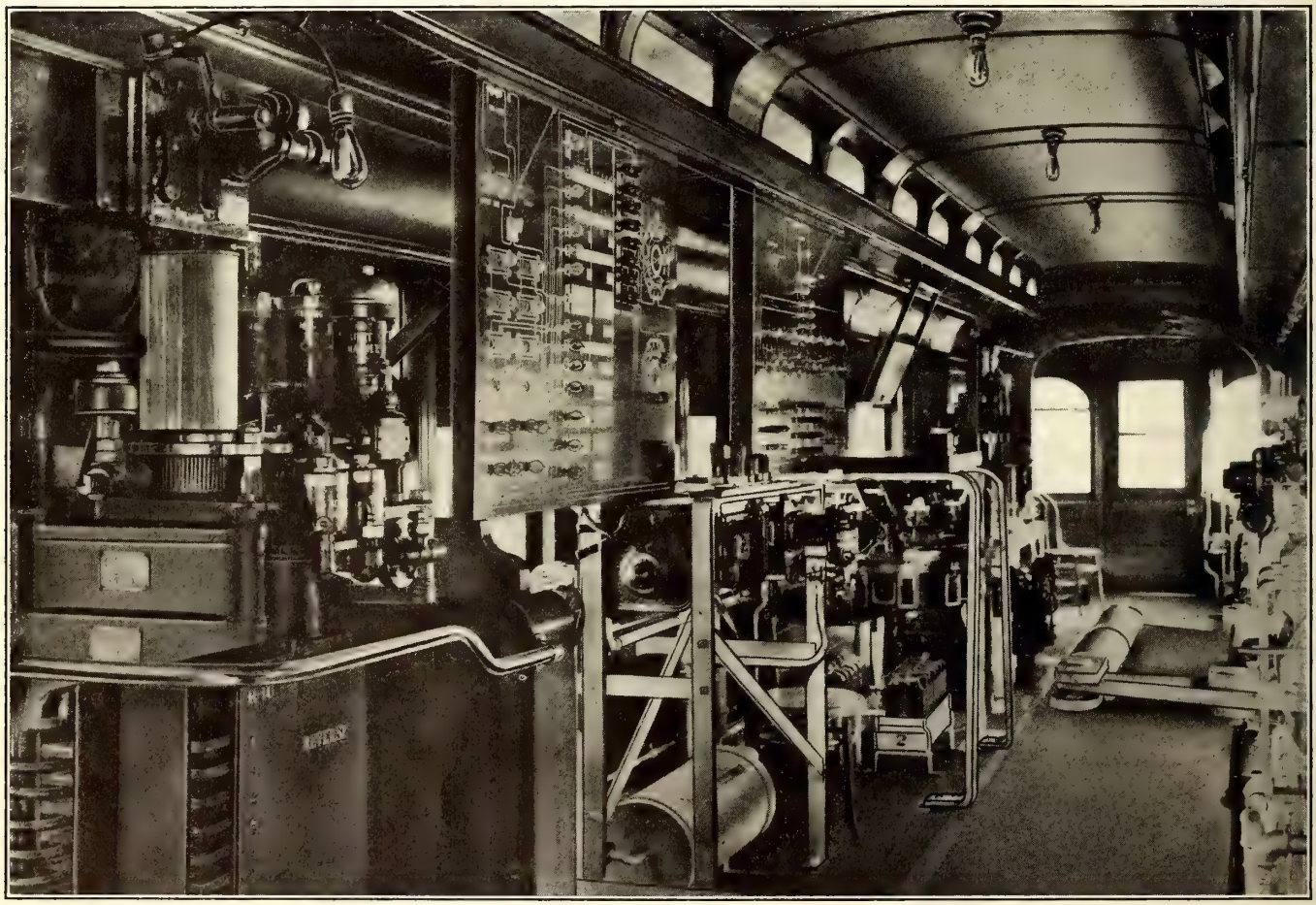
The Brooklyn Rapid Transit System has just finished the re-equipment of its elevated instruction car to make it complete and the best of its kind in every particular. Primarily, the changes and additions were made necessary by the recent adoption of the new Westinghouse A M L and A T L graduated release, quick recharge brake for all elevated cars. However, advantage was taken of this improvement to elaborate the instruction features of the electric control equipments by the installation of illuminated instruction boards. Thus when the motormen now go through the instruction course, they will not only become familiar with the very latest form of braking and draft-rigging equipments in use but will also have the opportunity of studying the electrical operation of trains in the simple and attractive manner afforded by the illuminated boards. The car was built and equipped by the mechanical department at the eastern division elevated shops for the elevated division of the transportation department. It is maintained by the former department at whatever inspection shop it happens to be during the instruction periods.



Brooklyn Instruction Car—General View of Car After Its Re-equipment

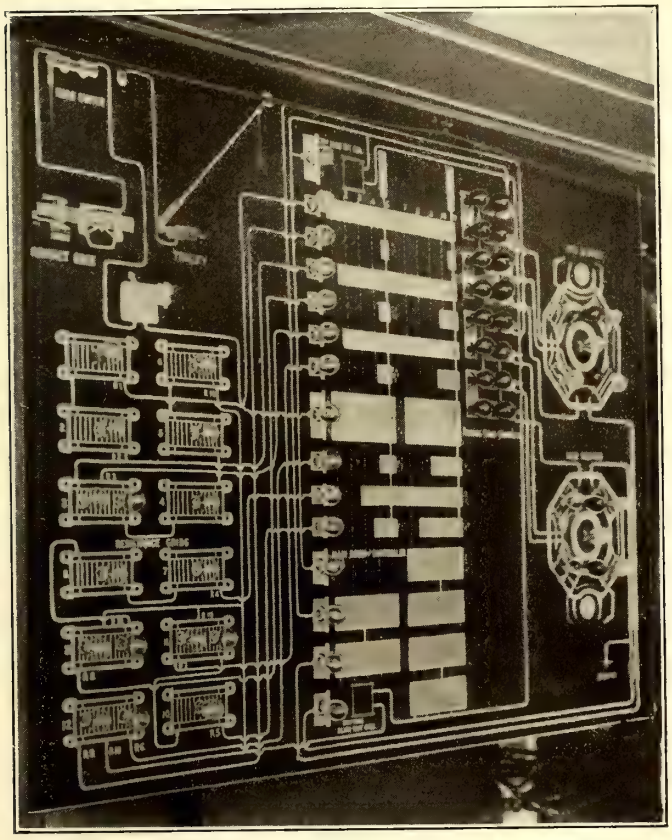
ELECTRICAL EQUIPMENT

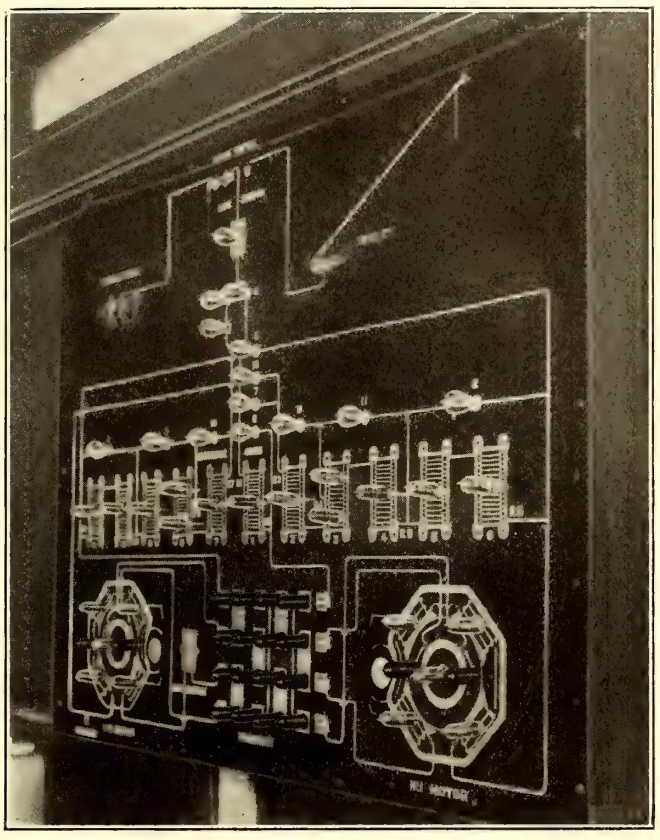
The electrical equipment on this car consists of single complete sets of the Westinghouse 131 and 160 control and the Type A B unit switch group control, together with sample motor car and trailer-switch cabinets with references to where these cabinets are placed on the different types of cars. The former control can be used in the actual running of the car, as a two-way switch permits the instruction board circuit to be cut in or out as the case may be. Each control system has all of its components mounted inside the car in plain view



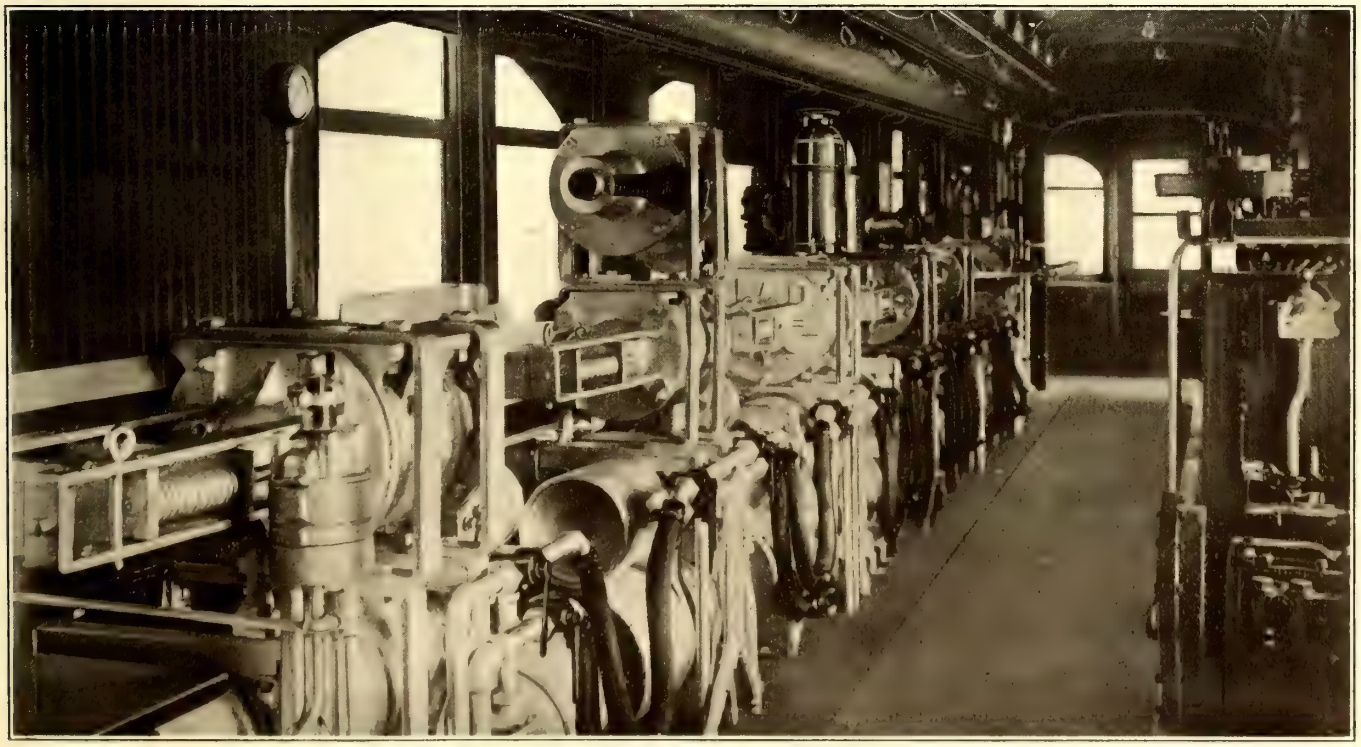
Brooklyn Instruction Car—Electrical Side, Starting from the Drum Control

and is supplemented by sections of the principal parts. Both of the illuminated lamp boards are faced with ¼-in. x 36-in. x 48-in. asbestos wood, ebony impregnated and backed by ⅛-in. asbestos wood. All the wiring is in metal conduit for the 14-





Brooklyn Instruction Car—Illuminated Lamp Boards for Drum and Unit Switch Group-Control Systems



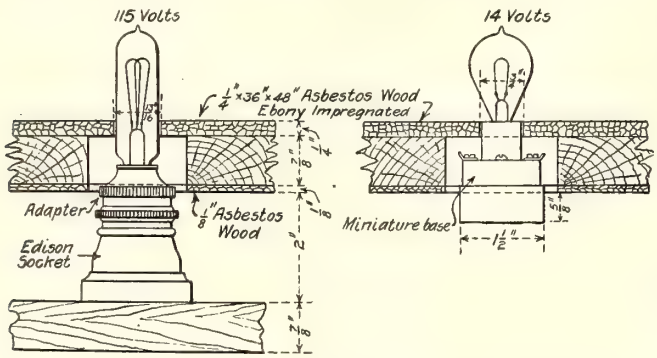
Brooklyn Instruction Car—Air Brake Side, Showing Full Equipment for a Standard Six-Car Train

volt miniature lamps which represent the control circuits and the 115-volt series lamps which represent the motor circuits.

OPERATION OF THE ILLUMINATED INSTRUCTION BOARDS

The operation of the lamp boards may be understood from the accompanying wiring diagrams and the following explanation of what occurs on the board representing the unit switch group control when the master controller in that circuit is manipulated. As shown on the diagram, current may be taken either from a trolley wire or a contact rail. Next comes the hood switch, its outlines being painted on the board but having no lamp indication. From this point on lamps are provided in parallel with the different portions of the equipment, such as

the line switch, resistance grids, reverser and motors. In the first position of the master controller, the current from the line switch will light up its corresponding white lamp and thence proceed through lamp indications corresponding to control



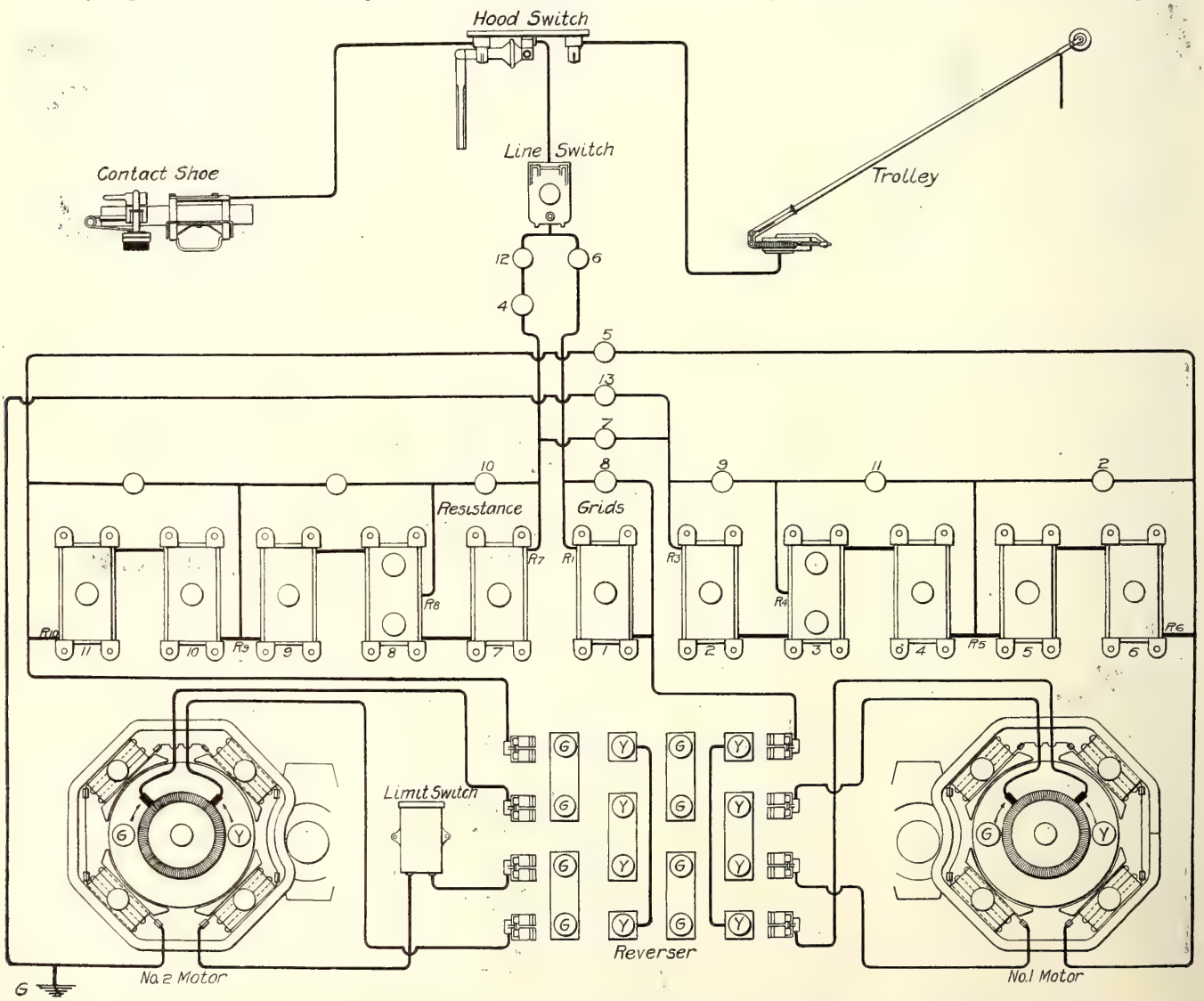
Brooklyn Instruction Car—Detail of Lamp Mounting on Illuminated Board

switches to the white lamp of R_1. On reaching the reverser, the green lamps of the latter will light up if the reverser is in the forward position, but the yellow lamps will light up if it is in the reverse position. These colors correspond to the clear and cautionary signals used in the transportation service. The illumination of the green lamps indicates that the current is going to the positive brush-holder, which is also indicated by a green lamp, thence to the armature of No. 1 motor, after which it returns to the reverser and lights the corresponding lamps. The current then enters No. 1 motor field, which is represented by four white lights, after which it continues on to No. 2 motor. As the controller is moved from step to step, the lights representing the resistances cut out are successively extinguished. At the same time the lamps representing the switches of the unit-switch group light up as the switches close. It will be understood that as the resistances are cut out, the lights representing the motor armatures and fields become brighter and brighter. In this way, the student receives a vivid impression of what goes on in the power circuit in relation to the building up of voltage. The limit switch shown on the diagram permits the instructor to stop on any point of the controller to make required explanations.

The 131 and 160 control differs from the unit-switch group in having a regular controller instead of the turret switches and in having the reverser contact as a part of the controller instead of separate.

AIR-BRAKE EQUIPMENT

The new air-brake equipment corresponds to that of a Brooklyn Rapid Transit standard six-car train, which consists of four motors and two trailers. Besides the complete equipment which is used in the actual braking of the car, there are provided full-size sections of the brake, triple, feed and engineer's valves, of hose couplings, and of both Christensen and Westinghouse governors. The complete Westinghouse governor forms a part of the operating equipment. Gages are provided to show how the pressure of the different reservoirs varies during the several applications of the braking system. The sectional triple valve installed is joined to the operating triple valve by a connecting rod so that the various service



Brooklyn Instruction Car—Circuit Diagram for Board Representing the Westinghouse Unit Switch Group Control

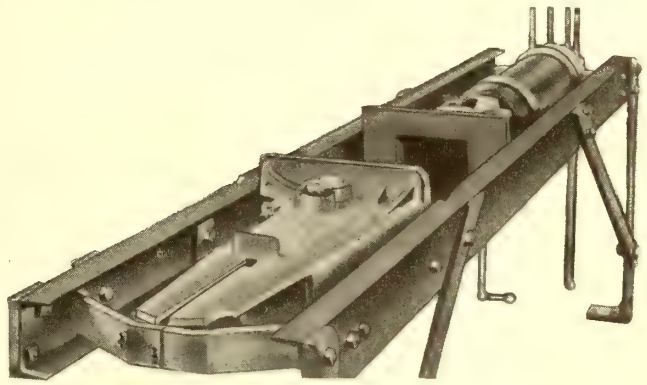
applications as they occur on a standard six-car train may be seen and explained to the students. A similar connection is provided between the operating and sectional compressors. Colored sectional charts of this new braking system are in course of preparation by the air-brake manufacturer, but at present the company is using for this purpose special white prints which are printed on linen cloth.

As all of the elevated cars are being equipped with slack adjusters, one has been installed under the instruction car and another is shown in section for instruction purposes. A rather novel part of the equipment is a Van Dorn No. 18 pneumatically operated coupler which has been placed inside the car to show how a coupling is made in every-day operation.

USE OF INSTRUCTION CAR

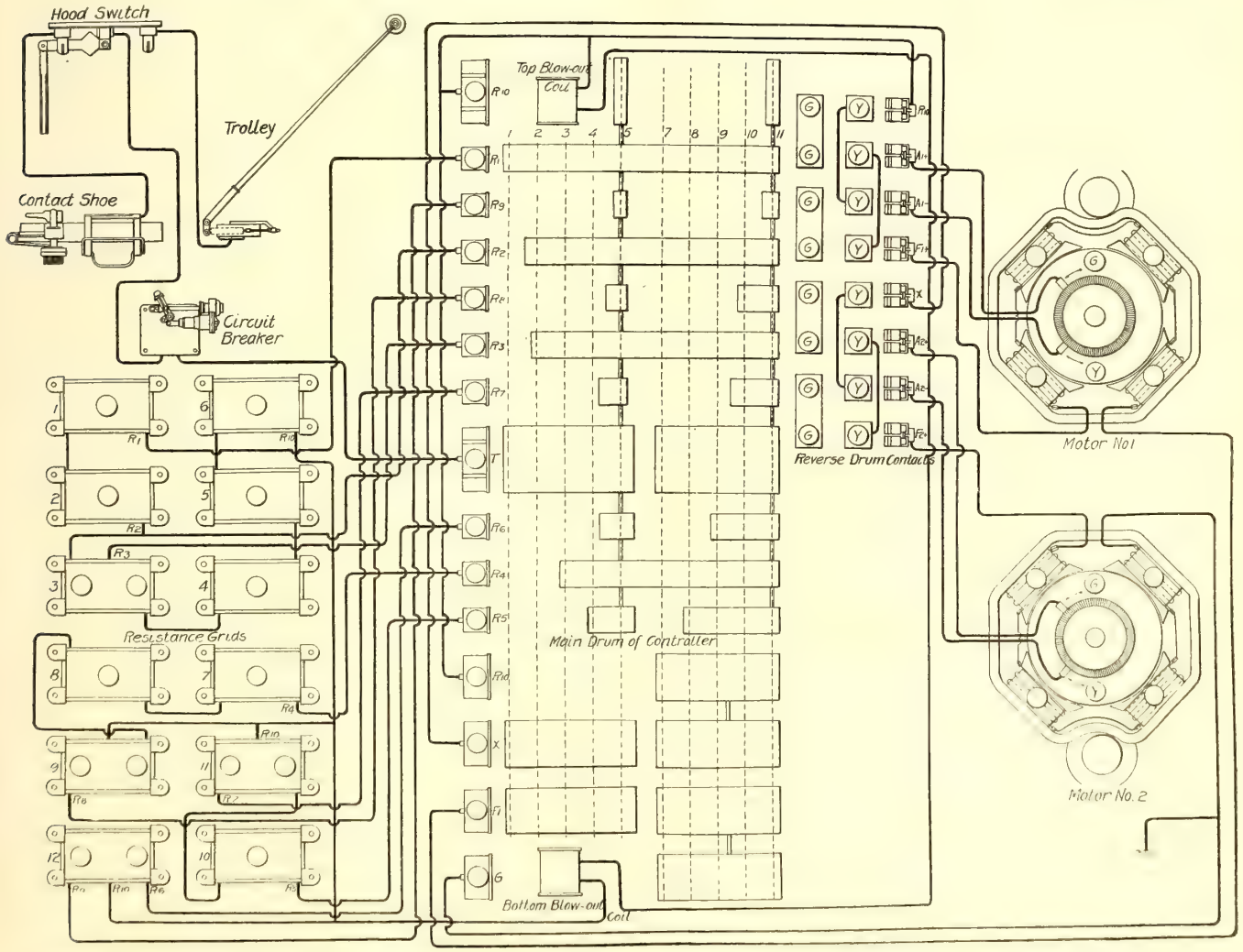
The instruction car is used by the transportation department both for new men who are being taught to handle elevated apparatus for the first time and for men who have been working on the line for some years. The candidates for the position of elevated motorman must be between the ages of 24 and 37 and are selected only from employees who have been motormen on the surface cars for two years or who have spent a like period as trainmen or yardmen in the elevated service. All applicants must not only have a clear record, but have to submit to a searching physical examination before they are permitted to take the instruction course, as it is the policy of the company to employ in its elevated train service only those men who have already proved their fitness and reliability. The requirements are so severe that, in general, not more than 75 per cent of the men who apply under these conditions are finally accepted.

The instruction of the recruit motormen begins with a preliminary course of six days on a school train. The latter does not include the instruction car, but is simply a regular train carrying no passengers, but with which all of the regular starts and stops are made. Hence, the student can familiarize himself with the track and bell signals, grade and curve conditions,



Brooklyn Instruction Car—Pneumatically Operated Coupler

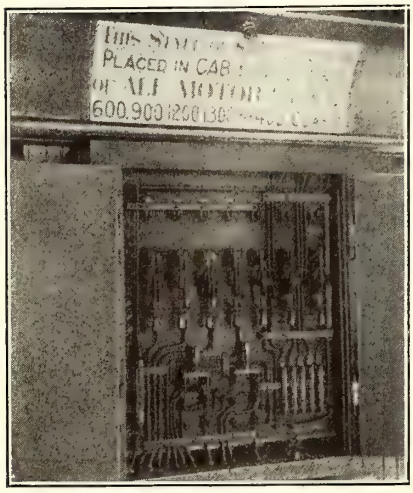
etc., without distraction as to details of apparatus. The instruction car was formerly a part of the school train, but it has been found more satisfactory to station it at different division headquarters, as required, rather than to keep it moving along the line all the time. An instruction train class consists of six men under an instructor motorman, each man taking his turn at the control equipment and spending the balance of his time in studying the several instruction blanks, rules and the catechism relating to the equipment and operation of the train. If the candidate can pass a satisfactory oral examination at the end of the six-day trial, he is placed under an in-



Brooklyn Instruction Car—Circuit Diagram for Board Representing the Westinghouse No. 131 Drum-Type Control

structor motorman for 12 days on a regular passenger train. During both courses, he attends a supplementary course in the instruction car for an hour each morning before going out on the school train and for one hour in the afternoon.

The final acceptance of the candidates depends upon the confidential reports of the motormen instructors who turn in the student's assignment sheets on which the records of their work are presented. The students are paid $2 a day during the training period and after graduation are usually placed on the extra list, or, if that is long enough, are returned to their old positions pending appointment. In this way the company always has a considerable body of trained men ready to take up the operation of its elevated rolling stock at a moment's notice.

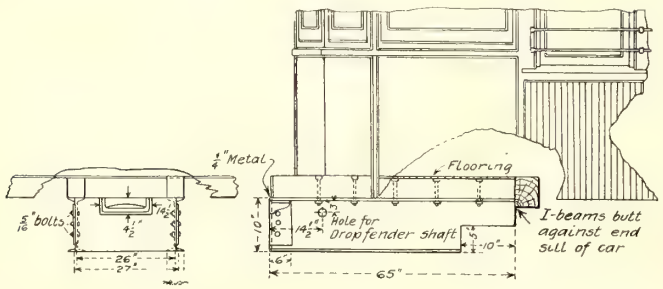


Brooklyn Instruction Car—Switchboard Location

When the instruction car was first placed in service, the course was confined to prospective motormen, but it has since been extended to include the elevated trainmen and yardmen. Experienced motormen are obliged to go through the instruction car about every six months, the dispatcher assigning them to the car for two hours during an off-duty period. It is likely that the instruction hours of the veterans will be lengthened on this occasion owing to the radical changes made in the air-brake equipment and because of the adoption of the illuminated instruction boards. The men show great interest in the equipment of the instruction car and it is not uncommon to see shopmen and others visit the car on their own time to hear the explanations of the instructors and to examine the apparatus themselves.

SPECIAL BUMPERS TO PREVENT OVERRIDING

Last summer safety bumpers were added to all of the high suburban cars of the Detroit United Railway. The additional bumpers have a depth of 10 in. and will prevent overriding if the suburban cars come in contact with city cars having low platforms. An accompanying illustration presents a side sectional view of the floor of a car with the safety bumper in-



Special Bumper for Suburban Cars of Detroit United Railway

stalled. At each end of the car two 10-in. I-beams 5 ft. 5 in. long are bolted to wooden sills and are butted against the end sills of the car. The I-beams are held vertically and are spaced 26 in. apart between centers. At the bumping end they are blocked apart and are sheathed on the outside with metal ¼ in. thick.

MESSAGES OF THE GOVERNORS

Extracts from the messages of the Governors of New York, New Jersey and Illinois, referring to public utility legislations, were published in the issue of the Electric Railway Journal, Jan. 22, 1910, page 157. Extracts from the messages of the Governors of Maryland and Rhode Island follow:

GOVERNOR POTHIER, OF RHODE ISLAND

The controversy between the city of Providence and the street railway authorities concerning passenger traffic between the center of the city and the east side is likewise of more than local interest. The present admittedly inadequate service affects not only citizens of Providence but the residents of East Providence and Pawtucket, and the towns south and west of Providence, who have occasion to use the College Hill route The whole question of congested street railway traffic in the business section of Providence concerns the entire suburban district extending into half a dozen cities and towns. At the present rate of increase in population the time is not many years distant—perhaps a decade or two—when a subway from the east side to the Doyle monument, and even to Trinity Square, will be absolutely necessary to accommodate ordinary daily travel. I am not prepared to say that the State should become a factor in the settlement of the question of an east side approach; but I do urge a recognition of the fact that interests not bound by the geographical lines of the city of Providence are undeniably involved and entitled to consideration.

GOVERNOR CROTHERS, OF MARYLAND

The reasonable and just regulation of public-service corporations through the agency of a commission with prescribed powers and duties has, as a policy, been adopted by a number of the largest and leading States of the Union, and is under favorable consideration in many other States. In New York and Wisconsin, and in Virginia and North Carolina experience has shown that such commissions furnish appropriate and essential protection to the rights and interests of the public, while at the same time they afford important and just safeguards and immunities to the public-service corporations themselves. The fact is so obvious as to dispense with the necessity of prolonged discussion that a public-service commission in Maryland, as in other States, will shield and secure the people from injustice, abuse and disadvantages of whatsoever form at the hands of corporations engaged for their own profit in the sale and supply of utilities and service of a general and public nature and will reasonably guarantee to the people adequate and proper service at just prices. The people are entitled to this in respect to the utilities in question—that is to say, they are entitled to justice—no more, no less. On the other hand, the same measure of regard and consideration is due to the capital and corporate and personal interests engaged and involved in the organization and maintenance of the public-service corporations of this State. These institutions, it cannot be denied, are often subjected to unreasonable demands and unjustifiable attacks. They, too, are entitled to justice—no more, no less. A public-service commission clothed with the necessary powers and charged with appropriate functions, and, above all else, composed of men embued with a full measure and high standard of intelligence, character and public spirit, would meet these requirements and subserve and accomplish the great public end in view, which, after all, is the full preservation to the people of the rights and advantages to which they are justly entitled without imposing unnecessary or unreasonable burdens upon the corporations in question. To effect this rightful object, which, indeed, is one of the salutary ends of government itself, it is indispensable not only that such a commission be provided for by the Legislature, but that it be vested with full and plenary powers to effectually and impartially accomplish its important object with respect to all public-service cohporations in the State in their various relations to the people. This is the spirit and design of the pledge we made to the people. Without hesitancy or shortcoming in any particular, let us now faithfully redeem it.

TRACKLESS TROLLEY LINES IN AUSTRIA

The prevalence of good roads on the Continent has lent considerable encouragement to the development of trackless trolley lines. The Mercedes-Stoll system, used chiefly in Austria, is one of the best known, and it may be of interest, therefore, to give a few details in regard to it.

Two types of overhead construction are employed, according to the conditions. Lines with heavy traffic are provided with two pairs of trolley wires, each pair consisting of a positive and negative conductor. In this case one pair of wires is used for one direction, while the other pair is for returning, so that cars can pass independently. Where little traffic is expected the roads only need one pair of overhead wires. This, however, renders it necessary to provide a certain method of changing over the current collector at the meeting points of cars. On several trackless roads in Germany the collector of one car is taken down while the other car is passing. With the Mercedes-Stoll system, however, both collectors can remain on the trolley wires and only the flexible connections to the car circuits are transferred from one car to the other. This manipulation can be made at any point on the line, and generally is accomplished in a few seconds' time. The collecting device is a carriage with four brass wheels, and runs on top of the pair of power wires and is dragged along by the moving motor car. The collector is divided lengthwise, both halves being carefully insulated from each other for carrying the positive and negative circuits, respectively. As shown in one of the accompanying views, collector derailments are avoided by using a short and a long hook under each wheel to prevent the collector from rising.



The Local Clergy Blessing a New Line

All fittings and clamps for supporting the trolley wires are made of bronze and are fastened on brackets or span wires. Iron poles are used usually on lines with two sets of conductors, owing to the considerable weight of four No. 00 wires and the additional downward pressure of the current collectors produced by the suspension weight. The current is conducted from and to the collecting device through a flexible weatherproof cable which is carefully protected against wear and tear. The cable ends in a coupling plug by which the connection to the car circuit is established.

The cars are of the omnibus type, all wheels being provided with rubber tires. Each car is driven by two gearless motors, which are either placed in the front or in the rear wheels in such a manner as to form their hubs. Contrary to the usual railway motor design, the field is the rotating part of the motor, while the armature windings are placed in the stator. The average one-hour rating of such a motor is about 20 hp, but in short periods of time an overload of 100 per cent can be attained. The motor frame is dustproof and waterproof. As all parts are substantially made, troubles with this style of motors are very rare. The trackless line in Gmünd, for instance, reports that during the first 20 months of service not a single motor defect was encountered. Grades of 4 per cent to 10 per cent are found on nearly all the roads, but they are climbed quite easily.

For starting and electric braking a controller only 2 ft. high is used. It is placed beside the motorman's steering wheel. The motor circuits are controlled through resistance, and the other electrical equipment is similar to that used on ordinary electric cars.

Trackless trolley lines are found in various parts of Austria, and their number is increasing every year. There are many small towns where street railway lines are needed, but on account of high first cost the wishes of the population cannot be gratified.



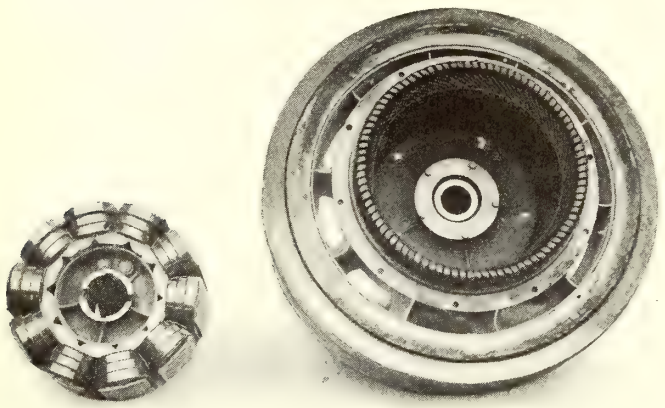
Circular Terminal Loop and Trackless Trolley Current Collector

In such cases the trackless trolley line shows its chief advantage very clearly. The construction cost is only one-fourth to one-third of that of regular railway lines. The costs of maintenance are also considerably lower. The average operating expenses per car mile of the trackless trolleys are given in the table on the next page.

Current at a rate of 15 to 20 heller (3 to 4 cents) a kw-h.	4-7 h.
Wear on rubber tires	9-12 h.
Wages (no conductors)	7-10 h.
Repairs	4- 6 h.
Administration	4- 6 h.
	28-41 h.

(Or only 6 to 8 cents.)

The fares on these lines are very low, generally 10 heller (2 cents). Working people and children are carried for only 6 heller (1 1-5 cents). The consumption of current is a little



Wheel of Trackless Bus with Built-In Motor

higher than on street railways, owing to the greater friction of the rubber tires. It amounts to 80 watt-hours per ton-mile on the horizontal and 90 to 120 watt-hours on lines with grades from 4 per cent to 10 per cent. Compared with the number of passengers per car carried, however, the cost of current is lower than on railway lines, as the weight of cars for 22 passengers is only 2½ tons.

A rather curious ceremony is the inauguration of a trolley



Trackless Buses Interchanging Current Collectors

line in a small Austrian country town. After several speeches concerning the great importance of the new line have been made by the burgomaster and other authorities of the town and the Government, there is begun a solemn clerical consecration of the line, and in particular of the vehicles. Each car is blessed separately. One of the accompanying cuts shows the oldest priest of a town preparing to carry out this ceremony.

Work will soon be started on an extension of the Central London Railway's tubes from the Bank to Liverpool Street, about ½ mile.

AUDITING EXPRESS AND RAILROAD EXPENSE BILLS

BY CHARLES T. DOERR, PURCHASING AGENT, BIRMINGHAM (ALA.) RAILWAY, LIGHT & POWER COMPANY

For convenience as well as for economical reasons many companies let their hauling of material and supplies to local transfer companies and voucher the accumulated freight and express bills periodically. When this is done there is sometimes a tendency to make only a hurried addition of the separate items and to ignore, or examine in only a superficial way, the detail of each charge. Such an audit gives assurance only that the freight shown on the bill has been received in good order.

In this day of economies, when every item of expense is analyzed, it will be surprising to many managers to find, upon a close examination of this account, that many small leaks are due to so haphazard a manner of checking expense bills. It is not likely that the amount involved is so great in extent that it would justify the expense of retaining the services of an official employed solely for this work, but almost any company can detail some one who will devote a portion of his time to the study and application of freight tariffs and classifications. The variety of items is not so great or the shipping points so many but that he will become sufficiently familiar with this work in time to effect an appreciable saving. The expense of a local freight bureau or a "rate doctor" in auditing this account will often be found a good investment.

Even though the approval of freight bills be not within the province of the purchasing agent, it is clearly one of the many subjects with which he should familiarize himself as far as possible. It is almost needless to say that unless he has at least a working acquaintance with the underlying principles his efficiency must be considered lacking in a very important detail.

In spite of highly titled officials, traffic managers, etc., actual billing is usually left to the whim or ignorance of clerks and subordinates, who are just as likely to ship commutators as "electric fixtures" as they are to designate electric irons as "electrical machinery," thus leading to endless disputes and contentions with local agents and voluminous correspondence with the inspection bureau. Most of the troubles of the consignee arise from this use of generic headings, and it would be desirable to have bills of lading show actual contents or proper names.

Electric railways, central stations and car companies are consumers of various kinds of specific materials, many of which are not set forth in sufficient clearness in the various classifications, and where listed are in many instances incapable of definite interpretation. As an example, the writer has now under consideration by the "powers that be" the question of whether electrically operated block signal apparatus should be classed under "electrical appliances" (first class) or "semaphores" (third class). It is also a question whether trolley poles in the rough, without base, harp or wheel, should be classed as "steel tubing."

While many instances may be cited showing the difference arising in the application of analogous classes and the losses which may occur through negligence on the part of shippers in the matter of unintelligible bills of lading, sufficient attention has been directed to this subject to illustrate the necessity of a closer scrutiny of expense bills.

The railroads endeavor at much expense and by every method of checking and inspection to assess charges justly, and they will almost invariably correct erroneous billing when properly presented. It devolves upon the consignee, therefore, to study the rules and tariffs pertaining to his interests, and to insist upon intelligent bills of lading from consignors and corresponding attention on the part of carriers. Absorption of switching charges, combination rates, or equalization through various gateways, as well as the relative advantage of all-rail and rail and water rates are all important details, which, in the aggregate, add to the total list of benefits to be obtained by an acquaintance with the governing conditions.

A DIRECT READING ACCELEROMETER

At a meeting of the Indiana Academy of Science on Nov. 26, 1909, C. R. Moore, of Purdue University, Lafayette, Ind., read a paper describing a new electrical device which can be calibrated to read directly the rate of change in velocity of a car. The measurement of acceleration has been attempted in many ways, but accelerometers employing a freely moving mass of some sort have been most used. Dr. Sheldon's device is of this type, using a suspended weight carrying a pointer at the bottom, fastened thereto by rods, which plays over a scale. The mass, being free to move, is sensitive to changes of velocity, and the scale may be calibrated to read acceleration directly. The calibration is fairly simple, and the device is not difficult to construct.

Another device, which works on much the same principle, consists of a "U" tube partially filled with mercury so placed that its plane is parallel to the motion of the car. It is obvious that changes of velocity will cause the mercury to rise in one side of the tube and to fall in the other. The more quickly these changes occur the greater will be the difference between the heights of the mercury in the two portions of the tube. The tube may therefore be calibrated to read acceleration directly. Still another form of accelerometer is a slightly inclined track upon which rolls a ball. This track is made to extend in both directions and has a short level portion at the middle. Changes of velocity cause the ball to move one way or the other along the track. This device is difficult to read, and is not very accurate. All of these accelerometers are confined to horizontal motions, and if the track be other than level, corrections must be made therefor. This involves a great deal of labor and expense, so that while the devices are simple in themselves, their use is complicated. It is next to impossible to make them self-recording.

Acceleration may also be measured by two magnetically actuated markers so arranged that dots may be made by each of them on a sheet of paper moved at a uniform rate of motion. The magnet of one of these pointers has its circuit closed through battery at regular time intervals by a clock. The other pointer has its magnet operated on a circuit which is closed through battery a definite number of times per revolution of the car wheel. From the record made by these pointers the acceleration at any time may be determined. This apparatus also involves a great deal of labor and expense, and is seldom used.

The new accelerometer described by the author depends for its operation entirely upon electrical phenomena and is independent of its own location, motion or position. It will therefore read acceleration vertically or at any angle as well as in a horizontal direction. No corrections are necessary, and it may easily be made self-recording. It is not difficult to calibrate, and is permanent. The apparatus consists of a double commutation, direct-current magneto having permanent magnet fields, a high-grade direct-current voltmeter, a condenser of suitable capacity and a bank of external resistance connected as shown in the accompanying diagram.

The equation of the condenser is $Q = EC$, in which Q represents the quantity of electricity in coulombs (ampere seconds), E is the voltage impressed, and C is the capacity in farads of the condenser. If E is increased uniformly, the quantity of the charge Q on the condenser plates will also increase uniformly. Since Q is increasing uniformly with respect to time, the inflow of current is at a constant rate. Likewise, a constantly decreasing E will give a constant outflow of current. However, as soon as E reaches a fixed value all current flow in the circuit ceases, since it is one property of the electric condenser to arrest the flow of direct current. The terms "inflow" and "outflow" refer to those condenser plates that are directly connected to the instrument terminal. Of course, as much current flows on to one set of plates as flows off of the other plates, the current in the line having a definite direction during an increase of voltage. The magnitude of these currents are shown by the direct-current instrument, which consists merely of a coil swinging in a uniformly magnetic field. So long, then, as the voltage is changing uniformly the instrument will read a constant value, returning to zero only when E ceases changing. It follows that if E does not change uniformly the instrument will not read a constant value, but that its indications will be proportional to the instantaneous rate of change of the voltage. The direct-current magneto is so designed that its voltage is directly proportional to its speed, so that changes of voltage at its terminals can only occur as a result of changes in speed. Therefore the instrument reads the rate of change of speed or acceleration, whether positive or negative.

It was implied above that an electric condenser allows no current to pass when the voltage E has reached a fixed value. This would be a fact if an ideal condenser could be made, but it is a well-known fact that there is always some leakage even in the best condensers. Provision must therefore be made to compensate for this small leakage current. The second commutator on the magneto is arranged so that it can feed current through a high resistance to another coil on the moving element of the voltmeter. This second coil is wound over the first and works in the same magnetic field. The current is passed through it in such a direction that the torque produced thereby opposes the torque of the original coil. By adjusting the high resistance these torques may be made equal and the instrument will read zero for any constant value of voltage within reasonable limits. This allows the charging currents to actuate the instrument entirely independent of the leakage current, and therefore condensers of reasonable cost may be employed.

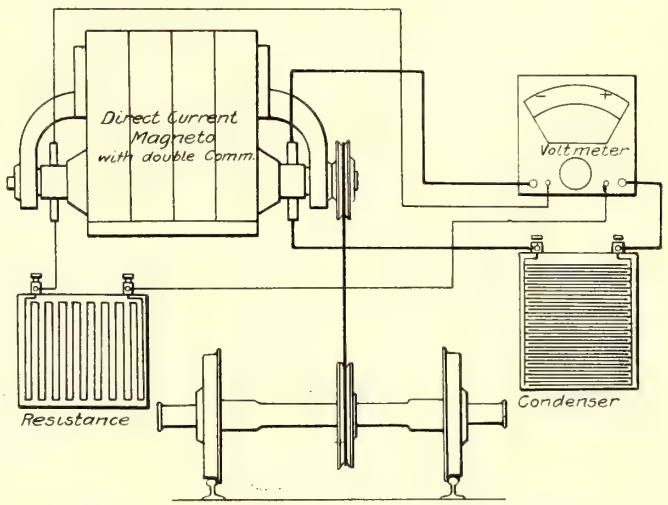


Diagram of Connections for Accelerometer

Almost any condenser when suddenly discharged will experience a rise in potential at its terminals if allowed to stand a few minutes. This rise is due to the residual charge. In the apparatus described this effect is entirely negligible, for the reason that the condenser is never charged or discharged suddenly, some few seconds being required to complete the action. In all condensers there is also some absorption, but with good condensers used at the voltages proposed for this apparatus this effect is also quite negligible, and for a given voltage change at any part of the potential range equal quantities of electricity pass through the instrument. With an instrument having a uniformly graduated scale, therefore, the apparatus will show equal increments or readings for equal rates of change of velocity. It is obvious that the readings of the instrument are unaffected either by grades or side tilting of the car.

The apparatus may be made self-recording by employing a recording instrument instead of an indicating one. These recorders may be obtained in the market, and are very sensitive and reliable. The accelerometer may be made self-contained, and is easily transferred from one car to another.

PHYSICAL APPRAISAL OF THIRD AVENUE RAILROAD

At a hearing of the Public Service Commission of New York, First District, held Jan. 18, to consider the plan for the reorganization of the Third Avenue Railway, submitted by the bondholders' committee, Henry Floy, acting for the committee, presented the estimates given below. These estimates were made by him as a result of an examination which he had made of the properties of the Third Avenue Railroad Company.

ESTIMATED PRESENT ACTUAL COST OF REPRODUCTION BY A GOING CONCERN (IRRESPECTIVE OF ANY ALLOWANCE FOR DEVELOPMENT EXPENSES).

Estimated actual cost of reproduction tangible properties, including construction and installation of plant, etc., on basis present day prices (as per itemized statement "A")	$46,500,000
Deduct items not subject to depreciation, such as real estate, obstructions, paving for obstructions, etc., at least	6,500,000
Leaving to represent reproduction cost of tangible property subject to depreciation (see statement "B"), approximately	$40,000,000
Deduct depreciation on said tangibles, an average of 25 per cent.	$10,000,000
Leaving as present approximate value of said tangibles on basis of reproduction cost less depreciation	$30,000,000
Add items not subject to depreciation as above	$6,500,000
Approximate present value tangible property	$36,500,000
Stated in different form:	
1. 75 per cent of net reproduction cost of $40,000,000 of tangibles	$30,000,000
2. Plus real estate, etc., not subject to depreciation, as above	6,500,000
Total	$36,500,000

NOTE.—The reproduction cost as above of $46,500,000 contains no allowance for development expenses and disbursements covering promotion, discounts on securities, expenses of financing, taxes, interest, title insurance, brokers' commissions and other general administration, legal and contingent expenses necessarily attending such an enterprise (See statement "C."). Minimum provision for these purposes should be 25 per cent, or $11,625,000, making a total cost of reproduction to a new company of $58,125,000.

This estimate makes no allowance for franchises, for loss involved in changing from horse to cable power and from cable to electricity, for obsolescence of portions of plant, for good will or for working capital.

STATEMENT A—COST OF REPRODUCTION.

Estimated Actual Cost of Reproduction of Entire Physical Properties, on basis of Present-day Prices of Third Avenue proper, 42d Street, Dry Dock, Union, Southern Boulevard, Bronx Traction, Kingsbridge, Yonkers and Westchester Railroads.

Building structures	$7,205,315
Tracks	10,331,894
Paving	3,542,644
Distributing system	2,838,246
Overhead construction	1,200,500
Duct lines	2,116,538
Power equipment	3,495,219
Rolling stock	7,650,934
Removal of obstructions	1,479,049
Paving over obstructions	1,289,035
Real estate	4,524,570
Tools, supplies, fixtures	553,165
Horses, wagons, etc.	56,874
Salvage, material	5,822
Total	$46,389,805
Purchase price, Mamaroneck & Larchmont Road	110,000
Grand total	$46,499,805

STATEMENT B—INCIDENTAL AND CONTINGENT EXPENSES INCLUDED IN ACTUAL COST OF REPRODUCTION.

The following were the incidental and contingent expenses included in the actual cost of reproduction:

1. Administration expenses chargeable to construction, including superintendence, inspection, accounting, salaries of officers and clerks, consents of authorities and property owners, legal expenses in connection with construction, rent, printing, store-room expenses, etc.

2. Architects' and engineers' fees, including cost of design and testing all construction and equipment items.

3. Provision for various incidentals and contingencies, incomplete inventories, unforeseen requirements, etc., which practical experience has shown to be necessary.

These incidental and contingent expenses attributable to actual construction would probably run over an average of two years and constitute capital expenditures to cover which at least 15 per cent should be provided.

STATEMENT C—DEVELOPMENT EXPENSES.

The outlay and expenditures necessarily attending organization, promotion and conduct of an enterprise such as the Third Avenue and other railroads, mentioned in Statement A, will average at least 25 per cent on actual cost of construction, and in City of New York would undoubtedly average much more. These include:

1. Legal and other expenses of preliminary promotion, incorporation and organization of companies, procuring property owners' consents, making arrangements for trackage rights and terminals, procuring local franchises and approval, consents and certificates from public bodies, title examinations and insurance, brokers' commissions, etc., at least ½ of 1 per cent.

2. Technical expenses in connection with preliminary work, surveys, expert estimates, etc., at least ½ of 1 per cent.

3. Interest on capital and bond issues, rents, wages of superintendence and administration in addition to portion of similar expense chargeable to construction, etc., payable during development stage and period of construction and until property can earn surplus over operating expenses and taxes sufficient to pay interest or dividends on investment. Minimum allowance of 8½ per cent.

4. Taxes, including incorporation tax, mortgage tax, real estate tax, personal property tax, capital stock tax, franchise tax, etc., which must be provided for and paid during period from first organization to date when property will earn a net surplus over operating expenses at least ½ of 1 per cent.

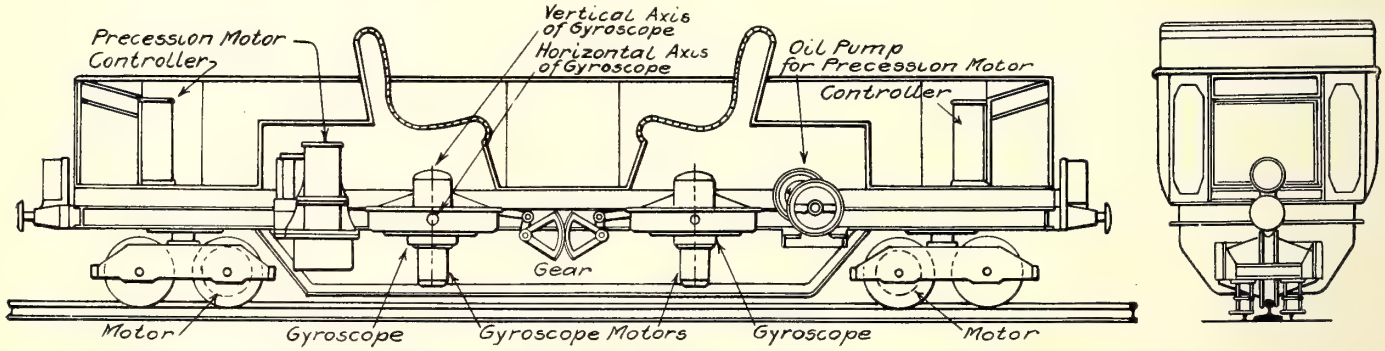
5. Discounts on securities or other customary and necessary expenditures in connection with financing such an undertaking and marketing securities. These expenses are greater in the cases of new enterprises or of the reorganization of old enterprises which have become insolvent, where there is as yet no established earning capacity and credit, or where credit has been impaired or destroyed by insolvency. The value of all street surface securities in New York at present time is greatly discredited and money could only be raised at or about par on the credit of the city itself. Minimum discount 10 per cent.

6. Reasonable promotion profit or compensation for risk of capital estimated at 5 to 10 per cent of cash secured and actually invested and put at risk in enterprise. Minimum allowance 5 per cent.

This percentage is calculated on basis of total reproduction value of $46,500,000.

OPERATING PRINCIPLES OF THE SCHERL GYROSCOPIC CAR

The accompanying cuts show a side and end elevation of the Scherl gyroscopic mono-rail car, described in the ELECTRIC RAILWAY JOURNAL of Jan. 15. Further particulars were presented in connection with Professor Franklin's lecture at the New York Electrical Society on Jan. 27. The Scherl gyroscopes are mounted on vertical axes with ball bearings and not on horizontal axes as in the Brennan mono-rail car. In both cases, however, the gyroscopes work in a vacuum and the force produced by the revolution of the flywheels is at right angles to the running rail. The Scherl gyroscopes weigh only 125 lb. each, but, as they revolve at the great speed of 8000 r.p.m., their momentum and consequent tendency to resist tipping is very great. They are driven in opposite directions by a ¾-hp motor.

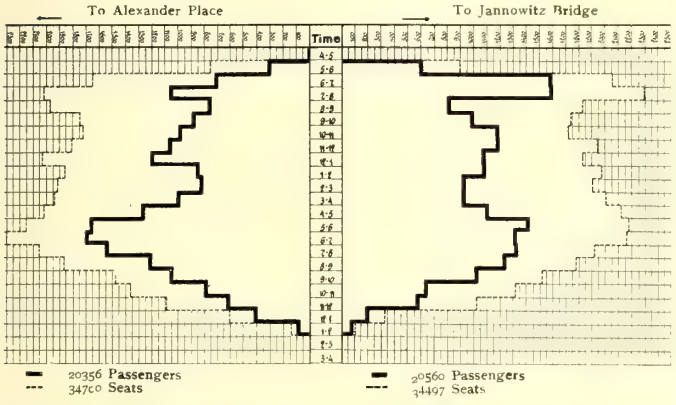


Side and End Elevation of Gyroscope Car

The simultaneous movement of the gyroscopes is secured by bell-crank levers and a pair of toothed quadrants, as shown in the side elevation. The tendency of the gyroscope flywheels is to rotate in a horizontal plane on their vertical axes and thus maintain the equilibrium of the car. If an outside force such as one due to the unequal weighting of the car or to wind pressure is applied, the car will tend to tip over, but this action is immediately opposed by the righting tendency of the gyroscopes which have what is termed a precessional or tilting movement. The righting movement of the gyroscopes is transmitted through levers to a valve controlling the piston of a hydraulic motor. The operation of the piston tends to increase the tilting movement of the gyroscopes which resist this movement by producing a powerful reaction transversely to the car. The latter is therefore restored to stable equilibrium. The precession motor at the back of the gyroscope casings is driven by an electrically operated oil pump, as illustrated.

NOTES ON FRANCHISE, FARE AND TRAFFIC CONDITIONS IN BERLIN

The Grosse Berliner Strassenbahn and its allied companies operate the largest part of the street railways in Berlin and the adjacent communities. The lines of the company are in 19 distinct municipalities, and the franchises are also of the most diverse character. The corporate life of the company and its subsidiaries extends to 1949. In Berlin proper all leases will expire in 1919, whereas those granted by the adjoining communities will be in force for varying periods up to 1997. In general, the several municipalities reserve the right to buy, and in



Berlin Traffic Conditions—Chart Showing Relation Between Passengers and Seating Capacity in Heart of Berlin

some cases to take over without cost the property of the company either upon the expiration of the franchises or before. The city of Berlin receives as franchise compensation 8 per cent of the company's gross income (in Berlin) plus fixed proportions of any surplus remaining after enough money has been laid aside to declare a 6 per cent dividend. The suburban towns receive less. From 1904 to 1908, inclusive, the average dividend of the Grosse Berliner Strassenbahn, with a total capitalization of 100,082,400 M ($24,019,776), has been 7.9 per cent.

A unique feature of the franchise agreement with the municipality of Berlin is that under certain conditions the latter must reimburse the railway company for any losses due to the construction of competing subway, surface or elevated lines, whether built by the city or private interests. The actual awards are made by a court of arbitration, after both parties have submitted their traffic statistics. No damages have been awarded for losses due to the present subway line or for the proposed direct extension from Spittelmarkt to Schönehauser Allee, because the street railway company failed to make a claim when the original franchises were granted in 1897.

Despite the added competition of elevated-subway lines and motor buses, the prosperity of the company has steadily increased during the last five years, and the traffic has grown in greater ratio than the population of the city and its suburbs—large as that has been. It is interesting to observe that 80 per cent of the company's entire traffic is handled in Berlin proper, with 70 per cent of the total car-miles operated and 52 per cent of the total trackage. These figures show that the suburban towns have not yet reached the most profitable point of travel density. In round numbers, the present populations of Berlin and its suburbs are 2,000,000 and 1,500,000, respectively.

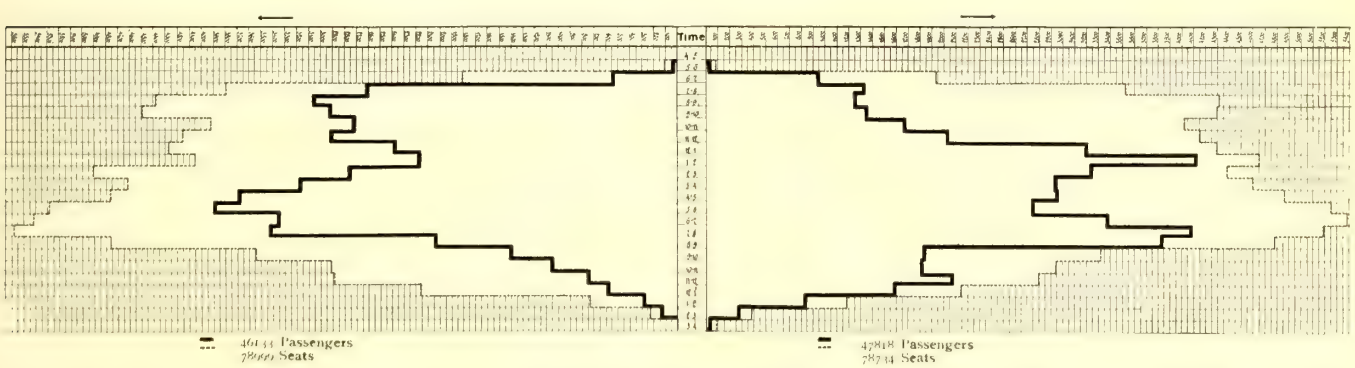
AGREEMENTS WITH SUBSIDIARY COMPANIES

The three subsidiary companies of the Grosse Berliner Strassenbahn are the Berlin-Charlottenburg Street Railway, the Western Berlin Suburban Railway and the Southern Berlin Suburban Railway. All of the cars are maintained in the shops of the parent company, but each corporation owns its own cars, which at the end of 1907 numbered: Grosse Berliner, 1250 motors and 872 trailers; Berlin-Charlottenburg, 79 motors and 61 trailers; Western Berlin, 67 motors and 57 trailers; Southern Berlin, 30 motors and no trailers. The contract between the four companies calls for the through operation of any car over any desirable combination of routes. Each company, however, is directly in charge of the service over its track, and, therefore, must assume all legal responsibilities, and all injury and damage suits, etc., involved on its particular section. Employees of each company are bound by the rules and instructions of the line over whose tracks they are running.

The division of the income of all interconnected lines is based in general on the car-miles run over the tracks of the several companies, but there are certain other agreements limiting the minimum which each is to receive. Each company also receives from the others 20 pf. for every motor-car-kilometer (8 cents per car-mile) and 10 pf. for every trailer-kilometer (4 cents per car-mile) operated over its track. An exception is made in the case of the contract between the Grosse Berliner and Southern Berlin companies, where the respective payments are 7.2 cents per motor-car-mile and 3.6 cents per trailer-mile. Accountings are made monthly. Each company has the privilege of withdrawing from the agreement upon six months' notice before the close of the year.

ARRANGEMENT OF TRAFFIC ROUTES

Berlin extends practically in all directions, with its business section in the center and suburban towns directly adjacent on every side. The traffic development, therefore, tends to be of radial character, except for various detours caused by parks and military grounds. Thus it is necessary for most of the cars to run over a portion of Leipziger Street, the main business thoroughfare, after which they radiate in all directions. It has been the policy of the companies in Berlin to run through cars to each part of the city as far as possible. As a result, only about 15 per cent of the passengers transfer.

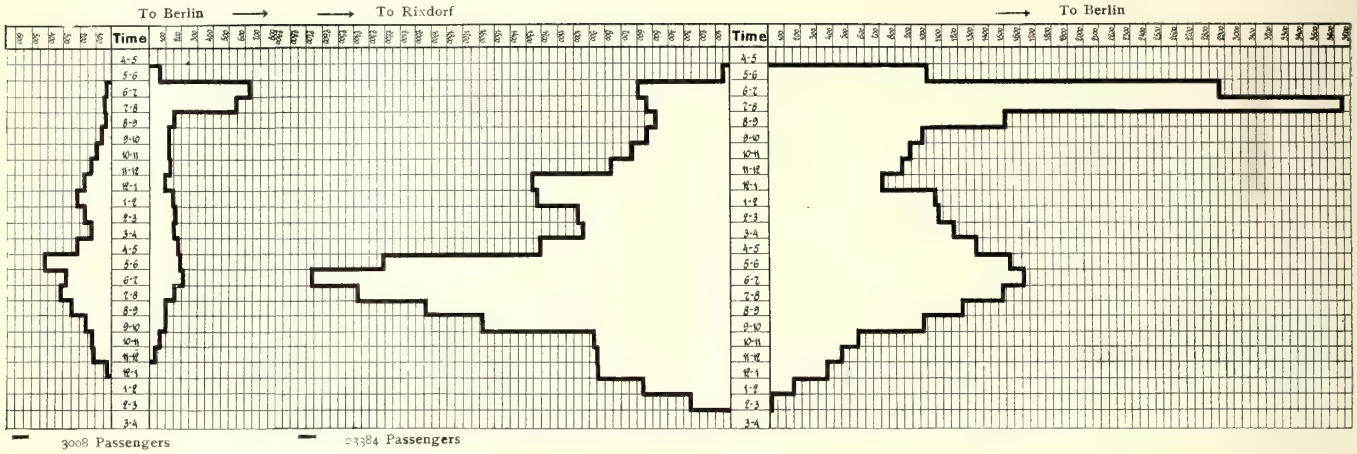


Berlin Traffic Conditions—Chart Showing Relation Between Passengers and Seating Capacity in Leipziger Strasse, the Busiest Street in Berlin

The traffic on each line is carefully and regularly charted to assist the transportation department in arranging and selecting its schedules. Typical curves used in this work and showing the relation between passengers and seating capacity are presented herewith. A striking feature of the two first

curves, both of which embrace large groups of lines, is the tendency toward equally heavy travel in opposite directions during the same hours. This, of course, is the usual characteristic of traffic in a radial city. An exception to this rule is afforded in Berlin by a strictly working-class district like Rixdorf. As shown by the third curve, the morning and evening peaks occur in opposite directions, corresponding to the movements of the workmen to and from their places of employment in the Street Railway Journal of May 19, 1906. All of the types of records mentioned have been prepared by A. Stavenow, traffic manager of the Grosse Berliner Strassenbahn. Mr. Stavenow is planning to exhibit enlarged models of these and other Berlin transportation statistics at the World's Fair to be held this year at Brussels.

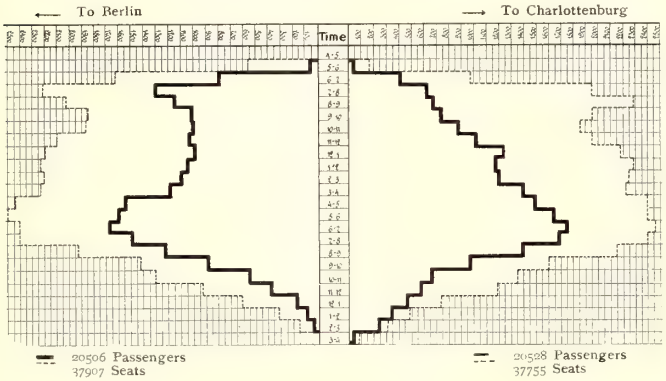
Since 1901 the standard cash fare on most of the lines of the parent company has been 10 pf. (2½ cents) and on a few



Berlin Traffic Conditions—Unbalanced Morning and Evening Peaks on the Rixdorf Lines.

Each community around Berlin is of such individual character that the traffic development of one of its lines is a good index to the growth of the others. This peculiarity is illustrated by the two sets of Rixdorf traffic curves presented in the fourth series of curves. The lines serving each district usually converge at some important point before spreading out again.

The records presented are only a part of the data which the traffic manager compiles to assist him in his work. In addition to the usual records of the receipts, expenses, car-miles, passengers, etc., for each line, the transportation department keeps daily records of the temperature and weather conditions in Berlin, and these are also charted daily and by months. As shown in the last diagram, which is for January, 1908, there

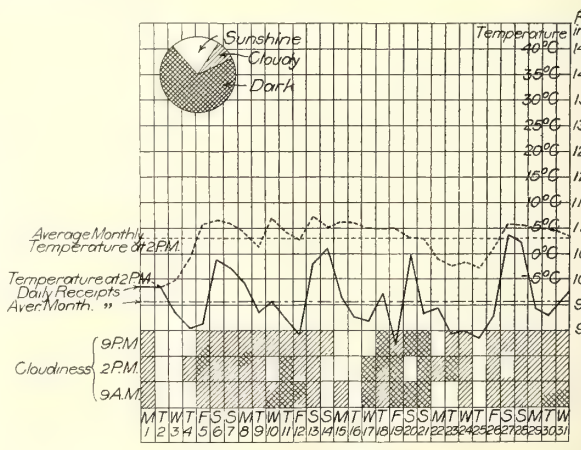


Berlin Traffic Conditions—Chart Showing Relation Between Passengers and Seating Capacity in High-Class Residential District of Charlottenburg

is kept a monthly and daily record of the weather, temperature and receipts. Friday is usually the poorest day for traffic; Sunday is usually the best except in winter, but also the most uncertain. To develop the faculty of rightfully predicating what schedule to put in force on Sunday, the traffic manager has each of his five assistants telephone him at noon every Sunday his estimate of the day's receipts. At the end of the year a prize is awarded to the man who has most closely predicted this important point.

Another ingenious annual record for the entire system consists of a map of the city on which are placed strata of papier-mâché of a thickness corresponding to the density of travel. Such a device shows very effectively the distribution of traffic along the different streets. One of these maps was illustrated

extensions 15 pf. (3¾ cents). No free transfers are issued except on a small part of the Charlottenburg system, but as previously noted, the arrangement of routes permits 85 per cent of the passengers to reach their destination for one fare on one car. The highest fare charged on any line interconnected with the suburban system is 20 pf. (5 cents). One child under six years of age is carried free if attended by an adult, but a full fare is charged for each additional child. Workmen's tickets, good for one ride each working day, are sold for 50 pf. (12½ cents), and for two rides each working day for 1 M. (25 cents) a week. School tickets are issued for children up



Berlin Traffic Conditions—Method of Charting Temperatures, Receipts and Weather; Chart Shows Record of January, 1908

to and including the sixteenth year. These tickets cost only 3 M. (75 cents) a month, and are good over two lines; every additional line costs 1 M. extra. Monthly unlimited ride tickets are also sold for the convenience of steady riders who use the cars more than twice a day. A ticket good only on one line costs 7.70 M. ($1.925), whereas two rides a day for a month of 31 days would cost 6.20 M. ($1.55). The length of an average ride on a purely city line like Schöneberg-Alexander Place is about 4 km (2.48 miles) in winter and 3.38 km (2.1 miles) in summer; the average fare per passenger-kilometer is 2.15 pf. (0.86 cents per mile) in winter and 3.63 pf. (1.45 cents per mile) in summer. The fares to an outlying amusement section like Tegel are much less. The Tegel average passenger ride is 5.56 km (3.44 miles) in winter and 6.22 km (3.85

miles) in summer, all for the 10-pf. fare; the corresponding costs per passenger-kilometer are 1.67 pf. (0.67 cents per passenger-mile) and 1.52 pf. (0.6 cents per mile). The average length of ride throughout the main system on Saturday, Nov. 7, 1908, was 3.45 km (2.14 miles), and the average receipts per passenger-kilometer 2.62 pf. (1.05 cents per passenger-mile). About 25 per cent of the total mileage is made by trailers. In 1908 the operating cost per motor-car-kilometer was 27 pf. (10.8 cents per motor-car-mile), and the cost per trailer-kilometer was 13 pf. (5.2 cents per trailer-car-mile.).

ANNUAL MEETING OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

The annual meeting of the Central Electric Railway Association was held at Columbus, Ohio, on Jan. 27. About 150 members and guests were present. The next meeting will be held at the Oliver Hotel, South Bend, Ind., March 24. The following officers were elected to serve during 1910: President, George H. Whysall, Columbus, Marion & Bucyrus; first vice-president, Arthur W. Brady, Indiana Union Traction; second vice-president, W. S. Whitney, Ohio Electric Railway; members of the executive committee—from Indiana: A. A. Anderson, C. L. Henry, H. A. Nicholl, C. D. Emmons, J. H. Crall; from Ohio: E. F. Schneider, F. D. Carpenter, S. D. Hutchins, C. M. Payton, F. W. Coen; from Kentucky: M. J. Insull; from Michigan: F. W. Brown and J. F. Keys.

Three special cars carried parties to Columbus from Terre Haute, Ind., and from Toledo and Cleveland, Ohio. Arthur A. Anderson, the retiring president, was in the chair. He first called upon Secretary Neereamer to read the minutes of the previous meeting. These were approved.

G. H. Kelsay, Indiana Union Traction Company, presented the report of a committee which had been appointed at a previous meeting to consider the recommendation made for the establishment of working relations between the Central Electric Railway Association members and a centralized testing organization. An abstract of the report presented by Mr. Kelsay follows:

Your committee appointed to report on a paper presented at the November meeting at Indianapolis by John G. Callan, who is associated with Arthur D. Little, Inc., on the subject of "A Centralized Testing Organization," met in Indianapolis on Jan. 9. The paper was very interesting and called particular attention to the vital subjects of the choice of fuel, specifications for purchase of coal, boiler and furnace tests, fire room practice, lubricating oils and lubricated parts, involving the subject of bearing metals. The subject of specifications and inspection, covering material and equipments, was discussed.

The discussion of this paper merited a great amount of detail consideration, which would require more time than was at the disposal of the committee. It appears to the committee that the question of obtaining better materials and equipment by the aid of tests, specifications and practical service experience is not being as carefully and systematically conducted by various railway companies as it should be, and that more attention to these matters would result in a very greatly reduced operating cost. This association with practically its present organization is in a position to furnish to its member companies a great deal of information as to the merits of various materials and equipment which are required. The traction lines operated within the territory covered by the Central Electric Railway Association have among their operating forces men fully competent to supply information about a large part of the various equipment and materials used. This, if properly collected and distributed, would be of great benefit to the association members. Very few, if any, traction companies employ men competent to make chemical determinations, or have at their disposal apparatus for making physical determinations. It is the opinion of your committee that there is a class of determinations which the railway companies, individually or as an association, could very profitably have furnished them by a testing organization, competent chemists or physicists, which would prove of very great value.

We believe that specifications for the purchase of practically all the materials desired could be drawn up and used by member companies and be just as practical as the present standard specifications for drawbars, journal boxes, car axles, etc.

It is, therefore, the recommendation of your committee that the association could profitably collect and distribute information relative to the merits of various materials and equipment, and could have supplied to the association members chemical and physical tests. Further, there could be referred to a committee, either the present standardization committee or another specially appointed committee, the work of supplying specifications for the purchase of various materials. If the above recommendations can be carried out, it is the opinion of your committee that the association members would receive great benefits by its efforts.

The practicability of having the secretary of the Central Electric Railway Association act as a collector and distributor of reports of tests and of specifications was discussed by several members.

H. A. Nicoll, Indiana Union Traction Company, did not believe that the proposed method of furnishing the secretary's office with copies of tests would be highly successful, because there might be a lack of interest displayed by a great many of the members. F. D. Carpenter, Western Ohio Railway, emphasized the need for a more free exchange of ideas among the various railroad companies.

Mr. Kelsay thought that much test information, especially that from service tests, which was the most valuable, would readily be furnished by the department heads of the railways. This would do away with the necessity for subscribing to a central testing bureau; providing, of course, that the secretary's office was equipped to handle the clerical work. There were a number of chemical and physical determinations which, when once made, could be put on record in the secretary's office, where they would be available for any member. On motion, the recommendations made in Mr. Kelsay's report were referred to the incoming executive committee.

CHARGES FOR INTERCHANGING EQUIPMENT

On Nov. 18 the following committee was appointed to investigate the necessity for changing the rules for making charges for interchanged equipment: H. A. Nicholl, chairman; C. D. Emmons, A. A. Anderson and W. S. Whitney.

Mr. Nicholl read the report of this committee, an abstract of which follows:

The committee decided to recommend that all charges for freight and passenger equipment remain as at present, with the exception that the charges for freight equipment should be amended to read:

"Over 100 miles at 3 cents per mile. The above rates to be for each 24 hours or fraction thereof."

Also, as the official classification covers the movement of passenger and freight cars on their own wheels, and stipulates the price per car-mile for handling same, that the members of this association, operating under the rules now in effect, file with the Interstate Commerce Commission an exception to the official classification covering the movement of cars on their own wheels. This recommendation refers particularly to the last three paragraphs of the rules as now in effect, which provide for a charge per car-mile, if used as a motor car of 25 cents, and if used as a trail car of 20 cents.

The report of the committee was accepted and its recommendations adopted.

STREET PAVING

A paper, entitled "Notes on Street Paving," by Thomas McMath, civil engineer, Indianapolis Traction & Terminal Company, was read by Rodney Hitt, associate editor, ELECTRIC RAILWAY JOURNAL. This paper will be found on page 236 of this issue.

G. J. A. Paul, Mahoning & Shenango Railway & Light Company, told of the experience which his company had had with

various kinds of pavement. During the last two years 8 miles of track had been relaid and the street surface paved with sheet asphalt, brick and blocks filled with grout or asphaltum. The city of Sharon would not permit any pavement to be laid unless the spaces between the blocks were filled with asphaltum. Three miles of track had been laid with this type of pavement recently, and Mr. Paul had not found the use of asphaltum to be satisfactory, because it worked out from between the blocks, got onto the rail, and made the track slippery. Sheet asphalt had not been satisfactory when laid directly against the rail.

Mr. Paul spoke of embedding ties in cinders and concrete. Whether or not this should be done depended largely on local conditions. On one street in Sharon the ties had been embedded in white slag cinders. This foundation had become so solid that it was necessary to chisel and blast it out when renewals had to be made. Notwithstanding the firmness of the foundation, every tie was rotten. The moisture had followed the rails down to the ties, which had absorbed it and decayed. Ties which were embedded in concrete had a life of about five or six years. Mr. Paul stated that blast furnace cinders which were granulated by pouring into water to cool formed a very hard roadbed, but did not protect the ties from decay.

INSPECTION OF ROLLING STOCK

A paper entitled "The Daily Inspection and Upkeep of Rolling Stock" was read by H. H. Buckman, master mechanic, Louisville & Northern Railway & Lighting Company. This paper was printed in the Electric Railway Journal of Jan. 29, page 193.

Mr. Anderson called attention to the common difficulty experienced in getting carmen to give serious attention to reports of defects in equipment. It was very desirable to get the transportation and mechanical departments to work in harmony in the reporting and repairing of defects. One way to place the responsibility for errors, which Mr. Anderson had found to be satisfactory, was that of using defect reports in duplicate. One copy of the report was kept by the motorman and the other sent to the shop with the car. If the repair of the defect had not been made the motorman had his duplicate report, which could be used in checking up the mechanical department.

L. M. Clark, Indianapolis Traction & Terminal Company, told of his system of inspection and repair records. A complete history of each car, so far as the mechanical department had anything to do with it, was exhibited by these records. The system of blanks also included a pull-in report. At the end of each month a general report was tabulated, which showed the number of pull-ins at each car barn and the ratio of pull-ins to the number of cars operated from that barn. These reports were posted in the barns in such shape that the record for the current month might be compared for the same month of the two previous years. This plan had materially assisted in reducing the number of pull-ins.

W. E. Rolston, Cleveland, Southwestern & Columbus Railway, said that when the cost of maintenance and the life of equipment were considered, it would readily be seen that considerable improvement might be made. A few years ago, when new cars were purchased, it was the practice to let those cars go for two or three years without very close attention, because they were new and did not need thorough maintenance. That practice now was obsolete. It had been found best to give new cars as thorough inspection and repairs as older ones; especially was this true of the car bodies. If a car body was varnished every 13 or 14 months, the expense for such work would be a minimum. On the other hand, if the car exterior was neglected for two or three years, then a thorough painting would be necessary. The cost of revarnishing as compared with the cost of repainting was as one to four.

Mr. Rolston held that the electric railways did not systematize their maintenance of equipment departments as thoroughly as should be done. More care should be taken in the choice of employees for special work. A system of advancement should be followed in the shops, as was done in the power houses. Mr. Rolston proposed the following plan of promotion





Group Picture of Delegates and Guests at Annual Meeting of Central Electric Railway Association

for repair shop employees: An inexperienced new employee would first work as a helper on the truck repair gang. The members of this gang would be paid a rising scale of wages, according to the time of their service. From the truck work the new employee would be advanced to work in the armature pit. Next, he would work at truck inspection and brake adjustment, and then be advanced to electrical equipment inspection. The man who had charge of the inspection of controllers and cables should be the best paid inspector. In following out such plan each man should be held responsible for some certain part of the work, and in this way there would be no shifting of responsibilities.

The inspection of brakes meant even more than the reduction of accidents due to faulty brake equipment. If the brakes were set too tightly then the drag would increase the load on the motors. If they were adjusted too loosely, then the motorman would undoubtedly reverse his motors to make quick stops and put the blame on the poorly adjusted brakes. The reversal of the motors, which Mr. Rolston said was done often, worked a hardship on the electrical equipment. Mr. Rolston said that on a road of sufficient size it would be an excellent plan to put one man in entire charge of the air-compressor motors. This man would then assume the responsibility. A testing rack should be installed and extra compressor motors should be purchased, so that no car need be held in for lack of an air-compressor set.

Mr. Rolston did not favor furnishing the car crews with stereotyped defect cards. If this was done, good judgment might not be exercised in reporting defects, and so unnecessary inspection work might result. The motormen on his road did not make any report if the car was in good condition. He favored regular and complete inspection by the mechanical department, rather than the placing of much trust in the reports made by the motorman. He would use the motorman's defect report only to check the other inspection.

George H. Whysall, Columbus, Marion & Bucyrus, told of duplicate car defect reports which had been used on the Columbus, Delaware & Marion Railway with good success. One copy was turned in to the mechanical department with the car, and the conductor turned in the other report with his trip-sheet.

Mr. Paul said that on the Mahoning & Shenango lines the motormen also made duplicate car-defect reports. The original was sent to the superintendent's office and the duplicate to the car house. If the motorman claimed that no attention had been paid to a trouble which he had reported, then the superintendent could place the responsibility. This method had largely prevented the incorrect reporting for defects. During the last six months but one motorman had claimed that no attention had been given to a defect which he had reported. On inquiry it was found that this motorman's original report was unintelligible.

R. C. Taylor, Indiana Union Traction Company, described in brief the system of car maintenance records in effect on that road. (See ELECTRIC RAILWAY JOURNAL, April 4, 1908, page 538.) A summary of the defects found on each car was tabulated yearly. Mr. Taylor described a "fault slip" carried by all officials of the Indiana Union Traction Company. Whenever a defect was noted a slip was used to inform the mechanical department.

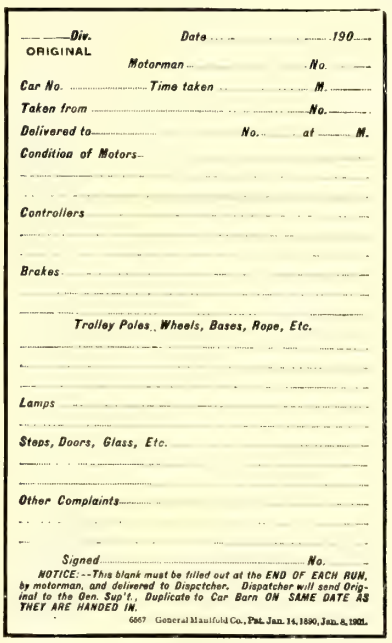
On motion the secretary of the association was instructed to ask each member company for a complete set of his car maintenance and inspection blanks.

E. C. Spring described the scheme of defect slips and carbons used on the Dayton, Covington & Piqua line.

F. E. Cole, Louisville & Southern Indiana, called attention to the need for having statements and records which might be made useful in defending damage suits. He received daily a statement of the condition of each car, where it was located and what work had been done on that car. On the last day of each month a report was prepared which showed the number of defects repaired on each car during the month. To simplify the records, a numerical index for all troubles ordinarily found was used. On the back of the barn foreman's daily report 125 troubles were listed and numbered. This key was used by the shopmen in their reports. In the monthly summary each car was listed and opposite its number were the key numbers of the defects or troubles which had been found. This showed to the superintendent whether there was an abnormal number of troubles of one kind on any one car or class of cars.

H. A. Nicholl said that the Indiana Union Traction Company had had considerable trouble in keeping the extra parts and fittings on its cars. When a car was transferred from one barn to another and when the crews were changed frequently it became almost impossible to place the responsibility for the loss of small fittings. During the last year the company had lost nearly 150 camp chairs, some large easy chairs, and even the rear door of a car had been taken away. Mr. Nicholl said that his road had as yet been unable to put into effect a system of records which would show just when supplies or small parts were lost.

Mr. Anderson told of a scheme used by the Indianapolis, Columbus & Southern for preventing the loss of incandescent lamps. Two racks were placed in each car. Each of these would hold four lamps. One of the racks was painted black, the other red. When the car was in the barn at night the lamp inspector filled the red rack with four good lamps. The other rack was left empty. If any lamp became unusable while the car was in service, the crew replaced it with one of the four good lamps and put the poor lamp in the black rack. This scheme required that there always be a total of four lamps in the two racks, and it had served to prevent the loss of lamps.


ORIGINAL

Div. Date 190

Motorman No.

Car No. Time taken M.

Taken from No.

Delivered to No. at M.

Condition of Motors

Controllers

Brakes

Trolley Poles, Wheels, Bases, Rope, Etc.

Lamps

Steps, Doors, Glass, Etc.

Other Complaints

Signed No.

NOTICE:--This blank must be filled out at the END OF EACH RUN, by motorman, and delivered to Dispatcher. Dispatcher will send Original to the Gen. Sup't., Duplicate to Car Barn ON SAME DATE AS THEY ARE HANDED IN.

6867 General Manifold Co., Pat. Jan. 14, 1890, Jan. 8, 1901.

Mahoning & Shenango Railway Defect Card

Mr. Cole said that the Louisville & Northern Railway & Lighting Company required its motormen and conductors to return old material before new parts or supplies would be issued to them. All small parts were stenciled with the car numbers. If an employee could not find an old part to exchange for a new one, he was required to present himself at the office before he could get an order for the renewal.

F. A. Bundy, Ohio Electric Railway Company, thought it would be impossible to get any system of inspection which would prevent the loss of small parts unless the men were educated to take pride in their cars. Hearty co-operation also would assist very greatly in reducing the little troubles between the car crews and the shopmen.

When questioned, R. C. Taylor said that the possibility of a fire being started by a trolley wire coming in contact with a car heater chimney had effectively been prevented by the use of a fiber insulating section which was inserted in the stovepipe.

Mr. Rolston, speaking of abuse of equipment in general, thought that cars would be maintained in much better condition if the transportation department would endeavor to let the same men run the same cars as much of the time as was possible. This also would largely prevent the loss of supplies from the cars, because the element of pride would enter. If it were possible to arrange the runs in an ideal way, so that

the men would always have the same cars to operate, then the cost of regular maintenance would be reduced from 25 to 30 per cent.

AFTERNOON SESSION

President Anderson called the meeting to order after luncheon, at 2:15 p. m. Hon. C. C. Williams, ex-judge of the Common Pleas Court, of Columbus, Ohio, read a paper on "The Method of Procedure When a Person Refuses to Pay Fare for Self or Child." An abstract of this paper will be found on page 237 of this issue. There was no discussion on the paper, but a vote of thanks was tendered to Judge Williams for his able presentation of the subject which had been assigned to him.

COMMISSIONER GOTHLIN'S ADDRESS

Hon. O. P. Gothlin, member of the Railroad Commission of Ohio, made an informal address to the association on the subject, "The Railroad Commission and Its Relation to Interurban Roads." He prefaced his remarks by stating that what he had to say was not intended to refer to the good or bad practices of any particular interurban road in the State of Ohio, but that he wished to outline if possible his own personal views on some practices which he had observed and some theories which he held regarding the operation of an ideal interurban railway.

The management of an electric railway company has a dual responsibility, to the public and to the stockholders. Whenever these two responsibilities apparently conflict and it became a question of deciding between the interests of the public and the owners of the property, it was evidence of something wrong in the management, because the speaker believed that a railway company which had any excuse to be in existence could prosper and at the same time give fair treatment to its patrons. An electric railway company owed to the public good service and safe operation at prices for the transportation it sold which would afford a fair return on the honest investment in the property. This implied the use of all necessary safety appliances, and, of still more importance, the selection of capable officers and competent men to run the cars. A company is criminally negligent if it employs men who, by reason of their experience or habits, are unfit to operate cars.

Interurban roads operate cars at very high speeds, and the speaker raised the question whether they did not require block signals quite as much as did the steam roads. He also urged the managers to caution their motormen to run around curves at moderate speed. Reckless running, in his opinion, had been responsible for many accidents which had been declared unaccountable.

The Railroad Commission of Ohio had recently given much attention to the question of derails at grade crossings of steam and electric lines. A derail is intended to insure running over grade crossings at moderate speed. Some accomplish this purpose and some do not. The commission favored a type of derail located on the inside rail and having a sharp curve outward. Unless a car is running at very high speed, when it strikes an open derail of this type it will not turn over. The parallel guard rail used with some types of derails would not accomplish the desired end of preventing a car from running on to the intersecting tracks after it had been derailed. The commission advocated the use of a signal at each derail, consisting of a red and white disk and a lamp at night.

Under the existing law in the State of Ohio, an electric railway company crossing a steam railroad siding track is under the same obligation to protect its own cars as when crossing a main track of a steam railroad. The speaker did not think that this was a just requirement since frequently as many as 30 or 40 cars per day were operated over the electric railway tracks, and possibly only three or four trains per week on the steam railroad siding. He believed that in cases of this kind the responsibility for protecting the crossing should be placed on the company which operated the fewest trains.

Mr. Gothlin advocated the use of trolley guards at crossings with steam railroad tracks. Many crossings were from 75 ft. to 100 ft. long, and intersected from six to eight main tracks of steam railroads. The conductor of the car is usually required to cross the tracks in advance and remain at the derail switchstand just at the time when the car is in the most dangerous position. The speaker then briefly referred to the recent conference of the commission and the interurban railway managers in Ohio, which resulted in the adoption of a standard code of rules.

Mr. Gothlin said that he thought few managers of interurban railways realized fully their possibilities as common carriers. Many of the companies had been spending money in purchasing connecting lines and in building extensions, but he believed that the same amount of money spent on the proper improvements to existing lines would net far larger returns. Freight traffic had been neglected largely because no adequate terminal facilities had been provided. The merchants were anxious to ship freight by the electric lines, but without freight houses in the cities and towns of sufficient size to provide reasonable storage capacity, the electric lines could not hope to get their fair share of the freight business. The merchants would not permit their teams to stand around idle while waiting for an opportunity to load directly into cars standing on a side track or on one of the main streets. There was a large field in the transportation of through freight which as yet had been undeveloped. The speaker called attention to the possibilities of developing traffic in the smaller towns along the line which, in many instances, have been neglected by the traffic department after the first novelty of travel over the electric lines had worn off.

Most of the freight carried by the electric lines at the present time, Mr. Gothlin pointed out, was hauled in single cars. He believed that if adequate transportation facilities were provided, trains of from 6 to 10 cars could be hauled at a very much lower cost per ton. The express business, he thought, had also been neglected. A much higher revenue could be derived from carrying express and package freight combined with a collection and delivery service than from an ordinary freight service. The public is willing to pay well for rapid transportation of packages and perishable goods, and the speaker thought that a profitable business could be built up along these lines.

The passenger service on interurban roads was frequently unbalanced and out of proportion to the traffic. Mr. Gothlin cited a hypothetical interurban line running between a terminal city, A, of 200,000 inhabitants and a terminal city, B, of 40,000 inhabitants. The cars were run through from A to B and the same service was given in and out of A and B, whereas B had only one-fifth the population of A. In other words, the service to and from B was more than adequate and the service to and from A less than was required. Many interurban lines also maintain the same frequency of service throughout the day, whereas it was well known that the maximum travel took place between 6 and 9 a. m. and 4 and 6 p. m. The speaker thought that through service and local service ought to be separated and that each should be given the attention it deserves. Referring to suburban traffic, Mr. Gothlin thought that a railway company could derive relatively more revenue from this source of traffic than from any other. The travel is regular and can be calculated in advance, so that the service can be adjusted in almost exact proportion to the requirements.

The traffic department of an interurban road makes the rates and prepares the tariffs. This is a most difficult task, and the Railroad Commission of Ohio appreciates all the difficulties. It is willing to give every assistance possible in the preparation and filing of tariffs. The temptation in making rates is always to make the rates higher on the profitable parts of the road, in order to recoup losses involved in handling traffic over the unprofitable parts of the system. Mr. Gothlin condemned any system of rate making which favored one community with low rates at the expense of another community which was given high rates, where the cost of service was no more.

The hostility of the steam railroads to the electric railways was unjustifiable, in the speaker's opinion, and he believed that ultimately interchange of business, but not necessarily interchange of equipment, would be compulsory. A steam railroad has no right to establish low rates on the parts of its system which compete with interurban roads. The commission recently had an exhaustive hearing on a matter involving this point. The Hocking Valley Railway established very low rates between the points where it competed with the Scioto Valley Traction Company. It was willing to stand the loss due to the low rates because it could make up the deficit on other parts of its system by putting into effect excessively high rates. The isolated interurban road could be ruined financially by such competition, but public policy demands that such unfair methods should be prohibited.

The question of what constitutes a fair return to the railway company depended on the honest value of the investment in the railway company's property. Recent statistics of the financial condition of the interurban railways in Ohio showed that the average capital liabilities per mile of track were $82,000. Of this amount $32,000 represented bonds and $50,000 represented stock. The speaker believed that the actual value on which rates could be equitably based was far less than $82,000 per mile in most cases. Regulation of the financial operations of railway companies was quite as necessary as regulation of the operation of their property. Only honest obligations should be sold to the public.

Commissioner J. C. Sullivan followed Mr. Gothlin and referred briefly to the necessity which led to the adoption of a standard code of interurban rules in Ohio. The commission and the managers of the interurban railways worked in entire accord, and he believed that the adoption of these rules would be satisfactory to all interests concerned. The commission was doing all in its power to prevent accidents on both the steam and electric roads and while it was not issuing formal orders, it was offering suggestions which in most instances had been followed with good results. He emphasized particularly the importance of retaining in the service old and experienced men who possessed good judgment and who could be depended upon to operate their cars safely under the most trying conditions.

A vote of thanks was offered to the railroad commissioners of Ohio for the interest they had manifested in attending the meeting and as an expression of appreciation of the co-operation which the commission has been giving to the electric railway companies in the State in promoting better and safer train operation.

Owing to the lateness of the hour, the reports of several of the standing committees were referred to the incoming executive committee of the association with the understanding that they were to be presented at the next meeting to be held in South Bend.

The secretary then read his annual report which was printed in the ELECTRIC RAILWAY JOURNAL of Jan. 29, page 190. The following statement of finances of the association which was not included in the report published last week was read by the secretary:

The receipts and disbursements to Dec. 31, 1909, were:

RECEIPTS.

Cash on hand	$325.21
Received from railroad and member companies	2,976.34
Received from supply men	480.00
Associate membership	9.00
Stationery and printing	2,006.15
Advertising	212.00
	$6,008.70

DISBURSEMENTS.

Salaries	$2,719.62
Traveling expenses	129.00
Stationery and printing	1,903.06
Postage	196.00
Telephone and telegraph	61.17
Office incidentals	38.50
Advertising	86.00
Taxes and insurance	9.03
Express	17.62
Office fixtures	17.90
Rent	129.50
Cash on hand	427.30
	$6,008.70

The following is a statement of assets and liabilities of the association on Jan. 22, 1910:

ASSETS.

Cash on hand Jan. 1, 1910	$427.30
Receipts since Jan. 1	1,090.79
Due from railroads	536.89
	$2,054.98

LIABILITIES.

Operating expense for January	$325.00
Surplus	1,729.98
	$2,054.98

A. A. Anderson, the retiring president, made a few brief remarks in which he complimented the association on the good work which had been done during the year and thanked all the members for the co-operation which they had given him during his term of office. The election of officers then followed and Mr. Whysall, the new president, was escorted to the chair. He thanked those present for the honor conferred upon him and expressed his intention to do all in his power to carry on the good work to which the association was pledged. The meeting then adjourned.

MEETING OF CENTRAL ELECTRIC TRAFFIC ASSOCIATION

The Central Electric Traffic Association held a meeting at the Southern Hotel, Columbus, Ohio, on Jan. 26, the day preceding the annual meeting of the Central Electric Railway Association. At the conclusion of the meeting, A. L. Neereamer, chairman of the association, when asked by a representative of the ELECTRIC RAILWAY JOURNAL for an account of the business transacted, made the following brief statement:

"The meeting was called to check rates. There were represented in person or by proxy 41 lines. The annual report of the chairman (see ELECTRIC RAILWAY JOURNAL of Jan. 29, page 190) was read and approved and ordered spread on the minutes. A. L. Neereamer was unanimously re-elected chairman. The next meeting will be held in Dayton, Ohio, Feb. 19, at which time matters pertaining to freight and express tariffs will be considered."

AVERAGE HAUL AND CRITICAL HAUL

L. H. Parker, of Stone & Webster, writing in the *Public Service Journal* regarding "The Average Haul and the Critical Haul on Electric Railways," says in part:

"According to the annual report just published, during 1909 the Boston Elevated system carried nearly 281,000,000 revenue passengers and ran about 51,000,000 revenue miles. Assuming that the average haul was 3 miles with an average of 40 seats per car, there were 843,000,000 passenger-miles and 2,040,000,000 seat-miles. The ratio of passenger-miles to seat-miles was 41.4 per cent. During the rush hours on certain lines the ratio of passenger-miles to seat-miles was, no doubt, nearer 200 per cent, while on late trips on certain suburban lines it was doubtless nearer zero per cent. The operating expenses, taxes, interest on funded debt, depreciation, rentals of subways, and guaranteed dividends on stocks of leased lines amounted to about $13,650,000, or nearly 26.8 cents per car-mile or .67 cent per seat-mile. If the yearly seating factor was 41.4 per cent, then one passenger-mile cost .67 cent divided by .414, or 1.62 cents, or the average journey of 3 miles cost the company 4.86 cents for which it received 5 cents, leaving .14 cent available for return on such part of the investment as is represented by capital stock of the company. The 'critical haul' would be equivalent to 5 cents divided by 1.62 cents or approximately 3.09 miles."

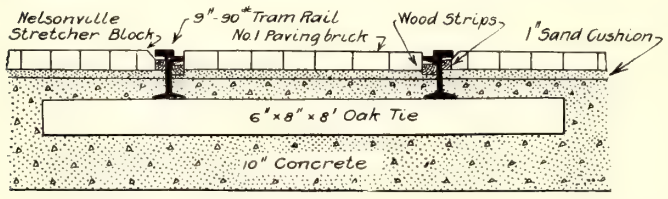
With the February number of the *Electrical Record* Albert Spies retires from the editorship of that publication, to become the managing director of *Foundry News*, a new illustrated monthly publication devoted to the foundry arts, with offices in the Hudson Terminal, 50 Church Street, New York. *Foundry News* will make its first appearance in April.

NOTES ON STREET PAVING*

BY THOMAS B. MCMATH, CIVIL ENGINEER, INDIANAPOLIS TRACTION & TERMINAL COMPANY

The pavement between street railway tracks is subject to destructive conditions not encountered in ordinary street paving. The concentrated wheel loads of the modern cars distort and deflect the rail. This breaks any contact between the pavement and the rail and permits the entrance of water into the foundation of the pavement. Heavy, stiff rails with good fastenings and solid ballast reduce the deterioration of the paving, but the vibration of the rail cannot be wholly eliminated.

During the past year several features of track paving have been studied in Indianapolis. The reconstruction of tracks in the business center of the city afforded an opportunity of trying some new methods. About 1000 ft. of double track on Pennsylvania Street between Washington and Ohio Streets were rebuilt, using every care to make the work as permanent as possible. Nine-inch girder tram rail weighing 90 lb. per yard was laid on 6-in. x 8-in. x 8-ft. white oak ties spaced 2 ft. apart center to center. The sub-grade was excavated to a depth of 10 in. below the bottom of the ties and rolled until solidly compacted. The track was raised on blocking to the proper grade and aligned, after which the excavation was filled with Portland cement concrete to within 5 in. of the top of the rail. The concrete was allowed to set 10 days before the brick paving was laid on a 1-in. sand cushion. At the street intersections where vehicular traffic could not be kept off, the bricks were filled with asphaltum filler, but the balance of the paving was grouted with a wash of Portland cement, every effort being made to completely fill all joints. The new features of this track construction are the increased thickness of the concrete base under the ties and the use of beveled-edge Nelsonville stretcher bricks on the outside of the rails, as shown above.



Cross Section of Track Construction with Brick Paving

Objections may be raised to the use of stretcher bricks outside of the rails on the ground that they might start the formation of a wheel rut along the rail. The beveled stretcher bricks in combination with the wood strip under the head of the rail are intended to keep the rail from direct contact with the brick, reduce the effect of vibration and prevent the paving outside of the rails from being crushed down by wide-tread wheels.

Asphaltum filler has been used on large areas of brick paving in Indianapolis. It has certain advantages in cases where vehicular traffic cannot be kept off the pavement for sufficient time to permit cement grout to take a complete set. Several brands of asphaltum and coal tar pitch fillers have been used under conditions which will make it possible to obtain data at a later time as to their relative merits. About 8000 sq. yd. of brick track paving were laid with asphaltum filler during 1908 and an adjoining stretch of track was grouted with Portland cement. As both stretches of paving are subjected to very heavy traffic they were laid with great care. At the present time both are in excellent condition, but the lapse of time will enable a direct comparison of results to be made.

The wear on brick pavement begins by the breaking off of the corners of the bricks at the joints and this continues until the bricks resemble cobblestones. The use of bricks with rounded or beveled corners is a mistake. Paving bricks should have as sharp corners as possible and an effort should be made to completely fill the joints with grout. Ordinary methods of grouting are the ruin of brick paving and an extra 5 cents per square yard spent in good grouting is the best investment on the job. The best pavement is always that which has been most carefully grouted. The following method of grouting is suggested: Mix cement and sand in equal quantities in a box, always using a measured amount of sand, cement and water. After thorough mixing dump the batch on the surface of the pavement and with a rubber squeegee instead of a broom sweep the grout diagonally across the joints. After the first sweeping go over the surface again and repeat the operation until all joints are full and the grout has taken its initial set.

The price paid for ordinary paving brick is probably too low. Smaller bricks of more uniform structure and burn than those commonly used are preferable. Bricks should be very carefully inspected and possibly 40 per cent of the bricks now classed as No. 1 quality should be rejected. If smaller bricks were used those rejected for paving could be sold for building purposes, thus protecting the manufacturer against loss by excessive culling. Inspection for quality while the bricks are being laid is unjust to both the manufacturer and the consumer, as the eye can detect only faults in size, color and perhaps absorption of water. Many bricks which would be satisfactory are rejected and many defective bricks are scattered throughout the pavement. The inspector should have an opportunity of judging the quality of the bricks from their position in the kiln.

A better market for second-class bricks will have to be found before the manufacturer can be expected to grade closer or else the price paid for first-class bricks must be higher. Both the manufacturer and the consumer should be insured against the expense of freight, unloading, hauling and storage on rejected brick.

Up to the present time no granite or stone block pavement has been used in Indianapolis. The traffic on several streets now paved with brick is so heavy that a block pavement is needed. The street railway company has 8000 sq. yd. of stone block pavement now under construction on Kentucky Avenue south of White River. The block selected is from quarries located 60 miles east of Pittsburgh, Pa., and is known as Ligonier block. It is a very tough limestone. The blocks are laid on a concrete foundation and the joints are filled with pitch. The pitch to be used will be Hydrolene 80 per cent and residuum oil 20 per cent. The stone blocks are smoothly cut and the pavement will not be materially rougher than brick. The blocks do not glaze or get slippery under traffic. They will eventually cobble if exposed only to horse travel, but if laid smooth they will remain so under wheel traffic, if fully grouted.

The secret of a good block pavement is in the cutting of the blocks with smooth faces and square edges. The blocks must be laid close with the joints filled with filler. If the pavement be made as smooth as brick the noise will be obviated largely and the pavement will continue smooth even when worn by traffic. For railway track paving, stone block has the great advantage that the paving can be replaced after making track repairs at small expense and the general condition of the street is not impaired as in asphalt or brick surface.

The maintenance of track and paving always presents the difficulty that minor repairs to the track cannot be made without a large expense for paving. In other cases reconstruction of the paving cannot be made because the condition of the track will not justify it and enough money to rebuild both is not available. A worn-out pavement on a street with a track two-thirds worn out presents a difficult problem. There should be some cheap pavement invented to use for such short time work. This problem is frequently presented on interurban lines in small towns in which ordinary T-rail construction should be paved. The success of pavements of the bitulithic class seems to indicate that something can be expected in this direction.

Assuming that the track roadbed is substantial enough to serve for a foundation, if a 4-in. or 5-in. layer of bituminous macadam could be cheaply laid and cheaply and easily repaired by ordinary section men it would solve this trouble. One asphalt contractor suggests a layer of clean macadam laid and rolled in place with a light roller, then poured with hot asphalt;

*Abstract of a paper presented at the annual meeting of the Central Electric Railway Association, Columbus, Ohio, Jan. 27, 1910.

this to be followed with a layer of ¼-in. stone, also poured with hot asphalt then coated with sand and cement and rolled with a heavy roller.

With this method no elaborate plant would be required. A closed heating kettle of two tons capacity with a hand agitator can be purchased for $700 and the grading of the macadam can be cheaply done. It has been estimated that such a pavement could be laid at 50 cents per square yard, and subsequent patching could be done by section men at the same cost. This would give a pavement suitable for streets with light traffic where the traffic largely avoids the car tracks. The cost of maintenance would be so small that it could be neglected.

The need to-day, for small towns, is a cheap yet reasonably durable pavement that can be repaired when necessary by ordinary labor with a small expenditure for plant. The macadam country road fails under automobile traffic. The need is now for a cheap cementing material.

THE METHOD OF PROCEDURE WHEN A PERSON REFUSES TO PAY FARE FOR SELF OR CHILD *

BY C. C. WILLIAMS, OF THE COLUMBUS (OHIO) BAR

The subject of this paper may be viewed from two standpoints. The first has to do with the naked legal rights of the parties. The other affects questions of policy in the handling of the traveling public by the railroad companies.

In considering the question of the legal rights of the parties and the examination of precedents, it may be of interest to note the decisions of the courts regarding steam as well as electric railroads. In the State of Ohio legislation has kept separate and distinct the provisions relating to street railroads and those affecting steam roads. In one case the Supreme Court has said, "The statutes as to railroads do not apply to street railroads unless made to do so by clear reference." But the law affecting passengers and the general public, or either, so far as the payment of fares, or failure to do so, is concerned, must rest upon the same principle. There is no reason why the same general rule applying to the treatment of passengers upon steam roads and those traveling and refusing to pay fare upon steam roads should not apply to persons similarly situated when traveling upon electric or street railroads.

A carrier of passengers has the right to make reasonable regulations for the management of its business. This may include provisions for the protection of its rights and property, as well as for the comfort, order and safety of its passengers. These would also include rules as to the paying of fare or the producing of a ticket. The carrier may require those desiring to become passengers to procure tickets before entering the train, or upon failure to procure tickets to pay a greater fare. It may require the delivery of the ticket or fare before entering the vehicle. The pay-as-you-enter electric cars are operated by virtue of this right. Where the carrier has made suitable provisions and accommodations for enabling the traveling public to comply with its reasonable rules, it has the right to insist upon their being observed. But how may it enforce these regulations? When it comes to a refusal to pay fare the answer is simple. If the person has entered the vehicle he may, upon such refusal, be expelled therefrom.

It is well settled that the carrier has the right to expel from its cars persons who refuse to pay fare or to furnish a ticket for their transportation, and this is the usual and reasonable remedy. Public carriers, whether steam roads or electric roads, are not eleemosynary institutions, but are supposed to be operated for the profit of those owning the stock and bonds of such companies, subject, of course, to such regulations as may be necessary for the proper care of the general public.

A sufficient opportunity should be given the person after he has been admonished that he will be expelled if the fare is not paid, to produce the fare and comply with the regulations of the carrier. The failure to produce the ticket or to pay the required fare may be due to some fault of the ticket agent or other employee of the company, but the courts have recognized the fact that it is impossible for the conductor to investigate and determine the rights of the passengers complaining, and therefore have recognized the propriety of the regulation requiring the payment of the fare by the passenger and the submission of his grievance to the proper officer of the company. If fare has been unfairly exacted the passenger has redress.

The method of procedure, then, when a person refuses to pay fare is expulsion. But what is to be done when an adult person is accompanied by a child? If he has refused to pay his fare and it becomes necessary to expel him, the child in his charge should also be ejected, unless the child's fare has been paid and the child is of sufficient age to travel alone. In the latter case the carrier would be justified in permitting it to remain if the person in whose charge it had been so desired.

Public carriers have the right to prescribe such reasonable regulations as they may deem proper for determining the age at which a child shall pay fare, and to fix a lower rate of fare for children under a certain age than for those over that age and for adults. Usually, children of the age of those required to pay half-fare are accompanied by adult persons.

What shall the carrier do when a person in charge of a child refuses to pay its fare and the child is within the age prescribed for the collection of fares? A person in charge of a minor child is responsible for its care, and the penalty for a refusal to pay for its trip may properly fall upon such person. And this is equally true whether the person in charge has or has not paid his own fare. It is important that the carrier, through its employees, should not exceed its authority at such a time, or to do what otherwise might be lawful in an unlawful or careless manner.

In Ohio the Supreme Court has clearly defined the duties of a railroad company under such circumstances, and the rights of the adult and the child who may be accompanying such adult. The Ohio rule is clearly laid down in the following language of the court:

"When a person having in charge a child of sufficient age to require payment of fare, takes passage on a railroad, such person becomes liable for the payment of the child's fare, and upon refusal to pay both may be ejected from the train at the next station.

"When such person has paid fare or purchased a ticket which is taken up by the conductor, such conductor must, before ejecting such person and child, return or offer to return to such person the unused value of such ticket or fare over and above the fares of both for the distance already traveled.

"If the ticket is such that a stop-over may be had thereon, the conductor may tender a stop-over check instead of money, but to retain the ticket and expel the parties from the train renders the company liable in damage."

It will be observed that under the above rule it makes no difference whether the person having the child in charge has paid his own fare or not, provided he neglects and refuses to pay the fare of the child. Both may be ejected from the train for such refusal. In Maryland, Minnesota, California, Pennsylvania, Illinois and several other States substantially the same general rule has been announced by the courts, and wherever there has been an expression on the subject the courts have conformed practically to the same rule. Some of them have not announced the duty of the company as to returning a fare. But the courts would hardly permit, on the one hand, the expulsion of a passenger before he has reached the point to which he has paid without returning to him the unearned portion of his fare, nor, on the other hand, require the company to pay back such part of the fare as had already been earned. The Maryland Supreme Court has even held that a passenger, being responsible for the fare of a child under his charge, may be ejected for refusal to pay such fare, though he has paid his own fare and though he himself is a minor.

*Abstract of a paper read at the annual meeting of the Central Electric Railway Association, Columbus, Ohio, Jan. 27, 1910.

The subject of this paper contains the words, "The Method of Procedure." If we are to gage the conduct of the officers of a company by the commonly accepted views of the general public, or of sensational newspapers, there is but one conclusion; namely, that the railroad company will exercise every legal right which it possesses, and hence the person and child will both be summarily ejected.

But what other course is left for the carrier which will protect it against imposition? A Pennsylvania court has announced the rule that the company had no lien upon the person of a passenger for fare. And it is no great satisfaction to arrest a dead beat for defrauding the company out of a fare when no recovery can be had of the fare and the company is simply put to the annoyance of the arrest and prosecution. Unquestionably, a traction company or any public carrier not only has the right to but should eject the passenger who refuses to pay his fare or the fare of one who is in his custody and care.

In the exercise of its right of expulsion great care must be used that the passenger and child are ejected in a lawful manner. In the Ohio case before cited, the Supreme Court announced the rule applying in the case of steam railroads, and in the speaker's judgment this is the law of Ohio which the court would recognize in the case of an electric or interurban road. The court held that the parties might be ejected from the train at the next station. It would seem from this that the court may have had in mind both the convenience of the company, in not being required to stop until it reached a regular stopping point, as well as the comfort of the passenger ejected, in not requiring him to be ejected in some out of the way place. But in the case of interurban roads, we often have stops at very short intervals. The courts would probably hold that a public carrier was not exercising ordinary care if it were to eject a passenger at some lonely or out of the way place, and especially if the person were to be ejected at night. The proper course in such a case would be to carry the person or persons to some suitable stop, where they could be expelled from the car with due and reasonable care for their safety. If they were to be expelled in some dangerous or lonely spot, where, perhaps, the only apparent means of reaching houses on the public highway would be by following upon the tracks and right-of-way of the company, and if any accident should occur under such circumstances the court doubtless would look upon such an expulsion as an act for which the company might be held accountable, and the circumstances warrant a jury in increasing the measure of damage which might be assessed by reason of such injury.

Another feature to be considered in determining the method of procedure under consideration is the manner in which passengers may be expelled from a car. Very much has been written upon this subject, but it all may be summed up in a very few words. A train crew may exercise such force as may be necessary to accomplish the purpose sought. In the exercise of this force too much stress cannot be laid upon the fact that great care should be taken not to use greater force than shall reasonably be necessary. The passenger whom it is proposed to eject may be boisterous and profane, but that fact affords no warrant for coarse language or rough treatment on the part of the trainmen. Nothing will arouse sympathy, either of the passengers on the car at the time of the expulsion or a jury in case the matter becomes a subject of litigation, as certainly as will coarse language or rough and boorish treatment on the part of the trainmen. Fortunately, traction companies have been so careful in their selection of suitable employees that complaint of such misconduct is almost unheard of.

In conclusion, a public carrier should not hesitate to properly enforce its rights in the collection of its fares, even, when necessary, to the expulsion of persons of whom such fare is not paid. But in the exercise of this right good judgment should be used, and the fact should not be lost sight of that a wrongful or brutal expulsion of a passenger may work far greater injury to the company than the fact that the passenger has been allowed to remain upon the car without the payment of his fare. The trainmen should be properly cautioned in this regard and instructed that an intelligent and discreet dispatcher stands ready in case of an emergency to advise them as to the course to be pursued.

INVESTIGATION OF SNOW FIGHTING FACILITIES

An investigation was held before the Public Service Commission of the First District of New York on Jan. 19, 1910, regarding the facilities of the Brooklyn Rapid Transit Company for protection against severe snowstorms. William McCarroll represented the commission, with G. H. Backus as counsel. The Brooklyn Rapid Transit Company was represented by W. S. Menden, assistant general manager.

H. L. Coyne, assistant engineer in the bureau of transportation of the commission, said that during the severe storm of Dec. 25 and 26, 1909, he had ascertained as nearly as possible how long each line was closed to service. For instance, service was discontinued on the Avenue C line for 63 hours, on the Bay Ridge line totally for four hours and partially for 26 hours, and the Bergen Street line totally for 15 hours and partially for 41 hours. Service was also abandoned temporarily over the west end elevated line between Ulmer Park and Coney Island and over the Sea Beach line south of Twenty-second Avenue. The trunk lines of the surface system were all kept open, but service over them was somewhat irregular.

C. W. Wilder, acting electrical engineer for the commission, said that the total snow-fighting equipment of the Brooklyn Rapid Transit Company consisted of 40 snow sweepers and 26 snow plows, with approximately 400 miles of line to be kept open in snowstorms. He contrasted this equipment with that of the Boston Elevated Railway operating 417 miles of line and having available 307 snow plows and seven snow sweepers; the Metropolitan Street Railway, New York, with 130 miles of track and 70 sweepers and five snow plows, and the Third Avenue Railroad, New York, with 76 miles of track and 15 snow sweepers. The plows of the Metropolitan Street Railway, he explained, were used only when a line was completely blocked. Assuming that the Brooklyn Rapid Transit Company operated its 400 miles of track and maintained a schedule of 8 m.p.h., it could cover its tracks once in 45 minutes with the snow machines. The Metropolitan Street Railway was able to cover its tracks every 14 minutes at the 8-m.p.h. schedule, and the Third Avenue Railroad every 30 minutes at the same schedule speed. The Union Railway, with conditions similar to Brooklyn, could cover its tracks every 45 minutes, while the Boston Elevated Railway could cover its tracks every 9 or 10 minutes. Mr. Wilder had lived in Boston and thought climatic conditions there were worse than in New York, but that vehicle traffic was heavier in New York than Boston. While he had no figures on the amount of snow precipitated on Dec. 25 and 26, it seemed to Mr. Wilder that the storm of Dec. 25 and 26 was the most severe during his experience in New York, which dated from 1900.

In reply to a question by Mr. McCarroll as to how far the equipment of the Brooklyn Rapid Transit Company was adequate and what the company was prepared to do to prevent a repetition of the conditions which prevailed on some lines on Dec. 25 and 26, Mr. Menden said:

"The question of whether equipment of this kind is adequate for the purposes for which it is intended is necessarily determined in each locality by previous experience. The fact that in one section of the country a railroad has a certain number of sweepers and snow plows per mile of track cannot be taken as a criterion for another locality. It appears from our experience in previous years, and the recent storm of a few days ago, which was more severe in the amount of snow that fell than the storm of Dec. 25 and 26, that our equipment was sufficient to take care of these storms if gotten out in time. As Dec. 25 was a holiday and a Saturday and the following day was a

Sunday, it was very difficult to secure men for service during the storm, which started about 8 p. m. In addition, the violence of the storm was underestimated, based on the previous weather report, and the equipment was not operated over our lines early enough for the storm which developed. Moreover, many men were not at home and those who were at home made every possible effort to stay there—a combination which caused delay until the lines were tied up. We have no reason to feel that our equipment is not adequate for our needs at the present time."

Mr. Menden said that no means had been taken since the storm to increase the snow equipment of the company, but that it was proposed to equip some flat freight cars with snow plows for fighting snow drifts and reconstruct the present snow equipment by reinforcing the car bodies. The successful operation of elevated trains on the surface was a question of protecting the particular location where the tracks were below the adjacent surface and the remedy was either to construct a snow fence or put cars on one track to act as a snow fence during a storm and operate over the other track. It was not a question of equipment.

In conclusion Mr. Menden said:

"Inasmuch as the recent storm was the worst we have had in quantity of snow in the last four years, and the company was able apparently to take care of that storm satisfactorily, we believe that our equipment is sufficient. Really, that is what determines the question. The number of sweepers per mile of track is not a fair guide as to whether your equipment is adequate. It is a question of whether you can keep your line open. We have a lot of other equipment we use in case of a snowstorm which other companies do not have. We have a very heavy ash car which we operate on certain lines which cleans the snow to an extent which permits passenger traffic. There are a number of considerations which apply to Brooklyn that do not apply to other cities."

The hearing was then closed.

On Jan. 20 an investigation was held before Commissioner McCarroll regarding the facilities of the Richmond Light & Railroad Company for taking care of traffic during severe snowstorms. Arthur Dubois represented the commission as counsel. A. H. Larkin represented the company. Mr. Dubois offered in evidence the monthly meteorological summary of the New York Weather Bureau for December, 1909, with special reference to the snow precipitation on Dec. 25 of 8.8 in. and on Dec. 26 of 1.3 in. He also offered in evidence the weather maps of the bureau for Dec. 25 and 26, showing the meteorological conditions throughout the country.

T. J. Mullen, superintendent of the Richmond Light & Railroad Company, said that the company had three Brill sweepers and a Taunton plow available for keeping lines open and that the Staten Island Midland Railway had one McGuire sweeper and one Taunton plow. There were approximately 61 miles of railroad in the two systems. Service over several lines was abandoned temporarily during the storm. The snow equipment of both companies was used on both lines, and was concentrated in severe storms in keeping open the lines of heaviest traffic.

F. E. Ferris, assistant engineer of the commission, testified regarding conditions on the lines of the company on Dec. 27 and 28 as reported to him by inspectors for the commission. H. C. Leonhardi, an inspector of the commission, also testified regarding conditions as he found them following the storm.

In conclusion, Mr. Mullen said that the storm of Dec. 25 and 26 was the most severe during his service with the company, which dated from 1905, and that it was one with which it would have been impossible to cope no matter how much snow equipment the company had. As soon as the character of the storm was apparent, the company sent employees in wagons to various parts of Staten Island to hire men to assist in fighting the storm, but they were unable to enlist the services of more than 120 men, whereas 500 or 700 were required.

The hearing was then closed.

COMMITTEE MEETINGS IN NEW YORK LAST WEEK

On Wednesday and Thursday, Jan. 26 and 27, a number of meetings were held in New York of the American Street & Interurban Railway Association and its affiliated associations. All of these sessions were held at the headquarters of the association, 29 West Thirty-ninth Street.

The following committees met at some time during the three days:

Executive committee, American Association.

Committee on public relations, American Association.

Committee on Interstate Commerce Commission affairs, American Association.

Committee on compensation for carrying United States mail, American Association.

Committee on revision of associate membership, American Association.

Executive committee, Accountants' Association.

Committee on a standard classification of accounts, Accountants' Association.

Executive committee, Claim Agents' Association.

Committee on subjects, Claim Agents' Association.

Executive committee, Transportation & Traffic Association.

Committee on city rules, Transportation & Traffic Association.

Executive committee, Manufacturers' Association.

There was also a meeting of the representatives of the various State and sectional associations, followed by a joint meeting of these representatives with the committee on public relations of the American Association. Reports of the meetings of the executive committee of the Claim Agents' Association and of the classification committee of the Accountants' Association were published last week. Brief statements of the meetings of the other committees follow:

COMMITTEE ON SUBJECTS

The meeting of the committee on subjects of the American Association was attended by Arthur W. Brady, chairman; C. S. Sergeant, W. J. Harvie, H. S. Swift, R. I. Todd and E. C. Carpenter. The subjects selected for the 1910 convention will be announced by the secretaries of the several associations.

MEETING OF REPRESENTATIVES OF STATE ASSOCIATIONS AND COMMITTEE ON PUBLIC RELATIONS

The meeting of the committee on public relations of the American Association was attended by C. Loomis Allen, chairman; Hon. W. Caryl Ely, Frank Hedley, Arthur W. Brady, Thomas N. McCarter, Gen. George H. Harries, E. C. Foster, W. G. Ross and P. F. Sullivan. After a discussion of the general work of the committee, a joint meeting was held with the representatives of the State and sectional associations who were in attendance. Invitations had been sent by the association to each of the State railway associations of which it had record to send representatives to attend the meeting. Those present were: W. D. Wright, New England Street Railway Club; A. H. Ford, Alabama Light & Traction Association; D. A. Hegarty, Arkansas Association of Public Utility Operators; R. S. Goff, C. S. Clark and E. S. Wilde, Massachusetts Street Railway Association; H. E. Weeks, Iowa Street & Interurban Railway Association; A. W. Brady, Central Electric Railway Association; Duncan McDonald, Canadian Street Railway Association; E. F. Peck, C. Loomis Allen and J. H. Pardee, Street Railway Association of the State of New York; C. L. S. Tingley, Pennsylvania Street Railway Association.

At the joint meeting the question of a closer affiliation of these local bodies was thoroughly considered, and it was decided to present a resolution to the executive committee of the American Association to the effect that the presidents of these sectional and State organizations should be appointed members of the committee on public relations of the American Association.

COMMITTEE ON UNITED STATES MAIL

The committee on compensation for carrying United States mail was represented by: R. S. Goff, chairman; C. L. S. Tingley

ley, J. K. Choate, A. R. Piper and Edgar S. Fassett. After full discussion of this subject, the committee decided to prepare an inquiry to member companies embodying four questions, replies to which would show the actual conditions of this class of service throughout the country.

COMMITTEE ON INTERSTATE COMMERCE COMMISSION

The committee on Interstate Commerce Commission affairs, American Association, was represented by: Gen. George H. Harries, chairman; F. R. Ford, C. S. Sergeant, F. W. Brooks, and G. O. Nagle. This committee considered in detail the work coming within its jurisdiction, but no definite action was made public.

COMMITTEE ON REVISION OF ASSOCIATE MEMBERSHIP

The meeting of the committee on revision of associate membership, American Association, was attended by: T. N. McCarter, chairman; James F. Shaw, Gen. George H. Harries, W. Caryl Ely, H. R. Goshorn, C. Loomis Allen and Robert N. Wallis. Different plans looking toward a revision of the conditions of associate membership were presented, but the subject will be given further consideration before any announcement of definite suggestions will be made.

EXECUTIVE COMMITTEE, AMERICAN ASSOCIATION

At the meeting of the executive committee of the American Association on the afternoon of Jan. 28 there were present: James F. Shaw, chairman; A. W. Brady, T. N. McCarter, Gen. and R. I. Todd. Past-Presidents Sergeant, Vreeland, Lang and Ely were also in attendance.

The executive committee received and discussed the reports of the chairmen of the various committees of the American Association which had meetings on the morning of that day. In addition, the matter of the location of the 1910 convention was taken up. Invitations had been received from Saratoga Springs, Niagara Falls, Portland, Ore., Toronto, Toledo, Atlantic City, Rochester and St. Louis. The president was authorized to appoint a special committee of three members to decide upon the time and place for holding this convention. The names of the gentlemen to be appointed will be announced later. They will take up the matter in connection with a corresponding committee to be appointed by the Manufacturers' Association.

The matter of insurance, as embodied in the report of the committee on insurance to the 1909 convention and various developments since that time, was given consideration. In this connection a resolution passed by the Central Traction & Light Bureau was presented reading as follows:

"Whereas, the Central Traction & Light Bureau desires to establish and maintain harmonious and mutually helpful relations with the owners of classes of property which it is called upon to consider, and

"Whereas, it is desirable at all times that there should be a method provided whereby organizations of property owners may communicate and consult with the committees of the Central Traction & Light Bureau.

"Resolved, that we respectfully request the American Street & Interurban Railway Association to appoint a committee empowered to confer with the above-mentioned bureau or its committees from time to time, and to present to and discuss with the bureau matters of mutual interest."

The chairman of the committee on associate membership, H. H. Adams, then presented a report and stated that 119 associate members had been enrolled since the beginning of the fiscal year. The membership of the association at this date was shown to be as follows: Active membership, electric railway companies, 335; associate membership, individuals, 934.

This statement shows a net increase over the corresponding period of the previous year in active membership of 44 companies and in associate membership of 428 individuals.

The chairman of the committee on education, Prof. H. H. Norris, was also present at the meeting and entered into the discussion of the report of that committee to the 1909 convention.

The matter of the secretaryship of the American Association was brought up. The resignation of B. V. Swenson, presented in January, 1909, was accepted and H. C. Donecker was appointed to that office. A biographical sketch of Mr. Donecker appears in the personal column of this issue of the Electric Railway Journal.

EXECUTIVE COMMITTEE, ACCOUNTANTS' ASSOCIATION

At the meeting of the executive committee of the Accountants' Association the following members of the committee were present: H. S. Swift, chairman; A. S. Michener, N. E. Stubbs, H. E. Weeks, Robert N. Wallis, W. J. Tharp, Robert Morrison, Jr., and C. S. Mitchell. The following, who are members ex officio, were also present: F. E. Smith, H. L. Wilson, W. F. Ham, William H. Forse, Jr., and W. B. Brockway. A number of topics proposed for papers for the next annual meeting of the association were considered, and it was decided that it was advisable to have papers presented that would take up some of the topics outlined as follows: Development of the theory underlying the principles of the standard classification of accounts; methods of determining overhead charges, such as expenditures for organization, engineering, interest and taxes during construction, etc.; accounting for freight and express business; methods of collecting and auditing revenues from various types of prepayment cars; construction expenditures and records. It was also suggested that data be collected as to the practice of various companies in handling payrolls. It was the idea that a symposium might be prepared presenting the practice of companies in various respects and that data could be added from year to year to the information obtained in the beginning.

It was announced that W. M. Steuart, chief statistician, Bureau of Manufactures, United States Census Bureau, will present a paper concerning the census report on electric railways. It was the plan to have this paper presented at the last annual meeting of the association, but the census figures were not in final shape and the paper was deferred for that reason until 1910. N. E. Stubbs, auditor, United Railways & Electric Company, Baltimore, Md., will take the place on the joint committee on shop accounts left vacant by the resignation of C. L. S. Tingley. It is expected that this committee will continue its work during the present year. Secretary Weeks was appointed a committee of one to prepare a circular soliciting blanks to supplement the collection of forms of the association.

EXECUTIVE COMMITTEE OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

At the meeting of the executive committee of the Transportation & Traffic Association there were present: R. I. Todd, president; H. C. Page, N. W. Bolen, G. W. Parker, J. N. Shannahan, Dana Stevens and J. W. Brown. The personnel of the committees of the association for the coming year with the topics to be discussed by them at the 1910 convention were considered. After the appointment of the different committees, the names of the members will be announced in this paper. It was also decided to appoint a special committee to consider the subject of schedules and time-tables, and present a report on this subject at the 1910 convention.

COMMITTEE ON CITY RULES

At the meeting of the committee on city rules, Transportation & Traffic Association, there were present: R. E. Danforth, chairman; D. A. Hegarty, Henry Bullen and L. H. Palmer. The amendments to the code of rules adopted at the Denver convention were discussed. Upon motion the chairman was instructed to prepare a bulletin to be sent to the member companies suggesting certain minor changes which it is desired to make in the code, together with the committee's reasons for making such changes.

GENERAL CONFERENCE ON FRIDAY

The meetings were closed with the general conference on Friday, which held an executive session open only to the delegates present. These were well-attended and enthusiastic meetings.

THE BANQUET

The sessions of the mid-year meeting of the American Street & Interurban Railway Association closed with a banquet Friday evening at the Knickerbocker Hotel, tendered to the association by the Manufacturers' Association. About 350 delegates and guests were present. The room was effectively decorated with flags of the three nations represented by the association—the United States, Canada and Mexico. After the dinner Charles C. Castle, who presided, announced that owing to illness Joseph R. Ellicott, president of the Manufacturers' Association, would not be able to preside. In a short speech he then introduced Charles C. Peirce of Boston, who acted as toastmaster of the occasion. Mr. Peirce then introduced W. Caryl Ely, who, he said, had something of interest to the members of the association to announce.

Mr. Ely spoke about the services rendered to the association by the retiring secretary, B. V. Swenson, and described the way in which the work of the association had increased from the time of the reorganization in 1905 and the appointment of Mr. Swenson to the present. In behalf of Mr. Swenson's friends in the association, he then presented Mr. Swenson a large chest of table silver. Mr. Swenson acknowledged the receipt of this gift, saying that it was with great regret that he had resigned from the office of secretary of the association, and expressed his sincere thanks for the cordial spirit of helpfulness and co-operation which he had received from all the members in carrying on his work as secretary of the association.



Guests at the Banquet of the American Street & Interurban Railway Association

The next speaker was James F. Shaw, president of the association, whose toast was "The Association."

After expressing the thanks of the association to the Manufacturers' Association for the courtesies extended by it during the mid-year meeting, and for other co-operation carried on for many years, Mr. Shaw said:

"To-day we have listened to able addresses, discussions have developed, old hopes have revived and new ideas have been brought forth, and if each one of us will return home resolved that this meeting shall be epoch-making in our effort to secure an honest return on an honest investment, we shall not have spent our time in vain. Means of reaching this goal of fair return are patent to all of us—an increased rate of fare, the abolition or curtailment of the transfer privilege, or freedom from taxation; any of them would tend to bring this about. The possibility of reducing operating costs may be eliminated, as their tendency, for obvious reasons, is to increase. The difficulty, therefore, does not rest in the specification of the remedy, but wholly and absolutely in the development of a condition which will permit that remedy to be applied. Law and custom have combined to prescribe the service that the railways shall perform for a rate of fare of 5 cents established as the American standard under conditions so utterly foreign to the present-day situation as to make any comparisons ridiculous. With the short haul, cheap equipment and low operating costs prevalent in the early days, there undoubtedly was a fair margin of profit. Gradually, as the towns and cities grew in population, came extensions of the railways, and there insidiously crept in an increasing length of ride for that standard fare. The railways made no complaint, perhaps with the idea that the length of ride was not an important factor in the profit-earning capacity of the road, and that the passenger could be carried just as cheaply five miles as two miles.

"Other motive powers then developed. The first was the cable, entailing great expense upon many of the railways of the country if they were to be kept well in advance of the progress of the cities. With the increased speed which the new motive power permitted came further extensions and relief was provided for the congested districts of our busy cities, whose people were thus given an opportunity to live in localities at once cheap in rental cost, easy of access and healthful and life-giving in atmosphere. Then quickly followed the advent of electricity, and with the immediate popularity of this new tractive force came the abandonment of the comparatively new and costly cable equipment and the substitution of the electric motor. This necessitated enormous investment in first cost and subsequently as replacement cost, as the inadequacies of the system developed and were overcome. Larger cars and improved roadbeds became necessary because of the increase in the number of passengers carried, and the outlying districts were brought into still closer touch with the business sections. The average distance a passenger is carried was constantly increasing. The operating cost was also growing greater, not alone because of the longer ride, but also because of the ever-increasing costs of material and labor. The unit of fare, however, has remained the same, for we still have with us that American standard, with the margin of profit fast disappearing or wholly extinct. Consolidations were then promptly effected on the theory of probably advantages in economical operation, and with them came the evolution of that fascinating adjunct, the free transfer. With the American standard unit of fare still intact, rides of 10 to 20 miles were now possible.

"A few years passed, and then the warning signs of the deterioration of present equipment and the need of more modern types; then the realization, as a shock to most of us, that in our proffers of service to the public we had passed be-

yond the mark where return was possible or provision for extensive replacements or improvements were practicable. Capital must see at least a reasonable chance for profit before it can be expected to invest, and with our transportation companies already selling to a great proportion of its passengers a service at far below its actual cost, and with a clamorous public demanding an even lower rate of fare or the entire confiscation of our properties, capital immediately closed the door. Then came stagnation in an industry in whose vitality every citizen is interested.

"I have thus briefly reviewed the progress of electric railways to show how a situation has been produced where the service rendered is far in excess of the compensation paid. Obviously, we should next take up the question of how the remedy can be obtained. It is evident that no remedy is possible unless it receives the sanction of the public. In other words, it would not be practicable to obtain the enactment of legislation providing the remedies which are necessary without the full indorsement of the public. Even if our State and municipal officials were fully convinced that an increase of fares, or a curtailment of transfers, or a reduction of taxation, was entirely fair and justified by existing conditions, they would hardly dare officially to advocate such measures unless these views were also held by their constituents. The remedy, therefore, will have to come ultimately from the public.

"To my mind, an important part of the work of this association, and one in which all who are in any way connected with our business should be vitally interested, is that of bringing the public to a better realization of the actual conditions which confront us. We should explain the large first cost, the conditions surrounding the business in its early stages, the great additional outlay required as the art developed, and the improvements which have been made to provide comfortable and rapid transportation. I am only one of many within our organization who believe that with these matters clearly explained we can safely trust the American people to deal fairly and honestly with us in all matters affecting our future. The money actually invested in the electric railway business does not yield anywhere near so large returns as those obtained in other industries. To illustrate, in Massachusetts, where the restrictive laws of the State prevent any possible issue of stock and bonds over the value of the property, the return on the total capital invested in street railways in 1908 was only a little more than 5 per cent. This return is but little larger than the interest on deposits paid by savings banks. So long as this condition exists, what inducement is there for investment in electric railway properties? A recent calculation shows that the average net return from manufacturing industries during 1905 was 15.1 per cent, and from agriculture 9.8 per cent.

"Railway investors should have as fair a return on their investment as investors in other industries, and should not be expected to sell their product without a reasonable profit. Our friends of the daily press can be of invaluable service to both the public and the electric railway corporations in bringing about a better understanding on the part of the people of the real condition of affairs. Street railway men have nothing to conceal, and welcome an impartial examination of their business. The public desires good service, and the street railway companies wish to give it. It is a self-evident fact that no street railway company can be successful which does not give good service, and that it can be successful only when it receives a fair price for the transportation which it has to sell.

"A great many of the newspapers have shown that they possess a knowledge of the facts, and in a number of communities there have been evidences of a change of sentiment on the part of the public toward the railway corporations. But a beginning only has been made. For instance, probably on account of an improper understanding, a misguided public recently defeated a long established and well conducted electric railway company in its efforts to obtain an extension of its franchises, which are to expire 16 years hence, in order that it might refinance immediately on a reasonable basis. I refer to the election recently held in Kansas City, where the company offered to accept a franchise providing for a lower rate of fare and many other terms advantageous to the city, but the measure was defeated by a large majority in a heavy vote.

"The chief argument which seemed to influence the voters was that it would be better to wait until the franchise was nearer its expiration. But the officials of the Kansas City railway company were wise and far-sighted in taking the matter up at this time. Certain issues of bonds were near their maturity and it was possible to issue new bonds on the present franchise only on terms disadvantageous to the company and therefore indirectly injurious to the public. It is doubtful whether the citizens of Kansas City will ever have offered to them again as favorable conditions as in the ordinance submitted, because all the tendencies in recent years have been toward increased fares on account of the increased costs of operation.

"It would be unfortunate if the situation now in Kansas City should lead to a repetition there of the long continued negotiations in Chicago and the deplorable state into which the railways were allowed to lapse because of their inability to secure necessary funds for their rehabilitation.

We have, as another illustration, the purgatory which the people of Cleveland have had to endure because of ex-Mayor Johnson's political methods which have only recently been discredited at the polls by a disgusted population. The contest was attended by much discomfort and expense to the patrons of the railway and distinguished by a convincing exhibition of the infeasibility of carrying passengers at the low rate of fare proposed by him. The citizens of Cleveland have learned, through their long struggle of eight years, the lengths to which unfair agitation against railways can be carried, and have experienced all the annoyance that accompanies such an agitation. In this case, as in all others that have come under my observation, poor service must necessarily follow too low a fare.

"A short statement concerning the situation of the Metropolitan Street Railway Company in this city may be interesting to you. Notwithstanding the fact that this company is located in the largest city in the United States and also that its gross earnings are approximately $13,000,000 annually, the company falls far short of earning a reasonable return upon a low estimate of the cash replacement cost of the property. The actual net return shows only between 3 and 4 per cent on what it would cost to reproduce this property, not taking into consideration the expenditures for organization and obsolescence.

"The operating expenses in New York are naturally very high, owing to the fact that the congested streets require slow time and consequently more cars. With the increasing congestion of the city, the company has been obliged gradually to reduce the average schedule speed of its cars, which is now about 6 m.p.h. So that you may all realize how serious this is, I might say that every reduction of a half mile per hour in average speed of these cars means a loss of half a million dollars per year in the net receipts of the company. Moreover, the earnings per car mile are little, if any, higher than in many cities of less population. Again, the carrying capacity of the system has now been nearly reached, as the cars on the main avenues are operated about as closely together and at as high a rate of speed as is consistent with the prevailing conditions. The additional transportation required by the city will have to be provided through new subways. Hence, there is not the same hope of increasing the traffic on the Metropolitan system as exists on the lines in most other cities.

"The solution of the difficulties in New York might come, then, in either one of two ways—material reduction in cost of operation or material increase in average fare. Since investigation has shown, however, that the operating expenses cannot be reduced sufficiently to produce a reasonable return on the cash investment in the Metropolitan property, relief must come from increased earnings through a higher rate of fare or a revision of the present transfer system; even an abolition of the franchise taxes would not be sufficient to produce the desired result. This view of the situation was confirmed in an address before the City Club of New York by Wm. M. Ivins, then special

counsel for the Public Service Commission of the First District. The conclusions which would seem to be derived from Mr. Ivins' statement are that neither the city nor a private corporation could expect to operate the system under the present restrictions and regulations without a large annual loss.

"I have touched on the foregoing as being excellent examples to put before the general public. We have not the time to discuss the actual cost per passenger on the systems mentioned, the length of ride, the point at which this ride becomes unprofitable to the company, the proportion of short and long distance hauls and the rate of return involved, but I think that a study of statistics of this nature properly and consistently kept in the public eye would eventually work the revolution that means so much to the street railway business.

"Our association is a most important medium for the collection and dissemination of this information. With its facilities for obtaining data of this kind and with the support of the member companies, we can carry on a vigorous and open campaign toward securing an enlightened public knowledge of the urgent needs of the business in which we are engaged. The Railway Business Association, whose president will speak to you to-night, has, in its short career, done a remarkable work for the steam railroads in appealing against restrictive and unjust legislation. Members of this organization are scattered throughout the country and the individual element in it is the one that carries on the work.

"We have fortunately in our association two classes of membership: the active or company members, and the individual or associate members. The latter can do for the electric railway business what the members of the Railway Business Association are doing for the steam railroad enterprises. Our associate membership at this date is composed of nearly 1000 members, but the extent of the business warrants at least 5000 members, and I hope that every man here to-night will go away prepared to support this work and, so far as possible, see that before another year passes our membership shall have been increased materially. With so large a number of working associate members in the field, determined to do their share of the work, we can spread the doctrine in which we all firmly believe in, that the education of the people by our people will lead to such changes as will give to the people the best service attainable.

"Complete recognition of the situation and active co-operation on the part of those interested in one way and another in this great industry will insure to the world the devotion of this great utility to the service of man and, at the same time, secure to those who furnish the capital for the active conduct of the business a fair and proper return."

The next speaker was George A. Post, who spoke on the subject of "Railways, Public Opinion and the Equipment Industries." Mr. Post said that in many respects the problems confronting the electric railway companies of the country were similar to those before the steam railroads. He referred to the large number of persons whose livelihood directly and indirectly depended upon the prosperity of the steam and electric railways. This number includes not only those who are directly employed by the companies, but those who manufacture equipment consumed by the railway companies. Senseless agitation against these corporations immediately closes the purses of capitalists to extensions and improvements. He believed that if each person who was thus interested in railways should make a little effort to counteract harmful and erroneous impressions in regard to them, beneficial results would follow.

John W. Griggs, ex-Attorney-General of the United States, was the next speaker. Mr. Griggs congratulated the railway managers that the trend of popular discontent against railway companies was now passing away. He referred to the present objects of unpopularity, the milk trust and the meat packing houses, and then called attention to the largely increased cost of living in all directions except that of transportation.

Charles W. Colby, Ph.D., professor of history at the McGill University, Montreal, closed with a speech on the subject, "Apropos of Canada." He spoke of the excellent electric railway system in Montreal, and to the popularity in the United States of the pay-as-you-enter design of car, which was originated that city. He also said there was an absence in Canada of agitation for fares less than 5 cents.

ANNUAL REPORT OF PENNSYLVANIA RAILROAD COMMISSION

The report of the Pennsylvania State Railroad Commission for the year ended Dec. 31, 1909, is devoted in part to the affairs of electric railways. An abstract of the discussion regarding street railways, touching the questions of service, particularly in Pittsburgh, and the rates charged for freight and express business, follows:

"There has been a great increase in the number of complaints against street railway companies, the majority of them based on lack of sufficient accommodation for patrons during the rush hours of the day.

"At the present time the attention of the commission is particularly occupied with the situation in Pittsburgh, where the conditions are made more difficult by reason of the topography of that locality, and the congestion of its general business within prescribed limits.

"The complaint which was made by the council of that city was practically disposed of upon a recommendation by this commission made pursuant to an investigation conducted under its supervision by an expert in that business. It subsequently transpired, however, that that recommendation proved inadequate, particularly in view of increase in business upon the revival of trade, and the complaint was renewed by the present Mayor, Mr. Magee. The commission visited Pittsburgh, now enlarged by consolidation therewith of Allegheny, made a personal inspection of the situation, and held a public hearing upon the question. The commission was soon convinced that greater transportation facilities than those at that time afforded were required to at all reasonably meet the legitimate demands of business, and consequently made then a recommendation that all the cars of the railway company available for the purpose should be immediately put into operation, and that the new cars which had been ordered but not yet received should follow in operation as soon as received and equipped, to the extent necessary to provide, as far as possible, the facilities demanded.

"The commission then also announced that it would appoint an expert to supervise and observe for a time the routing of the cars and study the complexity of the situation, and report to this commission what measures, in his judgment, he thought advisable to recommend for further relief. It is believed that the final result may prove satisfactory to all parties.

"A question which promises to become important and fruitful of more or less difficulty is that of freight and express rates on trolley lines. Because of the difficulty of determining a proper basis upon which legitimate freight rates can be based in the case of steam railroads, and the lack of any extended experience with such matters on the trolley lines of the State, it can but be naturally expected that upon the introduction upon the latter of the carriage of freight and express matter, there will be, in the absence of any legislation controlling the matter, very great divergence of opinion and consequent dissatisfaction respecting any rates that any such lines may put into effect. Several complaints have already been made as to charges made for such service, and the difficulty experienced by the commission in these cases, without any precedent or statutory provision to guide it, proves that upon the increase of such business these questions will be numerous and perplexing. Most of the roads have no equipment for this special service, and as yet it is only an incident of their ordinary passenger business, with which, under present circumstances, it more or less interferes. With these difficulties portending, it is nothing more than reasonable to expect that the trolley lines will realize that their safety and protection

depend upon the establishment of rates which will be recognized as fair and equitable for the service rendered."

In its discussion covering accidents, the commission recalls that in its last annual report it "recommended an act designed to prevent trespassing on the private rights of way of steam and electric railways, but without avail. Unless these rights of way are to continue to be highways of slaughter, it is imperatively necessary that some provision be made to prevent trespassing upon such rights of way. It is much to be desired that the public should take cognizance of the great destruction of life annually occurring on our railroads, and be aroused to demand the enactment of some preventive measures.

"It is believed that all serious accidents both on steam and trolley roads were promptly reported to the commission in accordance with its requirements, and in 44 of the cases, where the circumstances seemed to warrant it, the commission conducted a special investigation of the facts, in which investigations the very cordial assistance of the companies was rendered. In all cases where the responsibility was traced and the responsible party ascertained, and survived, proper discipline was imposed."

No accidents occurred on 47 of the electric lines during the year.

Regarding the transportation of passengers on the front platforms of electric cars the report says: "The commission has steadfastly adhered to its recommendation eliminating the carriage of passengers on the front platform of the cars of electric railways, and insisted upon its observance. This recommendation was made with the consent and by the advice of the officials of these railways and admitted by them to be a wise and provident measure. In some localities difficulty has been experienced in its enforcement, and in all cases the officials of these railways did not manifest the earnestness in efforts for its enforcement that was reasonably expected of them. It is thought that now, however, this recommendation is very strictly enforced, but should the commission be advised of its wilful violation in any locality, it will endeavor to correct that situation. The necessity for the observance of this recommendation has been proved by fatal accidents to passengers carried in violation of it, and the diminution of accidents on the lines of those companies where the order has been enforced, even to a limited extent, indicates that it is a proper precautionary measure for both the public and the companies to observe. It is the opinion of the commission that this recommendation would be more valuable, if it were made applicable to both platforms and also to the running boards, but neither public sentiment nor the attitude of street railway officials seems favorable to such action at this time."

In its concluding remarks the commission says regarding new legislation:

"Either that portion of section 17 of the act creating this commission, which purports to bestow upon it some control over the increase of the capital stock or indebtedness of posed in the commission's last report should be passed, or else the amendment to the act approved on Feb. 9, 1901, proposed in the commission's last report should be passed, or similar legislation enacted. The provision in the act creating this commission is wholly ineffective under the present statutory provisions for procedure by stockholders when such increase is proposed to be made. This is a matter of comparative indifference to the commission, and attention is called to it here only for the purpose of advising the public that if it wishes the commission to exercise any such authority, additional legislation is required.

"It is a pleasure to the commission to again record its gratification at the ready acquiescence in its recommendations by the common carriers of the State. This action on their part evinces a disposition to assist in creating a better public sentiment, and one calculated to contribute not a little to the successful conduct of the great industrial and transportation interests of the State."

THE LOSSES OF CLEVELAND IN STREET RAILWAY WAR

A paper on "The Street Railway Situation in Cleveland" was read before the meeting of the National Municipal League, at Cincinnati, on Nov. 18, 1909, by Warren S. Hayden, of Hayden, Miller & Company, bankers, of Cleveland. The author, after giving the history of the controversy between the city authorities and the Cleveland Railway Company, discusses the question whether the results secured are worth the price paid. Mr. Hayden says on this subject:

"For the purpose of discussion it is assumed that the direct and early result will be the enactment and acceptance of the ordinance now being completed by Judge Tayler. The ordinance fixes the initial fare at 3 cents with 1 cent for a transfer without rebate. A scale of rates is provided, according to which the rate shall be changed as may be necessary to return the agreed interest, and no more, upon capital value. Every test made in Cleveland tends to show that 3 cents is not enough to pay interest on capital. It is probable, therefore, that before long the fare will go to the next higher rate. At that rate the cheapest journey possible will cost 3⅓ cents, and for comparison that rate is taken as that which people will pay for a long period. It was said in 1901, and the newspapers printed it, that if given 25-year franchises the railway companies would accept a ticket rate of seven for a quarter, making the cost of the cheapest journey 3.57 cents. If this statement was true, eight years of fighting have beaten down the fare 0.24 cent a journey. However, the companies did not formally propose a ticket rate of seven tickets for a quarter in 1901, and perhaps they would not have done so. Late in 1906 the railway company did formally propose a ticket rate of seven for a quarter, so that, as far as the rate of fare is concerned, it is proper to consider whether the last three years of strife are justified by a gain of 0.24 cent in the cost of the journey. The answer, of course, depends on what the war has cost the city, and that subject will be considered before the end of this discussion.

"Included in the direct result is the establishment for Cleveland of the principle of service at cost. Whether that principle is the best for the public is fairly debatable, but it cannot be debated here. As carried out in the Tayler plan, it is acceptable for Cleveland in the circumstances now existing there. However, it probably would not be seriously contended that mere approval of this principle by the public makes the war worth while. The estimated cash benefit of the application of this principle of service at cost is 0.24 cent a journey, or $1.46 a year for the shop-girl making the round trip from home to work on each of the 305 working days.

"One writer says that Mayor Johnson 'has aroused in Cleveland a civic sense. He has made the people realize that the affairs of the city are their affairs.' If this is true, this civic sense is a result of the war, for the mayor's activities and the war are almost identical. Cleveland was well reputed for civic sense for some years before 1901. It is true, though, that since that date there have been new currents of popular feeling and that the mayor is responsible for them. He pitched his tent upon the sand lots; pointed to the railway company; talked of 'intrenched monoply,' 'special privileges,' 'an arrogant corporation'; promised '3-cent fare and universal transfers' and proclaimed the overwhelming power of the people. It was not service at cost—that is reasonable if not expedient—but '3-cent fare and universal transfers,' the feasibility of which in Cleveland no man knew or could know. Hatred and greed were stirred, then consciousness of power aroused. Unless there is a quick sense of duty to use power righteously, consciousness of power is vicious. So pleasant a phrase as 'civic sense' should connote public duty as well as public power, but the 'civic sense' aroused in Cleveland by Mayor Johnson is to be reckoned in the price paid and not as part of the good obtained.

"The price paid is the cost of the war, and, of course, cannot be exactly expressed. In making up the total for an industrial community of 500,000 people account must be made of

years of delay in the reduction of fares; industries sent and kept away from Cleveland by supposed hostility to capital at the city hall; hindrance to extension of plants through lack of car service; neglect of public improvements because the war absorbed attention and energy. Worse than the money cost are items of another sort. Malignant envy has been fostered among humble folk. Among the better-to-do, men of mind and conscience have doubted the good intention of the city government and feared its policies. Hatred has divided classes and invaded neighborhoods and even families. It is not extravagant to say *war* when these things are considered.

"The result is not worth the price. It was right that the railway company be denied a franchise until, for good service, it was willing to take a very moderate return upon its capital. To reach such agreement, intelligence and firmness were necessary, but a sensational raid, to say nothing of protracted war, was not justified. Since the railway company's offer of 1906 nothing has been gained which is worth a fraction of the cost.

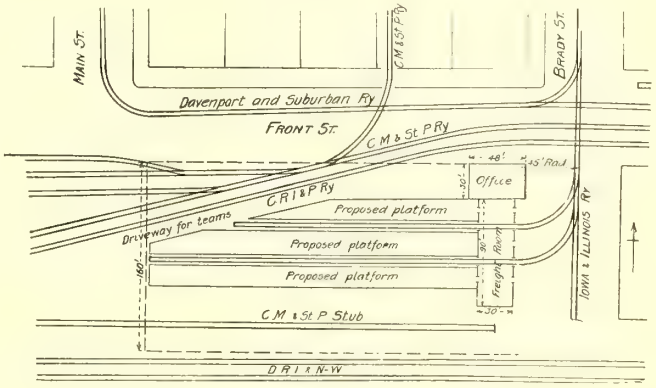
"When all is said the best result is peace, and peace is so welcome that it is almost possible to forget that, but for war, there is always peace. In all these years, Cleveland has gained in wealth and population, and an era of peace will show how much more she might have gained."

NEW FREIGHT TERMINAL OF THE IOWA & ILLINOIS RAILWAY

The Iowa & Illinois Railway has just secured a valuable freight terminal property in Davenport, Ia. This property, including an office building and warehouse, was occupied originally by the Burlington, Cedar Rapids & Northern Railway (now a part of the Chicago, Rock Island & Pacific system), under a right granted to it by the City of Davenport. Recently the property reverted to the city, and as the city authorities were desirous of encouraging the establishment of adequate freight and passenger terminals for interurban roads, the use of the property vacated by the steam road was offered to the Iowa & Illinois Railway Company on satisfactory terms.

A map of the property offered to the electric railway company is presented. The block of land and the buildings shown thereon, except such portions of the land as now are occupied by steam railway tracks, is leased to the Iowa & Illinois Railway Company by the City of Davenport during the life of the interurban company's franchise and for any renewal thereof, with the distinct understanding that the property may be used jointly by any other interurban railway entering Davenport. In the provision for joint use it is stipulated that any expense to the Iowa & Illinois Railway for the construction of tracks, rehabilitation of the building and ground upon which it stands, shall be equally apportioned among the companies which may in the future enjoy joint use of the property. The Iowa & Illinois Railway now pays only a proportional rent, based on the assumption that eventually three companies will jointly occupy the property.

The block of land on which the property stands is 160 ft. x 320 ft., and is bounded on the north by Front Street and steam railroad tracks owned by the Chicago, Milwaukee & St. Paul Railway and the Chicago, Rock Island & Pacific Railway; on the east by Brady Street, along which connecting tracks from the new station to the Iowa & Illinois line have been built; on the south by the Mississippi River and the Davenport, Rock Island & Northwestern tracks, and on the west by Main Street. A loop track of the Davenport & Suburban Railway extends along Front Street and is connected with the Iowa & Illinois track at the corner of Front and Brady Streets. According to the terms of the lease, the Tri-City Railway Company, of Rock



Plan of Davenport Freight Terminal

Island, Moline and Davenport, has made the necessary track connections to the depot. The expense for making the connections between the tracks of the Tri-City Railway Company and the buildings, together with the cost of the entrances to the buildings, was rather large for an interurban railway company doing the amount of freight business now conducted by the Iowa & Illinois Railway. This latter company, however, has borne the entire expense with the understanding that it is shortly to be relieved of one-half of the amount by the entrance of another interurban line.

The track work, including connecting curves and tracks along the loading platform space, has all been built at this time, although it is not yet required. The present buildings will suffice to handle the business now offered, and with the entrance of other interurban roads it is expected that long loading platforms and freight sheds will be built between two tracks which extend the full length of the property. When the terminal is thus fully utilized the freight station building on it will be used partly as an office and partly for the storage and care of perishable freight. It is anticipated that future development may make it advisable to use this station as a central interurban passenger depot for all lines entering the city.



Davenport Freight Station of the Iowa & Illinois Railway

When the Iowa & Illinois Railway first started handling freight there was some uncertainty about the profits to be derived from the business, and therefore both the freight and passenger business was handled in one small room at 117 Brady Street, Davenport. The freight business grew to such an extent that more space was soon required, and the original waiting room was given up wholly to freight, and a passenger waiting room established at 217 Brady Street. The business continued to grow and freight handling in Davenport soon became expensive, because it was necessary to load and un-

load the cars on the streets, without any platforms or other freight-handling conveniences. The new freight terminal greatly increases the facilities for handling the freight business, and a favorable effect upon the traffic already has been noted.

As a part of its publicity work the railway company has had a large sign painted on the south end of one of the new



Sign on End of Davenport Freight Station

freight buildings. This sign exhibits the initials of the railway. It can be seen from across the Mississippi River at any point in Rock Island from which the building itself can be seen. Acknowledgment is made to P. P. Crafts, general manager of the Iowa & Illinois Railway Company, for information used in preparing this article.

HANDLING INTOXICATED PASSENGERS IN BOSTON

During the past few weeks considerable interest has been manifested by the public in the work of the Boston Elevated Railway Company in handling intoxicated passengers. Attention was called to this problem by the decision issued recently by the Massachusetts Railroad Commission in connection with a complaint originating in Worcester regarding conditions in that city. The decision of the commission was published in full in the Electric Railway Journal of Jan. 1, 1910. This problem is not a new one in Boston, and for several years the company has been giving it careful consideration.

About three weeks ago the company inserted the following notice in each of its cars, for the purpose of informing the traveling public what had been accomplished in the matter and of stating its attitude upon the question:

"DRUNKEN AND DISORDERLY CONDUCT

"During the past two years the company has caused to be brought before the courts 1770 persons for drunken or disorderly conduct upon the company's cars. It is the company's intention to continue to endeavor to put a stop to such drunken and disorderly conduct. Accordingly the company has requested the co-operation of the public authorities, and now requests, also, the co-operation of its patrons, to whom drunken and disorderly conduct must be offensive.

"Boston Elevated Railway Company."

President William A. Bancroft, of the company, sent a letter on the subject to the Mayors of Cambridge, Somerville, Everett, Malden, Medford and Newton, chairman of the Chelsea Board of Control, and Selectmen of Arlington, Belmont, Watertown and Brookline, and the police commissioner of Boston stating that it was preparing the foregoing notice for display in its cars, and calling upon the municipal authorities for support, particularly in the matter of police assistance. The letter said, in part:

"The Boston Elevated Railway Company desires to do all that it reasonably can to prevent drunken and disorderly passengers riding upon its cars. The matter is perhaps more complex than appears at first thought, and we believe can only be successfully accomplished by the co-operation by the public authorities, the public and the company.

"We respectfully request that such assistance be rendered to the employees of the company by the public authorities of your city as seems proper under circumstances as they arise.

"The company has instructed its employees to allow no passenger who is visibly intoxicated to board its cars or to enter its subways or elevated stations. It is well known, however, that persons who are not visibly intoxicated may enter the cars or stations, and during the time spent upon the car become unfit to be transported so far as the other passengers of the company are concerned.

"Having this in mind, we respectfully request that you make such arrangements as to you may seem best, to detail officers to ride upon the cars of the company and that they ride far enough to assure themselves that no drunken or disorderly person is upon the car.

"In case any person is intoxicated or disorderly at the time the officer is upon the car, the employee may eject such passenger and the officer may properly make an arrest.

"This request is made of all the cities and towns wherein the company operates, and with the vigorous assistance of all, it is believed the end sought may be accomplished."

The attitude of the company was received favorably, and to a considerable degree the police authorities have co-operated in the work of keeping drunken patrons off the cars. Such police assistance as has been accorded, however, has not proved sufficient to entirely meet the situation, as the number of officers made available for this work has been rather limited, especially in Boston. The company feels that the moral effect of the presence of an officer upon its cars or property is a most powerful deterrent of drunkenness and disorderly conduct, but in order to handle the situation better the plan was adopted for three recent Saturday nights of placing about 120 experienced men, both motormen and conductors, at strategic points on the system and instructing them to co-operate with the crews of the cars in service in the removal or suppression of intoxicated patrons. Police officers also boarded the cars in and near the saloon districts and facilitated the work. The following special notice was issued to surface-line employees:

"SPECIAL NOTICE TO EMPLOYEES OF SURFACE LINES.

"The attention of conductors and motormen is called to the efforts of the company to prevent drunken and disorderly conduct on its cars.

"Police officers of the city of Boston will assist conductors and motormen by boarding cars on Saturday night, Jan. 15. No fare will be collected from policemen so boarding.

"All uniformed employees of the company riding on the cars, whether in charge of the car or not, are expected to assist if necessary.

"Be governed by Rule 110.

"C. S. Sergeant, *Vice-President.*"

RULE CONCERNING DISORDERLY PASSENGERS

Rule 110, from the company's rules and regulations for surface line employees, reads as follows:

"Disorderly Passengers.—(a) Passengers will be ejected from a car only as a last resort, when all other means have been tried and have failed, and when the conductor is positively certain that he is in the right.

"(b) Persons who are visibly intoxicated must not be allowed to board the car. If, however, such a person has entered the car without his condition being noticed, he may, if his condition is not offensive, and if he remains orderly, be carried to his destination. If this is done, care must be taken to see that he does not get off the car while it is in motion, and when leaving care must be taken to see that he is entirely free of the car before it is started. Should his condition be complained of as offensive by other passengers in the car, or should his conduct become disorderly, he must be treated according to paragraph (e). In case of complaint, care must be taken to secure name and address of party or parties complaining.

"(c) Any person who is complained of by other passengers as being personally offensive, and who is, in the judgment of the conductor, actually so, must be quietly asked to leave the car. Should he object or resist, he must be treated as a disorderly person according to paragraphs (e) and (b).

"(d) Do not make an ejectment of a passenger for non-payment of fare or the tendering of the wrong transfer, but, after using all reasonable efforts to collect proper fare, secure, if possible, the name and residence of such person, together with names of several witnesses, and report the facts on day card and to inspector or starter at end of trip.

"(e) Disorderly conduct consists of offenses as stated in paragraphs 'a' and 'b'; violent or unseemly actions, quarreling or fighting and of abusive, threatening, profane or indecent language. In all such cases the conductor must avoid exciting or aggravating passengers, and shall quietly and civilly request the disorderly person to discontinue such conduct. Should this be of no avail, the car must be stopped at a street corner if possible, or where it is safe to alight, and the person asked to get off. Should such person refuse to do so, and a policeman be within call, the latter must be called and asked to make the removal. Should no policeman be within call, or should he, if called, refuse to remove the disorderly person, the motorman must be called on and the person ejected. See that the person ejected is in a safe place.

"(f) In cases of ejectments no more force must be used than is necessary to remove the person from the car. No blows must be struck nor weapons used by either conductor or motorman, except in absolute defence of themselves or their passengers, and, under all circumstances, care must be taken for the safety of the passengers. In case the person voluntarily leaves the car or shows that he is willing to do so, no hand must be laid on him, except to assist him in case he is unable to get off without assistance.

"(g) In all cases of ejection the conductor has entire charge and responsibility and must use care and judgment to see that only offending persons are ejected. The motorman shall at all times aid the conductor when called on to do so or when he sees, hears or knows that his aid is required.

"(h) In case of ejection, a full report must be made out, same as in accident cases. Equal care must be taken to obtain names and addresses of witnesses (particularly name and number of police officer, if assisting in ejection), and if there are no passengers on car, call motorman to assist and witness the ejectment."

Between 200 and 300 persons have been either refused admittance to the company's subway, tunnel and surface cars or stations or removed from its property on each of the Saturday nights in which the experienced employees have been placed on the system to supplement the work of the men on the cars. The company's campaign has received much favorable newspaper comment.

HINTS FROM A CONDUCTOR

It is well to have a regular time fixed for the lighting of all tail lights at the different car houses. Orders could be posted up somewhat as follows:

November, December, January and February, 4 p. m.
March and October, 5 p. m.
April and September, 6 p. m.
May, June, July and August, 7 p. m.

DATING SHOPMEN'S BADGES

One of the large railway companies dates its shopmen's badges, so that their use is limited to a certain year. Thus all badges issued during 1909 were stamped with the words "Good during the year 1909." These badges were called in on Jan. 1, when others for the new year were issued.

DANGER SIGNS FOR GATES

Another company has embossed on the glass of all of its cars the following notice, "Don't lean against the gate. It is dangerous. The hand rail must be kept free for the use of passengers entering or leaving the car."

EXPERIENCE OF AN APPRENTICE IN BOSTON

Although the Boston Elevated Railway Company has never established an apprentice course for students it is known that the officers of the company are very much interested in the subject of training men for the service and that at least one man has taken what has practically amounted to an apprentice course on that system. The general plan to be followed was outlined by Gen. William A. Bancroft, president of the company, and was begun four years ago, or before the plan of apprentice courses had been discussed at conventions of the American Street & Interurban Railway Association. The previous training of the apprentice consisted of a first-class education and a course in civil engineering at a large technical school. In addition he had spent his summer vacations working for steam railroads in this country and Mexico in the engineering and maintenance of way departments. This had given a general training in the importance of personal effort, accuracy, reliability and the handling of labor to the best advantage. The necessary qualification of good general health was also brought to the work.

The first position, that of conductor, was secured through the regular channel of the employment department and after passing the various examinations as to health, eyesight, hearing and mental capacity in a satisfactory manner, the man was assigned to a division. Aside from the president and vice-president of the road, no one with whom he came in contact during his term of service on the cars was familiar with his aims. He was left to make his own way and was neither helped nor hindered by special attention or consideration.

As is the custom on the Boston Elevated he was assigned to a regular conductor, who was old in the service and had been chosen as an instructor of new men on account of his especial ability in training men to serve the company with common sense and loyalty. After two weeks service with this man, he was assigned to each line of the division in turn, under the care of a regular conductor, so as to become familiar with the routes. Then he was examined on the rules and, having passed satisfactorily, was assigned to the extra list where he remained for three months. Aside from the fact that his record was fairly free of discredits, his term of service was not at all different from that of hundreds of promising young men in the car service.

Having become familiar with the hours of work, rates of pay, and general trials of a conductor, the young man was transferred to a distant division and trained as a motorman. He had an opportunity to run cars of all classes and was given every opportunity to do snow work. Special care was taken that his hours of work were not different from those of the other men and he took his regular turn at early and late extras. During the six months spent on the cars a two-day lay-off was requested and granted. This was the only break in regularity of service.

The next position was in the carhouse as a pitman and the work was the maintenance and repair of cars. He acted as helper on truck work, carpenter work, replacing of armatures, gears and wheels, and finally as inspector of cars. Opportunity was given for a change of work upon becoming familiar with each branch, but this was given only as it is to every employee. Hours of work and pay were those of his companions and absolutely no distinction was made in his favor.

After four months a transfer was made to the track department, and he was set to work with a wheelbarrow carrying bags of cement. After several days of this he was promoted to mixing the concrete used in track construction and later to work in the trench putting this concrete in place and tamping. The next step was to lay paving stone and grout it in. After a period spent on general track maintenance, such as the repair of joints and special work and planking of bridges, he was taught to lay ties and rails, bond joints and put on fish plates and finally to spike rail and line and surface track. Having shown some ability the foreman put him in charge of several men placing tie plates and later in charge of 20 or

more men cleaning up the street after the work was finished. Progress was rapid for a short time and he was about to be made a sub-foreman after six months in the track department when he was transferred to the wire department. Here he passed through all branches, beginning as a helper in the overhead feeder work. He was soon transferred to work aloft and became proficient at stringing heavy feeders and making joints and connections. He was given an insight into submarine cable laying and also the installation of submarine compressed air pipes.

The next thing taken up was the pulling of feeders and return wires into conduits and the splicing of lead covered cable. Some time was spent at night work on the maintenance and repair of trolley wire and overhead work, as well as the installation and repair of electric track switches. After a few weeks' work at connecting up switchboards he was placed in the testing crew and became familiar with the layout of underground feeders throughout the city, as well as the methods of testing for leaks and damaged cable. The term of service in the wire department was completed with a position as inspector for the company on some conduit work and interior wiring of a power station. Practically every detail of wire work had been placed before him and every opportunity was given to become familiar with the installation, operation and maintenance.

His next move was to the armature room of the department of rolling stock and shops. Here he became familiar with the different types of motors in use and learned to work on all sorts of repair jobs, both on armatures used in car motors and on the large machines in the power stations. Some five months was spent mastering this line and he was subject to call for night snow work during this time.

The next place to which the young man was assigned was the power station, where he was put at work on the maintenance of boilers and automatic stokers. His work consisted in replacing boiler tubes and grate bars, cleaning tubes and mud drums and general repair work on the boilers, economizers, pumps and piping. After becoming familiar with this he was put in the engine maintenance crew and later on the maintenance of generators and wiring. Some work was done as an oiler and later as a helper on the switchboard. He was then placed in the office as clerk with charge of the stockroom and correspondence, as well as payrolls, etc. Later he helped on tests of coal and water and of draft. On the whole, the course in the power station was very thorough and while time was somewhat limited, the opportunity was unlimited and the chance to profit through actual work was great.

The next place was at the company's car shops, where he was put at work rewiring cars and connecting controllers. An opportunity for observing cars under construction was not possible, as no new work was in progress, but he was assigned to do considerable work on repairing and rebuilding cars. Some time was spent in the paint shop and he worked successively at cleaning, scraping, burning off, sand papering, painting and varnishing.

A two weeks' vacation was given after this work to visit other cities and observe their methods of operation and also their shops. A report of these observations was submitted.

Upon his return he was put in the office of the general storekeeper, where he had a chance to fill each position successively while the clerks took their vacations. He was next placed in the bureau of purchase and given an opportunity to become familiar with prices and with purchasing conditions and procedure. The same opportunity of filling different positions on account of vacations was gained in this office. The next step was to a division office, where he made a long stay and got a knowledge of office work and of timetables and all records and correspondence.

This practically ended the course and he then entered the transportation department and was prepared to bring to this position a knowledge of the men and the conditions under which they worked. He had spent three years making a study of the road and was helped in every way possible to get a grasp of the large problems, as well as a thorough knowledge of detail. The course as carried out in this particular case was of great value to the student and probably not without some benefit to the company, even during the term of instruction, as he was at all times encouraged to send in recommendations for changes which would benefit the service or would save money in operation.

VALUATION OF BROOKLYN RAPID TRANSIT SYSTEM

The hearing in the case before the New York Public Service Commission, First District, involving a tentative valuation of the physical property of the Brooklyn Rapid Transit Company in connection with the petition for a 5-cent fare to Coney Island, was resumed on Dec. 28. T. S. Williams, vice-president of the company, testified.

Mr. Williams had made a thorough study of the capital actually expended upon the Brooklyn Union Elevated Railroad and its constituent companies during the entire history of the properties. He had ascertained as closely as possible from the books of accounts and records of the various companies now comprising the elevated system, and also the construction contracts wherever ascertainable, what capital had actually been expended in the construction and development of the properties. His idea was to ignore the issues of stocks and bonds as far as possible, and to ascertain exactly what cash had been expended upon the properties. It was not possible always to determine what amount of securities had been issued as the equivalent of cash. It might be said that the present capitalization of the Brooklyn Union Elevated Railroad, of which about $29,000,000 of securities were issued upon the inception of the company for properties acquired under foreclosure, represented capital actually expended by the corporation, but, as had been pointed out in a previous investigation by the commission, there was an actual reduction of capitalization in the formation of that company.

The total actual cash expenditure on account of capital requirements was $30,258,568.92. In addition, there were many other items strictly the equivalent of cash, and some other items, a large part of which were undoubtedly the equivalent of cash. The total of items equivalent to cash was $23,794,802.55, or a total of certain cash and items equivalent to cash of $54,053,371.47. The witness said it would appear as if practically all the items under the head of equivalent to cash were justifiable, with possible reductions in the case of the issue of certain stocks. Elimination of these stocks, a total of $11,673,600, left a total of capital expenditures of $42,379,771.47. In reaching this amount every item that could be questioned as being properly chargeable as a cash item had been omitted.

The capital stock of the company is $18,000,000, divided between $5,000,000 preferred and $13,000,000 common, and the bonded indebtedness is $16,000,000, with an additional $7,000,000 assumed in the acquisition of the Kings County Elevated, a total of $23,000,000. In the year ended Dec. 31, 1908, the earnings after deduction of taxes and expenses were $2,112,821.95, or a trifle less than 4 per cent on the total of capital actually expended, $54,053,371.47, and less than 5 per cent on the total as reduced to $42,379,771.47. The earnings for a series of years prior to that time were very much smaller.

The cost of acquiring to-day the right-of-way or the right to operate from property owners for the 300.000 lineal ft. of easements of this company would probably be not less than $8,000,000 or $9,000,000, and probably would prove to be considerably greater.

SUPERSEDED EQUIPMENT

In the figures of values as given, the witness had included some expenditures for property that had been superseded. When electric cars were substituted for locomotives the cost, except the scrap value of the locomotives, was charged to capital; but at the same time part of the cost of the electric cars had been charged against income, so that a portion of the obsolescence had been made good. In the case of this particular company Mr. Williams thought there had not been any material obsolescence which had not been more than made good

by the enhancement in value of the remainder of the property or by direct charges to income. The real estate was, of course, much more valuable now than when it was purchased. The cars had been rebuilt and were substantially as good as new.

Discounts on securities charged to property account aggregated $3,088,000. That amount was less than 10 per cent of the actual cash investment and a very much smaller percentage of the entire amount of capital expended. It was a very small item for an enterprise of that size and that uncertainty, as elevated railroads during the initial 14 or 15 years were notoriously unsuccessful financial enterprises. Many of the securities were placed above par.

G. H. Backus, assistant counsel for the commission, asked Mr. Williams whether it had been the custom of any of the companies at any time to charge items to capital account that should properly have been charged to operating expense. The witness said that had undoubtedly been true of all corporations in greater or less degree, but that as nearly as he had been able to ascertain from the books of the old elevated companies, they were unusually conservative and moderate in such charges.

Responding to a question by Commissioner McCarroll, the witness said it was his recollection that the easements, of which he estimated the cost to reproduce at between $8,000,000 and $9,000,000, actually cost about $3,000,000, but a great many consents were given in the early history of the railroad, when people were anxious to have the property built and were willing to assist the company in getting easements.

Under cross-examination by Scott MacReynolds, complainant in one of the cases involved, Mr. Williams said that many old cars were re-equipped for electric operation, and part of that expense was charged against income and the remainder against capital. The replacements of rail on the elevated structure, when heavier types were installed, were charged to a large extent to capital account.

The hearing was closed, subject to the call of the commission.

BEARING COMPOSITION AND LUBRICATION ECONOMIES

A railway which uses the same tin base metal for armature and journal bearings has found the following composition to be satisfactory for both classes of bearings: Tin, 96 parts; aluminum, 8 parts; copper, 4 parts. New ingots and scrap removed for the first time are used exclusively for the armature bearings. After the armature bearings wear out the metal is remelted for journal bearings and for journal-bearing liners until it is finally scrapped. No mileage records are kept of the life of the journal bearings, but in motor bearings this babbitt metal has shown a life of 48,000 miles.

This company reclaims oil and waste in its shops with a turbine cleaner made by the Oil & Waste Saving Machine Company. Cotton waste, after leaving the machine, is washed in a solution of caustic soda and soap, while the wool waste is parboiled. The machine was installed three years ago and has cost nothing for maintenance. It has cut down the consumption of wool about 70 per cent and of cotton about 50 per cent.

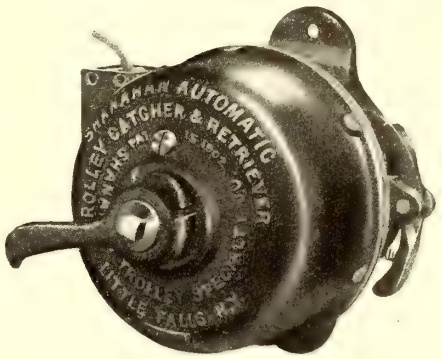
Gearing is being successfully lubricated with Whitmore's gear composition and is saving about $100 per car a year in gear and pinion wear alone. After eight months' service a gear thus lubricated showed but 0.004 in. wear and its pinion 0.007 in. wear.

A bill has been deposited for introduction into Parliament next session by the North & South Shields Electric Railway for the revival of power for the construction of the railway under the Tyne between North and South Shields. A grant for this work was originally made in 1902 and revived in 1906. It is now proposed that the land necessary for the scheme be purchased within two years of the passage of the act.

IMPROVED TROLLEY RETRIEVER

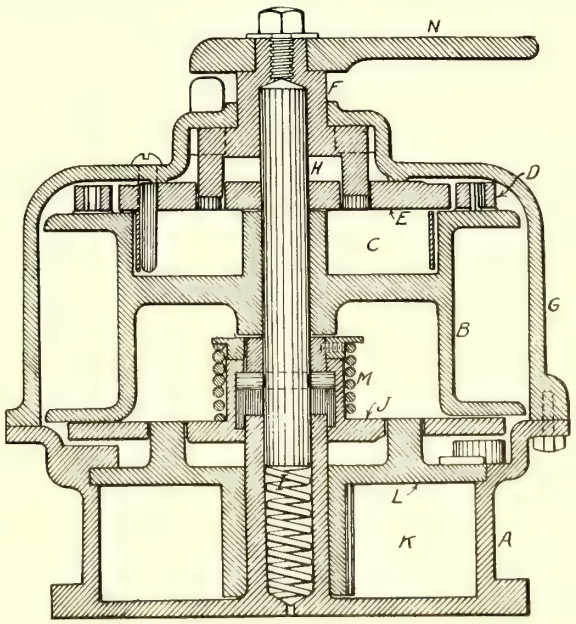
The Shanahan Trolley Specialty Company, Little Falls, N. Y., makes a trolley retriever which, during six years of continuous service on several prominent roads, has been found to be suitable for interurban work because of its heavy construction. Although the first retrievers manufactured gave successful results, the company has continued to improve the device in the details of the construction and the methods of manufacture.

A feature of this retriever is that it has a very heavy adjustable spring. This permits the pole to be pulled down instantly



Trolley Retriever Complete

against heavy tension without injury from violent strains. An idea of the retriever's quick action may be obtained from the fact that on a central New York interurban line it retrieved successfully when the car was moving at 60 m.p.h. without allowing the pole to strike the first span after the wheel left the wire. As the sections on this road are 80 ft. long, it follows that the retriever operated successfully in less than one second. The retriever enables the trolley pole to go through places with limited clearances because the pole can be adjusted for pull-down from 2 ft. to 6 ft. The heavy retriever spring will prevent any rebound or teetering after the pole has been



Section of Trolley Retriever

pulled down. The retriever is easily reset by the conductor and acts with equal certainty in all kinds of weather. It is large enough for any size of trolley rope.

The construction details of the retriever are shown in the accompanying drawings. *A*, the lower part of the case, locks in the base with a small lever attached to the rear car-dash. *B* is a reel upon which is wound the rope connected with the pole. The flat coil spring which revolves this reel and keeps the rope taut is in the space marked *C*. When the pole leaves

the wire, the wheel revolves rapidly, thereby causing the centrifugal dogs *D* of the reel to fly out and engage in the ratchet plate *E*. The plate then revolves and carries with it the crown fork *F*, which causes it to go down the inclined cams located in the top of the upper case *G*. This action releases the shaft *H*, which, moving laterally on account of its compression spring, *I*, carries the plate *J* along with it. When the retriever is set, plate *J* is engaged in the lower case *A* and when the shaft *H* carries this out, it engages immediately with the lugs in the reel, thereby causing the latter to revolve and pull down the pole. The heavy retriever spring is in the space *K*; its outer end is attached to the case *A* and its inner end is connected by a lug to the ratchet hub and plate *L*. The lugs on *L* are always engaged in the plate *J*. *M* indicates the spring which pushes off the plate *J* from the reel into engagement with the case *A* when the retriever is set. The handle for setting the retriever is marked *N*. By swinging the handle around against a stop, the shaft *H* is forced down through the turning of crown *F* on the cams.

AUTOMOBILE TOWER WAGON IN MINNEAPOLIS

A recent addition to the equipment of the overhead department of the Twin City Rapid Transit Company, of Minneapolis, Minn., is an automobile tower wagon. The accompanying engraving from a photograph shows this wagon with the tower in the running position. The body, engine and running gear were built by the Robinson-Loomis Motor Truck Company, of Minneapolis, while the tower and its operating mechanism were designed and built by the railway company. The height of the tower when lowered into the running position is 12 ft. 4 in. above ground, which gives ample clearance for passing under railroad viaducts. A novel feature in connection with the mounting of the tower is the provision for rotating both the elevating platform and the tower on the base which is supported on the automobile body. The platform may be raised to a



Twin City Automobile Tower Wagon

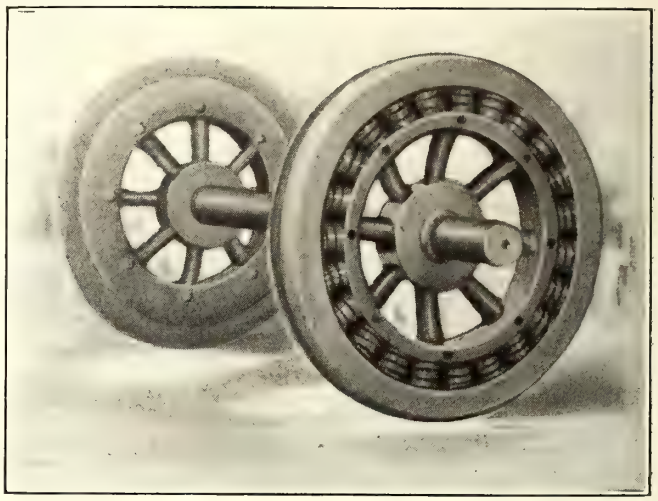
height of 20 ft. above the ground and both tower and platform revolved to a position at right angles to the body of the truck. In this position cars may be operated on the adjoining track.

The motive power equipment of the automobile tower wagon is a two-cylinder, two-cycle, 30-hp gasoline engine which is geared to a maximum speed of 20 m.p.h. The wheels are 32 in. in diameter and have solid tires 3½ in. in diameter in front and 4 in. in diameter in the rear. The total weight of the wagon and tower without supplies is 4800 lb.

This automobile equipment is kept in the same emergency station with the horse-driven tower wagons and with it an emergency crew may answer night calls promptly. The automobile equipment takes the place of one tower wagon in the daytime and is ready for service any time at night. It is capable, therefore, of doing as much work as two teams. This motor-operated tower wagon has been in service since June 24 and has operated very satisfactorily.

SPRING WHEEL FOR ELECTRIC CARS

One of the tramcars in daily service in Glasgow, Scotland, has been fitted with a new type of spring wheels made by the North British Locomotive Company, of Glasgow. The wheel consists of a steel tire, a spoke center and rim and 23 coil



Spring Wheel for Electric Cars

springs interposed around the wheel close together between the rim and the tire. The springs are under considerable initial compression, but are not fastened to either the rim or the tire. They are retained in place by inner and outer keeper rings bolted to the rim, and thus combined adhesion to the rim and the tire is sufficient to prevent the former from slipping appreciably with respect to the latter. Under the action of a jolt due to an inequality in the surface of the track, however, the rim moves downward under the compression of the lowest springs and creeps past the ends of the springs, which at that instant have their axes horizontal. As the wheel continues to revolve, this creep adjusts itself. It is claimed that this construction removes all lateral stresses from the springs when in a horizontal position, and for this reason greatly prolongs their life.

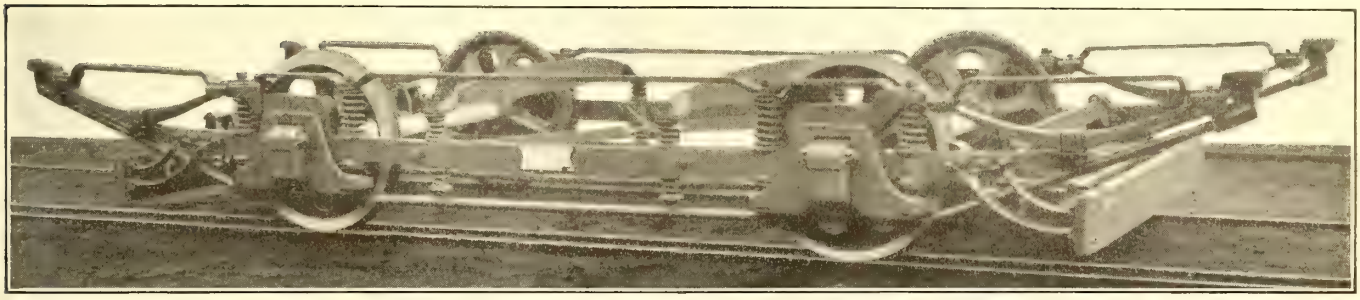
A FLEXIBLE AXLE TRUCK

The United Electric Car Company, Ltd., Preston, Eng., has recently brought out the four-wheel single truck with flexible axles as shown in the illustration opposite. The new truck is intended to meet the requirements with respect to long wheelbase trucks besides decreasing the track and rolling stock maintenance on lines with sharp curves. The company recommends this style of truck for 6 ft. or any other wheelbase, as the flexible axle feature is considered just as important with a short wheelbase as with a long one.

The truck is designed to utilize the same springs, spring seats, etc., at present in use on most British four-wheel trucks, and thus avoid the necessity of carrying duplicate sets of stock for repairs and renewals. The end body bearing springs can either be of the semi-elliptic standard type or the special auxiliary support leaf spring as used on the Preston compensating truck. The journal box is self-contained and fitted with a loose yoke which bears on the top of the box and carries the truck suspension springs ordinarily cast as one with the journal box.

This yoke is tied across the bottom by a cast steel distance piece. It will be seen that the standard arrangement for sup- journal box yoke from the top of the journal box (the bearing (8 ft.) wheelbase shown on this truck.

It is asserted that owing to the manner of suspending the journal box yoke from the top of the journal box (the bearing of which can either be placed directly in the center or at one side to give steadiness to the truck) and the lateral clearance allowed between the frame and yoke, the action of wheel flanges when entering or leaving a curve is accomplished without causing oscillation of the car body and superstructure.



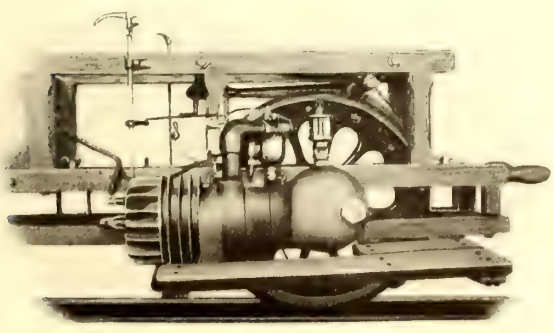
Flexible Axle Single Truck

The wear between the wheel flanges and the rails is also reduced as they are not called upon to overcome the inertia of the fully loaded car. When the truck is rounding a curve the action on the suspension springs is such that the tendency is to cause the car body and truck to adjust themselves to the normal position immediately the wheels leave the curves and enter the straight track. As the action at this point is spring-controlled, no appreciable oscillation is set up between the car body and truck.

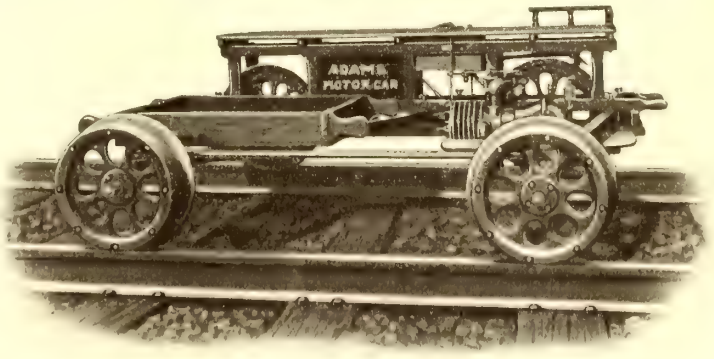
Excessive pounding at rail joints is overcome by the extended spring support given to the truck where it is carried on the journal box yoke. The majority of trucks at present in operation are carried at this point on springs suspended from journal boxes at not more than 13-in. centers; in the present truck, however, this dimension is increased to 22-in. centers, a most important point. The extended spring action is also increased by the equalizer action of the yokes carrying these suspension springs.

GASOLINE MOTOR INSPECTION CAR

Burton W. Mudge & Company, Chicago, are placing on the market a new gasoline motor car known as the "Adams" inspection car, designed especially to meet the requirements of severe service for railway construction and operation. The construction is such that dirt and grit are excluded from the working parts, and by the same means the lubricant is retained within the cases. This car is of the four-wheel type, but if desired the fourth wheel can be disconnected and the car may be used as a three-wheeled speeder. The motive power is furnished by a two-cycle, air-cooled, reversible, direct-connected engine, the use of which eliminates numerous valves, gears and chains. The main engine bearing is 1⅜ in. x 4½ in. in size, and the other bearings are proportioned with a view to durability. As the cylinder head and crankcase joints are accurately seated, no packing which might blow out is required. This prevents the loss of compression and the waste of oil. The ignition is made by jump spark and dry cells. The Schebler carbureter is used. Starting, stopping and coasting are controlled by throttle, spark and compression relief levers. By leaving the compression relief valve closed the lever can be used as a brake for stopping the car. The batteries, spark coils and switch and the repair tools are kept in a box which is built in the frame of the car. This box also serves as a locker.



Engine Mounted on Car



Gasoline Motor Inspection Car

The frame of the car is composed of six white ash sills which are well braced and bolted. The wheels have M. C. B. treads and flanges and wood centers. The car complete weighs 270 lb. and is balanced so well that one man can handle it easily. The car can be furnished in any desired color. It is geared for a maximum speed of 30 m.p.h. It is stated that 1 gal. of gasoline will propel the car from 70 to 90 miles, depending on the weather conditions.

ELECTRIC RAILWAYS IN AND AROUND LOS ANGELES, CAL.

An interesting description of the electric transportation lines of Los Angeles and surrounding territory was published in the special Jan. 1 issue of a daily paper of that city. The articles on the constructional and operating features of the Huntington System of electric railways and the Los Angeles-Pacific Company occupy three closely printed pages. Some descriptive features of general interest contained in these articles are given below.

The Huntington System, comprising the lines of the Pacific Electric Railway and the Los Angeles Interurban Railway companies, which are under one management, the Los Angeles & Redondo Railway Company and the Los Angeles Railway Company operate a total of 904 miles of track. The territory served by these lines was shown in the ELECTRIC RAILWAY JOURNAL for Oct. 2, 1909. The present article emphasizes the substantial part which H. E. Huntington and his associates have played in assisting the rapid growth of Southern California.

Attention is called to the complimentary remarks paid the Huntington System by members of the Massachusetts Street Railway Association tourist party which visited Los Angeles in October.

The Pacific Electric Railway opened its first line in March, 1902, with 75 miles of track. In less than eight years 525 miles of additional track have been laid. Los Angeles, with a population of 350,000, has 26 trolley-line routes centering in the business district, over which are dispatched daily 1418 interurban trains. On the three Pasadena routes alone 303 trains are operated each day. The Pacific Electric Railway has 491 large passenger cars and 574 freight cars. In the busy season 25 carloads of berries are brought into Los Angeles daily by electric cars, and as many as 120 cars of lumber, fruit, garden truck, milk and crushed rock are frequently carried across the city in a single night. Statistics show that the tourist travel in Southern California has increased in about the same ratio that the trolley system has been extended. The city of Long Beach has grown in a few years from a hamlet resort of 2700 people to a substantial business town having 30,000 inhabitants.

The Pacific Electric Railway is now four-tracking its Pasadena short line and contemplates extending to Long Beach its southern 14-mile four-track entrance to Los Angeles. The newspaper article compliments Joseph McMillan, general manager of the Pacific Electric Railway, for the important part which he has played in effecting the excellent operating organization of the road. The company maintains an aggressive passenger department, of which D. A. Munger is general agent. This department includes an agent in New York City, a Los Angeles agent, three traveling agents and 33 station agents. The traveling agents meet special tourist parties when they are 300 or 400 miles distant from Los Angeles, and arrange for special car service over the electric lines, which reach all the points of interest.

As an index of the capacity for handling heavy traffic, the following is given:

"On a recent occasion an excursion service was given to Arcadia, 18 miles from Los Angeles, which included 80 large interurban cars per hour, carrying an average of 145 people per car. Cars are chartered for 8 to 12-hour trips. The Pacific Electric Company has several private cars fitted elaborately, each of which luxuriously accommodates 75 passengers, and affords an ideal sight-seeing privilege. 'Tilton's Trolley Trip' carries the tourist 100 miles over the Pacific Electric lines for $1.

"A unique feature for the convenience of parties traveling in private Pullman cars is the 'parking side tracks,' where parties desiring to live in their cars are accommodated. The cars are connected with sewer and water services and ice and bathing suits are furnished. Electric locomotives handle the Pullmans in trains from point to point to suit the wishes of owners. The Postal Telegraph Company has offices in all the Pacific Railway depots. Western Electric telephone sets are installed at depots and in booths along the line, and are used for dispatching trains."

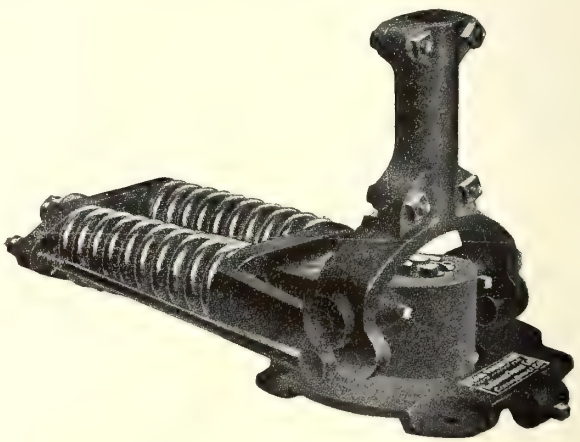
The Los Angeles-Pacific Company is referred to as follows:

"The Los Angeles-Pacific Company serves a large territory to the west and southwest of Los Angeles. On its Palms division are frequently run trains of four or six cars every seven minutes, and between Hollywood and Los Angeles its trains are regularly made up of two and three cars. The speed of these trains frequently exceeds 60 m.p.h.

This company has six routes between Los Angeles and the beaches over which it operates through interurban trains. The regular schedule for through trains to the beaches is as follows: One train on the Palms line every 20 minutes; one train on the Sawtelle line every 30 minutes; one train on the Hollywood line every 30 minutes; one train on the Redondo line every 30 minutes, and one train on the Westgate line every hour. On the old Santa Monica branch of the Southern Pacific Railway, cars run from Santa Monica to Port Los Angeles every 30 minutes, but from Ivy to Santa Monica the service is principally made up of special trains. The frequency of trains, however, is increased on all the above routes as the traffic requires. The traffic between Los Angeles and the beach resorts is exceptionally heavy on Sundays and holidays. Frequently the service on the Palms line, which carries the greater portion of the holiday travel, is increased to one train of four to five cars every 7½ minutes regularly. Perhaps no other road in the West has undergone such a general reconstruction and thorough improvement as the Los Angeles. A detailed description of the rehabilitation work of this company was presented in the Electric Railway Journal for Oct. 30, 1909, page 930.

FRICTIONLESS TROLLEY BASE FOR CITY CARS

The Trolley Supply Company, Canton, Ohio, announces that since it placed on the market the "Peerless" roller-bearing frictionless trolley base for high-speed cars, it has had demands from its customers for a similar frictionless base suitable for city cars. The company has met these requests by its new "Star" trolley base shown in the accompanying illustration. It scription of this rehabilitation work of this company was presented in the Electric Railway Journal for Oct. 30, 1909, page 930.



Frictionless Trolley Base

The new base is made to be absolutely frictionless in both the horizontal and vertical planes. The same roller bearing is used as in the company's other bases, the rolls being eight in number and fully ¾ in. in diameter, to insure long life. The principal advantages asserted for this base are that it maintains absolutely uniform tension against the wire, permits the wheel to adhere more closely to the wire, requires no oil, and is dust proof.

REDUCING THE FIRE INSURANCE RATE

During the last year the Coney Island & Brooklyn Railroad has spent about $5,000 in improving the insurance risk on its various properties. Most of this work consisted in the renewal of all lighting circuits in the car houses, conduit being installed wherever the wiring needed protection; the placing of lights in the housings of the chemical extinguishers; the closing up of partition walls and walling up of unnecessary windows in some places, and last, but not least, the thorough removal from all properties of inflammable rubbish. The result of these changes has been a most gratifying series of reductions in the fire insurance rate, as will be noted from the table below.

	Amount Insurance.	Average Rate.	Premium.
Previous to July 10, 1908	$1,033,000	2.049	$21,168.00
July 10, 1908	1,349,000	1.939	26,157.63
September 28, 1908	1,326,375	1.844	24,470.20
December 29, 1908	1,376,775	1.637	22,550.82
April 29, 1909	1,483,375	1.497	22,209.10
July 1, 1909	1,500,000	1.125	16,879.72

The Interstate Bridge Commission has recommended that the proposed bridge over the Hudson River to connect Manhattan Island and New Jersey be located at 179th Street.

ELECTRIC RAILWAY LEGAL DECISIONS

LIABILITY FOR NEGLIGENCE

Alabama.—Pleading—Passengers—Actions for Injuries—Injuries to Passenger—Negligence—Contributory Negligence—Willful Negligence of Defendant—Taking Up Passengers—Management of Conveyances—Authority of Conductor—Boarding Moving Car—Willful, Wanton or Reckless Acts—Question for Jury—Instructions.

Plaintiff's original complaint alleged that defendant was a common carrier, and that plaintiff, while a passenger of defendant, was injured, and that the injuries were caused proximately by defendant's negligence. Amended counts were filed, averring that plaintiff's injuries were proximately caused by the negligence of defendant's servant or agent while acting within the line of his employment in and about the carriage of plaintiff as a passenger, and that plaintiff's injuries were proximately caused by the willful conduct of defendant's servants or agents acting within the line of their employment in and about the carriage of plaintiff as a passenger, which conduct consisted in causing a car to be set in motion with the knowledge that plaintiff would probably be injured thereby and with reckless disregard of the consequences. Held, that the original count was in case, and those added by amendment were also in case, and constituted no departure, and were properly allowed. In an action against a carrier for injuries to a passenger, resulting from the negligence of defendant in failing to exercise all reasonable precautions against starting the cars after he had alighted on the train stopping at a siding, an amended complaint held to sufficiently allege defendant's negligence. Contributory negligence is not available against a charge of willful or wanton misconduct. Where a car stops at a place where it is customary for persons to take passage, it is the carrier's duty to use due care to determine, before moving the cars, that no person is in the act of boarding the same; and if the place is not one where it is customary to receive passengers, but the car has stopped, and a passenger receives permission of the conductor to temporarily leave the car, it is the duty of defendant's servants to exercise due care to know before moving the car that the passenger is not in the act of re-entering the car, or in a position which would be rendered perilous by moving the car; but if the place where a car is stopped is not the place where passengers are received there is no breach of duty to one who is attempting to get aboard, if the car is started while he is in a perilous position, unless the servants of the carrier know that by such movement his position is rendered perilous. A conductor is the representative of the carrier in charge of a train, and controls the operation thereof, and he acts within the scope of his powers if, while stopping at a place at which it is not customary to receive passengers, he grants permission to a passenger to temporarily leave the train. It is not negligence as a matter of law for a person to attempt to board a moving car in the absence of special circumstances, such as infirmity, or being incumbered with articles, or the speed of the train. Wanton or willful misconduct of a carrier's servants can only be predicated on actual knowledge, as distinguished from a mere breach of duty that, had it been observed, would have led to knowledge on the part of the servants of the peril of the person injured, or that from reasonable appearance such person would probably be imperiled by the action which the servant was about to take. Actual knowledge by a carrier's servants of the peril of a passenger, sufficient to render the carrier guilty of wanton negligence, so as to excuse contributory negligence, need not be positively and directly shown, but may be proved by circumstances from which such knowledge is a legitimate inference. Evidence in an action against a carrier for injuries to a passenger held sufficient to make the question of the wanton conduct of defendant's servants excusing contributory negligence one for the jury. In an action against a carrier for injuries received while plaintiff was attempting to board a car, there was evidence that plaintiff tried to catch the first car, and was injured by the last car catching his leg. Held, that a request to charge that plaintiff cannot recover unless the jury are satisfied that, when the train was signaled to go forward, plaintiff was in the act of boarding the car and was injured by the train starting while he was in that position, was properly refused as disregarding the inference from the evidence that the car was in motion when plaintiff undertook to board it, and as disregarding the duty resting on the conductor to know before causing the train to be started that plaintiff was not in the act of getting aboard thereof, provided tha permission had been granted to plaintiff to leave the car temporarily, as claimed by him. (Birmingham Ry., Light & Power Co. v. Jung., 49 S. Rep., 434.)

Massachusetts.—Discovery—Statutory Provisions—Interrogatories—Subject-Matter of Examination—Carriers—Injuries to Passengers—Evidence—Admissibility—Carriage of Passengers—Care Required—Instructions—Burden of Proof.

Under Rev. Laws 1902, c. 173, §63, providing that a person interrogated before trial shall not be obliged to answer a question disclosing the manner in which he proposes to prove his case, a defendant in a personal injury action is not compelled to disclose in advance its theory of the accident, or to state the facts derived from investigation on which it will rely to establish its defense.

The fact that a car jumped a switch on being replaced after its derailment at the switch, injuring a passenger, is inadmissible as evidence of an admission by the carrier that the passenger had been injured through its negligence.

An instruction, in an action for injuries to a passenger by the derailment of the car, that the carrier was bound to use the highest degre of care for the safety of its passengers consistent with the practical operation of the road, and that if the jury found that the accident would not have resulted, had greater care been taken to examine the switch at the place of the derailment of the car, the passenger was entitled to recover, was erroneous, because it subjected the carrier to a greater liability than the law imposes.

Where, in an action for injuries to a passenger by the derailment of the car, the carrier gave evidence from which the jury could find that it had used due care in the construction, equipment, and maintenance of the railway, the burden of proof was not shifted, but remained on plaintiff to establish the carrier's negligence on all the evidence, of which the presumption of negligence on proof of the derailment and injury formed only a part.—(Carroll vs. Boston Elevated Ry. Co., 86 N. E. Rep., 793.)

Massachusetts.—Municipal Corporations—Use of Streets—Contributory Negligence—Passing Vehicles—Actions—Questions for Jury—Appeal and Error—Presumptions—Sufficiency of Instructions.

There is no absolute rule of law requiring one about to alight from a street car to look up and down the street before alighting to prevent injury from passing vehicles.

Under Rev. Laws, c. 54, § 2, requiring a driver of a vehicle passing another vehicle traveling in the same direction to drive to the left of the middle of the traveled part of the way, if defendant was attempting to pass to the right of a street car from behind, when he collided with plaintiff, who was alighting from the car, the jury might find that defendant's conduct was such negligence as plaintiff was not required to anticipate.

In an action for injuries caused by colliding with plaintiff as he was alighting from a street car, whether plaintiff was guilty of contributory negligence, and whether defendant's negligence caused the injury, held for the jury.

In an action for injuries caused by defendant's negligence, though requested instructions, which were properly refused on other grounds, had a material bearing upon the issue of defendant's negligence, where the instructions given on that question were not complained of, it will be assumed on appeal that they sufficiently covered the question.—(McGourty vs. De Marco; O'Connor vs. Same, 85 N. E. Rep., 891.)

Missouri.—Carriers—Injuries to Passengers—Defective Platforms—Negligence—Question for Jury—Contributory Negligence—Action—Petition—Obligation of Conductor—Infants—Contributory Negligence.

Whether a carrier failing to maintain a guard rail at the end of a platform used to receive and discharge passengers was negligent, authorizing a recovery for injuries

to a passenger falling from the platform while alighting from a car, held, under the facts, for the jury.

A passenger may rely on the promise of the conductor that he will let the passenger off at a designated place where passengers are regularly received and discharged, and he need not give notice by ringing the bell of his wish to leave the car at such place.

A petition in an action for injuries to a passenger while alighting from a moving car which alleges that the conductor promised to let him off at a designated point, that the speed of the car was checked as it approached the point, inducing the passenger to believe that the conductor was about to stop the car, and that the passenger was in the act of alighting when the car was started at an accelerated speed, throwing him from the car, charges every negligent act on the part of the conductor as to stopping and starting the car at that point.

A conductor accepting the notice of a passenger to stop the car at a designated point for him must without further notice signal the motorman to stop the car at the designated point, and must see that the passenger is afforded an opportunity to alight in safety.

A minor is only required to exercise that degree of car which is expected of one of his age, experience and capacity.

Whether a minor is guilty of contributory negligence in failing to exercise the degree of care which is expected of one of his age and capacity is for the jury, unless the only conclusion that can reasonably be drawn from the evidence is that he was guilty of contributory negligence.

Whether a boy 12 years old was guilty of contributory negligence while alighting from a moving car, held, under the facts, for the jury. (Moeller vs. United Rys. Co. of St. Louis, 112 S. W. Rep., 714.)

Missouri.—Carriers—Injury to Passenger—Pleading—General Negligence—Question for Jury—Liability for Negligent Act.

A petition, alleging in general terms that defendant's servants negligently operated the street car on which plaintiff was a passenger, and as a result of such negligence it ran against a wagon in the street and plaintiff was thereby injured, charges general negligence and is sufficient.

Where the evidence shows that plaintiff was a passenger on an open street car, and that the conductor, while on the running board on the side of the car, in attempting to swing around a passenger in collecting fares, struck a wagon near the track, causing it to swerve so as to throw the pole of the wagon into the car and against plaintiff, and that the car was running at the rate of 14 or 15 miles an hour, the question of defendant's negligence was for the jury.

No liability is incurred by negligent acts, the results of which are beyond any reasonable expectation. (Monday vs. St. Joseph Ry., Light, Heat & Power Co., 119 S. W. Rep., 24.)

Missouri.—Trial—Instructions — Assuming Facts — Street Railroads—Collision with Vehicle—Action for Injuries —Misleading Instructions.

In an action for injuries caused by a collision between a wagon and a street car, a portion of one of plaintiff's instructions read: "And that said injuries to the plaintiff, if any, were caused by the carelessness and negligence of the defendant either by failure of the motorman in charge of said car to keep said car under such control that it would not run into and upon the said wagon in which plaintiff was seated, or by the failure of the motorman in charge of said car to check the speed of or stop said car, and thereby avoid running into the wagon in which plaintiff was seated, when he saw, or by the exercise of ordinary care ought to have seen, that said wagon was in a situation where it was liable to be run into by said car, unless the speed of said car was checked, or it was stopped before it collided with said wagon." Held erroneous, as assuming that defendant was negligent either in failing to control the car or check its speed or stop it.

In an action for injuries in colliding with a street car, an instruction for plaintiff stated that, if plaintiff was negligent in driving along defendant's west-bound track, "then he cannot recover herein, and your verdict should be for the defendant." In the next sentence it proceeded: "But if you further find and believe from the evidence that plaintiff was in a position of peril," and that defendant's servants saw him and could have stopped, etc., "and carelessly and negligently failed to do so, then you will find for the plaintiff, and not for the defendant, notwithstanding the said negligence of the plaintiff in driving along the west-bound track of the defendant." Held contradictory and misleading. (Gessner vs. Metropolitan St. Ry. Co., 112 S. W. Rep., 30.)

New York.—Street Railroads—Collision—Contributory Negligence—Burden of Proof.

One suing a street railway company for injuries in a collision with a street car while driving along the track must, to recover, present evidence from which it is proper to infer that he exercised reasonable care for his own safety.

One familiar with the operation of cars in a street drove his team on one of the parallel tracks at a place where the street was wide enough to permit a wagon to pass on either side of the tracks. He drove along the track, without making any effort to ascertain whether a car was approaching. There was no evidence that it was necessary for him to occupy the track. Held insufficient as a matter of law to show freedom from contributory negligence essential to a recovery.

One driving along a street railway track in a street sufficiently wide to permit a wagon to pass on either side of the tracks must exercise reasonable care, and use his opportunities for looking and listening for the approach of a car, and he cannot rely wholly on the motorman giving him warning of his approach, since the motorman is not bound to presume that persons will drive on the track without exercising some degree of care, and since he has the right to assume that the right of way will not be blocked, and that one driving on the track will leave it in time to avoid a collision. (Paladino vs. Staten Island Midland Ry. Co., 111 N. Y. Sup., 715.)

New York.—Street Railroads—Private Right of Way—Premises—Right to Occupy—Persons Near Track—Injury—Negligence—Contributory Negligence—Error in Judgment.

Defendant operated its street cars and trains over a space known as "Railroad Avenue," which, while not a street, was used as such with defendant's knowledge. A platform had been built, partly by defendant and partly by plaintiff's employer, between defendant's tracks and a brewery, on which plaintiff was accustomed to unload beer barrels, which he was doing at the time of the accident, having first driven his team adjacent to the platform and turned the horse and wagon, as he believed, into a place of safety. Plaintiff was injured by one of defendant's trains being backed along an adjoining track, by the step of one of the cars striking the hub of one of the wheels of plaintiff's truck and shoving it over on him. Held, that plaintiff, in using the space, was not a mere licensee, but a person rightfully there, and to whom defendant owed the duty of ordinary care.

Where defendant's motorman, while changing a train from one track to another, operated the same backward over a part of defendant's right of way, which defendant knew was used as a public street, and in so doing ran against plaintiff's truck and injured plaintiff, and if the motorman had been in the front car he would probably have seen the dangerous proximity of plaintiff's wagon to the track, such facts justified an inference that the motorman was negligent.

Plaintiff drove his horse and wagon into a space between a platform and a street railway track to unload, and cramped his wagon so that, as he supposed, the horse and wagon were in a place of safety. He made no further observations for 10 minutes before the wagon was struck by an approaching car and pushed against plaintiff, causing his injury. Held, that plaintiff's mistake in judgment, if any, or the fact that a slight movement of the horse brought the wheel too near the track for safety, did not establish plaintiff's contributory negligence as a matter of law. (Obenland vs. Brooklyn Heights R. Co., 111 N. Y. Sup., 686.)

New York.—Damages—Personal Injuries — Profits — Evidence.

Plaintiff in an action for injuries testified that he was an employing tailor, having a stock of cloth and materials;

that he paid rent for his store and gave his personal attention to the business, cutting, trying on, taking orders, and giving out work; that his average profits were $40 a week; and that he was absent from his business five weeks. There was no evidence of the cost of the rent or the amount of capital invested. Held, that the evidence related to profits, and not to the value of plaintiff's personal services, and was therefore too speculative and conjectural to form a basis of recovery for loss of earnings. (Gottheim vs. Nassau Electric R. Co., 111 N. Y. Sup., 678.)

CHARTERS, FRANCHISES AND ORDINANCES

New York.—Street Railroads—Construction of Franchise—Switches and Extensions—Injunction—Tearing up Street for Street Railroad—Evidence—Connection with Interurban Line—Rights and Authority of Village Trustees.

A franchise gave the right to build a street railroad on B. street to its intersection at right angles with C. street, and thence north thereon, but no part of the route was to be west of the center of line of C. street and the center line of the road was to coincide with the center line of the street, though necessary switches were permitted. It was sought to connect the tracks at the street intersection with a private right-of-way extending westerly from the westerly line of C., the north and south street near the northerly line of B. street. Held, that, while the point where the movable rails of the diverging tracks would connect, it would be a switch as ordinarily understood, from that point, and especially from the point where the proposed diverging tracks separate from the present tracks to the west line of C. street, it was an extension of the line, but that, whether it was a switch or an extension, it would run to the west of the track on C. street, and was therefore outside the limits of the franchise.

That defendant street railroads undertook under cover of night to lay tracks is convincing proof that they then supposed that they had no lawful right to tear up the street at the place in question, and that they then believed they were laying an unauthorized extension, and not a mere switch.

Laws 1890, p. 1084, c. 565, § 4, subd. 5, giving any railroad the right "to cross, intersect, join or unite its railroad with any other railroad before constructed at any point on its route," authorizes a connection of roads which do not in fact intersect, but come so near together that it becomes desirable, as where two interurban street railroads are within about 300 feet of each other.

Where connection is proposed to be made in a village street between interurban lines for the purpose of exchanging cars, the village trustees have the right to participate in determining the place and manner of making the intersection, though they would have no right to impose unreasonable or unusual conditions, or conditions intended to defeat or prevent it.—(Village of Waverly v. Waverly, S. & A. Traction Co. et al., 116 N. Y. Sup., 1074.)

New York.—Eminent Domain—"Compensation"—Easement in Street—Elevated Railroad—Right to Maintain—Consent—Estoppel—Appropriation of Street—Release—Title Acquired—Property Subject to Appropriation—Streets—Remedies of Owners—Injunction—Rights in Streets.

An instrument, executed by an owner of a lot extending to the center of the street in front thereof, by which he consents to the maintenance of an elevated railroad in the street, and operation thereof "as the same is now constructed without compensation therefor," and releases all claim arising from the maintenance of the structure and the operation of the railroad "as now constructed and operated," is more than a mere license, and is effective at least as an estoppel for any compensation that might be awarded in condemnation proceedings, "compensation being the word used in Const. 1894, art. 1, § 7, regulating the taking of private property, and, as used in the consent, indicating a continued invasion of the abutting owner's rights in the street without payment therefor.

A mere abutter on a street has only an easement in the street; and, when he gives a consent for the construction and maintenance of an elevated railroad in the street he releases so much of the easement as is interfered with by the railroad.

Where an abutting owner owns the fee of the street in front of his land, a railroad constructing and maintaining an elevated railroad in the street takes from him an easement in the land in the street.

The easements of a mere abutter on a street, and the rights of an abutter owning the fee of the street in front of his premises, are within the constitutional protection, and neither can be acquired by a railroad company, except by the procedure prescribed by the Constitution, unless the owner voluntarily seeks redress in equity.

One suing to enjoin the maintenance of an elevated railroad in the street in front of his premises, and for damages for past maintenance, is entitled to no greater relief than he would obtain in proceedings to condemn the property for the construction and maintenance of the elevated railroad.—(Smith v. Brooklyn Union Elevated R. Co. et al., 85 N. E. Rep., 1100.)

Texas.—Street Railroads—Use of Streets—License or Consent of Municipality—Nature and Extent of Rights in Streets—Erection of Electric Wire Poles—Municipal Corporations—Use of Streets—Electric Wires.

Where, at the time of the adoption of a city ordinance conferring on a street railway authority to use certain streets upon which to construct a street railway system, it was not known where the railway's power house would be located, and the ordinance did not require the railway to construct the plant on any of the streets over which such use was granted, the express authority carried with it the right to make use of such other streets for the transmission of electric power as was essential to the enjoyment of the authority expressly granted.

Where a city ordinance granted a street railway authority to erect a system of overhead wires for the purpose of conducting electricity to operate motors, and "to properly cross from such electric current generating station as may be required * * * they are hereby authorized to erect poles to place the wires upon," etc., and at the time the ordinance was adopted the location of the generating station had not been determined, the railway was authorized to erect its wires over such streets as might be required to properly conduct the current from the power plant to the motors, although the streets so selected were not any of those designated, for the construction of the railway system.

A city has the right to permit the use of its streets for the erection of poles and feed wires for use in connection with a street railway system.—(Beaumont Traction Co. v. Brock et al., 106 S. W. Rep., 460.)

Wisconsin.—Eminent Domain—Compensation—Amount—Nature and Extent of Right Taken.

St. 1898, sec. 1863a, confers on an electric railway the right of eminent domain, makes applicable the statutes relating to the exercise of that right by a railroad, but provides that the right shall not extend to the condemnation of rights in a street. Laws 1899, p. 537, c. 306, Laws 1901, p. 686, c. 465, and Laws 1905, p. 912, c. 497, in amendment of sec. 1863a, so modify the restriction with reference to streets that, where the use of a street has first been granted by franchise, the right to condemn may be exercised; and it is also provided that such a corporation shall have the power to lay out its right of way, not exceeding 100 ft. in width, etc., and that it may acquire by condemnation such property as may be necessary, and that where it has constructed its railway on a street under a franchise it shall not, during the franchise, abandon any part of the railway in the street. St. 1898, sec. 1836, relating to commercial railroads, recognizes that the exclusive use of a street is not acquired by condemnation, but that other uses continue impaired only so far as necessary. A petition filed by a street and interurban railway stated that it was desired to condemn all the rights which would entitle abutting owners to damages by reason of the construction of the double-track railway authorized by petitioner's articles of incorporation. Prior to the petition a franchise had been granted to operate a street railway in the street wherein it was sought to condemn. Held, that the effect of the condemnation proceedings was the acquisition by petitioner of a right of way for its interurban railway and of a perpetual interest, subject to the duty to continue the street railway service, and not merely of a right to run interurban cars over the tracks of the street railway, and that damages to abutting owners were to be estimated accordingly.—(Marsh v. Milwaukee Light, Heat & Traction Co., 114 N. W. Rep., 804.)

LONDON LETTER

(From Our Regular Correspondent)

A recent report by Peter Fisher, of the Dundee Municipal Tramways, on the conditions governing the operation of the Perth Tramways appears to show that it is a mistake for municipalities like Perth to operate their own tramways. The Perth Tramways were electrified five or six years ago and have not been a success financially. Finally it was decided to have Mr. Fisher report regarding the operation of the system. Briefly, Mr. Fisher recommended that cars should be operated on Sunday; that a more frequent service should be established, and that the operating staff should be reduced. He disapproved the introduction of halfpenny fares. In Mr. Fisher's opinion, the staff should be reduced about 50 per cent. Other recommendations are largely of local interest. Mr. Fisher approved the granting of season tickets to the heads of the various municipal departments and to the corporation employees; he advised against issuing season tickets to ordinary passengers.

Reference was made recently in this letter to the proposed consolidation of the Baker Street & Waterloo Railway; the Charing-Cross, Euston & Hampstead Railway and the Great Northern, Brompton & Piccadilly Railway, all of which operate underground railways composing the Underground Electric Railways Company of London, which was formed by the late Chas. T. Yerkes. The bill to effect the consolidation, which has been published, proposes that the consolidation shall take effect on July 1, 1910, the new company to be known as the London Electric Railway. The capital of the London Electric Railway will be divided into £3,150,000 of 4 per cent preferred stock and £9,450,000 of common stock and an amount of perpetual 4 per cent debenture bonds which, with the debenture bonds now issued by the three companies, will total £4,200,000.

F. A. Cortez-Leigh, for many years a member of Lacey, Sillar & Leigh, London and Manchester, consulting engineers, has severed his connection with that firm and has assumed the duties of chief electrical engineer of the London & North-Western Railway. Lacey, Sillar & Leigh have carried out many important contracts for electric traction and electric lighting in England and abroad. Mr. Leigh's appointment with the London & North-Western Railway was necessitated because that company is building an electric railway from Watford to its main station at Euston in London, and as the engineering work is well advanced, consideration must be given to the electrical equipment of the line, which is to be partly on the surface and partly underground. The London & Northwestern Railway is undoubtedly the most important railway in Great Britain, and has, perhaps, better train service than any other railway in Europe. Should the electric railway now under construction prove a success, further electrification will follow, so that Mr. Leigh is carrying out work of great interest.

The electrification of the London, Brighton & South Coast Railway between London Bridge and Victoria stations, about which so much has been written, is proving successful from a financial point of view. The company states that traffic on the electrified line has shown an improvement as compared with the returns on the same section before electrification. The company is preparing to increase the train service, and other railways which are interested in the experiment will doubtless electrify some of their branch lines.

It is proposed to build an electric railway between Wimbledon and Sutton which would connect with the London & South-Western Railway and pass through Morden, Cheam, Merton and Carshalton to Sutton, where a junction would be made with the Croydon and Epsom line of the London & Brighton Railway.

Dick, Kerr & Company have made excellent progress with the electrification of the York Tramways, and the section from Nessgate to Fulford has been formally opened by the Lord Mayor, following an inspection by Lieut.-Col. Von Donop, chief inspector of the Board of Trade, who expressed himself as well satisfied with the construction of the lines. York is a picturesque city, and one of the few remaining cities in Great Britain surrounded by walls, and much interesting work was undertaken in connection with the tramways to preserve the architectural features of the city. The city wall arch over Leeman Road was raised 3 ft. to provide headroom for the electric cars. The old material was used in replacing the arch, so that its appearance remains unchanged. The York system comprises four routes, with the railway station as the center—Fulford, Dringhouses, Acomb and Haxby Road. It is anticipated that the Dringhouses route will be ready for opening by March 1, 1910. The Haxby Road route, from the cocoa works to the center of the city, is in course of construction and the Acomb route will follow. The permanent way, which is narrow gage, follows the specifications made by the city engineer. Overhead trolleys have been adopted, but in all the narrower thoroughfares obstruction by standards has been avoided by the suspension of the trolley wires from the houses on each side of the street. The cars are double-deck, open-top cars with an 8-ft. wheel base, York being one of the first places to adopt the new system of a long wheel base on single trucks. The cars are also fitted with a new kind of destination indicator, which shows where the car is from, in addition to where it is going. The laying of cables has been carried out under the direction of J. W. Hame, the city electrical engineer, who has been appointed general manager of the tramways. The total cost, including necessary street improvements, is about £140,000.

With the exception of the amalgamation scheme in London, comparatively few measures of interest have been prepared for introduction into Parliament. The various tubes in London are applying for rights to make minor improvements in the service, and a few corporations are asking for powers for extensions, perhaps the most important being the Bradford Corporation, which proposes to construct tramways which will involve an expenditure of about £80,000. Leeds is promoting a bill for the use of the trackless trolley. In connection with the underground railways, perhaps the most important bill is the act of the Charing-Cross, Euston & Hampstead Railway for permission to construct an extension at its Charing-Cross terminus to connect with the Baker Street & Waterloo Railway at its Embankment station, and with the District Railway at its Charing-Cross station. This is an important and difficult piece of work and will probably take five years to complete. Powers are desired to increase the capital of the company £400,000. This addition will be extremely useful, as the Charing-Cross, Euston & Hampstead Railway comes to a dead-end at present, and passengers who wish to transfer to the Bakerloo Railway have to come to the surface at Charing-Cross and walk to Trafalgar Square, where there is a station of the Bakerloo Railway. Similarly passengers who desire to proceed east or west must walk to the Charing-Cross Station of the Metropolitan District Railway. These stations are about 200 yds. distant.

The second annual report of the London Traffic Branch of the Board of Trade was issued during January, and reference to it was published in last week's issue. Sir Herbert Jekyll states that the work of the traffic branch has hitherto been confined within narrow limits owing to the smallness of the staff, but the increase which has now been authorized will enable the board to undertake new duties, including the investigation of special subjects which the Royal Commission on London Traffic indicated as calling for detailed inquiry. The question of arterial roads, which will involve the examination of an area of 700 square miles with regard to its topographical features, distribution of population, etc., will be studied. The report deals very fully with tramways versus motor omnibuses, and also takes up the subject of the use of trailers in connection with the London County Council Tramways and the running of through cars. It also takes up the question of the undeveloped electrical schemes which have received the sanction of Parliament, including the Euston-Watford Railway, previously referred to in this letter. The competition of tramways and railways and the question of the electrification of steam railways are carefully investigated. The housing problem, the regulation of street traffic, fares, etc., all come in for minute attention, making the report one of peculiar interest to all interested in the solution of the problem of transportation in large cities.

A. C. S.

News of Electric Railways

Transit Affairs in New York

The Interborough Rapid Transit Company has begun the work of lengthening its station platforms so that they will accommodate 8-car local and 10-car express trains. The station at which work is in progress is at 116th Street on the Lenox Avenue division.

By adopting a report presented by Commissioner William McCarroll, the Public Service Commission has indicated that it will grant the petition of certain property owners in Brooklyn for the construction on the assessment plan of the proposed Livonia Avenue extension of the Eastern Parkway subway in Brooklyn. A necessary consequence of this action will be the formal laying out of a rapid transit route for this line. As soon as that is done the route will be sent to the Board of Estimate and Apportionment for its approval, and, if approved, the commission will push forward the early construction of the road.

More than 50 new steel cars which will be used in the tunnel traffic are now in every-day use on the Long Island Railroad and a second instalment is expected very soon. By the time the tunnels are ready for operation 140 of these new steel cars will be placed on the road and the number will be increased as the necessity arises. It is said now that the tunnel may be placed in service before the summer, which was the time set some months ago by the officers of the company for beginning service.

William May Wright, Charles S. Foote and Rudolph Block, commissioners appointed by the Appellate Division of the Supreme Court, have filed a report to that court recommending the double-deck form of construction for the Lexington Avenue subway, which is a part of the Broadway-Lexington Avenue subway system as planned by the Public Service Commission. The original plan involved the building of four tracks substantially upon the same level. This plan was approved by the Appellate Division, but on the recommendation of Henry B. Seaman, chief engineer, the Public Service Commission decided to change this plan to a double-deck road upon the portion of the routes beginning at or near Houston Street and thence extending northerly under Broadway to a point near East Ninth Street, thence through private property to Irving Place, and thence northerly under Irving Place, Gramercy Park and Lexington Avenue to 103d Street, and from 113th Street to the Harlem River.

On Jan. 28, 1910, the Public Service Commission received Max E. Schmidt, president of the Continuous Transit Securities Company; Robert Walker, president of the Rock Island Railroad, and Stuyvesant Fish, representing the Continuous Transit Securities Company, to urge the construction of a moving platform in New York. The commission originally selected a section under Broadway from Tenth Street to Forty-second Street as the best site for trying the proposed plan. The former Board of Estimate, however, suggested that a crosstown line be constructed under Thirty-fourth Street within First and Tenth Avenues. No action on the proposal has been taken since the organization of the new Board of Estimate in January, 1910.

The Board of Estimate of New York has authorized the payment of $31,000 asked by the Public Service Commission for the construction of a Bronx Park terminal station for the east branch of the subway at 181st Street.

Plans for Causeway Street Station Under Consideration at Boston

The Massachusetts Railroad Commission is considering plans recently filed with the board by the Boston Elevated Railway for the construction of an elevated station for surface cars in Causeway Street, opposite the North Union Station, Boston. The company plans to build a station of the double-platform type with inside east and westbound tracks to accommodate car service to and from Boston via the East Cambridge extension now under construction; to provide easy access to the North Station railroad terminal, and to improve the facilities for passage between the North and South Stations via the Atlantic Avenue shuttle trains.

The plans provide for a platform about 450 ft. long and 12 ft. wide on the north side of Causeway Street, immediately in front of the North Station, with an entrance gallery and lobby connecting with a passageway 14 ft. wide leading into the midway of the railroad terminal, with entrance and exit connections to points at the street level in front of the cab stand of the terminal. The easterly half of the platform is paralleled by a spur track connecting with the Atlantic Avenue elevated line, and will be used for the reception of passengers to and from the South Station. A connection is to be provided with the present bridge between the North Union Station and the North Station of the elevated system. On the south side of Causeway Street will be built an elevated platform about 235 ft. long, and from 8 to 18 ft. wide, to be used as a stopping place for inbound cars via the East Cambridge extension. A 12-ft. passageway will be built between the east and westbound platforms, and no stairways are planned to and from the sidewalks.

The design of the Causeway Street station will shorten the distance which passengers will be obliged to walk in passing between the North and South stations, provide quicker connections between the East Cambridge car service and the North Station, facilitate transferring between East Cambridge and Atlantic Avenue points, and relieve the platform and passageway areas of the present North Elevated station, facilitating the handling of traffic to and from the Washington Street tunnel. A desirable separation of traffic is expected to follow the establishment of the Causeway Street station, although stairway connections between all three stations will tie them together from the operating standpoint. A number of special track changes will be made at the intersection of Canal and Causeway Streets in connection with the construction of the new station. The East Cambridge surface cars will enter and leave Boston via an elevated structure for double-track service carried across the Charles River Dam to the Lechmere Square district.

Cleveland Traction Situation

At the meeting of the City Council of Cleveland on Jan. 27, 1910, the rule of "silence gives consent" was adopted toward the request of Warren Bicknell, receiver of the Municipal Traction Company, for authority to continue to operate routes on which franchises expired on Jan. 27, under the conditions in force on the lines of the Forest City Railway, which included a fare of 3 cents and a charge of 1 cent for a transfer which is rebated when the transfer is collected. Newton D. Baker, city solicitor, said that if no objections were made the company would have the right to operate until the Tayler grant is submitted to the voters for approval.

A resolution was adopted at the meeting of Jan. 27 requesting Judge Tayler to authorize the re-establishment of through routes on the Superior Street and Detroit Street, Payne Street and Bridge Street, Central Street and Denison Street and Euclid Avenue and West Fourteenth Street lines. These routes were divided at the Public Square on account of the difference in the fares, but the change in fare just made would enable the receiver to operate them as through lines again. Mr. Bicknell has been busy with criminal cases in Toledo for some time and has not had an opportunity to take up these matters.

An effort is being made by some of the councilmen to prevent the interurban cars from coming to the Public Square, because of the congested condition of that district at certain hours.

Mayor Baehr has approved the plan of voting on the grants made the Cleveland Underground Rapid Transit Company, notwithstanding the fact that the City Council has repealed the grants.

Former Mayor Johnson, who left Cleveland shortly after the settlement of the street railway controversy is ill at his

apartment in the Prince George Hotel, New York, N. Y. While visitors to Mr. Johnson are refused admittance it is said that he is not too ill to look after his personal affairs.

Association Meetings

Massachusetts Street Railway Association.—Boston, Mass., Feb. 9.

Central Electric Traffic Association.—Dayton, Ohio, Feb. 19.

New England Street Railway Club.—Boston, Mass., Feb. 24.

Street Railway Association of the State of New York.—Rochester, N. Y., March 1 and 2.

Central Electric Accounting Conference.—Fort Wayne, Ind., March 12.

Central Electric Railway Association.—South Bend, Ind., March 24.

Missouri Electric, Gas, Street Railway & Water Works Association.—Jefferson City, Mo., April 14, 15 and 16.

Iowa Street & Interurban Railway Association.—Sioux City, Ia., April, 1910.

Legislation Favored to Authorize Municipalization in Toronto.—The City Council of Toronto, by a vote of 18 to 4 has decided to seek legislation to enable the city to purchase the Toronto (Ont.) Railway.

Restaurant for Employees of the Twin City Rapid Transit Company.—The Twin City Rapid Transit Company, Minneapolis, Minn., has opened a restaurant for its employees in its car house in East Seventh Street, St. Paul, Minn., where sandwiches and other edibles will be sold to the men at cost. If the restaurant proves to be a success the company will provide restaurants at some of its other car houses.

Municipal Ownership Proposed in Tacoma.—The City Council of Tacoma, Wash., voted on Jan. 19, 1910, in committee of the whole to recommend the passage of an ordinance to submit to the people at the spring election a proposal to issue bonds to the extent of $1,000,000 to build and equip an electric railway system. Power to operate the line could be secured from the municipal lighting station of the company now under construction, according to the plan.

Bonds Authorized for Municipal Line in San Francisco.—In accordance with the vote at the election held at San Francisco on Dec. 30, 1909, as noted in the Electric Railway Journal of Jan. 8, 1910, page 84, the Board of Supervisors of San Francisco has unanimously approved the plan to sell $2,020,000 of municipal securities for equipping the Geary Street, Park & Ocean Railroad with electricity and operating it as a municipal enterprise.

Dinner of Stone & Webster Officers in Northwest.—A dinner of the officers of the companies in Washington controlled and operated by Stone & Webster, Boston, Mass., was held at the Hotel Butler, Seattle, Wash., on Jan. 13, 1910. Jacob Furth, president of the Seattle Electric Company, acted as toastmaster. Addresses were made by Judge Peter Grosscup; E. E. Potter, manager of the Seattle Electric Company, and R. T. Laffin, who is connected with the Stone & Webster interests in the Northwest in an expert capacity. Mr. Laffin discussed more particularly the suggestion of Mr. Potter that a club be organized among the Stone & Webster interests in the Northwest.

Meeting of Engineers' Society of Western Pennsylvania.—The thirtieth annual meeting of the Engineers' Society of Western Pennsylvania was held in the society rooms in Pittsburgh on Jan. 18, 1910. E. K. Morse, who succeeded to the presidency of the association on the death of G. T. Barnsley in October, 1909, presided. The annual report of the board of direction, including the reports of committees, sections and the treasurer, was read. The membership of the society on Dec. 31, 1909, was 835. The following officers were elected for the ensuing year: E. K. Morse, president; J. O. Handy, vice-president; A. E. Frost, treasurer; A. R. Rayner, Willis Whited, directors. The annual banquet of the society was held on Jan. 29, at 6 p. m., in the Fort Pitt Hotel.

Canadian Electric Railways.—The report of the Department of Railways and Canals of the Dominion of Canada gives the total mileage of the electric railways as 988 miles of main track. The paid-up capital of these lines was $91,604,989 and the gross earnings $14,824,936, an increase of $817,887 over the previous year. The net income of the various roads aggregated $4,716,308, or 5 per cent on the capitalization. The electric railways carried 314,026,671 fare passengers and 81,670,945 transfer passengers on 3544 cars. The total car mileage was 60,152,846, of which 737,720 was in the carrying of mails, freight and express traffic. There were in 1909 10,557 employees of electric railways, 603 more than in 1908, and their wages amounted to $6,761,281. During the year 11 passengers, seven employees and 50 other persons were killed and 1303 passengers, 218 employees and 618 others were injured in accidents on electric railways.

A. S. M. E. Dedication of Thurston Memorial Tablet.—The monthly meeting of the American Society of Mechanical Engineers for February will be devoted to the dedication of a bronze memorial tablet to Dr. Robert H. Thurston, the first president. All associates and former students of Dr. Thurston are earnestly invited to attend these exercises. The dedication will take place on the evening of Feb. 8, 1910, at 8:15 p. m., in the Engineering Societies Building, 29 West Thirty-ninth Street, New York. Among those who will participate are Prof. John E. Sweet, who was closely associated with Dr. Thurston in the organization of American Society of Mechanical Engineers; Colonel E. A. Stevens, a prominent representative of the Stevens family, founders of Stevens Institute; J. G. Schurman, president of Cornell University; Prof. Albert W. Smith, Dr. Thurston's successor as director of Sibley College, and William Kent, consulting engineer. It is expected that Mrs. Thurston will attend. Dr. Alex C. Humphreys, president of Stevens Institute, will be the chairman. The memorial to be unveiled is the work of Herman H. McNeil, a former student and personal friend of Dr. Thurston. It is a replica of the memorial tablet presented to Sibley College, Cornell University, by alumni and students of the university.

Examination for Position of Junior Railway Engineer, New York Commission.—The New York Civil Service Commission will hold an examination on Feb. 26, 1910, to fill the position of junior railway engineer with the Public Service Commission of the First District of New York. Those who desire to take the examination must secure a blank from the State Civil Service Commission, Albany, N. Y., and execute and file it with that body on or before noon on Feb. 19, 1910. The examination is described as follows: "Junior Railway Engineer, Public Service Commission, First District. Salary, $1,201 to $1,800 per annum. The duties are to inspect the power houses and equipment of subway, elevated and street railways, and of electric companies in New York City. Candidates must be graduate electrical or mechanical engineers and have had at least one year's practical mechanical or electrical experience, or offer four years' practical mechanical or electrical experience with railroad, street railway or electric companies. Subjects of examination and relative weights: Theoretical and practical questions relating to the construction and operation of power house and railway equipment; measurements; standards, and other pertinent subjects, 5; experience and personal qualifications, 3; education, 2."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Illinois.—Up to Jan. 22 no bills have passed both houses of the Illinois General Assembly, which met in extraordinary session on Dec. 14, 1908, except the appropriation measure to pay the expenses of the legislators and the other employees. The question of primary legislation has occupied the attention of the members of the Legislature very largely. The Senate has passed a municipal government bill, but that measure is awaiting action in the House. The Senate has also approved a few minor measures, but the question of deep-water waste and other important legislation has received very little consideration.

Maryland.—Both houses of Legislature reassembled on Jan. 25. The two most important bills to come before the Legislature were then being engrossed. One of these is the public utility bill drawn by Attorney-General Straus at the suggestion of Governor Crothers. According to the rules of both the Senate and the House a bill must be engrossed three times and in the case of the utility bill this engrossing is a tedious and costly operation, as the measure consists of about 40 printed pages.

Massachusetts.—At a recent hearing by the committee on metropolitan affairs, Chairman George G. Crocker, of the Boston Transit Commission, stated the time has arrived when the railroads must consider the electrification of their suburban service. Mr. Crocker said that $600,000 per year was lost in switching trains at the Boston North and South stations. The railroads should report upon the problem by the coming fall. A bill has been introduced requiring railroad corporations within the metropolitan district of Boston to operate their trains by electricity, subject to such conditions as may be established by the Railroad Commission. A bill has been introduced making it illegal for municipal authorities to grant a street railway location at one side of any highway within 1 mile of the center of any town of less than 5000 inhabitants. A bill has been introduced upon petition of Fred H. Smith, treasurer of the Massachusetts Street Railway Association, in the form of an additional amendment to Sec. 103, Ch. 463, Acts of 1906, and provides that the commission, in authorizing the issue of any bonds under this section, may prescribe the minimum price at which such bonds shall be sold, and may modify the price from time to time as conditions require. A bill has been introduced to prohibit the further construction of elevated railways in Boston. A bill introduced authorizes street, electric and elevated railways to carry baggage, express matter and freight subject to the regulations of the Railroad Commission.

New Jersey.—The Legislature met for a brief session on Jan. 17 and then adjourned for a week out of respect to the memory of a former Governor, George T. Werts, who died on Jan. 17. Mr. Scharf of Bergen has introduced a public utilities bill which will increase the Board of Railroad Commissioners from three members to five members, the new board to be known as the Railroad and General Utilities Commission. The salary of each commissioner will be fixed at $5,000. The total expenses of the body will be limited to $50,000 annually. If the measure is passed, the board will have general supervision over all public utility corporations and will hear complaints on all cases relating to service, rates, discrimination, carelessness and equipment of any public utility corporation, appeals from the finding of the commission to be made to the Supreme Court. Mr. Sullivan has introduced as a substitute for Mr. Pierce's public utility bill of last year Mr. Martin's bill of 1908-09, which would confer rate-making powers on the commission. This measure was drawn according to the terms of the public service commission law of New York. Senator Gebhardt has also announced a public utility bill which provides for the appointment of a board of five commissioners with a term of five years each. This bill would repeal the Railroad Commission Act and is somewhat similar to the Gebhardt bill of 1909.

New York.—Investigation into the acts of Mr. Allds will probably be protracted indefinitely and may interfere seriously with the work of the present session. Governor Hughes has announced the resignation of Thomas M. Osborne as a member of the Public Service Commission of the Second District and has appointed John M. Carlisle to succeed him. The Governor has also reappointed Martin S. Decker as a member of the Public Service Commission of the Second District and Milo Roy Maltbie as a member of the Public Service Commission of the First District. The appointments have been confirmed by the Senate. Louis H. Hahlo, assistant corporation counsel of New York, is engaged in drafting the enabling act necessary to put into effect the constitutional amendment adopted in November, 1909, to exempt from consideration, in arriving at a determination of the city's debt limit, such bonds for public improvements as are self-supporting. On Jan. 1, 1910, the city had a working margin, inside its debt margin, of $44,000,000, of which it was the intention of the administration to reserve $25,000,000 for use in building subways, the other $19,000,000 being for other public improvement. On July 1, 1910, as a result of the increased valuation of real estate, the debt limit will further increase $26,000,000, and that amount will be available for public improvements other than subway and rapid transit measures, thus bringing the total for public improvements of that class up to $44,000,000, with about $125,000,000 to use for subways or other rapid transit plans.

Financial and Corporate

New York Stock and Money Market

February 1, 1910.

The condition of the stock market during the last week has been unsatisfactory and almost alarming. There is a widespread feeling of uneasiness over the attitude of the Federal authorities toward corporations, and at every suggestion of a rally there has been a flood of selling orders. Traction shares have suffered a decline, principally Interborough-Metropolitan preferred and Third Avenue.

The money market is playing no part in the present disorder. Money continues plentiful and cheap. Rates to-day were: Call, 2 to 2¾ per cent; 90 days, 4 per cent.

Other Markets

In Philadelphia, trading in Rapid Transit has been light, and in other tractions almost nothing. Prices, however, have not sagged as much as might have been anticipated.

In Boston, trading has continued in Massachusetts Electric shares but prices have remained practically unchanged. There has been some dealing in Boston Elevated.

In the Chicago market traction issues have been neglected. Series 2 of the Chicago Railways has been in the market to some extent.

In Baltimore, as usual, there have been no traction securities sold except the bonds of the United Railways.

At the auction of securities last week the following were sold: 100 shares Brooklyn City Railroad at 197; $20,000 Second Avenue Railroad 5 per cent bonds at 47; $25,000 Metropolitan Street Railway refunding 4 per cent bonds at 25.

Quotations of various traction securities as compared with last week follow:

	Jan. 25.	Feb. 1.
American Railways Company	a47½	a48
Aurora, Elgin & Chicago Railroad (common)	*62	a61
Aurora, Elgin & Chicago Railroad (preferred)	*93	a92
Boston Elevated Railway	132½	132
Boston & Suburban Electric Companies	*16	a16
Boston & Suburban Electric Companies (preferred)	*76	74
Boston & Worcester Electric Companies (common)	a11	a11½
Boston & Worcester Electric Companies (preferred)	45	44
Brooklyn Rapid Transit Company	71½	72½
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	83	83½
Capital Traction Company, Washington	a135	a134½
Chicago City Railway	185	*185
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a105	a109
Chicago Railways, ptcptg., ctf. 2	a30	a30½
Chicago Railways, ptcptg., ctf. 3	a17	a17
Chicago Railways, ptcptg., ctf. 4s	*9½	*9½
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a77	a77½
Consolidated Traction of New Jersey, 5 per cent bonds	a106	a105
Detroit United Railway	*63	*63
General Electric Company	150½	152
Georgia Railway & Electric Company (common)	105½	105
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	20¼	20⅝
Interborough-Metropolitan Company (preferred)	55	52
Interurban-Metropolitan Company (4½s)	80½	80½
Kansas City Railway & Light Company (common)	*36	a30½
Kansas City Railway & Light Company (preferred)	*70½	*70½
Manhattan Railway	136¾	*136¾
Massachusetts Electric Companies (common)	a18	a17¼
Massachusetts Electric Companies (preferred)	a81	80¼
Metropolitan West Side, Chicago (common)	a17	a17
Metropolitan West Side, Chicago (preferred)	a54	a56
Metropolitan Street Railway	*21	*21
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	76¼	*76¼
Northwestern Elevated Railroad (common)	a18	a18
Northwestern Elevated Railroad (preferred)	a68	a68
Philadelphia Company, Pittsburg (common)	a50½	a50½
Philadelphia Company, Pittsburg (preferred)	a45¼	a46
Philadelphia Rapid Transit Company	a25½	a26¾
Philadelphia Traction Company	a88	a89
Public Service Corporation, 5 per cent col. notes	*100⅞	*100⅞
Public Service Corporation, ctfs.	a106	a106
Seattle Electric Company (common)	*115	a115
Seattle Electric Company (preferred)	*104½	a104½
South Side Elevated Railroad (Chicago)	a54	a53
Third Avenue Railroad, New York	15½	10⅞
Toledo Railways & Light Company	11	*11
Twin City Rapid Transit, Minneapolis (common)	111	112½
Union Traction Company, Philadelphia	50¼	a51½
United Rys. & Electric Company, Baltimore	a13½	a13½
United Rys. Inv. Co. (common)	a33	*33
United Rys. Inv. Co. (preferred)	a56½	61
Washington Ry. & Electric Company (common)	a10	a38½
Washington Ry. & Electric Company (preferred)	a88⅝	a88¼
West End Street Railway, Boston (common)	a95	a93
West End Street Railway, Boston (preferred)	*106	*106
Westinghouse Elec. & Mfg. Company	71	71
Westinghouse Elec. & Mfg. Company (1st pref.)	120	*120

aAsked. *Last Sale.

Annual Report of the South Side Elevated Railroad

Gross earnings of the South Side Elevated Railroad of Chicago in the year ended Dec. 31, 1909, were $2,234,972, a decrease of $7,718 or 0.3 per cent from the previous year. Expenses were lower last year than in the preceding year, however, and net earnings from operation in 1909 showed an increase, therefore, as compared with 1908, of $40,394, or 6 per cent. Earnings for three years compare as follows:

Year ended Dec. 31:	1909.	1908.	1907.
Gross earnings	$2,234,972	$2,241,690	$2,105,193
Operating expenses and taxes.	1,523,954	1,571,066	1,459,746
Net earnings	$711,018	$670,624	$645,447
Interest and rentals	453,080	436,620	205,939
Net divisible income	$257,938	$234,004	$439,508
Dividends	.....	76,723	409,187
Surplus	$257,938	$157,281	$30,321

As indicated by these figures, there was a decline in traffic which was slightly larger than the reduction in gross earnings, amounting to 0.63 per cent. Of the total operating expenses during the year, $746,575 or 33.4 per cent, was required for conducting transportation. The maintenance expenditures amounted to 12.6 per cent of gross earnings, divided as follows: Maintenance of way and structure, $126,575 or 5.7 per cent of gross; maintenance of equipment, $156,150 or 6.9 per cent of gross.

Charles V. Weston, the president, in a statement to stockholders at the annual meeting, said in part:

"The surplus from earnings for the last year was $257,938.40, equal to 2.52 per cent on the outstanding capital stock, as compared with 2.27 per cent for the previous year.

"The number of passengers carried during the year was 42,722,624, as compared with 42,994,610, a decrease of 271,986 passengers, or 0.63 per cent.

"The fixed charges last year increased $16,460, for the reason that the rental for that portion of the leased road extending from Indiana Avenue and Fortieth Street to the Stock Yards and Packingtown did not begin until April, 1908. With this increase the maximum fixed charges have been reached.

"The increases in the amount of net earnings and surplus are due entirely to improvements in operation that have been introduced, which have resulted in greater efficiency of service, as well as in saving of expense, although there was a substantial increase in wages to trainmen and some other of the employees.

"The structures, equipment and other property have been maintained throughout the year to the highest standard of efficiency. All of the GE-57 motors, the first electric motive machinery acquired by the company, have been rebuilt in the company's shops, and the machines are now in as good operating condition as when newly installed, 12 years ago.

"By the introduction of certain new methods of conducting work and rearrangement of the occupation of the space in the shops, the efficiency of the shop force has been materially increased and the cost of doing the work has been reduced. Besides keeping the entire rolling equipment up to the highest standard of efficiency, 138 cars were put through the shops last year for general overhauling, as compared with 116 cars during the previous year, an increase of 19 per cent in the output of the shops.

"The elevated railroads of this city are still operating at great disadvantage during the hours of maximum traffic on account of limited facilities offered by the short platforms at the loop stations in the downtown district. Although there has been considerable change in public sentiment in favor of lengthening the platforms at those stations, to provide for a more rapid and efficient service on the loop during the rush hours, the city authorities have not seen their way clear to grant permission to complete the building of the platform extensions which was begun several years ago. All of the steel work for the extension of these platforms is in place at nearly all of the stations, requiring only the floors to be laid and the safety railings to be placed to make the extensions available for use. The property adjacent to the stations has already suffered all the inconvenience possible from the construction of platform extensions without gaining any of the benefits of increased traffic which will come from their use when completed. It is hoped that permission for their completion will be forthcoming during the current year, so that the elevated lines will be able to serve their patrons better, provide for increasing business and relieve the hardships suffered by a patient public.

"In regard to the proposition from a committee, looking toward the leasing of various elevated railroads of this city, I wish to say that the gentlemen never submitted an offer which your directors felt they could consistently place before the shareholders of your company and recommend its adoption. At the termination of the negotiations, during which only the rate of rental to be paid by the leading company was considered, nothing was left in the way of the committee to make further suggestions in regard to the leasing proposal. No renewal of negotiations has been undertaken, to this date.

"The condition of your company may be summarized as follows: The physical property is in first-class condition of repair. The company has no floating indebtedness other than its current expenses. It had cash on hand amounting to $620,984 on Dec. 31, 1909, and you may confidently expect a steady and continuous improvement in the affairs of your company, as evidenced by the result of the operations during the last fiscal year.

"The consideration of the question of dividends, you may rest assured, will be taken up by your directors as soon as may be consistent with conservative and prudent business management."

Sale of Third Avenue Railroad

By order of United States Circuit Court, Jos. P. Day & Company, auctioneers, will offer the property of Third Avenue Railroad for sale at the county court house in New York on March 1, 1910. The property to be offered for sale includes power houses, equipment and depots, and following stocks and bonds: 20,000 shares Union Railway; 16,711 shares Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad; 11,287 shares Dry Dock, East Broadway & Battery Railway; 76 shares Kingsbridge Railway; 5000 shares Westchester Electric Railway; 2483 shares Southern Boulevard Railway; 12,000 shares Tarrytown, White Plains & Mamaroneck Railway and all bonds, stocks, mortgages and notes and other securities now in possession of the Central Trust Company, New York, N. Y., as trustee, and being the stock and other securities described in the mortgage. No upset price is fixed, the court reserving right to reject any bid. Bidders must deposit $200,000 cash.

Brooklyn (N. Y.) Rapid Transit Company.—At the annual meeting of the stockholders of the Brooklyn Rapid Transit Company on Jan. 28, 1910, Bernard Gallagher was elected a director for two years to fill the vacancy caused by the death of E. H. Harriman, and C. D. Meneely, for many years secretary and treasurer of the company, was elected a director for one year, to succeed the late William Seibert. The directors whose term of office had expired were all re-elected.

Chicago & Southern Traction Company, Chicago, Ill.—The Western Trust & Savings Bank, Chicago, Ill., as trustee for a note of $300,000 applied to the Circuit Court of Chicago on Jan. 24, 1910, for the appointment of a receiver for the Chicago & Southern Traction Company on the ground of insolvency. An order was also asked to restrain the company from paying alleged indebtedness to the Detroit & Toledo Construction Company.

Cleveland (Ohio) Railway.—Thomas P. Schmidt has been elected a director of the Cleveland Railway to succeed S. T. Everett.

Columbus Railway & Light Company, Columbus, Ohio.—The annual meeting of the stockholders of the company was held on Jan. 25, 1910. The report of the company for the year ended Dec. 31, 1909, was presented and showed gross receipts of $2,577,202, as compared with $2,281,951 for 1908; net earnings, $1,287,069, as compared with $1,096,347 for 1908; other income, $17,866, as compared with $18,795 for 1908; charges and depreciation, $1,044,582, as compared with $968,018 for 1908; dividends paid, $125,000, as compared with

$100,000 for 1908; surplus, $135,352, as compared with $47,-124. The directors and officers were re-elected.

Chicago, Joliet & St. Louis Electric Railway.—The Chicago, Joliet & East St. Louis Electric Railway, which was incorporated in Springfield, Ill., on Dec. 16, 1909, with $100,-000 of authorized capital stock, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, page 1277, has increased its capital stock to $7,000,000 to control and finance the Joliet & Southern Traction Company, the Bloomington, Pontiac & Joliet Electric Railway and the Chicago, Joliet & Central Illinois Railway, which aggregate 226 miles of line and extend from Chicago south to Bloomington, Ill., where connection is made with the lines of the Illinois Traction System. The Chicago, Joliet & East St. Louis Electric Railway has placed at par with a stock bonus of 25 per cent in its own stock, first mortgage 5 per cent gold bonds, of two of the controlling properties, namely, $250,000 of Joliet & Southern Traction Company dated Jan. 2, 1907, and $100,000 of Bloomington, Pontiac & Joliet Electric Railway dated Sept. 1, 1905, both of which issues are guaranteed principal and interest by the Chicago, Joliet & East St. Louis Electric Railway. The officers of the Chicago, Joliet & East St. Louis Electric Railway are: H. A. Fisher, president; S. A. Spry, vice-president; John M. Raymond, vice-president; John K. Newhall, secretary; Lee D. Fisher, treasurer and chief engineer; F. E. Fisher, general manager.

Lake Shore Electric Railway, Cleveland, Ohio.—The plan for refinancing the Lake Shore Electric Railway by the exchange of old preferred stock for a new issue of $1,000,000 first preferred 6 per cent cumulative stock and $2,000,000 of 5 per cent non-cumulative preferred stock in accordance with the plan outlined in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910, page 86, was approved at the annual meeting of the company on Jan. 25, 1910. The officers and directors of the company were re-elected.

Metropolitan Street Railway, New York, N. Y.—On Jan. 29, 1910, the Morton Trust Company, the Guaranty Trust Company of New York, and others, parties to the various suits against the Metropolitan Street Railway, and Adrian H. Joline and Douglas Robinson as receivers of the Metropolitan Street Railway, were given one week by Judge Lacombe in the United States Circuit Court in which to file briefs on the following motions: (1) For the payment of special franchise taxes amounting to $5,408,000 and Federal corporation taxes. (2) For the separation of the Fourth, Eighth and Ninth Avenue lines from the Metropolitan Street Railway. (3) For instruction in reference to payment for repairs to the tracks and equipment of the New York & Harlem Railroad (Fourth Avenue line).

Ocean Shore Railway, San Francisco, Cal.—F. S. Stratton, receiver of the Ocean Shore Railway, appeared recently before Judge Van Fleet of the United States Circuit Court for instructions regarding his management of the affairs of the company. Judge Van Fleet stated that he would not make any orders for expenditure of money until a committee of engineers reported upon the conditions and requirements, and announced that he would appoint one engineer and allow the bondholders and Mr. Stratton each to suggest another member. E. J. Pillsbury for the bondholders suggested Virgil Vogue. Mr. Stratton submitted the names of E. L. Dillman and W. D. Nicholson. Judge Van Fleet stated that it was to the best interests of all to operate the road. Exception to the plan to appoint a board of engineers was taken subsequently and the court postponed consideration of the subject.

Toledo Railways & Light Company, Toledo, Ohio.—August Ropke, Louisville, Ky., has been elected as an additional member of the board of directors of the Toledo Railways & Light Company and J. K. Secor, who has been a member of the board of directors, has been elected to the executive committee of the company.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio.—The Toledo, Bowling Green & Southern Traction Company has filed a mortgage at Findlay to secure an issue of $500,000 of 5 per cent bonds due in 1935. The mortgage is in favor of the Union Savings Bank & Trust Company, Cincinnati, Ohio, and covers all the property of the company and the Toledo Urban & Interurban Railway.

Traffic and Transportation

Increase in Wages for Subway and Elevated Employees in New York.

T. P. Shonts, president of the Interborough Rapid Transit company, New York, N. Y., announced on Jan. 27, 1910, an increase in the wages of the employees of the subway and elevated divisions of the company, effective on Feb. 1, 1910, in accordance with the following schedule:

OCCUPATION.	YEARS OF SERVICE.	PRESENT RATE. PER DAY.	NEW RATE. PER DAY.
Conductors	1	$2.10	$2.25
"	2	2.25	2.30
"	3	2.40	2.40
" After	3	2.50	2.50
Trainmen	1	1.80	1.90
"	2	1.90	2.00
"	3	2.00	2.10
"	4	2.00	2.15
" After	4	2.00	2.20
Gatemen	1	1.70 }	1.80
" After	1	1.80 }	
Ticket agents	1	1.90	2.00
"	2	2.10	2.10
"	3	2.25	2.25
" After	3	2.25	2.30
Platform men	1	2.00	2.10
" After	1	2.10	2.20
Train clerks	1	2.10	2.25
"	2	2.25	2.50
" After	2	2.40	2.50
Hand switchmen	1	2.20	2.40
"	2	2.40	2.50
" After	2	2.50	2.60

The advance in wages will increase the expenses of the company about $160,000 a year. This is the second general voluntary increase made to its employees by the Interborough Rapid Transit Company since January, 1907, and makes an aggregate annual increase in wages since January, 1907, of $660,000.

The company also announced that it has under construction recreation rooms at the terminals for the convenience of its employees which will be provided with conveniences for furnishing the men with their meals at cost and that it is considering the question of inaugurating a pension fund for employees upon a basis that will enable the company to take care of its pensioned employees without any expense to the men. The increase in wages will directly affect more than 6000 employees.

Excess Fare Upheld in New York

In a decision rendered on Jan. 30, 1910, the Public Service Commission of the Second District of New York sustains the legality of the practice of railroad companies in collecting a 5-cent excess fare for passengers not holding tickets on interurban and other trips where tickets are required, and the issuance of redeemable receipts therefor. The commission rules that the companies should allow three months from date of issue for redemption of the ticket. The decision was made in the complaint of James Morris, Albion, N. Y., against the Buffalo, Lockport & Rochester Railway. In the opinion, which was prepared by Commissioner Decker, the commision rules:

"An interurban railroad is entitled to make proper regulations for the collection of its fares and requiring a passenger at a ticket station to purchase a ticket for delivery to the conductor, with provision in case of failure for collection of an excess charge of 5 cents to be refunded at any ticket office upon demand is reasonable.

"Where an interurban electric railroad has provided a sufficient number of ticket stations properly distributed along its line, with numerous stops at non-ticket points to take on and discharge passengers, and where the percentage of unredeemed duplex receipts for required excess cash fares is small, showing that convenient opportunities for redemption of duplex receipts exist and are actually used by passengers paying the excess fare, the exaction of a 5-cent excess fare with redeemable duplex receipt issued thereon is not unreasonable or unjust.

"A time limitation for redemption of duplex excess fare receipts should be sufficiently long to cover inadvertent omissions to promptly present the duplex receipts for redemption. Respondent's time limitation of 30 days for redemption of its duplex excess fare receipts held unreason-

able and unjust, and such time limitation to be reasonable and just should not be less than three months from the date of issue, and should be plainly shown upon respondent's duplex receipts."

Vestibule Law Declared Unconstitutional in Texas.—The Court of Appeals at Galveston, Tex., has declared unconstitutional the vestibule law passed by the twenty-eighth Legislature of Texas.

Service Recommendation by Utilities Commission in Kansas City.—The recommendations of the Utilities Commission of Kansas City regarding changes in the schedules and methods of operating several lines of the Kansas City Railway & Light Company, Kansas City, Mo., have been referred by the City Council to the committee on streets, alleys and grades.

Ware & West Brookfield Street Railway, Secures Freight Rights Between Gilbertville and Springfield.—The Selectmen of Gilbertville, Mass., have voted to grant the Ware & West Brookfield Street Railway, Ware, Mass., the right to carry freight between the Ware and Hardwick town line and Gilbertville. The company now has right to carry freight in all the towns between Gilbertville and Springfield.

Subway Service Hearing Postponed.—The hearing before the Public Service Commission of the First District of New York which was set for Jan. 27, 1910, was postponed until Feb. 1, 1910, to give the transportation department of the commission additional time in which to tabulate the results of observations made by the inspectors of the commission. It was announced by counsel for the commission that joint observations of the traffic in the subway had been made by the representatives of the commission and of the company, and that data covering these observations would also be introduced before the commission.

Joint Use of Equipment Approved in New York.—The Public Service Commission of the Second District of New York has approved of the joint use by the Hudson Valley Railway, Glens Falls, N. Y., of its cars and electric locomotives and the steam locomotives and freight cars of the Greenwich & Johnsonville Railroad of the railroad track now built between the plant of the Standard Wall Paper Company on the westerly side of the Hudson River in Saratoga County and the plant of the Iroquois Paper Company on the eastern side of the Hudson River in Washington County, proper rules for the safe operation of the track in question having been submitted and approved by the commission.

Indiana Commission Refuses to Authorize Interurban Railway to Collect Excess Fare.—The Railroad Commission of Indiana has refused to authorize the Muncie & Portland Traction Company, Portland, Ind., to charge an excess fare when passengers who board trains at stations neglect to purchase tickets. The company complained that it had recently been annoyed by passengers tendering bills of large denomination in payment of fares on the cars. As noted in the Electric Railway Journal of Jan. 22, 1910, page 167, the Attorney-General of Indiana recently expressed the opinion to the Railroad Commission that the cash fare and the ticket fare on interurban railways in Indiana must be the same. The Railroad Commission says that the question of what constitutes legal tender in the matter of the payment of a fare is a question for the courts to decide.

Complaint Against Service in Rochester.—H. H. Edgerton, Mayor of Rochester, N. Y., has asked the Public Service Commission of the Second District of New York to conduct an inquiry into street railway operating conditions in Rochester similar to that conducted by the commission in Schenectady recently, and recommend changes which in the opinion of the commission will relieve congestion and work to the benefit of the public. In his letter to the commission, which was dated Jan. 24, 1910, Mr. Edgerton gives the following causes of complaint against service in Rochester: 1. Inadequate car service on nearly every line in the city, to provide comfortable and convenient transportation, especially during the rush hours. 2. Confusion and inconvenience caused by the near-side stop, and transfer regulation, recently put in operation by the company. 3. Congestion of cars on Main Street which seriously interferes with car movement and vehicle traffic.

Personal Mention

Mr. Fred M. Hawes has resigned as claim agent of the Middlesex & Boston Street Railway, Newtonville, Mass.

Mr. Martin S. Decker has been reappointed as a member of the Public Service Commission of the Second District of New York by Governor Hughes for the full term of five years.

Mr. Milo Roy Maltbie has been reappointed as a member of the Public Service Commission of the First District of New York by Governor Hughes for the full term of five years.

Mr. J. J. Sullivan, president of the American Railways, Philadelphia, Pa., has been elected president of the Johnstown (Pa.) Passenger Railway to succeed Mr. T. C. du Pont.

Mr. W. H. Zimmerman, formerly manager of the Michigan Power Company, Lansing, Mich., has been retained by the Michigan Railroad Commission as consulting engineer.

Mr. J. W. McNeely, trainmaster of the Paducah (Ky.) Traction Company, has been appointed to the newly-created office of superintendent of transportation of the company, which will include the duties formerly performed by him and an extension of his authority to the shops of the company.

Mr. Theodore B. Comstock has been retained as consulting engineer to the Public Utilities Commission of Los Angeles, Cal. Mr. Comstock was formerly president of the University of Arizona and at one time was connected with the department of geology at Cornell University. For some time he has acted in the West in an independent consulting capacity.

Mr. Stuart O. Winch, who has been connected with the Templeton Street Railway, East Templeton, Mass., for several years as engineer of the company's power station, has been appointed superintendent of the company to succeed Mr. J. H. Hamilton, who resigned recently. Mr. Winch will continue in the capacity of engineer of the company's power station.

Mr. Arthur L. Linn, Jr., has been appointed assistant auditor of the New York Central & Hudson River Railroad, New York, N. Y., and auditor of subsidiary lines, effective Feb. 1, 1910. Mr. Linn will also continue to exercise supervision over the accounts of the various electric railway and lighting properties controlled by the New York Central & Hudson River Railroad.

Mr. Garrett T. Seeley, who has been second vice-president and assistant to the general manager of the South Side Elevated Railroad, Chicago, Ill., has been elected second vice-president and general manager of the company, effective on Jan. 28, 1910. Before he had the duties of assistant to the general manager assigned to him Mr. Seeley was engineer of maintenance of the company.

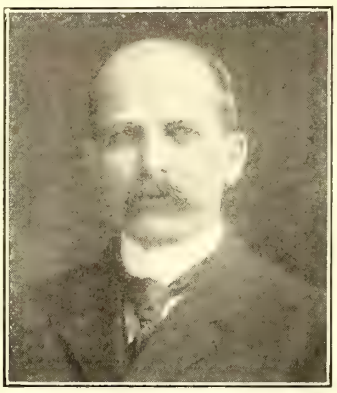
Mr. John N. Carlisle has been appointed a member of the Public Service Commission of the Second District of New York by Governor Hughes, to succeed Mr. Thomas M. Osborne, whose resignation is announced elsewhere in this issue. He will serve out Mr. Osborne's term of office, which expires on Feb. 1, 1911. Mr. Carlisle is a resident of Watertown, N. Y., and is a practising attorney.

Mr. Charles M. Durell has been appointed superintendent of the Biddeford & Saco Railroad, Biddeford, Me., to succeed the late W. A. Worthing. Mr. Durell has been connected with the Biddeford & Saco Railroad for 12 years. He served the company at first as a conductor. Subsequently he acted for seven years as car house foreman. For the last six months Mr. Durell has been acting superintendent of the company.

Mr. W. F. Bay Stewart, whose retirement as president of the York (Pa.) Railways was announced recently in the Electric Railway Journal, will continue his connection with the company as a director and as a member of the executive committee of the company. Mr. Stewart declined a re-election as president at the termination of his term of office owing to the pressure of outside duties and his desire for more leisure.

Mr. H. E. Huntington, president of the Los Angeles Railway and the Pacific Electric Railway, Los Angeles, Cal., was given a loving cup recently by the employees of the Los Angeles Railway as a token of their esteem. On one side of the cup is the inscription: "Presented to Henry E. Huntington by the conductors and motormen of the Los Angeles Railway Company, Jan. 1, 1910." On the opposite side is engraved the picture of a pay-as-you-enter car.

Mr. John F. Collins, whose appointment as assistant general manager of the Toledo Railways & Light Company, Toledo, Ohio, was announced in the ELECTRIC RAILWAY JOURNAL of Jan. 29, 1910, had under his jurisdiction as general manager and superintendent of the Saginaw & Bay City Railway & Light Company and general manager of the Saginaw Valley Traction Company, Saginaw, Mich., more than 50 miles of city and interurban electric railway, including the systems in Saginaw and Bay City and an interurban railway connecting the two cities. The operation of the company in each of these cities is separate and distinct and separate offices are maintained in each of the cities. Mr. Collins was previously connected with the Toledo Railways & Light Company as manager of railways of the company, with authority over the city lines and those of the Maume Valley Railways & Light Company, and is thoroughly familiar with the operating problems with which the Toledo Railways & Light Company is confronted. The Toledo system consists of more than 100 miles of city and suburban railway, and the company furnishes current for light and power. As previously stated, Mr. Collins expects formally to assume his duties about April 1, 1910.



J. F. Collins

Mr. Thomas M. Osborne has resigned as a member of the Public Service Commission of the Second District of New York to devote his time to strengthening the Democratic Party in New York along the lines laid down by the Democratic League. Mr. Osborne has become a member of the commission since it was created in 1907. He was born in Auburn, N. Y., in 1859, and was educated in the schools at Auburn, at Adams Academy, Quincy, Mass., and at Harvard, from which he graduated in 1884. After his graduation from college Mr. Osborne became a clerk in the farm tool factory of his father at Auburn, and later became president of the company which operated the factory. He has always been active in public affairs and was Mayor of Auburn from 1902 to 1905.

Mr. H. A. Fabian, assistant to Mr. Charles S. Mellen, president of the New York, New Haven & Hartford Railroad and the Central New England Railway, has been appointed manager of purchases and supplies of the New York, New Haven & Hartford Railroad, the Central New England Railway, New England Navigation Company, the Connecticut Company, the Rhode Island Company, the New York & Stamford Railway and the Housatonic Power Company, with offices in the South Station, Boston, Mass. As manager of purchases and supplies, Mr. Fabian will report to the president and have full authority over all purchases and matters pertaining to the testing, care and distribution of materials and supplies of every nature. Purchasing agents, general storekeepers, engineers of testing, fuel and supply agents will report to and receive instructions from him. Mr. Fabian's appointment becomes effective on March 1, 1910.

Mr. L. R. Grant has been appointed superintendent of equipment of the Seattle (Wash.) Electric Company. From 1902 to 1904 Mr. Grant was employed by the Boston & Northern Street Railway, successively as clerk in the transportation department, rodman on surveys, timekeeper in the engineering department and chief clerk in the department of motive power and machinery. In 1904 he accepted a position in the power department of the Tacoma Railway & Power Company, Tacoma, Wash., and remained with that company until April, 1905, when he became secretary of the Puget Sound Company and the Tacoma Industrial Company, acting as superintendent of the three lighting and power systems controlled by those companies. In the summer of 1908 Mr. Grant was appointed assistant superintendent of transportation of the Seattle Electric Company and continued in this office until January, 1910, when he was appointed superintendent of equipment of the company in charge of the maintenance of the rolling stock.

Mr. John T. Horton, chief claim clerk of the Norfolk & Western Railroad, Roanoke, Va., has been appointed general freight agent of the York (Pa.) Railways. Mr. Horton was born in England 45 years ago. After completing his education he spent two years with the London & Northwestern Railway and eight years in mercantile business. He came to America in 1883 and entered the employ of the New York Central & Hudson River Railroad as a clerk at Columbus, Ohio. In 1885 he entered the employ of the Norfolk & Western Railway and after holding various positions in the freight department, he became foreman of the warehouse. He served the Norfolk & Western Railway for eight years. In 1893 Mr. Horton was appointed assistant general freight agent of the Michigan & Lake Superior Company. In 1896, he became connected with the electric railways at Columbus, Ohio, controlled by the Appleyard syndicate as assistant agent and later was promoted to general freight agent, which position he held for two years. After resigning from the Appleyard properties, Mr. Horton reentered the employ of the Norfolk & Western Railway as chief claim clerk. Mr. Horton will organize the freight system of the York Railways along the lines of steam railroad practice.

Mr. H. C. Donecker, who since January, 1908, has acted as office manager of the American Street & Interurban Railway Association, has been elected secretary of the association to succeed Mr. B. V. Swenson, who resigned some time ago to become connected with Mr. Barron G. Collier. During his connection with the association as office manager, Mr. Donecker has become familiar with the work and requirements of the association, and is well qualified to succeed Mr. Swenson. Mr. Donecker has long been connected with the electric railway industry in the manufacturing, operating and engineering fields. His first business association with the industry was in 1890, with the Johnson Company, Philadelphia and Johnstown, Pa., later the Lorain Steel Company. Four years later, or in 1894, he became associated with ex-Mayor Johnson of Cleveland and his brother Albert L. Johnson in the construction and operation of the Nassau Railroad, Brooklyn, N. Y., and in 1899 entered the employ of the St. Louis (Mo.) Transit Company under Mr. J. J. Coleman, general manager of the company. In 1900 Mr. Donecker became connected with Col. Giles S. Allison of the Security Register Company, St. Louis, Mo., with whom he remained until 1906, when he entered the employ of Ford, Bacon & Davis, New York, N. Y., where his work was largely the compilation and classification of electric railway financial statistics. The experience acquired by Mr. Donecker in the various branches of electric railway work in which he has been engaged will prove of value to him as an officer of the American Street & Interurban Railway Association.



H. C. Donecker

OBITUARY

A. E. Sternenberg, who was secretary of the Houston (Tex.) Street Railway from 1872 to 1878, is dead.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Baltimore & Pennsylvania Railway, Reisterstown, Md.**—A bill has recently been introduced in the Senate to incorporate the Baltimore & Pennsylvania Railway to build an electric railway from Reisterstown to Hanover, Pa. Capital stock, $600,000. Incorporators: James H. Wilson, Jacob H. Sherman, Jacob A. Frederick, Newton S. Watts and William T. Deitrich. Permission is given the incorporators to acquire the franchise of the Hempstead & Manchester Railway.

***Bolivar-Wellsville Railway, Bolivar, N. Y.**—Incorporated in New York to build an electric railway, 19 miles long, from Bolivar to Wellsville. Franchises have been applied for in the towns through which the line will pass. Incorporators: Benjamin F. Patterson, Brooklyn; C. M. Vancuren and A. J. Matson, Bolivar.

***Catskill (N. Y.) Traction Company.**—Incorporated in New York to construct an electric railway from Hudson River dock in Catskill through Catskill, Jefferson, Leeds and South Cairo to Cairo. Capital stock, $200,000. Directors: F. N. Dubois, John H. Story, Catskill; John C. Conway, Brooklyn and L. G. Hechinger, East Orange, N. J.

***Hood River Light & Power Company, Hood River, Ore.**—Incorporated in Oregon to build an electric railroad from the mouth of the Hood River to a point in the Mount Hood district. Capital stock, $2,000,000. Incorporators: J. D. Wilcox, W. Minor and R. Smith, all of Portland.

***Scranton & Binghamton Traction Company, Scranton, Pa.**—Application will soon be made for a charter to operate a railway from Binghamton, N. Y., to Scranton, Pa., a distance of 62 miles. It is stated that the Northern Electric Street Railway, Scranton, which now operates 19 miles between these two places, will be acquired and form part of the through line. J. K. Griffiths and C. H. Campbell are interested. George R. Bedford, Wilkes-Barre, is solicitor.

***Logan Rapid Transit Company, Logan City, Utah.**—Incorporated to build an electric railway in Logan City. Capital stock, $100,000. Officers: David Eccles, president; Robert Anderson, vice-president; Joseph Quinney, Jr., secretary and treasurer.

FRANCHISES

Oakland, Cal.—The Southern Pacific Company has applied for a 50-year franchise to construct and operate an electric railway from Albany to Berkley as part of its present interurban railway system between Berkeley and San Francisco. [E. R. J., Jan. 8, '10.]

Washington, D. C.—A bill has been introduced in the Senate granting the Washington, Spa Springs & Gretta Railroad a six months' extension of time in which to complete the line in the District of Columbia.

Virginia, Minn.—The City Council has granted a franchise to W. M. Prindle, Duluth, for the construction of an electric railway in Virginia. The railway is to be extended to Eveleth and Gilbert. [E. R. J., Nov. 6, '09.]

St. Joseph, Mo.—J. H. Van Brunt has applied to the County Court for an extension of the St. Joseph & Savannah Railway's franchise from the local company's present terminus above Krug Park to the Andrew County line. The company proposes to build a 15-mile interurban railway from St. Joseph to Savannah. [E. R. J., Oct. 16, '09.]

***Bolivar, N. Y.**—C. M. Van Curen and Benjamin F. Patterson, representing the Bolivar-Wellsville Railway, have applied to the Board of Trustees for a franchise to build a street railway in Belleville which is also to extend to Wellsville, 19 miles. The rights-of-way have nearly all been secured.

***Newbern, N. C.**—Application has been made to the Board of Aldermen by W. S. X. Taylor and A. E. Stevens for a franchise for an electric railway to connect Newbern and Trenton, a distance of 18 miles.

Bryan, Ohio.—The City Council has recently granted the Fort Wayne & Toledo Electric Railway, Harlan, Ind., a franchise to construct an electric railway in Bryan. This is part of a plan to build an interurban railway which will connect Bryan, Ohio and Fort Wayne, Ind., via Hicksville, Farmer and William Center. R. T. Bastress, Harlan, general manager. [E. R. J., Sept. 23, '09.]

Beaver Falls, Pa.—The Borough Council has granted a 40-year franchise to the New Castle & Beaver Valley Street Railway to build a street railway through certain streets of Beaver Falls. Construction will begin within six months. This is part of a plan to connect New Castle and Beaver Falls. [E. R. J., Oct. 16, '09.]

***Provo, Utah.**—Jesse Knight has applied to the Council for an electric railway franchise in Provo. It is said to be the intention to build the line from Payson through Provo to Murray.

Aberdeen, Wash.—The Grays Harbor Interurban Company has applied to the County Commissioners for a new 50-year franchise for the construction of an interurban railway through Chehalis County to connect Montesano and Aberdeen. Eldredge Wheeler, Montesano, is interested. [E. R. J., Jan. 1, '10.]

***Centralia, Wash.**—Application has been made to the County Commissioners by the Tenino Light, Power & Water Company for a franchise to build an electric railway from the county line north of Centralia via Centralia to Chehalis.

TRACK AND ROADWAY

Highland Pacific Railway, Lakeport, Cal.—This company announces that all arrangements have been made for the sale of bonds for the construction of the 70-mile electric railway which will connect Santa Rosa, Lakeport and Upper Lake. A. Dickinson, president. [E. R. J., Nov. 13, '09.]

Pacific Electric Railway, Los Angeles, Cal.—Press reports quote H. E. Huntington as saying that this company will at once sell $300,000 of its bonds and with the available funds will build from Pomona to Ontario. A new route has lately been surveyed from Pomona to Corina. It is expected that cars will be running from Pomona to Los Angeles by June 1. [E. R. J., Jan. 29, '10.]

***Monrovia, Cal.**—Press reports state that Henry Bolaski is interested in a plan to build a street railway in Monrovia.

***Porterville, Cal.**—It is stated that R. D. Laidlaw, Los Angeles, and associates propose to build an electric railway from Porterville to Tulare, Poplar, Woodville, Springville and Globe. A location survey has been completed and profile maps have been drawn of the proposed line. The line will be about 87 miles long. It is said that ample power will be available from the water rights now controlled by those promoting the railway project. H. H. Holley and S. E. Henley are also interested in the company.

San Diego, El Cajon & Escondido Railway, San Diego, Cal.—It is stated that this company has begun work on the construction of its proposed electric railway in San Diego and extending to Escondido. Two years is given for the completion of the enterprise. [E. R. J., Nov. 27, '09.]

Southern Pacific Company, San Francisco, Cal.—Jere Burke, representing this company at a recent meeting of the Oakland Council, stated that the corporation would probably run an interurban service out of Oakland through San Leandro and Hayward to San José. Three different possible routes have been gone over in past several months by surveyors of the company. [E. R. J., Jan. 8, '10.]

San José (Cal.) Railroad.—The stockholders of this company, which recently merged the street railways in San José, have decided to issue bonds to the amount of $1,500,000, the proceeds of which are to be used for improvements to its system. It is stated that the First Street line will be entirely reconstructed.

***San Rafael, Cal.**—It is said that a project is being considered by the Chamber of Commerce for the construction of an electric railway from Ross Valley through San Rafael to McNear's Point. E. B. McNear and D. W. Martens are interested.

Idaho Falls (Idaho) Electric Railway.—A. V. Scott states that work will begin about April 1 on the projected railway

which is to connect Idaho Falls, Lincoln, Ammon, Iona and Heise. Capital stock, $1,000,000. Officers: J. L. Milner, Idaho Falls, president; F. L. Cleveland, Pittsburgh, Pa., vice-president; H. S. Sewell, Idaho Falls, secretary, and A. V. Scott, Idaho Falls, treasurer. [E. R. J., Jan. 1, '10.]

Mascontah-Belleville Traction Company, Belleville, Ill.—This company has filed for record at Belleville a 25-year mortgage in favor of the Illinois State Trust Company of East St. Louis as trustee to secure an issue of $150,000 of 5 per cent bonds. This company proposes to build an electric railway from Mascontah to Belleville. [E. R. J., May 15, '09.]

Union Elevated Railway, Chicago, Ill.—This company advises that it will place contracts during the next six weeks for the reconstruction of 4 miles of single track. F. J. Guernsey, purchasing agent.

Hammond, Chicago Heights & Southern Traction Company, Chicago, Ill.—Official announcement is made that this company has begun work on its 16-mile railway from Hammond to Lansing. Repair shops will be located at Lansing. Headquarters, 1145 First National Bank Building, Chicago. The company will purchase power and operate six cars. Capital stock, authorized and issued, $500,000. Bonds, authorized, $250,000. Officers: William S. Reed, president; Joseph Orr, vice-president; Alfred Van Steenberg, secretary, and E. R. Davis, treasurer. [E. R. J., Jan. 22, '10.]

Southern Traction Company of Illinois, East St. Louis, Ill.—This company has filed with the city clerk of East St. Louis a bond for $10,000 as a guarantee that the line will be in operation in East St. Louis by July 1. The line when completed will connect Belleville and East St. Louis. About 15 miles are under construction. William E. Trautman, president. [E. R. J., Jan. 8, '10.]

Winona Interurban Railway, Warsaw, Ind.—This company on Jan. 25 completed track-laying on the gap between Mentone and Chile, 24 miles. The company already has 25 miles in operation from Goshen to Warsaw and 20 miles in operation on the Peru division. Passenger and freight service will be installed between Warsaw and Peru when the ballasting is completed, which will be about Feb. 15.

***Charles City, Ia.**—It is stated that C. W. Hart, Charles City, has offered to subscribe $100,000 toward the construction of a street railway in Charles City if an additional $100,000 is subscribed by the people of Charles City. It is planned to have the interurban line reach about 40 miles of the surrounding country.

***Boothbay Harbor, Maine.**—It is reported that plans are being considered for the formation of a company to build an electric railway which will connect Boothbay Harbor and South Newcastle, a distance of 10 miles. Among those interested are Amos F. Gerald, Fairfield, and Luther Maddocks, Boothbay Harbor.

***East Grand Forks, Minn.**—It is reported that C. H. Anderson, East Grand Forks, is interested in a plan to establish an electric railway between Grand Forks and Oslo.

Detroit, Lansing & Grand Rapids Railway, Detroit, Mich.—It is announced that this company has surveyors at work on the proposed electric railway which will connect Farmington and Lansing. They expect to complete their work by March. The railway will connect with the Detroit United Railway at Farmington, thus making a direct electric route from Detroit to Lansing. [E. R. J., Dec. 18, '09.]

***Asbury Park, N. J.**—It is stated that H. W. Leland is obtaining right of way to construct an electric railway from Cookman Avenue to the west side of Asbury Park to Asbury Avenue and from Colt's Neck and Jerseyville to Freehold.

Caldwell, N. J.—A temporary organization for the purpose of operating a street railway in Caldwell equipped with the Edison storage battery cars has been effected by the selection of William Shears as president; Wilbur B. Guild, vice-president, and John J. Ottenheimer, secretary. [E. R. J., Jan. 29, '10.]

Millville (N. J.) Traction Company, George Wood, president, it is stated, will build a railway to Port Norris, providing the residents along the route will subscribe to $75,000 worth of stock at 5 per cent interest. The stock of the Millville Traction Company is to be merged with the new line.

Manhattan Bridge Three-Cent Line, Brooklyn, N. Y.—The Public Service Commission has set Feb. 9 as the date for a hearing on the application of the company for a certificate of public convenience and a necessity for the construction of a street railway to connect with each end of the Manhattan Bridge and through Canal Street to the Hudson River, a distance of about 5 miles. John C. Brackenridge, vice-president. [E. R. J., Jan. 15, '10.]

Elizabeth (N. Y.) Terminal Railway.—This company is making progress toward the construction of its railway between Elizabethtown and Westport. General bids are being received, and the contract for the entire work, it is said, will be let within 10 days. The company will have a hearing before the Public Service Commission at Albany Feb. 7, when application will be made for authority to issue its stock and $150,000 30-year 6 per cent gold bonds. [E. R. J., Jan. 22, '10.]

Rockland Railroad, New York, N. Y.—The Public Service Commission of the Second District has authorized this company to execute a mortgage upon all its property for the sum of $3,000,000 securing an issue of 5 per cent 50-year gold bonds for the same amount and allowing the issuance at the present time of $2,350,000 of such bonds. Bonds are to be sold at not less than 85. The company is authorized to issue at the present time $1,050,000 of common stock, of which $415,700 of the stock is to be issued in payment for all preliminary expenses in connection with the promotion of the railway in Rockland County, which is to be 49 miles long. The proceeds of the balance of the stock and the bonds authorized are to be used for the construction of the line. The remainder of the bonds and the balance of the authorized stock shall not be issued except upon further order of the commission. [E. R. J., Nov. 20, '09.]

Union Traction & Terminal Company, Marshfield, Ore.—This company advises that it has started construction work on its projected electric railway between Marshfield and North Bend. Power plant and repair shops will be located at Marshfield. Capital stock, $100,000. Officers: J. M. Blake, president; G. W. Kaufman, vice-president; Robert O. Graves, secretary, all of Marshfield. [E. R. J., Jan. 1, '10.]

Portland Railway, Light & Power Company, Portland, Ore.—This company announces that work will begin soon on a 4-mile branch from West Oregon City to Oswego. It will be an extension of the Willamette Falls Railway running south from West Oregon City past Willamette. It is reported that the company will build a bridge across the Willamette River at Rock Island and build an electric railway into the New Era, Molalla and Marquam country. [E. R. J., May 20, '09.]

Clarion & East Brady Electric Railway, Clarion, Pa.—This company has completed the final surveys and will award contracts early in the spring for the construction of a 13-mile railway which will connect Clarion and East Brady via Reidsburg and Philipston. At Reidsburg connection is made with the Franklin & Clearfield branch of the New York Central & Hudson River Railroad and at East Brady the Allegheny Valley Railroad is reached. Geo. E. Arnold, Clarion, president. [E. R. J., Sept. 4, '09.]

Pittsburgh (Pa.) Subway Company.—This company, which is seeking a franchise from the city for the construction of an underground electric railway system, has deposited with the city a bond of $100,000 as a guarantee to carry out its project. The franchise ordinance was introduced in the Council last April. [E. R. J., March 27, '09.]

Aberdeen (S. D.) Street Railway.—At a recent meeting of the stockholders of this company it was decided to proceed at once with the construction of the 4-mile street railway in Aberdeen. Charles N. Herreid, general manager. [E. R. J., Dec. 4, '09.]

San Angelo (Tex.) Street Railway.—This company expects to build about 4 miles of new track this year, but has not decided when contracts will be placed. Samuel Crowther, president.

Ogden (Utah) Rapid Transit Company.—This company has taken steps toward completing the electric railway between Ogden and Brigham City. The railway is in operation between Ogden and Hot Springs, half way to Brigham City, and about 12 miles remain to be completed. Joseph West, chief engineer.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—This company expects to build 1 mile extension to its city lines, and also double-track some of its present city mileage. Ernest Gonzenbach, president.

SHOPS AND BUILDINGS

Washington, Baltimore & Annapolis Electric Railway, Washington, D. C.—This company is preparing plans for the erection of a two-story brick and reinforced concrete terminal station on West Lombard Street, Washington. The dimensions of the structure will be 80 ft. x 170 ft. The lower floor will be divided into two sections, one for freight and the other for cars. The building will also contain offices, repair shop and sand and track pits.

Winona Interurban Railway, Warsaw, Ind.—This company expects to place contracts during the next four weeks for the purchase of tools and the erection of new repair shops.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—Contracts have been awarded by this company for the erection of a car house. W. F. Gorenflo, Gulfport, purchasing agent.

Interborough Rapid Transit Company, New York, N. Y.—This company will build a two-story wing to its car house at Lenox Avenue and 148th Street, to be used for a recreation hall for its employees. The annex will be built of concrete and will be 85½ ft. x 62 ft. The estimated cost is $30,000.

Warren & Jamestown Street Railway, Warren, Pa.—The Public Service Commission of the Second District of New York has closed upon its records the complaint of the residents of Fentonville, Chautauqua County, against this company as to the need of a waiting room and platform at that place, the offer of the company to erect a station having satisfactorily disposed of the complaint.

POWER HOUSES AND SUBSTATIONS

San Francisco, Oakland & Son José Consolidated Railway, Oakland, Cal.—This company has recently purchased a 5000-hp Hamilton Corliss cross-compound engine and a 2700-kw, 600-volt, d.c. General Electric railway generator.

Great Falls & Old Dominion Railway, Washington, D. C.—This company announces that it expects to purchase a 750-kw turbo-generator set. Theodore J. Kink, chief engineer.

Pittsfield (Mass.) Electric Street Railway.—This company has ordered from the Warren Steam Pump Company, Warren, two condensers for installation in its power plant in Pittsfield.

Rochester Railway & Light Company, Rochester, N. Y.—The Allis-Chalmers Company is installing two hydraulic turbines in the power station of the Rochester Railway & Light Company. One machine has a capacity of 900 hp and the other 2100 hp.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—This company advises that it expects to construct a new power station. Orders have been placed for two 500-kw, d.c., Canadian General Electric alternators and two 750-hp Goldie-McCulloch Corliss engines. James Anderson, general manager. [E. R. J., Dec. 4, '09.]

West Penn Railways, Pittsburgh, Pa.—This company expects to increase the capacity of its Greene Junction power station by the installation of two 12,000-hp turbo-generators. H. F. Barnard, Pittsburgh, purchasing agent.

Virginia Railway & Power Company, Richmond, Va.—This company has awarded a contract to the Westinghouse Electric Manufacturing Company for a 6000-hp turbo-generator. When installed the plant will have a capacity of 24,000 hp.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—This company expects to purchase an 800-kw low-pressure steam turbine and condenser. Ernest Gonzenbach, president.

Manufactures & Supplies

ROLLING STOCK

Municipal Traction Company, Cleveland, Ohio, will soon buy 250 new cars.

Old Colony Street Railway, Boston, Mass., has purchased eight 14-bench and eight 12-bench open cars.

Humboldt Transit Company, Eureka, Cal., has ordered four cars from the W. L. Holman Car Company, San Francisco.

Central California Traction Company, San Francisco, Cal., has placed an order with the W. L. Holman Car Company, San Francisco, for four cars.

Ferrocarriles, Urbanes de Jimenez, Jimenez, Estado de Chihuahua, Mex., will buy 16 pairs of standard-gage wheels with journal boxes for horse cars.

Portland (Me.) Railroad has ordered three 28-ft. closed cars mounted on Brill 27-G trucks and two 12-bench open cars mounted on Brill 39-E trucks from The J. G. Brill Company.

Hummelstown & Campbellstown Street Railway, Hershey, Pa., has contracted with The J. G. Brill Company for one 30-ft. semi-convertible car to be mounted on Brill 27-G trucks.

Boston & Northern Street Railway, Boston, Mass., has placed an order with The J. G. Brill Company for 32 14-bench and eight 12-bench open cars to be mounted on Standard trucks.

Emigration Cañon Railroad, Salt Lake City, Utah, has ordered one 35-ton electric locomotive from the Westinghouse Electric & Manufacturing Company, which will be delivered in 90 days.

Metropolitan Street Railway, Kansas City, Mo., reported in the Electric Railway Journal of Nov. 27, 1909, as being in the market for 50 cars, providing a franchise extension was granted, will not buy cars.

Ottawa (Ont.) Electric Railway has placed an order with the Ottawa Car Company for two 21-ft. vestibuled city cars and with the Preston Car & Coach Company for three 35-ft. vestibuled open interurban cars.

Columbia Electric Street Railway, Light & Power Company, Columbia, S. C., will buy either two or four pay-as-you-enter cars in February. That some cars would be bought was mentioned in the Electric Railway Journal of Dec. 25, 1909.

Whatcom County Railway & Light Company, Bellingham, Wash., reported in the Electric Railway Journal of Dec. 18, 1909, as receiving bids on three 46-ft. cars, will order these cars through Stone & Webster Engineering Corporation.

Union Traction Company, Sisterville, W. Va., reported in the Electric Railway Journal of Nov. 27, 1909, as contemplating the purchase of several cars, has ordered two 33-ft.-4-in. closed cars and one 15-bench open car from Jewett Car Company, Newark, Ohio.

Virginia Railway & Power Company, Richmond, Va., has purchased 20 32-ft. closed pay-as-you-enter cars from The J. G. Brill Company. That these cars would be bought was mentioned in the Electric Railway Journal of Dec. 11, 1909. General Electric motors were ordered for use on these cars.

Dominion Power & Transmission Company, Hamilton, Ont., reported in the Electric Railway Journal of November 20, 1909, as contemplating the purchase of 10 cars, has purchased this number of double-truck pay-as-you-enter cars from the Ottawa Car Company to be mounted on Brill 27-G1 trucks.

Los Angeles-Pacific Railroad, Los Angeles, Cal., mentioned in the Electric Railway Journal of Oct. 30, 1909, as contemplating the purchase of a large number of motor cars for use on the Santa Monica branch of the Southern Pacific Railroad, has placed an order with the American Car & Foundry Company for 125 all-steel car bodies to be mounted on Baldwin Locomotive Works' trucks. The cars will be equipped with GE motors and Westinghouse brakes and compressor sets.

Detroit (Mich.) United Railway has just placed orders for the following equipment: 75 double-truck city cars with platform arrangements for pay-as-you-enter operation and 14 interurban cars. The Niles Car & Manufacturing Company will build the interurban cars and 25 of the city cars. The other 50 city cars will be built by the G. C. Kuhlman Car Company. The 75 new city cars will have the following dimensions: Length of body, 31 ft. 3 in.; length over bumpers, 42 ft. 3 in.; width over all, 8 ft. 6½ in. The bodies will each be mounted on two Standard Type O-50 trucks with 5-ft. wheel base. K-35 General Electric control will be used with two Westinghouse 310-C interpole motors. The 14 new interurban cars will be of two sizes. Four will have the following dimensions: Length over end panels, 36 ft. 2 in.; length over bumpers, 46 ft. 4 in.; width over all, 8 ft. 8½ in. Baldwin M.C.B. Class 78-22-A trucks; four Westinghouse No. 310-C interpole motors and General Electric K-36-B control were specified. These cars will be used for short interurban runs. The other 10 large interurban cars will have the following characteristics: Length over end panels, 41 ft. 10½ in.; length over bumpers, 52 ft. 7½ in.; width over all, 8 ft. 8¾ in. Baldwin M.C.B. Class 78-25-A trucks, four Westinghouse No. 317 interpole motors and General Electric K-36-B control were ordered. All the new interurban cars will have Peter Smith hot water heaters, upholstered seats and toilet rooms. Report of this contemplated purchase was made in the ELECTRIC RAILWAY JOURNAL of Jan. 22, 1910.

TRADE NOTES

Indian Refining Company, Inc., Cincinnati, Ohio, has appointed J. V. Smith manager of its department of railway lubrication. Mr. Smith was formerly with the Galena Signal-Oil Company as salesman for five years.

Catalogs Desired.—G. D. Ellsworth, purchasing agent of the International Railway, Buffalo, N. Y., is revising his catalog file and would appreciate the receipt of recent issues of catalogs covering goods used by the company.

Baldwin Locomotive Works, Philadelphia, Pa., received the following truck orders during January: Lehigh Valley Transit Company, 36 motor trucks; Portland (Ore.) Railway, four motor trucks; Standard Roller Bearing Company, two motor trucks; Oregon Electric Railway, 10 motor trucks.

National Brake Company, Buffalo, N. Y., announces the appointment of S. A. Benedict to look after the interests of the company in the territory west of Buffalo. Mr. Benedict was for six years secretary of the J. P. Devine Company, Buffalo, N. Y., and is well known throughout the electric railway field.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., has opened an office in the Hudson Terminal Buildings, 50 Church Street, New York, N. Y., for the convenience of patrons. The main office of the company will remain as hitherto at the works in Brooklyn, to which all communications should be addressed.

C. P. Nachod, general manager of the Nachod Signal Company, Philadelphia, Pa., will deliver a lecture on the evening of Feb. 17, 1910, before the Franklin Institute on the subject "Electric Railway Signaling," with particular reference to a contact system which will be exhibited at the time. Electrical engineers and others interested in electric railways in the vicinity and visitors to Philadelphia are cordially invited to be present.

Warren Ross Lumber Company, Jamestown, N. Y., handles mahogany and cherry lumber for trolley cars. The company makes a specialty of catering to the requirements of car building companies and electric railways and carries on hand at Jamestown, N. Y., a large and complete assortment of cherry. It is well equipped to supply this material for the interior trim of electric railway cars. The company is also a direct importer of mahogany and carries a very fine selection in stock.

Norman C. Hayner Company, Rochester, N. Y., received a letter under date of Jan. 29, 1910, from the purchasing agent of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, saying that that company had used the Hayner germicide Killitol since October, 1909, and that it had proved very satisfactory. Killitol is applied twice a week in the toilets of the company's interurban cars and the floors of its regular passenger coaches and its baggage cars, and no trouble has been experienced with bad odors since its use was commenced.

F. A. Hall, who for the last 12 years has been manager of the chain block and hoist department of the Yale & Towne Manufacturing Company, New York, N. Y., with works at Stamford, Conn., has resigned to become vice-president and treasurer of the Cameron Engineering Company, of Brooklyn, N. Y. Mr. Hall's successor with the Yale & Towne Manufacturing Company will be R. T. Hodgkins, who for several years has been his chief assistant, and who is thoroughly qualified to perform the duties of the position. In his new connection Mr. Hall expects to make a specialty of trolleys and appliances for overhead handling of materials, and in connection therewith, to make use of the Yale & Towne blocks and hoists, with the sale of which he has so long been prominently identified.

ADVERTISING LITERATURE

Liberty Manufacturing Company, Pittsburgh, Pa., is mailing a postal card calling attention to its Cyclone tube cleaners.

Kelman Electric & Manufacturing Company, Los Angeles, Cal., is distributing bulletin No. 6 on high-voltage, disconnecting switches made for 10,000 volts to 80,000 volts with a current-carrying capacity of 100 amp to 300 amp.

Calendars for 1910 have been received from Henry W. Brooks, Jr., & Company, of New York, certified public accountants, and from Frank Ridlon Company, Boston, dealers in and manufacturers of street railway apparatus and supplies.

Western Electric Company, Chicago, Ill., has issued a booklet in which is described the manufacture of lead-covered cable in the large and well-equipped cable plant of the company. Illustrations are presented of a storm-proof, 600 pair of B. & S. gage, paper-insulated, lead-covered Western Electric cable, the manufacture of telephone cable, and the Hawthorne works of the company.

Holland Trolley Supply Company, Cleveland, Ohio, has issued a striking four-page illustrated pamphlet describing its well-known trolley specialties which include ball-bearing **trolley bases, harps, wheels, anti-friction pin plate** for trolley bases, sleet cutters, sleet wheels, trolley poles, trolley and bell cord, etc. The company has also issued a pamphlet regarding its new trolley grease, which, it asserts, will permit a trolley wheel to run seven to 10 days without inspection or relubrication.

W. J. Jeandron, New York, N. Y., sole agent in the United States for Le Carbone carbon brushes, has issued a 50-page booklet in which the history of the Le Carbone brush is reviewed and data given about the brushes for traction service, compressor motors, stationary generators and motors, etc. Classification of the brushes has been made as to low, medium and high conductivity. The company also calles attention to its Le Carbone carbon packing rings for high-speed engines.

Deming Company, Salem, Ohio, has issued an attractive and useful pocket diary for 1910 bound in leather. It bears the title "Every Day's Doings" and the Deming phrase "When water flows up hill." Aside from the diary, there are a number of pages of maps and useful statistical matter. The 10 pages devoted to descriptions and illustrations of Deming pumps for all purposes are very interesting and contain information about machinery of this kind which adds greatly to the value of the publication.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has issued Bulletin No. 1001, dated January, 1910, entitled "Despatchers' Signals for Electric Interurban Railroads" which contains a description of the company's telephone despatching signals for electric interurban railways and an article on their value. A feature of the publication is a double-page illustration showing an open view of the despatcher's office equipment, the intermediate station equipment and the terminal station equipment, also a closed view of the despatcher's office equipment, the intermediate station equipment and the terminal equipment.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit. ‡Includes Ferry earnings up to April 1, 1909. xIncludes other income received.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Dec. '09	182,912	*101,555	81,358	43,210	38,148
	1 " " '08	164,454	*86,147	74,306	43,999	30,307
	12 " " '09	2,177,642	*1,190,057	987,585	524,066	463,519
	12 " " '08	1,890,473	*1,086,424	804,050	526,532	277,517
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Nov. '09	36,856	19,763	17,093	8,517	8,576
	1 " " '08	32,971	18,694	14,277	8,861	5,416
	12 " " '09	405,071	226,709	178,362	100,124	78,238
	12 " " '08	358,094	205,609	152,485	98,429	54,056
BINGHAMTON, N. Y. Binghamton St. Ry.	1m., Nov. '09	25,911	15,909	10,002	8,931	1,071
	1 " " '08	24,823	15,827	8,996	8,748	248
	11 " " '09	313,951	179,988	133,963	99,338	34,625
	11 " " '08	290,328	170,575	119,753	92,098	27,655
CHARLESTON, S. C. Charleston Con. Ry., Gas & Elec. Co.	1m., Dec. '09	69,532	44,801	24,731	13,917	10,814
	1 " " '08	67,995	44,803	23,192	13,817	9,375
	10 " " '09	650,089	415,517	234,572	139,167	95,406
	10 " " '08	637,658	413,027	224,632	137,992	86,640
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad	1m., Nov. '09	122,789	69,526	53,263	29,586	23,677
	1 " " '08	109,912	64,969	44,943	27,723	17,219
	5 " " '09	740,805	372,108	368,696	146,663	222,034
	5 " " '08	671,467	346,198	325,269	138,481	186,787
CLEVELAND, O. Cleveland, Painesville & Eastern R. R	1m., Dec. '09	23,600	*12,428	11,172	8,428	2,744
	1 " " '08	32,763	*12,707	20,056	8,277	11,780
	12 " " '09	321,173	*163,909	157,264	101,283	55,981
	12 " " '08	305,745	*168,494	137,250	96,736	40,515
Lake Shore El. Ry.	1m., Dec. '09	89,062	*47,755	41,308	35,011	6,296
	1 " " '08	80,286	*47,193	33,093	34,481	†1,388
	12 " " '09	1,109,084	*586,184	522,900	414,950	107,949
	12 " " '08	1,035,650	*581,549	454,102	390,733	63,369
DALLAS, TEX. Dallas Electric Corporation.	1m., Nov. '09	121,215	68,780	52,435	27,471	24,964
	1 " " '08	105,194	66,355	38,839	28,395	10,444
	12 " " '09	1,307,186	812,326	494,860	337,856	157,004
	12 " " '08	1,162,592	782,856	379,736	350,733	29,003
DAVENPORT, IA. Tri-City Ry. & Lt. Co	1m., Dec. '09	204,859	110,659	94,200	.....	.....
	1 " " '08	178,259	96,652	81,607	.....	.....
	12 " " '09	2,038,728	1,148,141	890,587	.....	.....
	12 " " '08	1,819,077	1,069,317	749,760	.....	.....
EL PASO, TEX. El Paso Elec. Co.	1m., Nov. '09	56,069	31,302	24,767	8,398	16,370
	1 " " '08	47,597	34,684	12,913	7,508	5,405
	12 " " '09	596,486	364,863	231,621	96,580	135,041
	12 " " '08	529,820	381,818	148,002	85,280	62,722
FAIRMONT, W. VA. Fairmont & Clarksburg Trac. Co.	1m., Dec. '09	42,261	16,019	26,242	.....	.....
	1 " " '08	36,808	12,912	23,896	.....	.....
	12 " " '09	472,251	165,432	306,819	.....	.....
	12 " " '08	416,882	145,884	270,998	.....	.....
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Nov. '09	123,651	69,771	53,880	.....	.....
	1 " " '08	111,794	58,996	52,798	.....	.....
	11 " " '09	1,284,806	748,696	536,111	.....	.....
	11 " " '08	1,203,885	672,396	531,498	.....	.....
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Nov. '09	105,253	57,097	48,156	16,190	31,967
	1 " " '08	93,282	55,631	37,651	14,915	22,736
	12 " " '09	1,248,516	686,029	562,488	202,247	360,240
	12 " " '08	1,067,475	622,356	445,118	186,675	258,443
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Nov. '09	109,058	61,246	47,812	22,986	24,827
	1 " " '08	104,446	59,593	44,853	20,941	23,912
	12 " " '09	1,202,675	705,482	497,193	261,536	235,657
	12 " " '08	1,079,118	625,620	453,498	242,793	210,705
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Nov. '09	80,326	43,200	37,126	18,590	18,536
	1 " " '08	74,220	33,925	40,295	21,070	19,225
	11 " " '09	938,869	447,670	491,199	208,675	282,524
	11 " " '08	858,792	428,267	430,525	205,977	224,548
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Dec. '09	66,741	49,242	17,499	.....	.....
	1 " " '08	61,081	45,137	15,944	.....	.....
	12 " " '09	754,488	558,811	195,677	.....	.....
	12 " " '08	708,295	556,940	151,355	.....	.....
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Nov. '09	24,915	13,547	11,367	6,216	5,152
	1 " " '08	21,591	12,063	9,529	5,836	3,693
	12 " " '09	318,716	171,616	147,100	72,025	75,076
	12 " " '08	260,483	146,301	114,183	58,658	55,525
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Nov. '09	45,611	23,053	22,558	9,482	13,077
	1 " " '08	36,882	20,199	16,683	9,020	7,663
	12 " " '09	476,731	268,637	208,094	112,649	95,445
	12 " " '08	425,116	250,862	174,253	110,351	63,903
KANSAS CITY, KAN. Kansas City-Western Ry.	1m., Dec. '09	27,509	20,263	7,246	6,875	x550
	1 " " '08	28,439	18,389	10,050	6,871	x3,225
	6 " " '09	191,369	118,921	72,448	41,250	x32,059
	6 " " '08	182,927	110,258	72,669	41,200	x31,640
LIMA, OHIO. Western Ohio Ry.	1m., Dec. '09	40,623	22 688	17,935	15,402	2,533
	1 " " '08	36,232	21,360	14,872	14,866	6
	6 " " '09	268,463	138,578	129,885	92,659	37,226
	6 " " '08	240,524	128,198	112,326	91,180	21,146
MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co.	1m., Dec. '09	435,354	204,348	231,007	90,309	140,697
	1 " " '08	401,110	170,326	230,784	101,916	128,869
	12 " " '09	4,355,007	2,118,902	2,236,105	1,268,827	967,278
	12 " " '08	3,991,105	1,983,805	2,007,300	1,197,201	810,098
Milwaukee Lt., Ht. & Trac. Co.	1m., Dec. '09	166,770	34,569	132,201	67,624	64,577
	1 " " '08	182,359	30,425	151,934	60,731	91,203
	12 " " '09	1,519,780	392,078	1,127,702	779,336	348,366
	12 " " '08	1,471,477	371,072	1,100,405	716,941	383,464
MINNEAPOLIS, MINN. Twin City Rapid Transit Co.	1m., Nov. '09	580,795	273,044	307,751	140,251	167,500
	1 " " '08	526,574	259,780	266,794	143,667	123,127
	11 " " '09	6,354,177	2,982,786	3,371,391	1,529,012	1,842,379
	11 " " '08	5,846,542	2,897,698	2,948,844	1,427,456	1,521,388
MONTREAL, CAN. Montreal St. Ry.	1m., Dec. '09	337,563	212,000	125,557	34,481	91,076
	1 " " '08	304,885	203,119	101,767	30,727	71,039
	3 " " '09	1,026,441	586,879	439,562	96,345	343,218
	3 " " '08	935,071	549,195	385,876	90,569	295,307
NORFOLK, VA. Norfolk & Portsmouth Trac. Co.	1m., Nov. '09	155,756	85,495	70,261	64,208	6,053
	1 " " '08	‡156,732	87,332	69,400	65,762	3,638
	11 " " '09	‡1,748,495	1,006,832	741,663	709,898	31,765
	11 " " '08	‡1,708,761	1,010,919	697,842	723,720	†85,878
PADUCAH, KY. Paducah Traction & Light Co.	1m., Nov. '09	20,710	11,319	9,391	6,621	2,770
	1 " " '08	19,108	10,981	8,126	6,709	1,417
	12 " " '09	227,210	132,575	94,635	81,638	12,997
	12 " " '08	227,104	135,669	91,434	82,875	8,560
PENSACOLA, FLA. Pensacola Electric Co.	1m., Nov. '09	21,176	12,362	8,814	4,509	4,305
	1 " " '08	18,666	11,046	7,620	4,271	3,350
	12 " " '09	245,049	140,443	104,606	52,316	52,290
	12 " " '08	209,974	146,847	63,127	51,371	11,756
PHILADELPHIA, PA. American Rys. Co.	1m., Dec. '09	252,178	.....	.....	.....	.....
	1 " " '08	237,531	.....	.....	.....	.....
	6 " " '09	1,563,415	.....	.....	.....	.....
	6 " " '08	1,473,188	.....	.....	.....	.....
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Nov. '09	8,628	6,450	2,178	1,756	422
	1 " " '08	8,331	7,013	1,318	2,119	†801
	12 " " '09	130,747	91,748	38,999	22,013	16,987
	12 " " '08	121,672	89,732	31,940	26,894	5,045
PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Dec. '09	432,666	182,277	250,389	129,812	120,577
	1 " " '08	386,797	177,923	208,874	116,606	92,268
	12 " " '09	4,818,022	2,196,496	2,621,526	1,493,039	1,128,487
	12 " " '08	4,351,676	2,122,486	2,229,190	1,384,542	944,648
ROCKFORD, ILL. Union Railway, Gas & Electric Co.	1m., Nov. '09	251,350	134,711	116,639	65,027	51,612
	1 " " '08	226,808	117,156	109,652	64,835	44,817
	11 " " '09	2,534,338	1,301,649	1,232,689	708,344	524,345
	11 " " '08	2,326,110	1,202,442	1,123,668	696,184	427,484
ST. LOUIS, MO. United Rys. Co. of St. Louis.	1m., Dec. '09	918,328	*601,491	316,837	232,176	84,661
	1 " " '08	910,288	*555,430	354,858	233,866	120,992
	12 " " '09	11,111,431	*7,028,178	4,083,253	2,798,182	1,285,071
	12 " " '08	10,593,166	*6,737,460	3,855,706	2,798,738	1,056,968
SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Nov. '09	619,313	352,570	266,743	.....	.....
	1 " " '08	574,522	316,333	258,189	.....	.....
	11 " " '09	6,810,118	3,862,445	2,947,673	.....	.....
	11 " " '08	6,262,900	3,899,679	2,363,221	.....	.....
SAVANNAH, GA. Savannah Elec. Co.	1m., Nov. '09	51,088	33,516	17,572	17,555	17
	1 " " '08	54,949	34,194	20,755	17,566	3,189
	12 " " '09	607,527	393,404	214,123	209,171	4,952
	12 " " '08	595,384	390,850	204,534	207,099	†2,565
SEATTLE, WASH. Seattle Elec. Co.	1m., Nov. '09	451,533	265,088	186,445	104,184	82,261
	1 " " '08	398,795	236,679	162,116	95,797	66,319
	11 " " '09	5,372,280	3,105,503	2,266,777	1,138,953	1,127,824
	11 " " '08	4,103,860	2,416,759	1,687,101	993,934	693,167
SYDNEY, N. S. Cape Breton Elec. Co., Ltd.	1m., Nov. '09	22,784	11,889	10,894	5,049	5,846
	1 " " '08	21,789	11,313	10,476	4,896	5,580
	12 " " '09	238,167	142,446	95,721	60,340	35,381
	12 " " '08	250,583	143,690	106,893	59,407	47,486
TACOMA, WASH. Puget Sound Electric Ry.	1m., Nov. '09	139,018	97,507	41,511	48,930	†7,419
	1 " " '08	132,352	89,882	42,470	43,399	†930
	12 " " '09	1,856,678	1,234,895	621,783	564,323	57,460
	12 " " '08	1,629,729	1,031,741	597,988	515,514	82,473
TAMPA, FLA. Tampa Elec. Co.	1m., Nov. '09	52,900	28,583	24,317	4,594	19,723
	1 " " '08	49,176	31,412	17,763	4,414	13,349
	12 " " '09	589,977	346,280	243,697	56,362	187,335
	12 " " '08	548,406	364,432	183,974	35,608	148,365
TOLEDO, OHIO. Toledo Rys. & Lt. Co.	1m., Dec. '09	263,552	136,305	127,247	75,927	51,320
	1 " " '08	236,067	120,356	115,711	72,125	43,586
	12 " " '09	2,733,177	1,526,120	1,207,057	879,503	327,554
	12 " " '08	2,542,110	1,377,022	1,165,089	851,782	313,307
TORONTO, ONT. Toronto Ry.	1m., Nov. '09	325,417	168,112	157,305	.....	.....
	1 " " '08	286,957	126,643	160,314	.....	.....
	11 " " '09	3,515,684	1,789,199	1,726,485	.....	.....
	11 " " '08	3,223,036	1,708,838	1,514,198	.....	.....

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The American Association Papers

Through a wise decision of the executive committee of the American Street & Interurban Railway Association, abstracts of the papers presented at the mid-year meeting of the American Street & Interurban Railway Association on Jan. 28 are made public. The papers were originally prepared as addresses for executive sessions, but the facts given in them were so instructive that it was decided to print them, and with the permission of the authors, abstracts are published elsewhere in this issue. All of the papers relate broadly to the subject of how a fair return can be secured upon investment in electric railway properties. Thus, Mr. Sergeant draws attention to the low rate now being secured in an industry in which there is considerable risk and to the erroneous impression held by the public in general as to the profits gained in electric railway undertakings. Mr. Clark quotes from various authorities the enormous increases which have occurred during the past five years in the cost of labor and materials required in electric railway operation, and points out methods by which the public can be made familiar with these facts. The paper of Mr. Ford is devoted to a discussion of the subject of depreciation. It presents, in brief, the somewhat divergent rules of State and Federal authorities concerning the treatment of depreciation of railway properties and describes a method which has been applied on one property. Mr. Sullivan's address was a complete exposition of the history and work of the Massachusetts Board of Railroad Commissioners, and it was received with close attention as a critical account of the results accomplished by the public regulating body which, so far as street railways are concerned, has been the most conspicuous example of commission rule in the country.

These four papers will give to those who are familiar with the conditions upon individual electric railway properties a very clear understanding of the status of the industry as a whole. To those who are not so conversant with the subject they are of the greatest value because they summarize a situation which is of almost as vital interest to the public as to the railway companies themselves. Taken in connection with the address of President Shaw at the mid-year meeting, they constitute an unanswerable argument in favor of some radical change in the policies generally pursued toward public-service corporations, if the latter are to give efficient service.

The present seems to be an appropriate time for driving this lesson home. The fact that there has been an increase in the price of nearly every article used in individual consumption is a matter of common knowledge, but all do not as fully realize that the "cost of living" of public-service corporations has increased in like ratio. We believe that if the publication of these four papers will assist in extending a knowledge of this fact, the authors of the papers will feel fully repaid for the work expended in their preparation.

Repair Methods and Overhauling Period

A number of large city railways with practically the same class of equipment have adopted 10,000 car-miles as their overhauling interval, but with very different results. Of course, when a railway establishes a standard of this kind for its electrical car equipment, the presumption is that the motors, controllers, circuit breakers and other parts will operate without serious breakdowns until the next overhauling period falls due. If the mileage lost through "run-ins" of electric apparatus does not exceed, say, one-tenth of 1 per cent of revenue mileage, it is fair to say that the company has an overhauling basis which is not too large. Of course, the efficiency of the motormen has a great deal to do with the number of repairs required, but thoroughness in electric repair work is usually the more important factor in fixing the length of the interval between overhaulings.

One company, whose winter record of "run-in" mileage per 1,000 car-miles operated is only 0.75 mile, ascribes this excellent performance to the fact that every part of its motor repairs, controller overhauling, circuit-breaker calibration, and the like, is done at the bench. This method insures thorough performance, because the apparatus is repaired with the best available tools in the most convenient position and under the eyes of the shop foremen. Bench work is not an unmixed blessing, however, because if the different leads and terminals are frequently reconnected they are apt to deteriorate rapidly. It therefore appears advisable to adopt a middle course, and take to the bench only those parts which, in the judgment of the foreman, require the most careful attention. This plan is followed by a company which has had in service 330 cars a day during the past year without a single controller failure. It might be said, however, that the controllers were provided with a system of continuous lubrication, and although the segments are lubricated by rubbing against felt pads soaked in oil, there has been no trouble from fire in the controller cases.

Simple Endurance Tests

It is an excellent plan to obtain performance or endurance records of the many small pieces of apparatus which have to be used on an electric railway system. Such records often will show a purchaser where he can gain a considerable economy. Those roads which have gone into testing work in earnest have found it to be of such value that the scope of the tests has often been broadened. Few roads, however, are large enough to establish a testing bureau as a separate department, and so on some roads each department head assumes the responsibility of recommending to the purchasing agent which make of device or material of a certain class shall be bought for a certain use. This procedure does not approach in thoroughness the work of a testing bureau or well-organized testing department. So much may depend upon the qualities of a device or material that, within reasonable limits, too much care can hardly be given in ascertaining before purchasing just what results may be expected. The large road, with its testing bureau, and the smaller road, as a subscriber to a central testing laboratory, can quickly obtain records that will bring about economies; yet supplementary to such testing bureau work are some endurance tests that can be made in such simple ways that hardly any road can afford not to utilize them. There is such a vast difference in the way in which various materials behave under widely different operating conditions that an endurance test of some small part will often bring out a flaw in design or material which the purchaser can properly insist on having corrected before he assumes any responsibility.

The shop superintendent of a large city property in the central States has made a number of very simple tests which have produced results far beyond expectation. All of these tests are more or less comparative, and perhaps are not always carried out in close accord with operating conditions, but the results show which kind of material or device will give the best service, price and life considered. Small car parts, for example, are subjected to actual use until they break down, and comparison is made between first cost and life.

At one time bell circuits were to be installed in about 1500 cars. A special resistance formed an important part of a patented scheme for using trolley current for bell ringing. The shop superintendent had some doubt about the life of this resistance, and so obtained sample sets for testing. He connected up a bell circuit similar to that which was planned for the cars, and inserted the sample resistance. Current was taken from the shop trolley, and the circuit was closed so that the bell would ring continuously. The resistance thus was doing very nearly the same service that it would if installed on a car, except that under test the service was continuous. The life of the resistance was noted, and it was found to be not so great as could be desired. Suggested changes were made by the manufacturer, and the samples were again tested. These had a much longer life under the same service. With the life thus determined, the shop superintendent could make close estimates of the cost of trolley current for bell ringing as compared with battery current. He was not accepting the new method blindly.

Another endurance test was made for the purpose of determining the life of trolley bushings. Trolley wheels with the bushings which were to be compared were mounted in harps on poles and bases as regularly used. A rope was passed over two pulleys in such a way that the trolley wheels could be set against the moving rope as in actual service. The speed of the rope was found and the time of starting noted. Thus the miles run by the wheels were measured and the life of the bushings compared. A criticism of this test was that no current passed through the wheels during the test. Nevertheless, with the rope traveling continuously at a high rate of speed the lubrication and mechanical qualities of various wheels could be compared very quickly in this way.

Before deciding on a type of journal box for new cars the management put several makes through endurance tests at the railway shops. The object, of course, was to test the boxes under conditions which closely approached those of actual service, and there was not sufficient time for road tests. Six kinds of boxes were under trial, and interesting results were obtained. The method of testing was to clamp a journal box on its side on the bed of a planer and move it back and forth under a wearing plate which resembled a pedestal guide in its wearing effect. This plate was held down in the box way under a pressure of about 450 lb. applied by an adjustable weight carried at the end of a lever mounted in the tool post. A counter was attached to the planer and the box moved back and forth under the weight 10,000 times or less, according to the wear. Records of the tests showed the number of strokes of the planer with each type of box, wear of the box and wear of the plate, compared with the original thickness of the metal

in the box. With these results it was easy to determine the comparative life to be expected from machined and unmachined boxes and those made of semi-steel, chilled iron, or with steel inserts.

Center bearings also were given tests. Two bearings of like design were placed under a hydraulic press and the amount of pull necessary to turn the two middle halves by pulling on a long bar inserted between them was measured. A comparison of the friction of different kinds of bearings under various loads up to 100 tons was thus obtained. Some of the bearings broke down before the full load was applied, thus exhibiting weakness which would not be desired on the score of maintenance charges, no matter how little friction the bearing had.

In all these and many other tests made at this shop the one idea has been to gain a comparative idea of the qualifications of a certain piece of apparatus or a part for severe service. The results have more than justified the work and expense for testing, and now plans for a more complete testing equipment are being made.

The Hydroelectric Problem

Within the last year or two the question of development of hydraulic privileges has come more conspicuously to the front than ever before. Very keen attention has been concentrated on the matter, owing to the long-winded and somewhat acrimonious discussions over the Government policy toward water-powers, coupled with a great deal of vague polemics directed against the alleged water-power trust. As regards the economic aspect of the matter, it must be admitted that there are two sides to the question. A well-located steam plant operating on a very large scale can really deliver power at a price lower than can be afforded by most hydroelectric plants, while, on the other hand, the well-located and economically installed hydroelectric plant can easily surpass anything in the way of a steam plant that has yet been devised. Between these two extremes lie many debatable cases in which the net economy of hydraulic generation of power may be somewhat in doubt.

There are many instances, especially in the older portions of the country, in which it is certain that water-power as developed costs more per horse-power than would be the case with a thoroughly modern steam plant. Looking at the matter from the larger view however, the cost of coal is steadily increasing and very few power companies can own their own coal mines, as do some of those which are making record breaking low costs. Water-power, on the other hand, is a source of power that will stay with us after the last pound of coal is mined, and as a permanent national resource the integrity of the water-power supply should be jealously guarded. There is no need of befogging the real issue with speculations as to the existence or growth of any trust or combination intended to get possession of the hydraulic resources of the country. If there is not such a combination now there is very likely to be one a few years hence merely on the general principle that every imaginable valuable thing of public utility will be grabbed by a combination of capital if the public permits it. The main question is whether the Government shall, so far as in it lies, exercise a restricting influence on the present development of water-powers, or whether it shall throw open the gates and let them be utilized as speedily and completely as possible.

The recent paper by Mr. Doherty, discussed in the current number of the "Institute Proceedings," has awakened even a keener interest in the matter than has before existed, and the question has really become of large national importance. From the standpoint of the public good a cheap and plentiful power supply is a prime necessity to successful manufacture. If this can be obtained best by encouraging the rapid taking up and development of water-powers, that is the policy to be pursued, while if such development is likely to lead to imperfect utilization of powers and to combinations which will artificially hold up the price of water-power, then to encourage hasty development is an injury to the public.

In considering this question it seems to us that so far as the matter of combinations is concerned a sharp line ought to be drawn between physical amalgamation and financial association. If the water-powers of a given territory are to be so utilized that they will be a great industrial resource, not to-morrow and next day, but a century ahead, they must be so organized as to assist each other physically. A few great power networks exist, and their usefulness is well established. On the other hand, if the only association of the water-powers of a given territory rests in a community of ownership, either through individuals or by a holding company, then it is perfectly safe to say that the combination will inevitably result in that holding up of the prices which is invariably and always associated with firmly established monopoly. The long and short of the affair is that if the Government is to consider the interest of the public, and not that of favored individuals, it should take a firm and unalterable stand against the merging of power enterprises which are not physically connected and against the acquisition of hydraulic privileges by any concern whose object is to merge them in a financial and not physical way with other holdings. On the other hand, if any persons propose to develop all the powers of a region as a coherent whole, they should be encouraged to do so under rigid Government supervision and control.

Whatever may be said about the virtues of cheap steam power, a first-class group of hydraulic privileges intelligently developed without the taint of high finance is pretty certain to prove a paying proposition at a price for power which benefits the community as well as the stockholders. Moreover, the demand for power in the future is practically certain to increase, probably in a greater ratio than almost any other commodity or service employed by mankind. Power is one of the very few things for which the demand seems constantly to be increasing, but for which the ultimate supply is already in sight. This condition emphasizes the importance in the development of water-powers of a conservation of all of the forces ultimately available. But in not a few recent instances there has been no proper realization of the engineering requirements of the case.

Waste of this sort when applied by any one to matters of so great public concern as hydraulic privileges ought to be put down with a strong hand, in so far as the Government has power to do so with respect to the privileges which remain still in its guardianship. But there is no reason why the Government should hold out a power or group of powers from utilization, provided such utilization be properly carried out, under regulations that will insure on the one hand a fair profit for the cash actually spent and a favorable price of the product to the public, whose rights it is the duty of the Government to conserve.

NEW PAY-AS-YOU-ENTER CARS FOR THE PUBLIC SERVICE RAILWAY, NEWARK, N. J.

The Public Service Railway Company, Newark, N. J., has recently completed nine single-end pay-as-you-enter cars at its Plank Road shops. These new cars are in addition to the 150 cars purchased three years ago from the Cincinnati Car Company and like them will be operated under the license of the Pay-As-You-Enter Car Corporation. The prepayment cars of the Public Service Railway Company differ from the usual designs principally in the fact that they do not use the ordinary folding vestibule doors, but employ in their stead novel platform gates designed by the mechanical department of the railway company.

The nine new cars are very similar to the 150 pay-as-you-enter cars now in use except that they are 3 in. narrower and have different platform arrangements and longitudinal instead of transverse seating. The car body proper is also 32 ft. long instead of 30 ft. 8 in., but its weight has been reduced from 20,063 lb. to 18,589 lb. The total weight of the new car, however, is greater because instead of using Brill 27-GI trucks, which weigh only 10,860 lb. per pair, they have the heavier Brill 27-MCB trucks. The first two trucks of the new design weigh 16,164 lb., but the weight of the remaining trucks was cut down to 14,564 lb. per pair. The No. 27 truck was chosen in order to

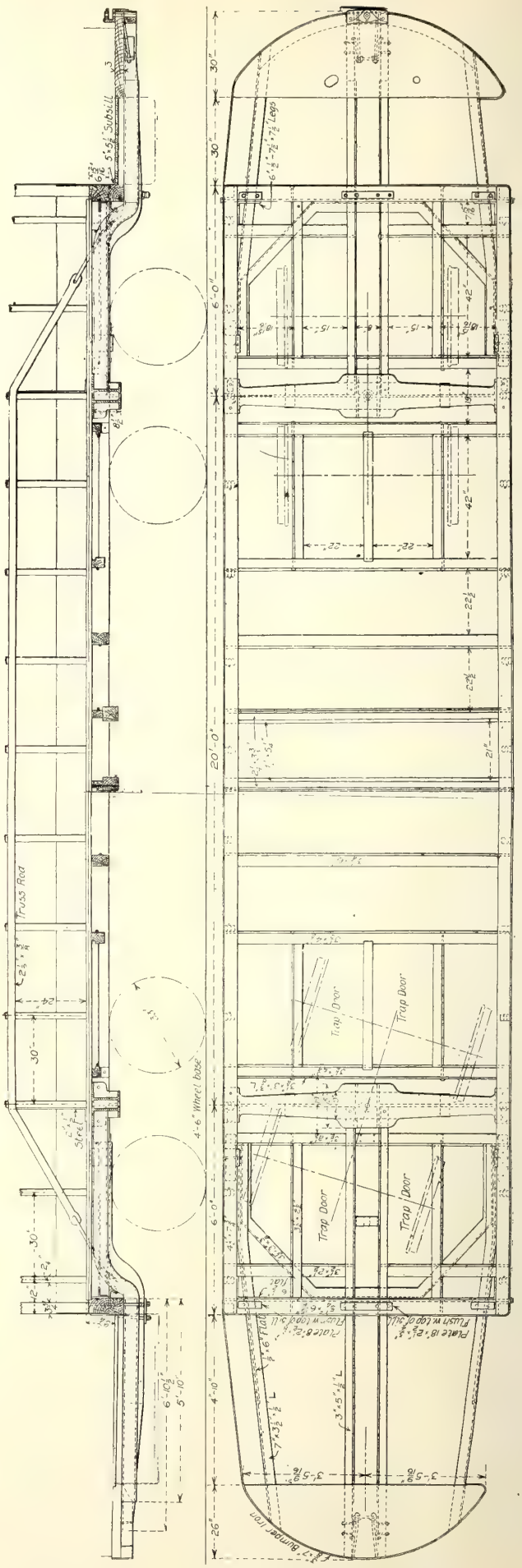


Public Service Railway Cars—Rear Platform, Showing Gates

secure a truck which would permit the use of inside hung motors carried on 5 ft. 10 in. centers.

The table on page 274 gives a comparison of the first and second types of these pay-as-you-enter cars. It will be observed that the type 1900 or more recent car, when carrying exactly the same equipment except for trucks, weighs 1200 lb. per seated passenger, while the type 2100 or older car weighs 1144 lb. per seated passenger.

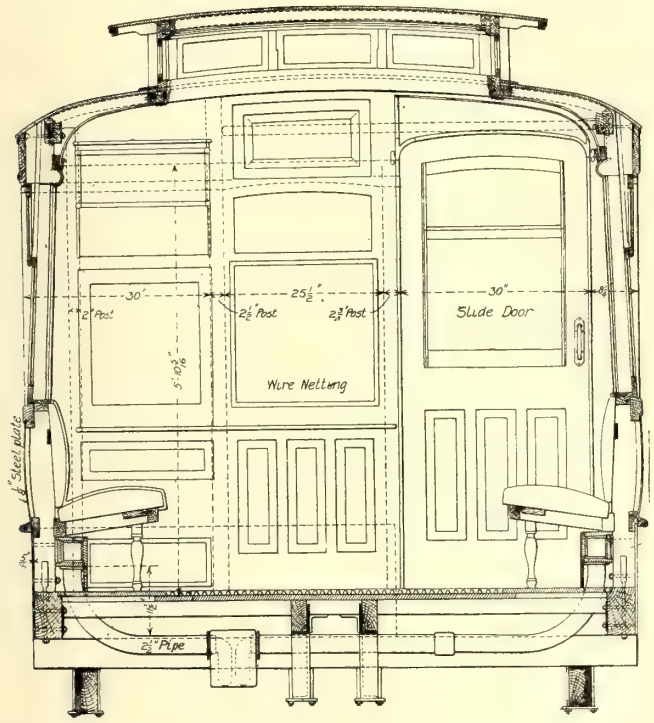
The new cars are 44 ft. long over the bumpers; 32 ft. long over the corner posts and have an over-all height of 11 ft. 1½ in. from the rail to the roof. The motorman's platform is 4 ft. 6 in. long with a 30-in. exit step, and the conductor's platform is 6 ft. 5 in. long with a 27-in. and 25-in. entrance and exit step opening respectively. The car is 8 ft. 3 in. wide over the posts and 8 ft. 1½ in. wide over the sill plates. This dimension is 3 in. less than the first pay-as-you-enter cars, but it is still liberal enough to have the entrance and exit doors of good widths. Thus the single-entrance door has a clear opening of 24 in. wide and both the rear and front sliding exit doors have



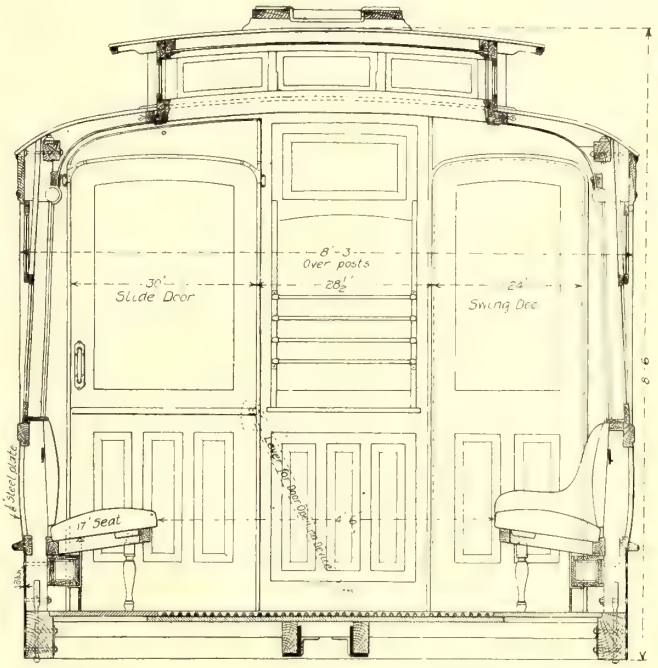
Public Service Railway Cars—Plan and Side Elevation of Underframe

clear openings of approximately 26 in. Furthermore, as the seating on both sides is longitudinal and only 17 in. wide, it has been found possible to have a 54-in. aisle. It will be seen from this that the car is very well suited for the rapid handling of passengers in city service.

The construction of the car is almost entirely of wood. The



Public Service Railway Cars—Cross Section at Front End



Public Service Railway Cars—Cross Section at Rear End

side sills are 7¾ in. high x 4½ in. wide throughout the car. They have an outer facing of 5/16 in. steel plate, which is carried up 18 in. or as far as the belt rail. A ⅛-in. steel plate is also used between the belt rail and the bottom window sills. The center sills, cross sills and platform sills are also of wood, but most of the members are reinforced with angles and plates as shown on the accompanying drawings.

CONDUCTOR'S PLATFORM AND GATES

The conductor's platform is not divided by a continuous curved rail as on the usual pay-as-you-enter platforms owing to the use of step gates which control the exit and entrance. These gates are operated by the conductor through two handles placed in the platform railing one above the other. The top handle controls the entrance gates and the bottom handle the exit gates. One pair of gates can be closed while the other is being opened or both may be opened and closed simultaneously. This arrangement places the movement of passengers under the control of the conductor. All the operating levers for the gates are beneath the platform or inside the front dividing wall, which is connected to the step stanchion, so that no mechanism obstructs the platform. When the gates are closed, they are parallel to the back of the step. On the company's double-end cars, an unobtrusive locking device is provided to prevent the gates from being manipulated by passengers on the front platform.

The cash box is placed inside a short curved pipe rail in the usual position along the path to the entrance door. With his left hand, the conductor can work the gate handles while his

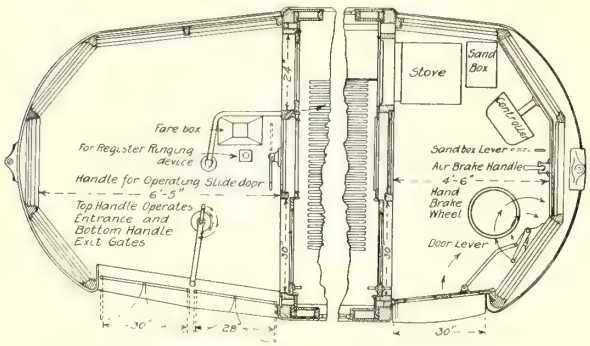


Public Service Railway Cars—Side View, Showing Exit Door from Front Platform

right hand can control the sliding exit door through a lever. Fares are registed through a pedal mechanism or a strap overhead. In the roof over the cash box there are placed five 16-cp lamps. These afford so much light that at night the conductor is no more likely to be deceived by bad coins or old transfers than in the day time.

MOTORMAN'S PLATFORM

As previously noted these cars are single-enders so that only an exit door has been provided for the front platform. The step exit is closed normally by a double-folding door which is

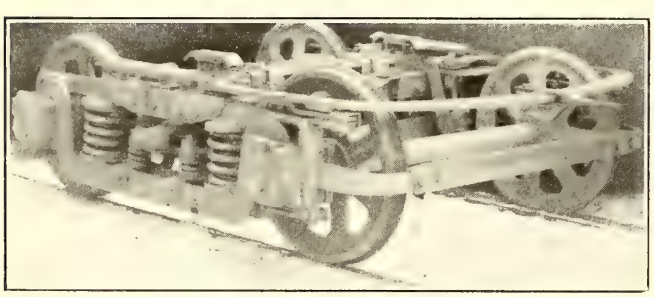


Public Service Railway Cars—Plan of Platforms

manipulated by the motorman through a lever above his hand-brake wheel. This platform contains quite an array of equipment. In the case of the car illustrated, the stove is placed in the rear corner in an aluminum-painted case and the heated air passes through a screen into the body of the car just above the heads of the passengers. The sand is placed in a metal box alongside the stove and thus is kept warm and dry. The rest of the apparatus on this platform consists of the controller and an engineer's valve for the operation of the air brakes. The motorman's vestibule contains no lights except the lamp used in the destination sign box.

MISCELLANEOUS

The electrical equipment of these cars consists of four Westinghouse 101-B2 motors. The power wiring of the motors is lead through 2-in. pipes to opposite sides of the car and thence carried under the car seats in ¼-in. transite-lined wooden



Public Service Railway Cars—Standard M.C.B. Type Truck

troughs. These troughs are encased by ¾-in. boards coated on the inner side with flameproof paint, and as shown in the sections have a strip beneath extending to the car floor to prevent the deposit of imflammable rubbish. The cables are led from the forward end of the troughs through 2½-in. pipes to a junction box near the body and sill, and thence under the front platform to the controller.

The window sash are equipped with National Lock Washer Company's fixtures and the ventilator sash are of wired glass. The interior of the car body is illuminated by 12 16-cp lamps set in the roof. As customary in cars of this type, a push-button circuit is also installed. Although the pay-as-you-enter cars are no longer a novelty to the Newark patrons of the Public Service Railway Company, care has been taken to indicate that they are prepayment cars. The dashers, which are painted yellow, bear in aluminum letters the words "Pay-as-you-enter" on a red shield bordered in black. At the rear of the car the words "In" and "Out" are painted on the steps, and at the end of the car body appear the words "Have Your Fare Ready, Please." Passengers on entering the car also will note instructions on the vestibule sash regarding fare payment by cash or transfers. A large sign extending across the roof inside the car reads "Leave by the Front Door."

OTHER CARS

The company has also placed an order with the Cincinnati Car Company for 100 cars generally similar in design to the cars just described except that they will not be pay-as-you-enter cars. The difference in arrangement will be in the design of the rear bulkhead, which will be provided with double-sliding doors in the manner usually followed in ordinary street cars. These doors when open will give a clear space of 48 in. The fare box will be located on the platform in the usual manner and gates will be installed as on the other cars. Both these cars and the nine others described were designed for independent air brakes as they are for use on lines where storage air is not in operation. The latest cars will seat 41 instead of 39 passengers, and as the car body will weigh only 16,500 lb., the average weight per passenger will be cut down to 1091 lb.

COMPARISON OF TWO P.-A.-Y.-E. CARS OF THE PUBLIC SERVICE RAILWAY.

	Type 1900.	Type 2100.
Length of body	32 ft.	30 ft. 8 in.
Seating capacity	39	39
Weight of body, with seats	18,589 lb.	20,063 lb.
Electric equipment, except motors	746 lb.	746 lb.
Two Brill No. 27-G-1 trucks	.....	10,860 lb.
Two Brill, No. 27-M.C.B. trucks	14,564 lb.	.....
Four Westinghouse 101-B_2 motors	10,908 lb.	10,908 lb.
Brakes (approx.)	1,351 lb.	1,351 lb.
Jewel stove	282 lb.	282 lb.
Detroit fender	390 lb.	390 lb.
Total equipment weight	29,841 lb.	24,537 lb.
Total weight	46,830 lb.	44,600 lb.
Weight per seated passenger	1,200 lb.	1,144 lb.

LONDON TRAMWAY DEPRECIATION ALLOWANCE FOR INCOME TAX

At a recent meeting of the London County Council the finance committee submitted a record of the results of negotiations with the income tax authorities in relation to the London tramways. The assessment for the past five years under Schedule D had been standing over pending a settlement of the amounts to be allowed for depreciation, etc. The settlement had now been made. Concerning allowances for depreciation of permanent way constructed on the conduit system, figures were prepared for the Council which showed that the average cost of renewal on conduit lines was £5,450 per single mile of track, and this figure had now been accepted by the chief inspector of taxes. Taking the average life at 10 years, the annual allowance was £545. The following items had also been allowed in accordance with a scheme adopted by the Inland Revenue:

Three hundred and fifteen pounds per single mile of track for permanent way on the overhead trolley system, 7 per cent on written-down capital cost of cars, 3 per cent on written-down capital cost of cables, and 5 per cent on written-down capital cost of general plant and machinery. The total allowances for depreciation for each of the 5 years to 1908-09 were £36,202, £52,308, £77,878, £122,680 and £160,900. A claim had also been made to set off against the "profit" on the tramways the loss on the steamboats. This claim had been admitted, and the total amount allowed was £88,171. A claim had also been made for an allowance of £3,725 a mile in respect of horse lines reconstructed for electric traction which were wholly worn out at the time of reconstruction. The present position was that the Council had been allowed £3,725 a mile in respect of about 71¼ miles single track wholly worn out, and nothing in respect of about 50 miles not wholly worn out at the time of reconstruction. On March 31, 1909, there were about 69 miles not reconstructed, and the Council would be able to claim allowances for the greater part of these. The amounts allowed each year for 5 years ending 1908-09 were £12,436, £17,135, £104,747, £82,829 and £29,688. The report was adopted.

POWER STATION IMPROVEMENTS AT TERRE HAUTE

The generating capacity of the Terre Haute power station of the Terre Haute, Indianapolis & Eastern Traction Company has just been increased by the installation of a 3000-kw Curtis turbine set. Existing generating apparatus, of the same manufacture, had a rated capacity of 3500 kw. The maximum hourly demand on this station is about 6000 kw, and the daily output is about 80,000 kw-hours. A description of the Terre Haute station appeared in the ELECTRIC RAILWAY REVIEW for Nov. 9, 1907, page 755. As explained in that article, the plant was designed with a view to its subsequent enlargement, but at that time the need for its extension so soon was not anticipated.

Additional generating capacity has been made necessary by the increase in traffic on the 88-mile interurban system which radiates in four directions from Terre Haute, and by a considerable increase in the lighting and power loads at Terre Haute. The local street car service, with 27 miles of track, and the residence and commercial lighting of Terre Haute and three smaller towns form an important part of the load on the Terre Haute station. The street lighting load includes 606 constant-current arc lamps.

Current at 22,000 volts is fed from this station to six interurban railway substations. The transmission line possesses many interesting features, including a river span 900 ft. long supported on steel towers, all of which were described in the article already mentioned



Exterior View of Remodeled Terre Haute Power Station of the Terre Haute, Indianapolis & Eastern Traction Company

ADDITIONS TO BUILDING

The original station building consisted of a boiler room 72 ft. wide x 81 ft. long and an engine-room 62 ft. wide x 81 ft. long. These subdivisions were separated by a brick firewall. All of the side walls of the building except that on the north side, are of concrete, steel and brick. The north wall was constructed temporarily of corrugated iron carried on a wooden framework, and this has been carried out to gain the additional floor space. The new equipment required an extension of 17 ft. on the turbine room and 85 ft. on the boiler room. These extensions are built of yellow brick and have a concrete-steel roof, and conform to the fireproof construction of the remainder of the building. Because of the height of the 3000-kw turbine, which is mounted on a condenser base, it became necessary to raise the level of the roof over the new turbine room extension above that of the roof which covers the 1500-kw and 500-kw units first installed. The old turbines are served by a 20-ton Cleveland crane, with runways 26 ft. above the floor. The large new turbine in its 17-ft. extension is served by a 30-ton Cleveland crane carried on runways 45 ft. above the turbine floor. Preparation has been made for the extension of the new crane runways whenever further extension of the turbine room is required.

A concise description of the principal units of this station, including an outline of the improvements made at the time of enlargement, may be of interest.

BOILER PLANT

The fuel used in the Terre Haute plant is local run-of mine

coal received from mines located about 5 miles from Terre Haute. This coal is delivered on a steam railroad side track parallel with the boiler house end of the station. At the present time coal is distributed to the boiler fronts by hand, but plans have been completed for the installation of a coal-crushing and elevating plant. This plant will include a hopper under the present steel-supported receiving track, a crusher located near by, a cross conveyor leading into the basement of the boiler house and an elevating bucket conveyor which will deposit coal in a concrete bunker above the front of the boilers. The present storage capacity under the receiving track is 1800 tons.

The boiler installation includes the original plant of eight 520-hp Aultman & Taylor boilers and four new boilers of the same size and type. The old boilers are equipped with Foster superheaters and the four new boilers have the B. & W. type superheaters, all designed to superheat the steam 100 deg. The eight original boilers exhausted to two brick stacks 165 ft. high, with an internal diameter of 8 ft. 6 in. The new boiler plant is served by a new stack 175 ft. high, with 9-ft. internal diameter. This stack is made of Kellogg radial brick. Three additional stacks will be needed before the ultimate capacity of the station is reached.

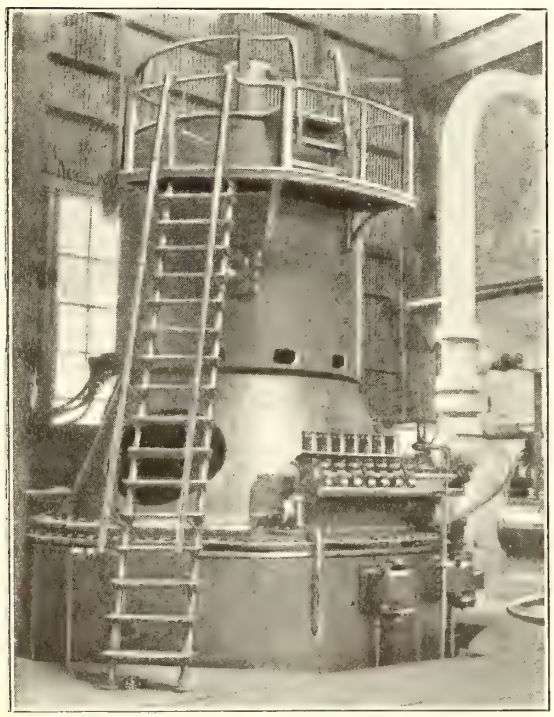
ture. Within the station provision is made for connecting the new and old water supplies.

Feed-water for the four new boilers is supplied by duplicate sets of Dean Brothers pumps with duplex cylinders, 14 in. x 10 in. x 24 in. The older equipment included two Smith-Vaile pumps, with cylinders 12 in. x 8 in. x 12 in. A Venturi meter installed in the discharge end of the boiler feed pumps provides a ready means for measuring the feed-water. A bypass around the meter is available. The boiler-feed water is warmed by two Goubert closed heaters, with a total rating of 3000 hp, and two open-type heaters with a total rating of 6000 hp. The latter heaters were built by the John Angell Company, St. Louis. All the auxiliaries and the surface condensers exhaust into the heaters.

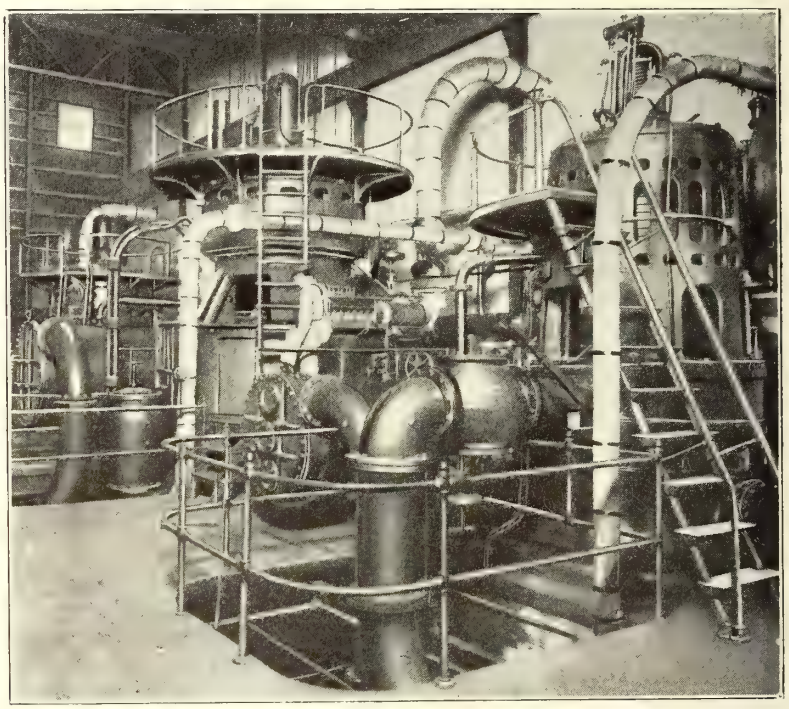
TURBINE EQUIPMENT

The newly installed unit is a four-stage vertical Curtis turbine, operated at 700 r.p.m. at 175-lb. steam pressure. The electrical end of the unit is a 3000-kw, 2300-volt, 60-cycle, two-phase, eight-pole form T General Electric a.c. generator. The older units are two 1500-kw, four-stage and one 500-kw, two-stage Curtis turbine a.c. sets.

The 500-kw unit is equipped with mechanical valve gear, the two 1500-kw units with electrical valve gears, and the new



New Turbine Unit in Terre Haute Power Station



Interior View of Terre Haute Power Station

With the addition of the four new boilers foundations were prepared for four additional boilers and for one other new stack. The latest installation of boilers is equipped with Roney mechanical stokers 12 ft. 6 in. wide, and stokers of similar design have been purchased for the eight older boilers. These will be installed shortly.

WATER SUPPLY

Water for boiler feeding and condensing purposes is obtained through intakes leading to the Wabash River, about 100 ft. distant from the plant. Inasmuch as the level of the river has a yearly variation of about 20 ft., the intake construction is of special design. There are three main intake wells. A new concrete intake well has been built close to the shore, and is supplied with water by a pipe extending 50 ft. out into the river. From this large concrete well on the shore, which is fitted with Liberty strainers, water is carried to a well under the turbine room basement. The suction line is a concrete tunnel with rectangular interior opening 5 ft. high x 6 ft. wide. The discharge conduit directly below the suction conduit is of like dimensions, and forms a part of the same concrete struc-

3000-kw turbine with the latest type of hydraulic valve gear. The new unit receives steam through a 10-in. lead, which is fitted with a Schutte & Koerting automatic throttle valve. A centrifugal device on the main shaft automatically trips and closes the valve at 10 per cent above normal speed. The device is so adjusted that after the valve has been tripped it cannot be closed until the speed has fallen to 15 per cent below normal. The reset is hand-operated.

Steam at 175 lb. and 100 deg. superheat is admitted to the turbine through 14 inlet valves which are grouped in two gangs of seven valves, each located on opposite sides of the casing. One gang of valves normally operates and makes adjustments for ordinary variations in load. The second group is brought into play only on a heavy overload. The movement of each gang of valves is controlled by a camshaft. The two shafts are interconnected and in turn are actuated by a hydraulic piston. The piston has an 8-in. x 12-in. cylinder and is moved by oil at a pressure of 125 lb. per square inch, supplied by duplicate pumps. Close regulation is effected.

H. E. Smith, chief engineer of this plant, finds the regulation

with this new type of governor to be so good that a substitution of the new type on the older equipments is being considered, even though no serious difficulties have been found with parallel operation of the four turbines with the old and new types of governors.

The new 3000-kw turbine is self-ventilated. Cool air is drawn in through a duct leading from outdoors. The revolving ports draw the air through the passages and force it out at the top of the unit.

The step bearing of the new unit is maintained under an oil pressure of 700 lb. per square inch supplied by duplicate steam pumps. Exciting current is furnished by one 75-kw, motor-driven and one 75-kw, engine-driven unit operating in parallel with a 30-kw, engine-driven, and a 35-kw, motor-driven exciter in the older section of the plant.

The new 3000-kw unit is mounted on a base condenser of Alberger design. As the power station is located close to the river it was necessary to build a rather deep foundation for this large unit. The turbine and condenser are supported on a nest of 30-ft. piles capped with a block of concrete 4 ft. deep, surmounted with a concrete foundation 14 ft. in diameter and 6 ft. 6 in. thick. The base condenser has 12,000 sq. ft. of surface, made up of 1-in. tubes. The older condensers in this plant were fitted with ¾-in. tubes, but on account of the impurities in the water experience shows that larger tubes will be more satisfactory. The condensers for the two 1500-kw and the 500-kw turbine units are two surface-type and one barometric-type Alberger installations. These older surface condensers are located below the engine room floor level. The large condenser for the new unit is exhausted by a dry-vacuum pump with cylinders 8 in. x 24 in. and 24 in. x 24 in. Circulating water is furnished by a 22-in. centrifugal pump driven by a 100-hp Westinghouse vertical engine. All the high-pressure piping in the new installation is covered with Keasby & Mattison 85 per cent magnesia insulating material.

On account of the high water sometimes experienced at this plant, an efficient system of drainage and sumps was necessary. The system as designed provides that when the river level is low all the drips find their way to sumps under the basement floor, which drain to the river. At times of high water this outlet is closed, and the sumps are cleared by a steam ejector and a steam sump pump, either or both of which may be used as occasion demands.

MISCELLANEOUS

The new turbine unit operates electrically in parallel with the older turbines, and its output is controlled by a large combination railway and lighting switchboard installed on the second floor of the electrical section of the station. The additions to the switchboard made necessary by the increase in the capacity of the plant include gray marble panels carrying General Electric and Westinghouse instruments. A Tirrill regulator is connected with the exciter bus. Bristol recording instruments are connected to each group of outgoing services to furnish continuous voltage charts and to afford a permanent record of the continuity of the service. A Westinghouse graphic recording wattmeter for the d.c. railway output of three 500-kw rotary converters is included in the switchboard equipment. A totaling panel for the railway transmission lines carries a Westinghouse integrating wattmeter.

Acknowledgment is made to T. F. Grover, general manager of the Terre Haute, Indianapolis & Eastern Traction Company, for assistance in the preparation of this article. Under Mr. Grover's administration of the last few years the Terre Haute property has shown a very substantial increase in earnings as well as in the demand for power made necessary by the railway, lighting and commercial extensions.

The Washington, Baltimore & Annapolis Railway Company is planning to change its electric system from single phase to 1200-volt direct-current on Feb. 14. In Baltimore and Washington 600 volt direct current will be used.

CONSTITUTIONALITY OF CORPORATION TAX LAW

One of the test cases concerning the constitutionality of the corporation tax law now pending before the United States Supreme Court affects the Coney Island & Brooklyn Railroad Company. Although a number of suits bearing on this law have been carried to the Supreme Court, that which concerns the Coney Island & Brooklyn Railroad Company is the only one that involves a public-service corporation. In this case Wyckoff Van Derhoef, a stockholder, asked that the Coney Island & Brooklyn Railroad and its directors be restrained from the payment of the corporation tax on the ground that the law is unconstitutional.

Charles W. Pierson, of Alexander & Green, counsel in the case, stated that arguments will be heard by the Supreme Court during the week beginning March 14. The case has been through the lower court, which rendered a decision upholding the validity of the law. A motion was made last week to advance the case before the Supreme Court in order that a decision may be rendered as speedily as possible. There is no expectation now that a decision can be rendered before March 1, the date prescribed in the law on which returns must be made for corporations. It is hoped, however, that a decision may be reached before June 30, the last day when the tax may be paid.

The bill of complaint filed by Mr. Van Derhoef in the United States Circuit Court for the Southern District of New York is directed against the Coney Island & Brooklyn Railroad and Slaughter W. Huff, William N. Dykman, James H. Hyde, George H. Prentiss, William H. McIntyre, Charles T. Young, John H. Walbridge, Harold Fitz Gerald, Frank R. Ford, Guy Richards, Edwin S. Marston, Allan McCulloh and Duncan B. Cannon, directors of the company. Mr. Van Derhoef, a citizen of the State of New York and a resident of the Borough of Brooklyn in the City of New York, brings the bill in behalf of himself and all other stockholders of the company who are similarly situated and who are entitled to avail themselves of the benefit of this suit.

It is shown that the business conducted by the company is solely and exclusively that of owning, maintaining and operating railroads on which passengers are transported for hire and that the company is not engaged in the transaction of any business between the State of New York and any foreign country or between the State of New York and any other States or Territories. The bill shows that the net income of the company from all sources during the year ended Dec. 31, 1909, was in excess of $205,000, after making all deductions of the character provided in the section of the law prescribing the corporation tax. The complainant became the owner and registered holder of 10 shares of capital stock of the company more than 10 years ago and has held it in his own right ever since.

The complainant shows that the company and a majority of its directors have announced that under the alleged authority of the provisions of the act of Congress, they intend voluntarily to make and file with the Collector of Internal Revenue prior to March 1, 1910, a return or statement in the form prescribed by the section of the act, showing in detail the amount of net income of the company for the year ended Dec. 31, 1909, and voluntarily to pay to the collector on or before June 30, 1910, a tax of 1 per cent upon the entire net income of the company over and above $5,000 received by it from all sources during the calendar year, after making the deductions for which provisions are made in the act. The tax which the company would have to pay upon its net income for the year would, as the complainant is informed, exceed $2,000. The bill adds that the provisions of the act, purporting to levy a special excise tax upon all corporations with respect to the carrying on or doing business by such corporations and measured by a percentage upon their net income are unconstitutional, null and void in that:

(a) "Said tax is in effect a tax upon the corporate existence or franchises of corporate capacity of the defendant, the Coney Island & Brooklyn Railroad Company, and is, therefore, a tax

upon the exercise by the State of New York of sovereign powers and functions not surrendered to the United States and clearly reserved to said State of New York by the tenth amendment of the constitution of the United States.

(b) "The said tax is in effect an interference with a governmental agency or instrumentality of the State of New York.

(c) "The said tax constitutes, in effect, an interference with the exercise by the State of New York of a governmental function to wit: the function of providing means of transit and intercommunication for its citizens and the public."

The bill further states that the provisions of the act of Congress imposing the tax are unconstitutional, null and void in that they are not uniform throughout the United States as required by section 8 of article I of the constitution and in that they are arbitrary and unequal in violation of the constitution and the fifth amendment thereof and the fundamental principles of taxation and are in excess of the powers of taxation surrendered to the general Government by the States and the people thereof.

The tax is declared to be unequal and arbitrary and not uniform throughout the United States:

(a) "Because the tax is measured not by the income derived from the business carried on, but by the income of the owner derived from all sources whatsoever.

(b) "Because said tax is imposed upon corporations measured by a percentage upon their net income, whereas no similar tax is imposed upon the income of either individuals or ordinary partnerships, although they may be engaged in the same general business.

(c) "Because labor, agricultural and horticultural organizations, fraternal beneficiary societies, orders or associations operating under the lodge system, domestic building and loan associations, organized and operated exclusively for the mutual benefit of their members, all of which are corporations, are specifically exempted in and by said act from all liability for the tax imposed thereby.

(d) "Because all corporations whose net income for any one calendar year does not exceed $5,000 are specifically exempted in and by said act from the tax imposed thereby.

(e) "Because by said act a larger tax is imposed upon the defendant, the Coney Island & Brooklyn Railroad Company, by reason of the fact that its indebtedness exceeds the amount of its paid-up capital stock, than upon other corporations engaged in the same general business whose capital stocks exceed their indebtedness."

The provisions of the act prescribing the tax are also declared to be unconstitutional in that the corporations subject thereto may be deprived of their property without due process of law and in violation of the fifth amendment of the constitution.

The franchises of the company to construct, maintain and operate its railroads, including its right to occupy the public streets, are, by the laws of the State of New York, defined to be real estate, and substantially the entire income of the company is derived from the exercise of these franchises. If the tax be construed as a tax upon the franchises of the company regarded as property or as a tax upon the income, the provisions of the act imposing the tax are said to be unconstitutional because it is a direct tax upon real estate and personal property or the income therefrom and is not apportioned among the several States according to population as required by sections 2 and 8 of article I of the Constitution.

The provisions of the act imposing a tax are declared also to be unconstitutional in that all corporations thereby taxed may be compelled to produce and disclose their private books and papers in order to make them liable to a penalty or to forfeit their property in violation of the fourth and fifth amendment of the Constitution. The bill states that the suit is not a collusive one to confer on a court jurisdiction of a case of which it would not otherwise have cognizance, and the complainant declares that he has duly requested the company and its directors in writing to refuse to pay the tax, to contest the constitutionality of the act, to refrain from voluntarily making the return, and to apply to a court of competent jurisdiction to determine the company's liability, but that the company and the majority of its directors, after a meeting at which the request was formally laid before them for action, refused to comply with the demand.

It is stated, further, that if the company and its directors pay a tax out of the net income, they will diminish the assets and lessen the value of the stock and lessen the dividends thereon. It is declared that the voluntary compliance of the company and its directors with the provisions of the act would expose the company to the risk of a multiplicity of suits on behalf of its numerous shareholders, and that such suits would work irreparable injury to the business of the company and involve it and its stockholders in great and irreparable loss.

The stockholders are said to have no adequate remedy at law for the matter in dispute and the contemplated action of the company and its directors is declared to be contrary to equity and good conscience and to tend to manifest wrong, injury and oppression of the complainant, who, therefore, prays that the provisions of section 38 be declared unconstitutional, null and void, that the defendant be restrained from complying with the provisions, and that the complainant may have such further relief as to a court of equity may seem meet.

The exhibits presented with the transcript of record include a letter addressed by Mr. Van Derhoef to the company and its directors on Jan. 18, 1909, in which, as a stockholder, he protested against any action of the company and its directors in voluntarily complying with the provisions of the act, and requested that the company and its directors refrain from so doing. He also requested that the company and its directors contest the constitutionality of said act and protect itself and the stockholders.

In reply to this letter, Duncan B. Cannon, secretary of the company, sent to Mr. Van Derhoef, on Jan. 19, a copy of a resolution passed by the directors on that date expressing their opinion that it was inexpedient to comply with the demand on the ground that failure to obey the provisions of the act would subject the company to litigation with the United States and the risk of incurring penalties and of clouding the title to the real estate.

MILWAUKEE CLASSIFICATION OF ACCOUNTS

The Milwaukee Electric Railway & Light Company and associated and controlled companies have published in convenient form a classification of accounts in conformity with the uniform classification prescribed by the Railroad Commission of Wisconsin. The classification comprises accounts for the electric railway, electric light and power, the steam heat and gas companies. It was arranged by C. N. Duffy, comptroller. The new system was placed in effect on Jan. 1, 1910. The book contains 162 pages printed on only one side of the paper and it is bound in flexible covers which are removable so that the sheets may be changed if desirable. The book measures 7½ x 5 in.

Several pages of special instructions precede the schedule of accounts and the titles and details of the various classifications. The instructions state that the accounts have been arranged to meet the requirements and cover the conditions of the Milwaukee Electric Railway & Light Company, its associated and controlled companies and the diversified business of the companies in conformity with the uniform classification prescribed by the commission. It is also stated that the accounts may be rearranged or subdivided to any extent desired or required for special conditions or purposes provided, as laid down by the Railroad Commission, they are not rearranged or subdivided in a manner that will interfere with the integrity of the general scheme or change the basis of the charges or credits of any account as this would absolutely destroy the purpose and value of the uniform classification prescribed by the commission. Each book is numbered, and an account is kept of those to whom copies are issued. In this way if any changes are made in the classification used, corrected pages can be sent to the holders of the books and these pages can be inserted in their proper places.

PAPERS PRESENTED AT MID-YEAR MEETING OF AMERICAN ASSOCIATION

Four papers were presented at the mid-year meeting of the American Street & Interurban Railway Association held in New York on Jan. 28. The titles of the papers and the gentlemen who presented them were as follows: "Public Service Commissions," by P. F. Sullivan, general manager, Massachusetts Electric Companies, Boston, Mass.; "Treatment of Depreciation," by Frank R. Ford, Ford, Bacon & Davis, New York, N. Y.; "Return on Investments," by C. S. Sergeant, vice-president, Boston Elevated Railway Company, Boston, Mass.; "The Fare Question," by Wm. J. Clark, General Electric Company, New York.

While these papers were read in executive session, it was the concensus of opinion of the members present and of the executive committee of the association that the points brought out in them were so valuable it would be for the interest of the industry at large that they should be made public. After the consent of the authors to this plan had been secured the papers were revised by a committee of the association and are published herewith. The discussions were held in executive session and are not available for publication, but the papers will give those who were unable to be present a partial idea of the subjects taken up and considered.

THE FARE QUESTION

BY WILLIAM J. CLARK, GENERAL ELECTRIC COMPANY, NEW YORK

The "fare question" is the keynote to improvement in results from the operation of street and interurban railways. Its direct solution may be a local question for each individual property, but its consideration by this association can at least lay the foundation for some general plan of action thereon which will be of benefit to each locality and company.

You gentlemen, from personal experience, grasp the present unfortunate condition surrounding your great industry, but a brief review of certain important features involved will not be amiss.

An official statement and chart recently issued by the steam railroad interests show that within a period of 10 years prior to Jan. 1, 1908, rates paid for their labor had increased approximately 31 per cent. The average increase in prices of all materials which they use was slightly greater, while upon certain of such items the increases have been astounding; such, for instance, as 72 per cent on cross ties; 80 per cent on bridge timber; 38 per cent on fuel, and 47 per cent on steel rails. Similar increases in cost have come upon every essential to construction and operation of your properties, plus other burdens unknown in the steam railway field.

The present conditions surrounding American street and interurban railways, as a whole, both on the fare question, per se, as well as upon the net income derived from their operation, can best be illustrated by stating that a coming Census Bulletin will show the following average percentages of increase from 1902 to 1907 for the entire United States on important features bearing upon results derived from their operations:

Length of track	52.4 per cent
Investment	63.5 per cent
Earnings from operation	68.9 per cent
Operating expenses	76.6 per cent
Net income (after deducting operating expenses, taxes and fixed charges)	31.00 per cent
Net income (after deducting operating expenses, taxes and fixed charges) per mile of track.....*Decrease*	13.46 per cent
Fare passengers	55.9 per cent
Transfer passengers	87.8 per cent
Number of salaried employees	64.1 per cent
Amount of salaries	73.5 per cent
Wage earners	56.9 per cent
Amount of wages	71.00 per cent
Damages and legal expenses	93.3 per cent
Consumption of energy per car mile (kw-hours)	48.48 per cent

The average percentage of net income on capital stock in 1902 was only 2 per cent, but in 1907 this had shrunk to slightly under 1.6 per cent, a decrease of 20 per cent. The average return upon bonded indebtedness in 1902 was 4.39 per cent. In 1907 this had been reduced to 4.26 per cent, a shrinkage of about 3 per cent. It is thus seen that inadequate as the return upon investment in street and interurban railways has been, it is rapidly decreasing, probably at a greater rate during the past three years than in five years prior to 1907.

The causes lie in what has already been stated. But to give emphasis to some of those features:

Initial investment and operating costs have increased enormously through rise in prices of labor and materials.

Prejudice against corporations is reflected in the enormous increase in expenditures for damages and attendant legal services.

The use of larger and heavier cars to afford a more satisfactory service for the public has resulted in an average increase of power consumption per car mile of from 1.98 kw-hours in 1902 to 2.94 kw-hours in 1907.

In 1902 for each 100 fare-paying passengers 22¼ were carried free on transfers; in 1907 for each 100 fares 26.8 free transfers were issued.

Labor, representing over 60 per cent of the total of operating expenses, has had its share too, for in 1902 the average annual compensation for each salaried employee was approximately $1,043.50; in 1907 this average had risen to $1,102.60. In 1902 the average paid per wage earner was $600.62; in 1907 this average had become $658.33.

No single industry can stem the tide of rapidly advancing prices, and as all the refinements of economic management have practically been attained in conducting street and interurban railways, the great question of finding an effective remedy for present conditions resolves itself into that of increasing rates of fare in some manner. Not an easy task, but one born of necessity, so it must eventually be accomplished.

EDUCATING THE PUBLIC

Important as are existing conditions themselves, is the fact that to secure the results desired the public must be educated into realizing what these conditions are; the causes that have created them; what, under the circumstances, is fair to the companies, and, above all else, the course in connection therewith which is most beneficial to the public itself, through showing the co-relation between good local transportation and almost every other interest in which the public, collectively or individually, is directly concerned, some features of which are not thoroughly grasped by ourselves.

As to its form, methods and details, opinions will naturally differ and discussion alone can bring out the strongest and best ideas thereon. So the following suggestions are made, in the hope that discussion and criticism will develop the most effective line of arguments that can be adapted to and utilized in meeting the necessities of the fare question in all localities.

BENEFITS CONFERRED BY ELECTRIC RAILWAYS

First: Frankly admit any past mistakes on the part of the companies as to the construction of unprofitable trackage and underestimation of the costs of operation, etc.

Second: Maintain and demonstrate that the economic benefits derived by the public from the extensive development of local transportation systems has been many times greater than the profit derived from their financing, construction and operation, and far more than offsets mistakes in finance and errors in judgment.

Show that these benefits will continue to the public in direct proportion to the encouragement which is given to the still further development of street and interurban railways operating the best possible service.

This can be done in the following way:

(1) Estimate in dollars and cents the annual value of the time saved by rapid transit to the passengers carried. To illustrate, in 1907-9 9,533,080,761 passengers were carried on the street and interurban railways of the United States. If we consider each passenger was saved but 10 minutes in time over former methods of transportation and that such time was worth but 15 cents an hour, this economic saving would aggregate the enormous sum of $238,327,019. This amount is more

than one and a half times greater than the net earnings of the companies from operation, and nearly six times greater than the net income divisible among the stockholders. Emphasize and ring the changes on this indisputable fact until the public realizes that instead of being robbed of something intangible it has been and is receiving enormous tangible benefits on this particular feature.

(2) Work up from local assessor's records and elsewhere statements showing what the development of local transportation systems has done to increase the value of outlying real estate, thus greatly increasing the amount of assessable property with its consequent tendency to hold down the local tax rate. State the amount of taxes paid directly by the company and show that it is much higher proportionally than upon any other class of property in the community. Bring out clearly the enormous sum paid in taxes on personal property by the holders of the securities of local transportation companies. This last for the entire country probably aggregates nearly $40,000,000 annually.

(3) Arouse civic pride to prevent one of the largest local interests from becoming bankrupt and a consequent reflection upon and injury to every other interest in the community.

(4) More important than all of the rest: Demonstrate in graphic form what street and interurban railways have done on re-distribution of population and lessening its congestion with attendant blessings, such as permitting greater ownership of homes; securing less rate of rentals for better surroundings; greater comfort in every phase of living and securing improved sanitation, with its consequent reduction in the death rate. All of these conditions have been improved in proportion to the increase in local transportation facilities, the value of which, to every community, is beyond estimation.

(5) Elaborate upon how these desirable features can all be extended, increased and improved through more liberal treatment of the companies by the public on "the fare question."

Third: Show the causes that in each instance have brought about the conditions recited in the first portion of this paper.

Fourth: As regards interurban systems, tell the story of their frequent and superior service; state its cost and maintain that in all justice these roads are entitled to as high a rate of fare for the same distances as are the steam railroads.

Fifth: As to the city systems: Go into greater detail. State such facts as follow, addressed directly to the public:

"What we do for a nickel."

"You are transported to your point of destination."

"You are saved minutes in time over horse car days, or time over walking."

"Time is valuable to you. Figure out what the saving is worth."

"Besides transporting you, to enable it to be done, we are also hauling an average of —— lbs. in dead weight of car."

"To transport an equivalent amount of weight by dray for the same distance would cost $....."

"Our rate for hauling this weight in small high speed units is only .... per cent higher than the average charge for transporting first-class freight in large, slow-moving units on steam railroads."

"For every four nickels received we carry a passenger free on a transfer."

"We are developing your community in every way."

"We are constantly increasing your comfort, health, happiness and chances for improvement in your methods of living."

"We are giving you greater value received than you get for any other nickel you spend."

"We get a far smaller percentage on our turn over and on our investment than does any merchant or manufacturer in the community."

"We have continued to give you good service and all that goes with it for that 5-cent fare, although the cost of every feature involved in doing it has increased enormously in recent years."

Then explain "where the nickel goes," setting forth how, in payroll and otherwise, its major portion helps local trade and the entire community. The Boston News Bureau on Feb. 26, 1909, in an article on the Boston Elevated, stated this most admirably, as follows:

"There was not very much of each nickel left for the stockholders after the prior claims upon it had been satisfied. Wages of motormen and conductors was the largest single item. Nearly 1½ cents of each fare was paid over to them. More than ½ cent was paid for power and ¾ cent was needed to make good the wear and tear to the rolling stock and roadbed. Only 0.1 mill was used to remove snow because of the open winter, but in some years a full mill has been needed. One-third of a cent was required for interest on bonds and ½ cent for rentals to other companies for the use of surface lines, including the Old Colony and Boston & Northern, as well as the West End. One-third of a cent was spent for damages and legal expenses. It may surprise the juryman who is in favor of 'soaking the corporations' to find how he pays for it himself. Nearly ½ cent went directly to the city or State, 3½ mills for taxes and 1 mill for the rental of the subway and East Boston tunnel. There remained just over ¼ cent—0.285 cent, to be exact—which was the profit out of each fare paid in dividends to stockholders."

Effective as the above showing is, the local benefits derived from the circulation of most of the nickel after it has been paid out by the company can be still further demonstrated to advantage.

No other industry has so ready and effective means of publicity at command as that afforded by the cars of local transportation companies.

The press will more readily undertake and far more effectively conduct a campaign of truth for the right than it will anything else.

Civic organizations are alive to problems of the day, and the justice of our contentions can be demonstrated to them.

The fair-minded portion of the public, which means its majority, will respond when convinced that a cause is just; that action thereon is imperative and that the truth in its entirety is being told about both features.

When the public responds the work is practically done!

PUBLIC SERVICE COMMISSIONS

BY P. F. SULLIVAN, PRESIDENT, BOSTON & NORTHERN AND OLD COLONY STREET RAILWAY COMPANIES

While the subject upon which I have been invited to speak is "Public Service Commissions," I shall, with your permission, limit it to "Railroad Commissions," in which we are most directly interested. There are railroad commissions of various kinds in 40 States of this Union, and so far as I can learn, in only eight of the States have the commissions jurisdiction over the issue of securities of railroads and street railways. As the Massachusetts board is in this class, is one of the oldest railroad commissions in the country, and has been referred to most frequently by Federal and State authorities, I shall confine myself to some of its work. One word in passing: The Massachusetts board is usually considered the oldest board in the country, whereas, as a matter of fact, the New Hampshire board is the oldest, for while this year it made its sixty-fifth annual report to the Legislature, the Massachusetts board made its forty-first annual report. Yet Massachusetts was early alive to the necessity of having assistance to legislation. Petitions for railroad charters were so numerous that in 1845 the Legislature appointed a Railroad Commission to which it referred petitions for railroad charters, with instructions to investigate and report. The commission reported the following year and, having performed its duties, was discharged.

It may be seen from this that our early New England lawmakers were alive to the changed conditions made possible by two causes—the possibilities resulting from steam applied to transportation, and the creation and development of a new element—the public-service corporation. And this is not surpris-

ing, for in 1820, James Gray, of Nottingham, England, in his observations "On a Railroad for the Whole of Europe," made this remarkable prophecy: "Here is the mainspring of the civilization of the world; all distances shall disappear, people will come here from all parts of the continent without danger and without fatigue; distances will be reduced one-half; companies will be formed; immense capital paid and invested; the system shall extend over all countries; emperors, kings and governors will be its defenders; and this discovery will be put on a par with that of printing."

I stated that our early lawmakers were alive to the necessity, and wisely so, of providing means to meet the changed conditions. Had they not done so in the manner in which they did they would have been compelled to enlarge the courts to meet the legal questions which would arise, and would have been compelled to delegate to municipal officers powers delegated to the Railroad Commission, and this would have resulted in confusion.

THE MASSACHUSETTS RAILROAD COMMISSION

In speaking of the Massachusetts Railroad Commission I shall give you an outline of that organization, also of the statutes under which it acts. Both should be considered together in order intelligently to understand their operation. Later I shall endeavor to show the effects of both, and express my opinion.

Under the Massachusetts statutes the Governor, by and with the advice and consent of his council, appoints three competent persons, each for a term of three years, to serve as a Board of Railroad Commissioners. The salaries are $6,000 per annum for the chairman and $5,000 each for the other members. They are authorized to employ clerks, inspectors and experts to assist them in their duties. In the early days it was decided to appoint a lawyer as chairman, and for the other two positions a business man and a man experienced in some branch of railroad work, and this practice has been followed since.

From the very beginning the commission has taken a broad and comprehensive view of its powers and duties. It has always taken the view that its duties were quasi-judicial and administrative, and as a result its decisions carry great weight with the Legislature and with the public; in fact, so much so that they have been quoted approvingly by our courts. Governor Draper, a few weeks ago, publicly stated that the Board of Railroad Commissioners had his full approval; he believed it also had the approval of the public, and that the corporations had no just cause for complaint. Very few changes take place for political reasons. The result is a perfectly consistent course and policy from year to year as consistent and as careful as to precedents even as are the decisions of our courts.

The commission's duties have increased enormously, as may be learned from its latest report to the Legislature. In that report the board states that in 1869, at the time of its first report, the total length of railroad line in the State was 1241 miles; in 1909, 4685 miles. The total capital invested in 1869 was $132,795,229; in 1909, $642,906,436. Of street railways the length of line was in 1869, 105 miles; in 1909, 2869 miles. The capital invested was $5,612,503 in 1869; in 1909, $168,628,151. In 1869 the board passed upon 140 cases; in 1909, 656, and held 365 public hearings.

LEGISLATION IN MASSACHUSETTS

Previous to 1864 there was no general law in force in Massachusetts relative to street railways and few companies were in existence, and all such companies obtained their charters directly from the Legislature. Those charters usually specified the particular streets in which the companies should operate, but delegated minor details and sometimes the selection of particular routes to Aldermen and Selectmen, not in their capacity as municipal officers, but solely as officers of the State. In 1864, and again in 1871, a general law was passed for the general government of street railway companies and regulating the construction and operation of their railways, but still reserving to the Legislature in every instance the sole power to grant charters. In 1874, however, a general law was passed making it possible to take out a street railway charter without an act of the Legislature. While from year to year amendments are passed to this general law, a general revision to our statutes is made every tenth year, so that as a result our street railway statutes may be readily understood. At present the railroad and street railway statutes are compiled in a volume of nearly 300 pages, nearly equally divided between both classes of railways—a body of statutes so complete and workable that the street railway companies seldom have occasion to seek general legislation.

Our Legislature meets annually in January, and each session usually sits until late in June. All petitions for legislation must be filed with accompanying bills on or before the third Saturday after the opening of the session. All petitions must be heard and all hearings advertised. If there should be more than one petition relating to the same subject, and the committee be favorable to a report, it is compelled to report a general bill. In addition to basing legislation upon petition, it is also based upon recommendation of the Governor, or upon reports of the various commissions.

EFFECT OF OBTAINING CHARTERS EASILY

I stated earlier that street railway charters can now be obtained without going to the Legislature—that is, unless a company desires privileges beyond the power of the general law. Fifteen or more persons may sign articles of association, state where they intend to build and operate their road, subscribe $10,000 per mile for urban and $5,000 for interurban tracks, obtain the local franchises, obtain the approval of the Railroad Commissioners as to the legality of the proceedings, and upon payment of 10 per cent of the subscription, the secretary of the State issues a charter. The ease with which charters are obtained in Massachusetts has, in my opinion, more to do with some of the street railway financial results than all the adverse legislation, decisions of the Railroad Commissioners and public demands, as I shall endeavor to show later.

Franchises in the public streets are obtained from aldermen and selectmen if, in their judgment, "public convenience and necessity" require the grant. While franchises are not limited as to time, nor can they legally be called perpetual, they are practically perpetual, for since 1898 they cannot be revoked by the local authorities without the approval of the Railroad Commissioners. This amendment to the general law was passed in 1898 owing to the threats and improper use of their power by local boards. Previous to 1898 the West End Street Railway Company was the only company which had this protection, and this company had such protection in only two cities and one town. In addition to this amendment, and also in 1898, another amendment was passed giving to the Railroad Commission authority to grant franchises to connect two municipalities, in case the local authorities should refuse the grant or should within 90 days from the filing of the petition refuse to act. In addition to these two important amendments another amendment was passed in 1902 upon the recommendation of the Governor which requires the approval of the commissioners of all original locations and of relocations which change the original locations. While in detail the operation of this amendment is a good deal of a nuisance, it is, on the whole, beneficial, as it enables existing companies to oppose duplication of lines. It also enables the commission to reject franchise grants which contain illegal conditions, such as rates of fare, time limits and other illegal conditions, and this the commission has done. Before a line can be opened for public travel it must be approved by the commissioners as to safety.

ISSUING SECURITIES

All issues of stocks and bonds require the approval of the commissioners after public notice and hearing, but the amount of bonds cannot exceed the amount of the capital stock plus the premium paid into the treasury of the company upon such stock. All securities are issued only for property at cost or value, and to ascertain such cost or value the commission em-

ploys experts. All stock must be issued at not less than par at a price approved by the commission, and if the stockholders do not take the stock at the price approved, it must be sold at public auction at not less than par.

No notes or other evidences of indebtedness can be issued by the companies for a period in excess of one year without the approval of the commission. For many years previous to 1902 a street railway company could not get authority to increase its issue of stock or bonds until after an appraisal of its whole property, and such appraisal should show an amount of property at least equal to the liabilities. Since then, companies are authorized to issue securities for additional property at cost.

Rates of fares are, in the first instance, made by the directors of the companies and remain in force unless complaint is made to the commissioners and the latter, after public notice and hearing, recommend otherwise. Many of the franchises of 10 to 15 years ago contained conditions as to fares and transfers, but our Supreme Court decided a few years ago that such conditions were illegal and, therefore, of no force. Transfers are also issued upon authority of the directors, but cannot be reduced or withdrawn without approval of the commission.

Speed of cars is fixed by local boards, subject to approval of the Railroad Commissioners.

An inquiry will naturally be made as to how the street railways of Massachusetts get along with annual sessions of our Legislature and with so much power lodged in the Railroad Commissioners and as to the financial status of street railway companies under such conditions. I shall endeavor to answer such inquiry.

SAFETY VALVES OF PUBLIC OPINION

Annual sessions of our Legislature are, to my mind, one of the great safety valves of public opinion. Every man with a real or an imaginary grievance thinks the General Court is a panacea for all ills, and if he does not succeed in getting what he wants, he has at least the satisfaction of speaking his mind. While our Legislature is annually petitioned for legislation upon 1500 to 2000 subjects, only about one-third or less of these petitions result in legislation. In the case of street railways the legislative committee has considered from 40 to 125 such matters, the smaller number, strange to say, in the later years. The aim of our legislation is to deal with principles, and this is why we have so much general legislation and why so many matters are placed in the hands of the Railroad Commissioners.

We look upon our Railroad Commission as a quasi-judicial body—one to which the public can appeal and one to which we can appeal. The board has always been composed of good and able men. Particularly is this true of the chairmen of the board. Many of these men accepted the position through a sense of public duty—men who would have honored our Supreme Bench. They have all been men of high character, who have carefully studied the principles of their powers and duties. The results are that the commission and its decisions have the confidence of the public—and without this confidence the commission would cease to be of any real service. The commission has always taken the position that charters were granted and received to enable capital to perform a semi-public function at reasonable rates and in a reasonable manner; and it has stated to the companies that this must be done, and to the public that this is all that can reasonably be expected. The rulings of the board have maintained this position.

The commission has authority to approve the consolidation of connecting companies and leases for 99 years or less.

In the matter of fares, the commission has taken the view that a regulated monopoly of transportation furnishes the best service at lowest rates to the whole public, and in line with this view has approved consolidations where they would result in only one company and one rate of fare and free transfers in each municipality. Its rule is that, where practicable, there should be one fare in each municipality and one fare between centers of municipalities.

FINANCIAL CONDITIONS OF MASSACHUSETTS ELECTRIC RAILWAYS

Referring to the financial condition of Massachusetts street railways: In the text of the latest report of the commission to the Legislature it is stated that 81 companies reported for the year and of the 81 companies, 41 declared or paid no dividend. The 40 companies paid from 2 per cent to 10 per cent. Forty-one companies which declared or paid no dividends is not a good financial showing; in fact, it is a bad financial showing.

The figures which I have just quoted to you are, as I stated, taken from the text of the latest report of our Railroad Commission to the Legislature. As that report does not contain the details of the operation of the companies, I shall use the statistics of 1908 for analysis. Those statistics of 1908 vary very little from these of 1909. What do the statistics of 1908 show? That 39 companies paid dividends varying from 1 per cent to 10 per cent and 43 companies declared or paid no dividends; that the dividends paid averaged 5.29 per cent on the capital stock of the dividend and non-dividend paying companies, and substantially 6 per cent for the dividend-paying companies; that the dividend-paying companies had 75 per cent of the total mileage, 88 per cent of the total capital stock, and 90 per cent of the gross income. The total dividends amounted to rising $4,000,000.

And what of the 43 non-dividend-paying companies? The West End Street Railway Company in 1888-1889 changed from animal to mechanical power, and in the next two or three years the older and larger companies followed. The apparently successful result of this changed power induced a great wave of street railway building and organization of new companies, which resulted in an increase from 49 companies in 1890 to 118 in 1900, and length of tracks increased 200 per cent. The dividend-paying companies, as a rule, were organized before, the non-dividend-paying companies since, 1890. The non-dividend-paying companies earned, gross, $3,600, the dividend-paying companies $13,000 per track-mile per annum. Omitting the Boston Elevated Railway Company, the remaining dividend-paying companies earned $8,100 per track-mile. The explanation of the condition of so many companies in Massachusetts is that the older companies occupied the best territory and the newer companies were forced into unprofitable territory, and in their anxiety to obtain rights in such territory made too liberal promises as to fares, which reflected upon the older companies, as the latter were forced to extend into unprofitable territory, thereby reducing fares. Massachusetts is overbuilt. This you will admit when you learn that of the total street railway mileage in New England over one-half is in that State.

You naturally will ask if I consider present dividends satisfactory. I unhesitatingly say no, nor do our Legislature or Railroad Commissioners. Our statutes by implication name 8 per cent as the rate, for they provide that, except in the case of the Boston Elevated, when companies pay over 8 per cent they shall then pay to the State an amount equal to the excess of over 8 per cent. Our older companies, as a rule, are steadily improving. They have absorbed by consolidation many of the smaller companies and have not fully digested them.

There is, and has been, a favorable change in the attitude of our Legislature, our commission and the public toward the street railway companies, and that, too, in a period noticeably hostile, not alone to public service, but to all corporations, and our Railroad Commisison has done more than any other force, in fact, than all other forces, to bring this about. Some seven or eight of the smaller companies have changed the unit of fares from 5 cents to 6 cents, others have changed the fare zones, and in every case where the matter was brought to the attention of the commission the action of each company was sustained and in language and by reasons which carried infinitely more weight than if stated by representatives of the companies. The commission has taken the ground that in order to interest capital for improvements the companies must show earnings, and that in order to show earnings they must charge living rates.

Frankly, I must state that I am in favor of our statutes as a whole in so far as they relate to essentials, except the ease with which now companies can be organized. I am also in favor of our Railroad Commission as a board of appeal. Its

decisions, on the whole, are more satisfactory than the decisions of our courts in our jury-tried cases, and, strange to say, while the verdicts of our juries have been growing more hostile to corporations, the decisions of our commissioners have been growing more favorable. There is, I find, agitation in other States to place more power in the hands of their commissions. It is bound to come; it is a progressive movement.

A FAIR RETURN UPON THE INVESTMENT

BY C. S. SERGEANT, VICE-PRESIDENT, BOSTON ELEVATED RAILWAY COMPANY

We are living in a period which will be especially noted by historians as a formative one, with reference to many political and social questions, and especially so in regard to the relations between the community and those corporations who serve it.

Men of business activity have been so busily, perhaps so greedily, engaged in the acquirement of wealth that they have paid too little heed to the growth of public opinion. Unwilling to spare either time or money to the cause of good government, they have awakened to see our governing bodies too often composed of cheap men, to a very large extent men with no thought beyond personal gain and popularity with the masses, and any theory or cause embraced which seemed likely to win popular favor.

Nor have our captains of industry paid much attention to the general socialistic propaganda which has gained so much force and has been so insistently pushed in press and school. The eager mind of youth, inflamed by the unscrupulousness of some prominent leaders of finance, and always ready for revolution, has in its inexperience and led by the sociologist embraced heartily the most revolutionary doctrines, the fads of every kind, of which municipal ownership, governmental regulation of business, woman suffrage, trade unionism and socialism are examples.

The conservative and intelligent portion of the community, equally outraged by many manifest wrongs, has gradually been affected by these doctrines and imperceptibly its views have been and are being colored by them.

Public service corporations thus find themselves in a most serious position. Their work comes home to the common people. The common people have been taught:

That the possession of wealth is wrong;

That a corporation is a public robber;

That ordinarily accepted and long-established business methods may be crimes under the law (the anti-trust law);

That it is a sin against the people to make money in any public service.

Under these adverse conditions we may well ask how we are to secure a fair return upon investment.

But what is a fair return? Let us see what others say. Prof. Dugald C. Jackson, in an admirable paper, entitled "Equitable Rate-Making by Public Service Companies," says:

"Seven and one-third per cent is a large return to expect from mortgage bonds of a great corporation like a railway company, owning some thousands of miles of track and carrying on a profitable business in a diversified territory; but it is small as a return on capital risked in general business or manufacturing, and the average business of the electric light companies, electric railway companies, and the like, partakes of risks resembling those of general business concerns;" and, further:

"A new company, even in a stable country, ought to earn more than current rates of interest for its investors, whose enterprise enables them to take the risks of establishing the business, but the rate of return on the investment may be expected finally to approach current rates of interest after the business has become profitable and is firmly established on fixed franchise rights covering a long period. * * * The public service companies, well established in the old and permanently settled portions of the country, which have elected to do business under franchises without term limits and are guarded from unjust competition, which conditions now exist in several of our States, must finally expect to give their best grade of service at rates which earn a margin for the investors which is little or no greater than the rate of current interest for tried and sound commercial investments."

Mr. Gilbert Holland Montague, in a paper on "Trust Regulation To-Day," in the January, 1910, issue of the *Atlantic Monthly*, expresses the following opinion:

"The duty to serve everybody, without discrimination, at a reasonable price that may be regulated and determined by the State is properly enforceable upon railroads, lighting and water companies, and other corporations which perform a public service, and in most cases enjoy exclusive powers from the State. This duty arises from the fact that the business of such companies is naturally and unavoidably a monopoly, in which competition does not exist, and, in fact, should be discouraged. The duty and purposes of such companies are best fulfilled under State regulation."

The Supreme Court of the United States, in its opinion in the case of "Willcox vs. Consolidated Gas Company," says: "There is no particular rate of compensation which must in all cases and in all parts of the country be regarded as sufficient for capital invested in business enterprises. Such compensation must depend greatly upon circumstances and locality; among other things the amount of risk in the business is a most important factor, as well as the locality where the business is conducted, and the rate expected and usually realized there upon investments of a somewhat similar nature with regard to the risk attending them."

It is unnecessary to go further. Clearly, as would be admitted by any financier, by any investor, the element of risk is most important in determining a fair return.

Let me again call attention to Professor Jackson's conclusion that "the average business of electric light and railway companies partakes of risks resembling those of general business concerns.'

What returns are obtained in general business?

Is there any reason why the department store, which has for customers the same public which rides upon our street cars, should make a large profit while we are to be content with simple interest? The manufacturer whose goods we use cannot live on any beggarly 6 per cent. Both the merchant and the manufacturer use money in their business obtained at ordinary rates, as we do, but they do not give the use of this money to their customers at cost, as we do. They expect a profit upon their operations, a return for their energy and skill. Why should we not expect the like?

We must consider not only the risk of the investment, but the nature of the service rendered.

If stockholders in railway and lighting companies contented themselves with the mere loaning of money for use in a public service it might well be concluded that they should be satisfied with ordinary interest rates. We must discriminate between the money lenders (the bond holders) and the venturers (the stockholders). The latter take the main risks of the business. They have been engaged in development work of the highest value to the community. Shall they have no greater reward than the coupon clipper? Not only do they take the risks, accepting a residue of net income after the great demands of the public, the employees and the creditors have been satisfied, but they have led in the marvelous improvements which the past 20 years have developed in the public service. Again and again have they discarded new systems and new apparatus for something more highly developed. With undaunted courage they have gone forward with a progress that has been a world wide wonder, yet we are told that they must be satisfied with ordinary interest rates.

I contend that their status is not that of a money lender.

They are constructive workers for the general good of mankind, and as such they ought to be rewarded.

But, we are told, they have a monopoly; to prevent abuse they must be restricted in their profits, regulated in their service, taxed unmercifully and allowed to survive if they can under such treatment.

I think we must agree that any company performing a public service and having a monopoly in its own territory must in some way be restricted or supervised for the protection of the public.

We may go so far with Mr. Montague as to acknowledge "the duty to serve everybody, without discrimination, at a reasonable price," but we cannot accept his further conclusion that this service must be performed "at a reasonable price that may be regulated and determined by the State."

Surely the State goes too far when it regulates the rates we shall charge, service we shall render, capital we shall invest, price at which stock shall be sold, rate of dividends we shall declare, and last, but not least, what part of our income shall be paid to the public in the form of taxes.

Such are the conditions governing the street railway industry in Massachusetts. They do not offer great inducements to the investor, nor do they tend to progress in public improvements of this character. I believe the State may properly require a reasonable service and fix in advance a reasonable rate, but should not regulate the rates once fixed. I am speaking now of city railway companies. Having done these two things its functions should cease. The company should be left free to make what profit it may under the conditions, and the conditions must be guaranteed a sufficient permanence to attract capital.

As a different method, the State might require a reasonable service and limit the profit to the stockholder, leaving the latter to fix and regulate rates. Either of these alternatives would amply protect the public which uses the facilities. To recapitulate, it would seem that the determination of a fair rate of return upon investment must depend upon the circumstances of each case, which may be designated.

THE CHARACTER OF THE RISK

This includes the questions of the magnitude of the business to be expected, the length of time of the franchise, the stability or otherwise of the rates, the freedom or otherwise of control by the owners, the limitations of dividends, if any, the danger of oppressive taxation, the danger of adverse legislation, the local, climatic and business conditions, etc.

Since this difficult question of determining the relations between the State and the public service company is continually arising and its settlement is receiving many different solutions, would it not be most desirable that a clear exposition of the principles involved should be made and that the factors in the case should be clearly presented to the public. Thus they might learn that the best service and the lowest rates are only obtainable when undisturbed security is offered the investor and an opportunity for ordinary business profit is not denied him.

In making these suggestions I am not unmindful of the recent utterance of our neighbor Mr. Whitridge: "Beware of general principles; they can only be attained through patient and laborious years. They cannot be reached merely by the expression of vague desire. They are not to be promulgated by every weakling who wants them to lean upon."

Excellent as this advice is it still seems to me that there is grave danger that the State will lose sight of certain cardinal principles in the attempt to correct many abuses which have become manifest in the management of public service corporations and may institute regulative measures of so far-reaching a scope as to deprive stockholders of a reasonable control of their own property and business. There only will remain for their protection that bulwark of liberty—the United States Supreme Court—and it is with no small satisfaction that one reads in the decision of the court in the Knoxville Water case the following:

"Regulation of public service corporations, which perform their duties under conditions of necessary monopoly, will occur with greater and greater frequency as time goes on. It is a delicate and dangerous function and ought to be exercised with a keen sense of justice on the part of the regulating body, met by a frank disclosure on the part of the company to be regulated. The courts ought not to bear the whole burden of saving property from confiscation, though they will not be found wanting where the proof is clear. The legislatures and subordinate bodies, to whom the legislative power has been delegated, ought to do their part. Our social system rests largely upon the sanctity of private property, and that State or community which seeks to invade it will soon discover the error in the disaster which follows. The slight gain to the consumer, which he would obtain from a reduction in the rates charged by public service corporations, is as nothing compared with his share in the ruin which would be brought about by denying to private property its just reward, thus unsettling values and destroying confidence. On the other hand, the companies to be regulated will find it to their lasting interest to furnish freely the information upon which a just regulation can be based."

THE TREATMENT OF DEPRECIATION

BY FRANK R. FORD, OF FORD, BACON & DAVIS

Each street railway corporation in the United States is today in possession of a blank form of the Internal Revenue Bureau, one line of which, under the heading "deductions" from gross income, is as follows:

"5-b. Total amount of depreciation Jan. 1 to Dec. 31, $——."

A footnote states: "The deductions authorized shall include all expense items under the various heads acknowledged as liabilities by the corporation making the return and entered as such on its books from Jan. 1 to Dec. 31 of the year for which the return is made. This form properly filled out and executed must be in the hands of the Collector of Internal Revenue for the district in which is located the principal office of the corporation making the return on or before March 1."

Therefore, the subject of depreciation has been removed from the realm of theory. Heretofore a few States have required returns to be made on this subject through their commissions having jurisdiction, notably the Public Service Commissions of New York and Wisconsin. The Interstate Commerce Commission has required a depreciation charge only by companies the greater part of whose operated mileage is in States where this is required.

Therefore, street railway companies must now decide whether for the year ended Dec. 31, 1909, they will refuse to acknowledge as a liability the amount of current depreciation and in that event possibly cut themselves off from claiming depreciation for this period as a part of the cost of operation in any case of proposed rate regulation, imposition of additional service or limitations of rate of return on capital; or, on the other hand, by adopting a reasonable plan for charging depreciation offer proof that this is a conservatively managed business.

DIVERGENT RULINGS OF PUBLIC AUTHORITIES

As to what this charge for depreciation should include, there is some divergence in the rulings of the four authorities in question, as follows:

1. The Interstate Commerce Commission provides for electric carriers two accounts called "depreciation of way and structures" and "depreciation of equipment," while for steam railroad companies no charge is required for depreciation with respect to way and structures, but merely for equipment.

2. With regard to the Public Service Commissions of New York it was originally intended that the State railroad commissions having jurisdiction over electric railways would follow the practice adopted by the Interstate Commerce Commission, but these commissions have so enlarged and amplified it as to be in effect a different classification. Thus all replacements under the heading of "way" are to be charged to the proper maintenance accounts and not to the depreciation account. The

New York commissions also, as to electric light and gas companies, provide that depreciation is to be charged in operating expenses under general and miscellaneous expenses rather than under maintenance.

The United States and New York commissions, therefore, do not agree as to the policy of charging depreciation as between steam and electric transportation, or as between public utilities frequently under one capitalization.

The Public Service Commissions of New York have under operating expenses two acounts, namely, "depreciation of way and structures" and "depreciation of equipment." They provide that the "amount estimated to be necesary to cover such wear and tear and obsolescence and inadequacy as have accrued during any month shall be based on a rule determined by the accounting corporation." Apparently, they provide that such an account shall cover not only the actual renewals necessitated by complete depreciation, but also the month's accruals of present or incomplete depreciation due both to wear and tear and also to the so-called obsolescence and inadequacy. This double renewal charge is not financially practicable under present rates of fare, and has not been forced.

3. The law under which the Wisconsin commission is working seems to be tempered with common sense, recognizing that a difference exists between theory and practice. This law provides that: "Every public utility shall carry a proper and adequate depreciation account whenever the commission, after investigation, shall determine that such depreciation can be reasonably required" * * * and that "the commission shall provide for such depreciation in fixing the rates, tolls and charges to be paid by the public."

Under the uniform classification of accounts of the Wisconsin commission it is provided that: "Every electric railway shall carry a proper and adequate depreciation reserve to cover the full replacement of all tangible capital in service. There shall be opened a depreciation account, to which shall be charged monthly, crediting the depreciation reserve, an amount equal to one-twelfth of the estimated annual depreciation of the tangible capital in service of the railway, or as near that amount as the finances of the property will permit."

As tangible property comprises all land and its improvements, it is conceivable that the intent of the commisson is to allow for the appreciation of value of real estate, which seems to be contrary to the orders of the other commissions.

4. The Bureau of Unted States Internal Revenue, which has in charge the collection of the new corporation tax, apparently treats the subject of depreciation as differentiated between complete depreciation or abandonment or destruction due to obsolescence, inadequacy, age, action of the elements or otherwise, and incomplete or partial depreciation due to wear and tear and obsolescence.

Complete depreciation, unless already charged out under the depreciation account or the maintenance accounts, is provided for apparently under one of the deductions from gross income as follows:

"5 (a). Total amount of loss sustained Jan. 1 to Dec. 31, $———." The definition covering this item is as follows:

"Losses.—The deduction for losses must be in respect of losses actually sustained during the year and not compensated by insurance or otherwise. It must be based upon the difference between the cost value and salvage value of the property or assets, including in the latter value such amount, if any, as has in current or previous years been set aside and deducted from gross income by way of depreciation as defined in the following section and not been paid out in making good such depreciation."

The ruling on "depreciation" provides for the year's accrued or incomplete depreciation due to exhaustion, wear and tear or obsolescence. Complete depreciation due to exhaustion and wear and tear is apparently to be charged under the heading of "expense of maintenance and operation," and complete depreciation due to obsolescence, etc., under the above deduction for losses unless formerly provided for by the depreciation fund. This ruling is as follows:

"Depreciation.—The deduction for depreciation should be the estimated amount of the loss, accrued during the year to which the return relates, in the value of the property in respect of which such deduction is claimed that arises from exhaustion, wear and tear, or obsolescence out of the uses to which the property is put, and which loss has not been made good by payments for ordinary maintenance and repairs deducted under the heading of expenses of maintenance and operation or in the ascertainment of gross income. This estimate should be formed upon the assumed life of the property, its cost value, and its use. Expenses paid in any one year in making good exhaustion, wear and tear, or obsolescence in respect of which any deduction for depreciation is claimed must not be included in the deduction for expense of maintenance and operation of the property or in the ascertainment of gross income, but must be made out of accumulative allowances deducted for depreciation in current and previous years."

This ruling seems to be carefully drawn, although I doubt the propriety or practicability of making an allowance for incomplete or accrued depreciation due to the so-called obsolescence or inadequacy. In the first place, there is no adequate standard for gaging the probable life of any part of the construction or equipment of a street railway, the discarding of which depends on its becoming obsolete or inadequate. A careful distinction should be made between the useful life of the article in question based upon wear and tear or the action of the elements and the useful life before becoming obsolete or inadequate. Wear and action of the elements are dependent upon service and time; obsolescence and inadequacy are dependent upon changes in the art, which may take place within one year or 50 years. Considering the property as a going concern, an article cannot be said to be 50 per cent obsolete by the use of any present standard; it is either obsolete or not obsolete, 100 per cent obsolete or a proper standard. On the other hand, an article can be said to be 50 per cent worn out either by wear and tear or by the action of the elements.

Furthermore, obsolescence and inadequacy usually occur for business or economic reasons. The new standard will produce more net profits than the old one, even allowing for interest and depreciation on the new standard, together with interest on the old. If this were not so the old article would not become obsolete. Consequently, from a business standpoint, renewals due to depreciation from obsolescence can be capitalized. In the street railway business the notable examples of obsolescence from a change in the art have been the change from horse to the cable system, and from the cable to electric. From the rates of fare in force it would generally have been impossible to have made these changes out of income, and certainly so with the increased length of ride and use of transfers of to-day. If a provision had been in force at the time requiring such a change we would probably still be burdened with the older system in the same manner as the city of Edinburgh is to-day suffering from the operation of its cable system.

From the standpoint of the public, if renewal or change of the whole system due to obsolescence before wearing out has to be charged to income, either the present rates of fare must be raised or the replacement cannot be made. It would appear, therefore, that the public's interest is thus served by capitalizing such charges, if otherwise not financially practicable.

The very rulings of these public service commissions that obsolescence shall be charged to income has already had the effect of increasing largely the useful life of all physical property and of delaying changes in the art.

Three different policies of providing for the upkeep of physical property out of income may be followed:

1. Charging out when the expenditure is made.
2. Charging out over a period after expenditure, and
3. Accruing in advance of need.

I believe that a combination of these three methods will produce the most satisfactory results and will correspond with the best steam railroad practice of the past 25 years.

Apart from the technicalities of accounting, I think that depreciation should be divided and charged as follows:

1. Complete depreciation.
   a. That due to wear and tear should be charged to proper maintenance accounts.
   b. That due to obsolescence, inadequacy, age or destruction by any cause should be written off from current income or from past accumulations of profit and loss account, if financially practicable, or, if not, such obsolescence or inadequacy should be capitalized.
2. Incomplete depreciation.
   a. That due to wear and tear, if likely to fall due in large amounts at irregular intervals, should be provided for by a depreciation fund.

From a practical standpoint the method which I have used in working out this problem recently for a street railway property operating both on paved streets and private right-of-way, has been as follows, referring to the balance-sheet accounts of the physical property:

Right-of-way Real Estate.—Appreciation over original cost is estimated to provide partly for depreciation of the intangible property included in the balance sheet.

Track and Roadway.—Renewal of ties, special work and paving is charged direct to maintenance. To provide for the renewal of rails, including the labor, ballast, joints, ties and paving occasioned by such renewal, there is charged annually to a depreciation fund such an amount as will provide the cost of the renewal when it is made, the remaining life of each section of track construction being estimated.

Electric Line.—Renewal of poles, wire and fixtures is made through maintenance.

Real Estate Used in Operation of Road.—Appreciation over original cost it is estimated will more than provide for depreciation on buildings.

Buildings.—Repairs and renewals are charged to maintenance. Depreciation due to obsolescence or inadequacy will be more than covered usually by appreciation on real estate; if not, upon discarding the building any net depreciation should, where financially practicable, be written off.

Investment Real Estate.—Appreciation is estimated to provide partly for depreciation of intangible property.

Power-Plant Equipment.—Renewal necessitated by wear and tear is provided for from maintenance. Any articles retired through age or inadequacy should, where financially practicable, be written off.

Shop Tools and Machinery.—Renewals are made from maintenance. An annual inventory is taken and book values increased or decreased accordingly.

Cars, Including Electrical Equipment.—Physical wear and tear are provided for from maintenance. Any car or class of cars upon being retired should be written off, where financially practicable, unless provided for by car equipment trust or other sinking fund.

The depreciation fund should be available in cash when needed. With this in mind, it may be invested in the company's saleable securities and in some cases in additions to property.

The depreciation fund is essentially a financial problem, the solution of which is apparently by law left to the directors of the corporation, as they are empowered to determine the amount of current income to be set aside for working capital and the amount of dividends to be declared. It is questionable if utilities commissions can lawfully impose rules for the charging of depreciation in cases where the physical property is fairly maintained and securities properly issued. I believe that no hard and fast rule can be laid down for charging a fixed amount to such a fund month by month or year by year; the proper amount to be charged should be known, and if in lean years this amount is not laid aside, in prosperous years the deficiency should be made up. It might even be necessary to use this fund for other purposes than renewal of physical property, due to business contingencies unforeseen.

This program, I believe, will provide for the upkeep of the physical property until another change in the system occurs, such as from the cable to electric, if it ever does.

For the company mentioned, to which we have applied this policy of charging depreciation, I find that it results in a charge to depreciation fund of about 3 per cent of the gross earnings in addition to charges for renewals in the maintenance account, which, with current repairs, usually average about 10 per cent of the gross earnings, making a total of 13 per cent, to which must be added the amount written off for the abandonment of property due to obsolescence or otherwise, so that the total would probably be 15 per cent of gross earnings. The proper amount to be charged to a depreciation fund varies with every property, and should be carefully estimated as a factor of the physical cost, although it has been here stated, for convenience, as a factor of the gross earnings.

On the other hand, the theoretical depreciation fund arrived at by guessing at obsolescence and assuming a given life for each article of the construction and equipment based on the past 25 years' physical history of horse, cable and electric railways during their development to the present apparently well-settled standards, will involve a charge of usually from 10 per cent to 25 per cent of the gross earnings. Adding to this the current repairs and renewals covered in the usual maintenance accounts, of some 10 per cent of gross earnings additional, the total charge for maintenance, renewals and depreciation will amount to from 20 per cent to 35 per cent or more of the gross earnings. With the present insufficient return upon the capital actually invested in street railway enterprises, it would not be reasonable to expect these corporations to make appropriations for depreciation based upon this theory of obsolescence.

Referring to the methods currently employed for providing for the upkeep of the property from earnings, an examination of the public reports of a number of street electric railway companies in the United States, Canada and Great Britain shows that there is no standard practice; each company is apparently actuated by its financial condition and managerial opinions. The range of methods employed to return income into the property is as follows:

METHODS OF CHARGING RETURNS INTO PROPERTY FROM INCOME

1. From the current year's income.
   1. Actual cost in operating expenses charged for
      1. Maintenance.
      2. Renewals.
      3. Extensions, additions and betterments.
   2. Apportioned in operating expenses for
      1. Renewals.
      2. Depreciation.
      3. Car and equipment obligations.
   3. Apportioned in fixed charges for
      1. Renewals.
      2. Depreciation.
      3. Car and equipment obligations.
      4. Sinking funds, if permanently to retire capital.
      5. Contingent funds.
   4. Apportioned from net income or surplus for
      1. Renewals.
      2. Depreciation.
      3. Extensions, additions and betterments.
2. From accumulated profit and loss from operation.
   1. Apportioned to physical uses for
      1. Renewals.
      2. Depreciation.
      3. Extensions, additions and betterments.
   2. Apportioned to adjust accounts of
      1. Assets affecting maintenance, renewals, etc.
      2. Liabilities affecting maintenance, renewals, etc.
3. From profit and loss other than operation—not applicable to dividends.
   1. Premium on securities sold. Held and used for extensions, additions, etc.
   2. Profit on assets sold and reinvested in property.

The rights of stockholders as to preservation of original investment and return upon securities are involved in any consideration of depreciation or the return of income into property. Should stockholders, who in early years have taken the risk and have provided for and outlived early losses of operation, be subject to the obligation of providing for wholly theoretical wasting of capital in the future?

Provision for charging depreciation has been made in the new franchises which have recently been granted to the street railway companies at Chicago and Cleveland. In the Chicago franchise, beginning February, 1910, it is provided that there shall be set aside 8 per cent of the gross earnings as a renewal fund, in addition to 6 per cent and as much more as may be necessary for current repairs or maintenance. The total charge for current maintenance, depreciation and renewals in Chicago will, therefore, as a minimum, be 14 per cent of the gross earnings.

In the Cleveland franchise it is provided that an average of about 5 cents per car-mile shall be applied to maintenance, depreciation and renewal account, which is about 22 per cent of the gross earnings.

From the published reports of the 20 largest electric railway companies in the United States and Canada it is apparent that 13 are making specific charges to income for depreciation or renewals; these, in percentage of gross earnings, are as follows:

City.	Year ending	—Depreciation— Amount.	Per cent. gross earnings.
Baltimore-United Rys. & El. Co	Dec. 31, 1908	$813,751 B.F.	11.9
Milwaukee Elec. Ry. & Lt. Co	"	475,127 E.	10.0
Minneapolis-Twin City R. T. Co	"	544,000 C.	8.5
Buffalo-International Tr. Co	"	403.280	7.7
St. Louis-United Rys	"	527,856	5.0
Montreal St. Ry	Sept. 30, 1909	175,000	4.5
Detroit United Ry	Dec. 31, 1908	300,000 A.	4.2
Toronto Railway	"	150,000	4.2
Washington Ry. & Elec. Co	"	150,323 B.	4.0
Washington-Capital Traction Co	"	70,117 B.	3.8
Boston Elevated Ry	Sept. 30, 1909	200,000	1.4
Brooklyn Rapid Transit Co	June 30, 1909	148,806 G.	.7
Kansas City Ry. & Lt. Co	May 31, 1908	829,814 D.	13.7

NOTES.

A. Also set aside $50,000 to contingent liability reserve, including which the percentage of gross earnings is 4.9.
B. Renewals and betterments.
C. Including interest on fund, which consists of company bonds, this percentage is 9.
D. Written off surplus—applicable to 1908 and prior years.
E. Includes Milwaukee Light, Heat & Traction Co.
F. Subject to further distribution by directors.
G. In the last six years $5,400,000 discount on bonds has been written off.

In all of the above cases these charges do not represent the entire return into the property from income. When we include all charges for maintenance, reserves, depreciation and other funds, special appropriations and unappropriated surplus these figures are increased largely.

For the last year obtainable for various groups and individual street railways of this and foreign countries the total amounts returned into the property from income have been the following percentages of gross earnings:

RETURN INTO PROPERTY FROM INCOME

Company, State, etc.	Kind of service.	Year end'g	Per cent gross e'rn'gs.
United States Census, 1907	939 electric railway companies, including small amount of electric light	Dec. 31, 1907	17.1
United States Census, 1902	799 companies, all electric railways, including some electric light	Dec. 31, 1902	17.4
State of N. Y.—District No. 1	Electric railways	June 30, 1907	11.7
State of N. Y.—District No. 2	Electric railways	June 30, 1907	19.9
State of Massachusetts	Electric railways	Sep. 30, 1908	15.3
United Rys. & Elec. Co., Baltimore	Urban and suburban railway	Dec. 31, 1908	21.7
Brooklyn Rapid Transit Co	Surface and elevated railway	June 30, 1909	19.3
Internationcal Tract. Co., Buffalo	Urban, suburban & interurb. railway	Dec. 31, 1908	19.3
Twin City Rapid Transit Co	Urban and suburban railway	Dec. 31, 1908	18.1
Kansas City Ry. & Lt. Co	Railway and electric light	May 31, 1908	17.8
Boston Elevated Railway	Surface, elevated, subway railway	Sep. 30, 1909	18.6
American Cities Ry. & Lt. Co	5 electric railway & light companies, B'ham, Memphis, Little Rock, Knoxville and Houston	Dec. 31, 1908	14.9
Capital Tract. Co., Washington	Urban and suburban railway	Dec. 31, 1908	14.1
Philadelphia Rapid Transit Co	Surface, elevated, subway railway	June 30, 1909	9.7
Great Britain and Ireland	Municipal and company railways	Mar. 31, 1908 Dec. 31, 1907	28.7
Great Britain and Ireland	Municipal rys	Mar. 31, 1908	31.2
Great Britain and Ireland	Company railways	Dec. 31, 1907	22.2
Glasgow Corporation Tramways	Municipal rys	May 31, 1909	42.6

The ability of large manufacturing corporations to make the consumer pay for the charge for depreciation and the great difference between the financial condition of those properties and that of street railway properties are shown by a recently advertised letter of the Western Electric Company to its bankers, dated Jan. 21, 1910, from which I quote the following:

"The stated net profits are after deducting liberal charges for depreciation, pursuant to the well-known policy of all companies controlled by the American Telephone & Telegraph Company. This is evidenced by the fact that the book valuation of real estate and plants covered by the mortgage has been reduced to 51 per cent of their actual cost."

Under the present well-known conditions of the street railway industry this method of treatment is an impossibility today. After all is said, the treatment of depreciation is largely a financial problem.

ELECTRIFICATION OF BAVARIAN STATE RAILWAYS

Several short notes have been published in this paper in regard to the investigation being conducted by the Bavarian Government into the electrical equipment of a number of the Bavarian main line and branch line railroads. A very full abstract of the report recently submitted to the Bavarian Parliament by the Minister of Transportation of that country is contributed by J. Jacquin, engineer to the Bavarian State Railways, to the *Bulletin* of the International Railway Congress, published in Brussels.

In the report the trains were divided into four classes: Freight trains, suburban trains, express trains and local trains, and power-speed-distance curves were prepared for each line. The total consumption and ton mileage of the system estimated upon are shown in the accompanying table, which is based on an average day in July, 1906. To the figures for energy therein shown an allowance was made of 10 per cent for contingencies, 15 per cent for transformer losses based on a transmission voltage of 10,000 and 25 per cent for transmission losses. This gives for the average daily demand 3,400.000 hp-hours, equivalent to an average daily load of 142,000 hp. With a load factor of 33 per cent and a further allowance for extensions probable before 1920, the engineers estimate that there should be provided a maximum power station capacity of 606,000 hp. The largest output of energy is required in November, because at that time power is needed for light and heat and the traffic is greater than during any other winter month. The least energy is required in April. The figures for July are a close average of those for the year.

A study of different electrical systems resulted in the recommendation for single-phase operation with transmission voltage of 50,000 and a trolley voltage of 10,000 with low frequency.

The report then considered the financial aspect of the proposition. This was based on a cost of coal per ton in the northern sections of $5.12 and in the southern sections of $5.48, and a cost per kw-hour from water-power in the northern sections at from 0.8 cent to 1.2 cents, and in the southern section, where water-power is more abundant, from 0.4 cent to 0.8 cent. The conclusion is reached that electric power would be cheaper than steam on the southern lines and on some of the lines running northward.

DISTRIBUTION OF ENERGY CONSUMPTION ON BAVARIAN STATE RAILWAYS

	Ton, miles.	Kw hours.	Watt hrs. per ton mile.
Main lines—			
Passenger trains	8,416,813	578,890	68.27
Freight trains	14,542,236	646,010	44.48
Branch lines—			
Passenger and freight	1,433,976	78,525	54.61
Miscellaneous—			
Switching	.....	135,400	.....
Local lines	197,359	12,270	62.16
Total	24,590,384	1,447,095	58.87

Note—All tons are English tons. One ton = 2240 lb.

The Japanese Government is said to be preparing plans to lay four tracks on the Tokio-Yokohama line, 18 miles long, and to equip it for electric operation.

ASSOCIATION NEWS

The electrification by several steam railroads of sections of their lines has led to a growing interest in the American Street & Interurban Railway Association by the officers of these steam railroads, particularly by the officers connected with engineering departments. In many respects the American Street & Interurban Railway Association is in a better position to assist these officials in a solution of their problems than any other association, because many of the questions connected with their work are similar to or closely allied with those in connection with interurban and rapid transit systems. In view of this condition, President Shaw has appointed as an additional member of the committee on active membership of the association, J. S. Doyle, of the Interborough Rapid Transit Company, New York, who will give special attention to the subject of active and associate membership in the association of these steam railroad companies and their officers.

In this connection several proposals have been made that the name of the association should be changed to American Electric Railway Association. No immediate plans have been made for such a change, but President Shaw has appointed a committee to consider all phases of the question. The committee consists of W. Caryl Ely, Thomas N. McCarter and the president.

Several member companies have recently suggested that it would be of considerable value to the association, as well as to the companies themselves, if each company should secure from each delegate whom it sends to conventions a statement of the most helpful ideas obtained at the convention and suggestions as to matters to be considered or changes made at future conventions. Certain companies have made it a practice in the past to do this, and the suggestion has been offered that if duplicates of these reports should be filed with the association they would be helpful. The officials of the association are considering the matter.

The following is a list of the companies which have been added to active membership list of the association since Oct. 1, 1909, and of those added to the associate membership since Jan. 1, 1910:

NEW ACTIVE MEMBERS, ADMITTED BETWEEN OCT. 1, 1909, AND FEB. 7, 1910

Albia Interurban Railway Co., Albia, Ia.
Asheville & E. Tennessee R. R. Co., Asheville, N. C.
Baton Rouge Electric Co., Baton Rouge, La.
Central California Traction Co., San Francisco Cal.
Coast Counties Light & Power Co., Santa Cruz, Cal.
Connecticut Co., New Haven, Conn.
Denver & South Platte Railway Co., Denver, Colo.
Guadalajara Tramways Co., Guadalajara, Mex.
Indianapolis, Crawfordsville & Western Trac. Co., Indianapolis, Ind.
Inter-State Traction Co., Duluth, Minn.
Johnson City Traction Co., Johnson City, Tenn.
Lincoln Traction Co., The, Lincoln, Neb.
New York & North Shore Trac. Co., Long Island City, N. Y.
Pacific Electric Railway Co., Los Angeles, Cal.
Peekskill Lighting & Railroad Co., Peekskill, N. Y.
Portsmouth Street R. R. & Lt. Co., Portsmouth, O.
Quebec Railway, Light & Power Co., Quebec, Que., Can.
Rapid Transit Railway Co., Dallas, Tex.
Saginaw & Flint Railway Co., Saginaw, Mich.
San Jose & Santa Clara Railroad Co., San Jose, Cal.
Shawinigan Falls Terminal Ry. Co., Montreal, Que., Can.
Tama & Toledo Electric Ry. & Lt. Co., Toledo, Ia.

NEW ASSOCIATE MEMBERS FROM JAN. 1, 1910, TO FEB. 7, 1910

J. M. Ayer, engineer, Boston Elevated Railway Company, Boston, Mass.
C. F. Bedwell, assistant engineer, Public Service Railway Co., Newark, N. J.
H. C. Benagh, roadmaster, Nashville Railway & Light Company, Nashville, Tenn.
Frank L. Bigelow, president, Bigelow Company, New Haven, Conn.
F. W. Brooks, general manager, Detroit United Railway, Detroit, Mich.
Harry Bullen, general superintendent, Detroit United Railway, Detroit, Mich.
Samuel A. Bullock, assistant manager electric truck department, Baldwin Locomotive Works, Philadelphia, Pa.
J. B. Burdett, Burdett-Rowntree Manufacturing Company, Chicago, Ill.
C. H. Burnett, manager, Los Angeles & Redondo Railway Company, Redondo Beach, Cal.
W. C. Burrows, chief clerk accounting department, Third Ave. Railroad Company, New York, N. Y.
W. M. Casey, trainmaster, Denver City Tramway Co., Denver, Colo.
Reginald M. Campbell, eastern sales manager, Peter Smith Heater Company, New York, N. Y.
Everett U. Crosby, manager, Independence Inspection Bureau, Philadelphia, Pa.
W. C. Cuntz, Pennsylvania Steel Company, Steelton, Pa.
Geo. H. Davis, Ford, Bacon & Davis, New Orleans, La.
W. T. Dougan, engineer maintenance of way, Metropolitan Street Railway Company, New York, N. Y.
Clark D. Eaton, sales agent, American Car & Foundry Company, New York, N. Y.
Emil Ehnbom, engineer, Denver City Tramway Company, Denver, Colo.
J. H. Davis, electrical engineer, Baltimore & Ohio Railroad, Baltimore, Md.
James F. Feely, secretary to general manager, Third Ave. Railroad Co., New York, N. Y.
Paris R. Forman, mechanical engineer, Burdett-Rowntree Manufacturing Company, Chicago, Ill.
Henry Glazier, superintendent, Holmesburg, Tacony & Frankford Electric Railway Company, Tacony, Pa.
James Grady, vice-president, Columbia Machine Works & Malleable Iron, Company, Brooklyn, N. Y.
W. B. Graham, division superintendent, Public Service Railway Company, Newark, N. J.
J. E. Harrall, district superintendent, United Railways & Electric Company, Baltimore, Md.
Ernest F. Hartmann, president, Carbolineum Wood Preserving Company, New York, N. Y.
E. C. Hathaway, general manager, Norfolk & Portsmouth Traction Company, Norfolk, Va.
J. F. Heyward, vice-president and general manager, Maryland Electric Railways Company, Annapolis, Md.
J. M. Hood, Jr., chief engineer, United Railways & Electric Company, Baltimore, Md.
Albert F. Hovey, cable engineer, Interborough Rapid Transit Company, New York, N. Y.
Samuel P. Hunt, assistant general manager, Manchester Traction Lighting & Power Company, Manchester, N. H.
Wm. F. Ham, comptroller, Washington Railway & Electric Company, Washington, D. C.
John M. Johnson, superintendent of transportation, South Shore Traction Company, New York, N. Y.
Chas. W. Jones, assistant engineer of construction, New York, New Haven & Hartford Railroad Company, New Haven, Conn.
J. F. Layng, engineer, Maryland Electric Railways Company, Annapolis, Md.
Ira B. Lesh, National Brake Shoe Company, New York, N. Y.
James Link, superintendent of power, Knoxville Railway & Lighting Company, Knoxville, Tenn.
Alexander McIver, commercial engineer, Westinghouse Electric & Manufacturing Company, New York, N. Y.
R. L. MacDuffie, vice-president, Wendell & MacDuffie Company, New York, N. Y.
H. G. McConnaughy, Dearborn Drug & Chemical Works, New York, N. Y.
H. W. Marsh, Marsh & McLennan, New York, N. Y.
W. G. Matthews, superintendent overhead lines, Denver City Tramway Company, Denver, Colo.
C. S. Mitchell, auditor, Pittsburg Railways Company, Pittsburgh, Pa.
T. C. Moore, New York sales manager, International Time Recording Company, New York, N. Y.
J. W. Moyer, president, Schuylkill & Dauphin Traction Company, Pottsville, Pa.
Wm. S. Murray, electrical engineer, New York, New Haven & Hartford Railroad Company, New Haven, Conn.
John C. Neale, assistant manager sales, Carnegie Steel Company, Pittsburgh, Pa.
F. C. Norisiek, purchasing agent, Metropolitan Street Railway Company, New York, N. Y.
Wm. Northrop, president, Virginia Railway & Power Company, Richmond, Va.
Farley Osgood, general superintendent, Public Service Railway Company, Newark, N. J.
R. J. Owens, manager New York branch, Boston Woven Hose & Rubber Company, New York, N. Y.
Wm. H. Pape, manager, Pittsburg & Butler Street Railway Company, Butler, Pa.
G. W. Parker, general express and freight agent, Detroit United Railways, Detroit, Mich.
Lee H. Parker, Stone & Webster Engineering Corporation, Boston, Mass.
R. Henry Phillips, secretary and manager, Kensington Railway Company of Maryland, Washington, D. C.
A. J. Pizzini, New York sales manager, International Time Recording Company.
J. R. Pratt, assistant general manager, United Railways & Electric Company, Baltimore, Md.
L. W. Proctor, general foreman electric department, Boston & Maine Railroad Company, West Medford, Mass.
H. F. Purrington, Sr., superintendent maintenance of way, Rhode Island Company, Providence, R. I.
W. J. Quinn, assistant engineer, Third Avenue Railroad Company, New York, N. Y.
C. H. Quereau, superintendent of electric equipment, New York Central & Hudson River Railroad Company, New York, N. Y.
Harold Rowntree, secretary-treasurer, Burdett-Rowntree Manufacturing Company, Chicago, Ill.
E. M. T. Ryder, engineer maintenance of way, Third Avenue Railroad Company, New York, N. Y.
H. A. Robbins, superintendent of power, Brooklyn Rapid Transit Company, Brooklyn, N. Y.
Darrow Sage, chief engineer, Jersey City Power House, Hudson & Manhattan Railroad Company, Jersey City, N. J.
Ralph Sanger, Wonham, Magor & Sanger, New York, N. Y.
Pierre V. C. See, superintendent car equipment, Hudson & Manhattan Railroad Company, Jersey City, N. J.
J. N. Shannahan, vice-president and general manager, Washington, Baltimore & Annapolis Electric Railway Company, Baltimore, Md.
Nathan Shute, district sales agent, Ohio Brass Company, Philadelphia, Pa.
J. B. Smiley, assistant sales agent, Pennsylvania Steel Company, New York, N. Y.
D. W. Smith, president, Peter Smith Heater Company, Detroit, Mich.
M. G. Starrett, consulting engineer, New York, N. Y.
John H. Sturge, assistant district superintendent, Public Service Railway Company, Newark, N. J.
Geo. W. Swint, master mechanic, Nashville Railway & Lighting Company, Nashville, Tenn.
C. E. Taylor, superintendent, Edmonton Radial Railway Company, Edmonton, Alta., Can.
Carroll Thomas, electrical assistant, United Railways & Electric Company, Baltimore, Md.
T. H. Tutwiler, president, Memphis Street Railway Company, Memphis, Tenn.
J. L. Thurston, Hildreth Varnish Company, New York, N. Y.
Langdon B. Valentine, second vice-president, Valentine & Company, New York N. Y.
R. N. Wallis, treasurer, Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.
C. B. Wells, superintendent of transportation, Denver City Tramway Company, Denver, Colo.
Sydney F. Weston, New York district manager, National Brake & Electric Company, New York, N. Y.

J. M. Willis, chief dispatcher, Nashville Railway & Lighting Company, Nashville, Tenn.
Augustus Wolff, superintendent of motive power, United Railways & Electric Co., Baltimore, Md.
W. E. Woodard, manager electric locomotive and truck department, American Locomotive Company, Schenectady, N. Y.
Percy Warner, president, Nashville Railway & Lighting Co., Nashville, Tenn.

HEARING ON SERVICE IN NEW YORK SUBWAY

A hearing was held before William R. Willcox and J. E. Eustis, of the Public Service Commission of the First District of New York, on Feb. 1, 1910, in regard to the method of operation and equipment of the subway lines of the Interborough Rapid Transit Company. H. H. Whitman acted as counsel for the commission and James L. Quackenbush and Theodore L. Waugh represented the company in a similar capacity. Frank Hedley represented the company in his capacity as vice-president and general manager.

E. G. Connette, transportation engineer of the commission, submitted observations of the express service in the subway on Jan. 25 and of the local service on Jan. 26, which were made under his direction. Referring to southbound express trains, Mr. Connette said that there were only one or two trains at Seventy-second Street between 6 a. m. and 10.30 a. m. in which there were not more passengers than seats. At the Grand Central station the overload period began at 7 a. m. and continued until 10.30 a. m. Between 7 a. m. and 7:30 a. m. at the Grand Central station 16 eight-car trains were operated with a seating capacity of 6400 and approximately 10,000 passengers. At Fourteenth Street the overload period commenced at 8 a. m. and continued until 10:30 a. m. Between 10:30 a. m. and 4 p. m. 235 express trains were operated northbound and southbound between Fourteenth Street and Forty-second Street. Passengers were standing in about 60 per cent of these trains. Between 10 a. m. and 4 p. m. 231 local trains were operated north and south of Twenty-eighth Street. Thirty-eight, or 30 per cent, of these trains carried passengers who were standing. Between 11 a. m. and 12 m. no overload period was noted on the express trains. Details of observations of the local trains made at the various stations on Jan. 26 were also given by the witness.

Mr. Connette recommended that the maximum express service should be operated for a greater length of time than at present in order to provide adequate service before and after the peak at the rush hours. The fastest service north that Mr. Connette had noted on the express lines for an half-hour period was 16 trains at the Fourteenth Street station, or an average of one train every 112 seconds. Eighteen trains, or a train every 100 seconds, comprised the fastest southbound service.

Mr. Hedley said that the service observed by Mr. Connette on Jan. 25 and 26 was substantially that given daily by the company, although a train or two might have been withdrawn. The speed control system installed at the Ninety-sixth Street crossing had been fully developed in all stations and had exceeded expectations. The headway of trains could be reduced to 90 seconds when the station stops were reduced through the operation of the sidedoors. The starting of the train from the home signal, approaching a station, the acceleration and the deceleration took fixed periods of time, and these plus the time of the station stop make the intervals between trains. The company had 20 men at the Fourteenth Street station, 20 men at the Forty-second Street station, and six or eight men at the Seventy-second Street station to assist in handling traffic.

Mr. Hedley said that the company had ordered 250 steel cars, 159 of which were contracted for delivery in October, 1909, but only one sample car had been delivered to date. One hundred and ten cars were under order with the American Car & Foundry Company, 100 with the Pressed Steel Car Company and 40 with the Standard Steel Car Company. It had been impossible to secure the steel from the mills for these cars. With these new cars in service a headway of 1½ minutes could be maintained. According to the revised records of the company, complete side-door trains had decreased the time of the different station stops from about one minute to 35 or 40 seconds. Under the conditions which now obtain it would be at least a year before the company secured enough side-door cars to complete the express service. About 150 side-door cars were now in service, 70 of which were of wood construction.

The American Car & Foundry Company had promised to ship two cars on Feb. 1, six on Feb. 8, six on Feb. 15, six on Feb. 22 and at the rate of eight per week commencing March 1. The Standard Company had promised to deliver 40 cars during March and April. It would require from 20 to 30 days to equip each car. If the car companies lived up to their promises, the company would have nine cars ready by March 1, 24 by April 1, 32 more by May 1, 40 more by June 1, and nine more by July 1. The contract with the Pressed Steel Car Company had been placed last and did not call for delivery until June, July and August, 1910. Three patents cover the form of door controlling the device to be used on these cars. Two of these were owned by the Pitt Car Gate Company and the other by the Interborough Rapid Transit Company. It took a combination of the three to make a successful device. The device had been in use on the cars of the company for some time and had never tended to delay the completion of equipment by the car companies.

Mr. Connette said that the company has 818 cars available. On an average about 23 of these were in the shops for change into side-door cars, leaving 795 available for service. On Dec. 15, 1909, 43 cars were in the shops undergoing repairs. In order to comply with the order of the commission of May 11, 1909, and give a headway of 1 minute and 30 seconds on the express service with side-door trains, a total of 640 cars would be required.

Mr. Eustis asked Mr. Hedley to file with the commission a report of the number of cars on hand for subway service at present, the number of cars operated on the average and the percentage of cars out of service. The hearing was then adjourned until Feb. 7.

CHICAGO SUBWAY PLANS

Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, has just been appointed by Mayor Busse engineer to undertake the work of constructing a system of subways for Chicago. Mr. Arnold will organize an engineering force and prepare plans for the work. He is quoted as saying that in a general way the plans will include provisions for the through routing of trains between different sides of the city and the elimination of loops so far as practicable in the business district.

The city has a fund of more than $3,000,000 as its share of the net receipts of the traction companies during the past two years, and approximately $1,500,000 will be paid in by April, 1910. In addition to this fund it is stated that the surface railway companies are required to contribute the entire expense of building those parts of the subways which are occupied by their cars, with the provision that this shall not exceed $5,000,000 for the first five years of operation under their ordinances.

Walter L. Fisher, special traction counsel, in commenting on the transportation future of Chicago, has urged the union of the surface and elevated systems. In his opinion, if all the companies were consolidated the passengers would use the elevateds for long rides and the surface lines for shorter travel, according to their convenience. If a 5-cent fare was found to be insufficient to give a fair return on the capital invested when unified traction facilities were afforded, then, Mr. Fisher held, the rate should be made adequate by charging for transfers. The first step toward a more ideal transportation system would be to secure a thorough and comprehensive report on the whole question of the proper development of local transportation, including elevated, surface and subway services. It is understood that this is one thing which the local transportation committee has in mind in appointing Mr. Arnold to take charge of subway construction.

INTERSTATE COMMISSION REPORT ON DISTRICT OF COLUMBIA STREET RAILWAYS

In its second annual report to Congress on street railways in the District of Columbia, dated Jan. 24, 1910, the Interstate Commerce Commission renews its recommendation of a year ago that it be relieved of the duty of supervising the street railway service in the district. The commission believes that its responsibility of regulating interstate carriers is an undertaking of sufficient magnitude to demand all of the time and personal attention of the members of the commission. The report of the Interstate Commission says in part:

"The supervision of a city's local street car service presents a problem essentially different in character and entirely foreign to the purpose for which this commission was established. Moreover, the members of the commission must necessarily be absent from Washington for extended periods throughout the year, thus rendering impossible that intimate touch with local conditions which is believed to be necessary if the intent of the act of May 23, 1908, is to be effectuated. These considerations prompt us to strongly urge that Congress place this work and responsibility in some other hands.

"A survey of the work of the past year shows that gratifying progress has been made in the direction of improving the local street car service. Responsive to orders from this commission the equipment of cars has been materially improved. Modern safety appliances have been installed, better route signs have been adopted, and heating apparatus has been extensively provided.

"Perhaps the most stubborn problem confronting the commission is the overcrowding of cars. Conditions have been improved in some measure by requiring the operation of more cars under shorter headway on important routes during the rush hours, but these requirements have proved by no means an adequate cure for the overcrowding evil. The long-continued failure of the street railway companies to observe the provisions of the law at length led the commission to institute prosecutions in the police court of the District of Columbia. Four informations were filed charging the Washington Railway & Electric Company and the Capital Traction Company with operating cars in a crowded condition. The defendant street railway companies moved to quash the information upon the ground (1) that the act is unconstitutional in that the penalties provided for disobedience are so heavy as not only to be confiscatory of the property of the defendants, but to deter them from attempting to test in the courts the validity of the law or of regulations made by the Interstate Commerce Commission in pursuance thereof; (2) that the section is altogether general in its terms, being intended only to announce certain principles which should guide the commission in prescribing such regulations as might be necessary in order to make the law effective. This second contention was sustained by the police court in a decision rendered on Sept. 23, 1909, and the motions to quash the information were granted. The initial contention of the defendants, viz., that the penalties established by the act rendered it unconstitutional, was not sustained. The case has been carried to the court of appeals on a writ of error, and it is hoped that in the near future a decision will be rendered which will definitely fix the responsibilities of the street railway companies under the law."

CONEY ISLAND & BROOKLYN RAILROAD VALUATION

Since the publication in the Electric Railway Journal of Jan. 15, 1910, of an abstract of testimony before the New York Public Service Commission, First District, in the case involving the valuation of the Coney Island & Brooklyn Railroad, several additional hearings have been held. Frank R. Ford, of Ford, Bacon & Davis; G. B. Watkins, a statistician of the commission; S. W. Huff, president of the company, and Elmer M. White, auditor of the company, have testified. The next hearing will be held on Feb. 17.

DATA BOOK ON THE COLUMBUS, MARION & BUCYRUS RAILWAY

H. L. Weber, chief engineer of the Columbus, Marion & Bucyrus Railway, has gotten out in neat pocketbook form a series of blue prints of general use to the men in his department and for other officials of the road who like to keep with them in convenient form engineering data of the line. The book of blue prints, when folded for the pocket, measures 7 in. x 3¼ in., and includes the following: Map and timetable of the line; data on the track; schematic plan of the line, showing curves, feeder layout and street crossings, with the name of the foreman of each section of the line; tables of superelevations in inches at different degrees of curves and miles per hour; leads used for switches and frogs of different angles; diagrammatic chart of running time; diagrams showing standard spiral and method of its calculation; diagram of standard overhead construction; spiral tables; diagram of standard 4-deg. curve and typical form for field notes. The blue prints are pasted together so that they make a long folder, and where a little extra space is available at the end of a sheet Mr. Weber has added some appropriate motto, such as, "Do the thing right and do it right now," "Don't worry, but tighten up those loose joints."

The blue points comprising the book are contained in a blue print cover, which bears the statement that it is the 1910 edition of the Columbus, Marion & Bucyrus Railway Company's Blue Book, which is "issued every once in a while by the chief engineer for the members of the flock." While Mr. Weber was chief engineer of the Fort Wayne & Wabash Valley Traction Company he published a somewhat similar folder for that road, but it was not so elaborate.

MOVING DOUBLE-TRUCK CARS WITH A SINGLE-TRUCK TRANSFER TABLE

The Homewood shops of the Pittsburg Railways Company were built to accommodate single-truck cars and the transfer tables in the carpenter shop and paint shop have platforms only 11 ft. long. In order to handle double-truck cars on these transfer tables a track was laid across the shop floor parallel to the pits and far enough outside so that the distance between the center of the transfer table platform and the center line of the surface track was approximately equal to the distance between truck centers of the double-truck cars. A very low platform car carrying a pair of rails runs on this surface track and the front truck of a double-truck car is run over the transfer table and up onto the rails of the platform car, which have beveled ends. The rear truck then stands on the transfer table and the wheels are securely blocked in place. When the transfer table is moved the platform car carrying the front truck moves with it. This arrangement cost practically nothing to install and saves the floor space which it would have been necessary to sacrifice if all of the tracks had been shortened to accommodate a wide transfer table.

CATALOGS OF TECHNICAL BOOKS

The McGraw-Hill Book Company has just issued in pamphlet form three catalogs of books published by it. The first catalog is entitled "Electrical Books," the second "Mining and Metallurgy," and the third "Engineering Books—Civil, Mechanical, Machinery." Each catalog is indexed by the titles of the books and by their authors, and each contains a brief description of each book listed, showing the size of the book, number of pages and in all cases where it is practicable the chapter headings.

All books sold by this publishing company carry the guarantee that where cash accompanies the order the purchaser may, within five days of the receipt of the book, return it for any reason whatsoever, and his money will be refunded promptly.

News of Electric Railways

Chicago Elevated Loop Situation

The local transportation committee of the Chicago City Council announced that on Feb. 9, 1910, it would take up with the representatives of the elevated railways in Chicago the question of congestion on the Union Elevated Loop, which encircles the business district of the city. The chairman of the local transportation committee has declared that an effort would be made to bring about such a solution of the problem as would increase the capacity of the loop tracks. In his opinion, the best means to do this was by through routing of the trains of the different railroads.

The Union Elevated Loop is a double-track structure 2 miles in length, which is used by all the elevated railways in Chicago as a downtown terminal. Most of the elevated trains operated in the city encircle this loop, and at the rush hours the loading capacity of the platforms and the capacity of the interlockers to handle the incoming and outgoing trains freely is exceeded. The managements of the elevated railways desire to lengthen the platforms so that seven-car trains can replace the five-car trains now in service. With platforms long enough so that two trains could be loaded and unloaded at the same station at the same time, it is claimed that the passenger-handling capacity of the loop would be increased 25 per cent.

Charles K. Mohler, consulting engineer for an association of property owners known as the "Loop Protective Association," is said to have asserted that the present platforms, slightly extended, could accommodate seven-car trains without difficulty if a plan for through routing trains from one side of the city to the other was adopted, and that through routing would increase the number of trains which could be passed through the loop more than 100 per cent. With seven-car trains the increase in car capacity with through routing and slightly longer platforms over the present method of operation would be from 130 per cent to 140 per cent.

In connection with the discussion to increase the capacity of the loop, Mason B. Starring, president of the Northwestern Elevated Railroad, and Chas. V. Weston, president of the South Side Elevated Railroad, have publicly expressed the attitude of the companies which they represent toward the question. Mr. Starring said:

"On the question of through routing of cars and passengers, the Northwestern Elevated Railroad has yielded to the city's views. All it can do it has done. It is denied permission to floor over the platform extensions, long since erected, but not floored over because the work was stopped by the city authorities. This improvement the city should order made at once. An immediate increase of 20 per cent in car seating capacity would thus be afforded and, to a great extent, the two stops and two starts at each station, now mostly caused by short platforms, would be eliminated.

"This improvement has been recommended by the city's experts, Bion J. Arnold and George Weston. Similar improvements have been ordered by the Public Service Commission in New York City and by the Massachusetts Railroad Commission in Boston. The city's rights with regard to pending or future litigation can be preserved with the same safeguards it secured in the Ravenswood and subsequent ordinances.

"Just as soon as the city will permit the necessary structural changes the elevated railroads will proceed with plans to rearrange their tracks with a view of removing the delay due to the direct interference caused by one company's trains crossing those of another at grade at junction points.

"These two necessary improvements should materially and quickly increase the capacity of the loop, affording substantial relief to elevated railroad patrons for years to come. They should be made now, not delayed to await other and more remote developments. I see no gain to the patrons of elevated railroad service by waiting for such improvements as subways, for instance. The Northwestern Elevated Railroad is not antagonistic to subways. On the contrary, it did, on Feb. 26, 1908, ask the city to consider track privileges for it in a subway from Chicago Avenue downtown. Its existing four-track road ends at Chicago Avenue—thence it comes to the central business district over two tracks. The number of persons it carries will warrant the operation of four tracks from Chicago Avenue downtown as soon as such tracks can be constructed."

In his statement Mr. Weston said in part:

"The Union Elevated Loop, as a terminal for the four elevated railways of Chicago, has a relatively greater importance in the transportation of the public into and out of the business district than is generally known.

"The surface car systems cover the same general territory as do the elevated roads, but, because of their many lines, give transportation to a large district not served by the elevated railways. The surface car passengers are brought into the downtown center by three main trunk lines from the south, five trunk lines from the west and three trunk lines from the north. The number of passengers carried by these lines into the district outlined during the hour of maximum travel is about 88,500.

"A comparison of the figures follows:

	Passengers.	Per cent.
Elevated lines	62,000	41.2
Surface car lines	88,500	58.8
Total	150,500	100.0

"The number of cars entering the Union Loop during the maximum hour follows:

	Trains.	Cars.
Metropolitan	45	208
South Side	40	180
Northwestern	40	186
Oak Park	22	86
Total	147	660

"The number of cars on the surface lines entering the business district during the maximum hour is 910.

"A comparison of the above figures follows:

	Cars.	Per cent.
Elevated lines	660	42
Surface lines	910	58
Total	1,570	100

"The outer loop track is used jointly by the Northwestern Elevated Railroad and the Chicago & Oak Park Elevated Railroad, the combined traffic being, approximately, 62 trains and 272 cars during the hour of maximum travel. The inner loop track is used jointly by the Metropolitan West Side Elevated Railway and the South Side Elevated Railroad, all the cars of these companies being forced to cross the traffic of the outer loop in order to gain access to the inner loop track.

"The volume of traffic on the inner loop is, approximately, 85 trains and 388 cars during the hour of maximum traffic. This makes a total of 147 trains and 660 cars operated on two tracks, all of the cars being operated in the direction of maximum travel.

"The station platforms, each used jointly by two roads, are of such length that the maximum length of a train that can be operated is five cars. Separate stops must be made by each train, as the platforms are not long enough to permit two trains to make simultaneous stops at a station.

"A comparison of the capacities of elevated and subway systems in various cities follows:

	Cars.	Capacity per hour—Trains.	Capacity per hour—Cars.
Manhattan elevated	7	60	420
New York subway	8	32	256
*Hudson tunnels	8	40	320
Brooklyn elevated	6	60	360
*Boston elevated	8	35	290
*Philadelphia elevated	8	40	320
†Union Loop, inner track	5	85	388

*Ultimate capacity. †Some trains less than five cars, due to traffic conditions.

"From these figures it is seen that more trains per hour are operated on the inner track of the Union Loop in Chicago than on any single track in any city in the United States and more cars are operated than on any single track on any system except the Third Avenue Elevated in New York, where seven cars are operated in each train.

"It also is shown that the train length in Chicago is shorter than operated or provided for in any city in the United States. Lengthening the train unit is the easiest and most effective way of increasing the capacity of any transportation system, and until the length of trains in Chicago is increased beyond the present limit, the elevated roads are not being operated to the extent that the public has a right to demand.

"A close study of the relative importance of the elevated loop to the transportation of people in Chicago reveals the fact that the general impression concerning the value of that utility is erroneous and that it not only deserves to be continued, but its usefulness should be increased as much as possible. Here is an instance of service companies making an honest effort to improve conditions and where every effort of the companies to accomplish a good thing is being blocked by those who should be most interested in obtaining better service for the public. All possible inconvenience from the building of these platforms has already been suffered by the property owners adjacent to the stations without gaining any of the benefits which will arise from increased traffic when the platforms are put in use.

"It is the plain duty of every one concerned to begin now, at this moment, to make the very best use of that which we have, and not put it off until some future day, when a comprehensive and satisfactory enlargement of the local transportation systems shall have been devised and created to meet the demand of the future growth of the city's population."

Electric Club of Chicago.—At the annual meeting of the Electric Club of Chicago on Feb. 2, 1910, the following officers were elected for 1910: Frederick P. Vose, president; Homer E. Niesz, vice-president; F. S. Hickok, secretary; F. J. Postel, treasurer.

Experimental Service in New York with Edison Storage Battery Car.—The single-truck car equipped with the new Edison nickel-iron storage batteries, which was described in the Electric Railway Journal of Jan. 29, 1910, has been placed in service on the Central Park, North & East River Railroad, New York, N. Y., with a view to adopting cars of this type to supplant horses as motive power.

Negotiations Between Railway and Power Company in Cleveland for Power.—Negotiations are said to have been entered into for the Cleveland Electric Illuminating Company to furnish current for operating the Cleveland Railway. Samuel Scovill, vice-president of the Cleveland Electric Illuminating Company, said that his company could take care of the railway load, and that the matter hinged on the question of terms which both sides might consider reasonable.

Application for Permit to Cross Manhattan Bridge, New York.—Application has been made to the Board of Estimate and Apportionment by the Brooklyn Rapid Transit Company, Coney Island & Brooklyn Railroad and the Metropolitan Street Railway for a temporary permit to operate cars across the newly completed Manhattan Bridge, until a permanent franchise can be granted. The railways state that the line across the bridge will be ready for service 30 days after the permit is granted.

Suits to Compel Restoration of Strip Tickets in Philadelphia Before Supreme Court.—The Supreme Court of Pennsylvania has heard the separate appeals taken by the city of Philadelphia and Rudolph Blankenburg, acting for the Committee of Fifteen, from the decision of Common Pleas Court No. 2 in dismissing the suits to compel the Philadelphia (Pa.) Rapid Transit Company to restore the six-for-a quarter strip tickets. Court No. 2 was unanimous in dismissing the Blankenburg suit, but one of the judges before whom the action of the city was brought filed a dissenting opinion.

New Mechanical Engineering Laboratory at Yale.—A gift of $250,000 to the Sheffield Scientific School of Yale University for the construction and equipment of a new mechanical engineering laboratory is announced. The donors are G. G. Mason, New York, and W. S. Mason, Evanston, Ill. The new laboratory will occupy an area 85 ft. x 200 ft. and will be four stories in height. The equipment will consist of the most modern appliances for assisting the student in studying the fundamental principles of applied science which are closely related to mechanical engineering. It is expected that the building will be completed and equipped by June, 1911.

Lectures on Electric Railroading at University of Minnesota.—On Feb. 1, 1910, Edw. P. Burch began a course of 12 lectures on "Electric Traction for Railway Trains," before the senior students in electrical engineering at the University of Minnesota. The subjects of the lectures follow: "History of Electric Traction;" "Modern Steam Locomotives;" "Advantages of Electric Traction;" "Electric Systems Available for Traction;" "Characteristics of Electric Locomotives;" "Features of Motor-Car Trains;" "Electric Railway Motors;" "Power Required for Trains;" "Steam, Gas and Water-Power Plants;" "Transmission and Contact Lines;" "Electrification of Railways;" "Work Done to the Year 1910."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

New York.—Senator Harden, the successor of P. H. McCarren, has introduced a bill making mandatory the construction of subways in the Williamsburg and Greenpoint sections of Brooklyn according to routes set forth in detail in the bill. The Assembly has adopted a concurrent resolution continuing the life of the joint legislative committee appointed by the last Legislature to examine the Ivins charter and administrative code for New York City. In its third annual report, which will soon be presented to the Legislature of New York, the Inter-State Bridge Commission will recommend that the proposed bridge across the Hudson River have its New York approach at 179th Street, where it will cross part of Fort Washington Park. The estimated cost of the structure is $10,000,000 and the cost of the bridge and its approaches, together with land damages, is estimated at $30,000,000. The bridge will extend over Palisade Park on the New Jersey side. On the Manhattan side it will be convenient to the 181st Street subway station. The commission has served without compensation in conjunction with a similar body appointed by the Legislature of New Jersey. The act introduced in the Senate to amend the railroad law by making it necessary for railroads to post time tables in all their stations and publish their time tables in the newspapers in each city of the third class in which they maintain a station has been referred to the committee on railroads. On Feb. 7, Assemblyman Lee of Kings introduced the bill to render effective some of the provisions contained in the debt-limit amendment for New York City which was adopted in the referendum in November, 1909. The Lee bill, in providing for the exclusion of certain classes of bonds from consideration in the computation of the city debt, applies only to bonds issued prior to Jan. 1, 1910. About $40,000,000 worth of rapid transit bonds will be excluded under the Lee bill should it become a law. All additional borrowing capacity thus obtained must be used exclusively for rapid transit and dock purposes. Two concurrent resolutions introduced by Assemblyman Goldberg of New York called upon the Public Service Commission for the First District to furnish to the Legislature full information to show what it had done to bring about a restoration of transfers on the Fifty-ninth Street line, New York, and to provide electric railway facilities over the Blackwell's Island Bridge. Both have been referred to the committee on railroads. The Public Service Commission of the First District of New York has asked the Legislature to appropriate $600,000 for the elimination of grade crossings within the limits of New York City. It is proposed to divide this sum between the different counties within the city as follows: Queens, $400,000; Kings, $50,000; Richmond, $50,000, and New York, $100,000.

Ohio.—Representative Shankland has introduced a bill which will allow railroads to maintain four tracks instead of two so as to make it possible to operate a suburban service out of cities separate from the main traffic. A bill has been introduced to exempt those who are unable to obtain seats on street cars from paying fare. Another bill authorizes municipalities to build conduits and rent or lease space in them to electric light, telephone, telegraph, street railway and water companies.

Financial and Corporate

New York Stock and Money Market

February 8, 1910.

The stock market during the past week has more nearly bordered on a state of demoralization than at any time since the fall of 1907. Prices have declined sharply, the entire tone of the market has been very weak and nervous, and there has been an absence of any definite attempt at support. The industrials have been especially weak, Amalgamated Copper and United States Steel leading in the downward movement. The traction shares have followed the trend of the market, and Interborough-Metropolitan and Brooklyn Rapid Transit have each suffered considerable declines. Third Avenue has remained about the same.

The money market continues easy. Quotations to-day: Call, 2¼ to 2½ per cent; 90 days, 3¾ to 4 per cent.

Other Markets

There has been considerable activity in Rapid Transit stock in the Philadelphia market during the past week at prices which have eased off in sympathy with the general depression in securities. Other tractions have been inactive.

In Chicago, a few sales of Series 2 Chicago Railways at old prices were the only transactions.

In the Boston market, Massachusetts Electric continues to be the most active traction stock. Transactions, especially in the common, have been quite liberal. The price for the common is slightly lower.

In Baltimore the bonds of the United Railways are still popular with the traders. The prices at which these are selling have not changed materially.

Quotations of various traction securities as compared with last week follow:

	Feb. 1.	Feb. 8.
American Railways Company	a48	a47
Aurora, Elgin & Chicago Railroad (common)	a61	a57¾
Aurora, Elgin & Chicago Railroad (preferred)	a92	*91
Boston Elevated Railway	132	129½
Boston & Suburban Electric Companies	a16	15
Boston & Suburban Electric Companies (preferred)	74	73
Boston & Worcester Electric Companies (common)	a11½	a11½
Boston & Worcester Electric Companies (preferred)	44	42
Broklyn Rapid Transit Company	72½	68⅞
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	83½	82½
Capital Traction Company, Washington	a134½	a133½
Chicago City Railway	*185	a195
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a109	a106¼
Chicago Railways, ptcptg., ctf. 2	a30½	a30
Chicago Railways, ptcptg., ctf. 3	a17	a14
Chicago Railways, ptcptg., ctf. 4s	*9½	a9
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a77½	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a105	a105½
Detroit United Railway	*63	*63
General Electric Company	152	148½
Georgia Railway & Electric Company (common)	105	a107
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	20⅝	18½
Interborough-Metropolitan Company (preferred)	52	46
Interborough-Metropolitan Company (4½s)	80½	79
Kansas City Railway & Light Company (common)	a30½	a30
Kansas City Railway & Light Company (preferred)	*70½	a70½
Manhattan Railway	*136¾	*136¾
Massachusetts Electric Companies (common)	a17¼	a16
Massachusetts Electric Companies (preferred)	80¼	a80½
Metropolitan West Side, Chicago (common)	a17	a17
Metropolitan West Side, Chicago (preferred)	a56	a53½
Metropolitan Street Railway	*21	18
Milwaukee Electric Railway & Light (preferred)	*110	*110
North America Company	*76¼	76
Northwestern Elevated Railroad (common)	a18	a17½
Northwestern Elevated Railroad (preferred)	a68	a70
Philadelphia Company, Pittsburg (common)	a50½	a49
Philadelphia Company, Pittsburg (preferred)	a46	a45
Philadelphia Rapid Transit Company	a26¾	a25¾
Philadelphia Traction Company	a89	*89
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a106	a105
Seattle Electric Company (common)	a115	a115
Seattle Electric Company (preferred)	a104½	a106
South Side Elevated Railroad (Chicago)	a53	a51
Third Avenue Railroad, New York	107⅞	11
Toledo Railways & Light Company	*11	10¼
Twin City Rapid Transit, Minneapolis (common)	112½	111
Union Traction Company, Philadelphia	a51½	a51
United Rys. & Electric Company, Baltimore	a13½	a13
United Rys. Inv. Co. (common)	*33	*33
United Rys. Inv. Co. (preferred)	61	60
Washington Ry. & Electric Company (common)	a38½	37
Washington Ry. & Electric Company (preferred)	a88¼	a88
West End Street Railway, Boston (common)	a93	a93
West End Street Railway, Boston (preferred)	*106	a108
Westinghouse Elec. & Mfg. Company	71	63
Westinghouse Elec. & Mfg. Company (1st pref.)	*120	*120

a Asked. * Last Sale.

Annual Report of North American Company

The annual report of the North American Company for the year ended Dec. 31, 1909, shows a net income of $1,706,876. The undivided profits as of Dec. 31, 1908, were $3,445,777 and the dividends paid and accrued during the fiscal year aggregated $1,489,665. The balance as of Dec. 31, 1909, was $3,662,988.

James Campbell, the president, states that "in accordance with established precedent, the securities and assets of the company have been revalued as of Dec. 31, 1909." The company sold to a syndicate of St. Louis people on July 1 of last year its holdings of Laclede Gas Light Company common stock, consisting of 74,408 shares, at 97½. This stock was carried on the books of the company at 93½, netting a profit of $286,570. Of $5,000,000 of 5-year 5 per cent collateral trust notes, dated May 1, 1907, $2,584,000 have been cancelled, leaving $2,416,000 outstanding.

In referring to the subsidiary companies Mr. Campbell says:

"The officers and directors of this company were advised that the acquisition and development of the property of the West Kentucky Coal Company would be advantageous in the operation of the public utility plants in St. Louis controlled by this company. This belief was at the time in part, at least, justified by the then prevailing prices of Illinois coal. But this expectation will not be realized, as coal cannot now be mined at these mines and delivered in St. Louis in competition with Illinois coal at present prices. The policy of the company must therefore be directed to the development of the properties and the increase of the output, so as to enable it successfully to compete with other mining companies in the commercial field."

In the following comparison of income accounts of two of the subsidiary properties, the Milwaukee figures refer to the combined operations of the Milwaukee Electric Railway & Light Company, the Milwaukee Light, Heat & Traction Company, the Milwaukee Central Heating Company, the Racine Gas Light Company, the Kenosha Gas & Electric Company, and the Watertown Gas & Electric Company:

FISCAL YEAR ENDED DEC. 31, 1909.

	Milwaukee.	United Railways Company of St. Louis.
Gross revenue	$5,709,946	$11,111,431
Operating expenses, taxes and reserves	3,680,420	7,028,178
Gross income	$2,029,526	$4,083,253
Interest accrued	1,257,974	2,798,182
Net income	$771,552	$1.285,071
Preferred stock dividends	270,000	849,160
Balance	$501,552	$435,911
Common stock dividends	315,000	.....
Balance carried to surplus	$186,552	$435,911

Legislative Hearing on Financing of Shelburne Falls & Colraine Street Railway

The committee on street railways of the Massachusetts Legislature gave a hearing on Feb. 1, 1910, upon the bill to authorize the Shelburne Falls & Colraine Street Railway, Shelburne Falls, Mass., to refund its funded debt and fund its floating debt by issuing $50,000 of bonds. The case is similar to that of the Connecticut Valley Street Railway, Greenfield, Mass., which was successful in its appeal to the Legislature of 1909 for rights of the same kind. C. M. Stoddard, Greenfield, who represented the company, stated that it had paid only two dividends of 1 per cent each in 1903 and 1904. The earnings had been sufficient to pay the operating expenses and the interest on the bonds, but the rest of the revenue had been put into the property. A year ago the company built a concrete bridge across the Deerfield River, between Shelburne and Shelburne Falls, and entered into an agreement with the Boston & Maine Railroad to handle cars between the tracks of that company and the plants of manufacturers along the Shelburne Falls & Colraine Street Railway. The reduction in the cost of handling freight and express matter between the Boston & Maine Railroad and the manufacturers would net the community $1,000 per year, in addition to the interest on the securities desired.

The floating debt was about $36,000, personally indorsed

by directors of the company. The company had about $154,180 of permanent property outstanding and would save nearly 2 per cent on its capital stock by refunding its debt. F. L. Davenport, president of the company, said that the cost of transportation has been reduced from $2,500 per year to $12 a month since the abandonment of teaming freight across the river. No market existed for the stock, and it was felt that the bonds could be placed without difficulty. The supervision of the Railroad Commission would be acceptable to the company. Although the consideration was small, the principles were important. The only question raised was the advisability of a general law to meet cases of this kind. The hearing was then closed.

American Railways, Philadelphia, Pa.—The American Railways has leased the Scranton, Dunmore & Moosic Lake Railroad, 10 miles long, and will electrify the road.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—The Aurora, Elgin & Chicago Railroad has sold $555,000 of its first and refunding 5 per cent mortgage bonds to Hayden, Miller & Company, Cleveland, Ohio. The company had outstanding on June 30, 1909, $1,494,000 of these securities, making the total of this issue, including the new $555,000 issue, $2,044,000. The total bonded debt of the company is $7,044,000.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—Arrangements have been made by the Chambersburg, Greencastle & Waynesboro Street Railway to authorize $1,000,000 of bonds of which $600,000, it is said, will be reserved to retire existing issues of the same aggregate amount.

Chicago (Ill.) City Railway.—The Chicago City Railway has declared an extra dividend of 4 per cent for the year ended Jan. 31, 1910, payable on March 2, 1910, to stockholders of record on Feb. 21, 1910. The Appellate Court has affirmed the decision of the Superior Court by dismissing the mandamus suit brought by Clarence H. Venner against the Chicago City Railway in which he asked to be allowed to examine the books of the company.

Chicago (Ill.) Railways.—The National City Bank, New York, N. Y., and N. W. Harris & Company, New York, N. Y., offer for subscription at 101 and interest $6,000,000 of first mortgage 5 per cent gold bonds of the Chicago Railways, dated Feb. 1, 1907, and due Feb. 1, 1927. This is the last of the bonds to be issued to insure the rehabilitation of the property of the company.

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.—It is reported that the interests which control the Chicago, South Bend & Northern Indiana Railway are negotiating for the purchase of the property of the Southern Michigan Railway in the interest of the Chicago, South Bend & Northern Indiana Railway.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Eli M. West, receiver of the Columbus, Delaware & Marion Railway, has deposited with the trustee for the holders of the $1,000,000 consolidated mortgage bonds of the company the money for the payment of the coupons on which payment was defaulted on Aug. 1, 1909. Asking that sales of stock made on alleged fraudulent representation by J. G. Webb, Springfield, be set aside and that they be adjudged creditors of the company, an intervening petition has been filed in Common Pleas Court by George McMillan and others against the Columbus, Delaware & Marion Railway.

Detroit (Mich.) United Railway.—The Detroit United Railway will pay the $2,000,000 of collateral trust 5 per cent notes of the company at maturity on Feb. 15, 1910, with funds derived from the surplus of the company and from money borrowed.

Eastern Ohio Traction Company, Cleveland, Ohio.—The Cleveland & Chagrin Falls division of the Eastern Ohio Traction Company was sold at auction to Frank H. Ginn and J. R. Nutt, by R. D. Beatty, receiver, acting as master commissioner, on Feb. 5, 1910, for $263,050. Mr. Ginn and Mr. Nutt represent the holders of the first mortgage bonds of the company.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Public Service Commission of the Second District of New York has authorized the Elmira Water, Light & Railroad Company to issue $20,000 of consolidated mortgage 5 per cent 50-year gold bonds for the purpose of acquiring the capital stock of the Montour Falls Electric Light Company.

Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad, New York, N. Y.—Judge Lacombe has signed an order directing that the decree of foreclosure and sale of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad be adjourned until March 26, 1910. This order was entered in the suit brought by the Union Trust Company for the sale of the road. All defendant parties agreed to the adjournment. The order was issued on the petition of Benjamin A. Morton, who asserted that the plan of reorganization submitted to the Public Service Commission had not yet been approved.

Fort Smith Light & Traction Company, Fort Smith, Ark.—H. M. Byllesby & Company, Chicago, Ill., offer for subscription at 97 and interest $650,000 of 3½-year 6 per cent notes of the Ft. Smith Light & Traction Company dated Jan. 1, 1910, and due July 1, 1913, but callable on 30-days' notice at 101 and interest. The American Trust & Savings Bank, Chicago, Ill., is trustee of the issue.

Galveston-Houston Electric Railway, Galveston, Tex.—The Galveston-Houston Electric Railway has filed a first mortgage to the City Trust Company, Boston, Mass., to secure not more than $5,000,000 of 5 per cent bonds dated Oct. 1, 1909, and due Oct. 1, 1954, but callable on any interest day at 105 as a whole or for sinking fund of 1 per cent yearly between 1910 and 1944, and 1½ per cent yearly between 1945 and 1954. The issue is guaranteed as to principal, interest and sinking fund by the Galveston-Houston Electric Company. The Railroad Commission of Texas on Dec. 31, 1909, authorized the company to issue $3,000,000 of the bonds to cover the cost of construction of the railway between Houston and Galveston. The remaining $2,000,000 of bonds are reserved to provide for future acquisitions, improvements, betterments, etc.

Grand Rapids (Mich.) Railway.—Anton G. Hodenpyl of Hodenpyl, Walbridge & Company, New York, N. Y., has been elected a director of the Grand Rapids Railway to succeed Jacob Kleinhans.

Holmesburg, Tacony & Frankford Electric Railway, Tacony, Pa.—The decree of Judge Holland of the United States Circuit Court at Philadelphia, on Jan. 25, 1910, ordering the sale of the property of the Holmesburg, Tacony & Frankford Electric Railway under foreclosure on May 25, 1910, at an upset price fixed at $350,000, was vacated on Jan. 28, 1910, for lack of proper notice.

Hudson Companies, New York, N. Y.—The Hudson Companies has arranged for the sale to J. P. Morgan & Company and others of $5,500,000 of 3-year 5 per cent notes, to be secured by the deposit of $1,500 of bonds of the Hudson & Manhattan Railroad for every $1,000 of notes. The bonds which secure the notes are part of an authorized issue of $100,000,000 of which $54,500,000 have been issued. Up to the time of the issue of $15,000,000 notes in January, 1908, a total of $34,190,164 had been expended by the Hudson & Manhattan Railroad on its tunnels and other property.

Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Ind.—The Marion Trust Company, Indianapolis, Ind., as mortgage trustee, has brought suit in the Federal Court at Indianapolis for the foreclosure of the mortgage of the Indianapolis, Crawfordsville & Western Traction Company at the request of a committee composed of Guy M. Walker, New York, N. Y.; A. B. Conover, Chicago, Ill.; A. E. Reynolds, Crawfordsville, Ind.; T. M. Lucas, Frankfort, Ind., and Hugh Dougherty, Indianapolis, Ind., which represents the holders of about $1,000,000 of the $1,500,000 of bonds of the company.

Interstate Railways, Philadelphia, Pa.—It is understood that the Interstate Railways will take advantage of the three months' grace allowed for the payment of the semi-annual interest due on its 4 per cent bonds on Feb. 1, 1910. The time for the deposit of bonds under the plan of the readjustment committee, of which George H. Earle, Jr., is chairman, with the Real Estate Trust Company or the

Guaranty Trust & Safe Deposit Company, Philadelphia, Pa., has been extended to Feb. 15, 1910.

Louisville (Ky.) Railway.—The stockholders of the Louisville Railway have authorized a blanket mortgage in favor of the Fidelity Trust Company, Louisville, Ky., as trustee to secure an issue of not more than $20,000,000 of 5 per cent, 40-year bonds. L. W. Botts has been elected a director of the Louisville Railway and the Louisville Traction Company to succeed the late Henry Bishop.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Jenks, New York, N. Y., have made a conditional proposition to buy from the stockholders of the New Orleans Railway & Light Company $4,000,000 of the common stock and $2,000,000 of the preferred stock of the company, being 20 per cent of their respective holdings, at 62½ for the preferred stock and 30 for the common stock, provided the requisite assents be filed with the Hibernia Bank & Trust Company, New Orleans, La., not later than Feb. 15, 1910.

Northern Texas Traction Company, Ft. Worth, Tex.—A special meeting of the stockholders of the Northern Texas Traction Company has been called to authorize an issue of $10,000,000 of 5 per cent bonds, $1,000,000 of which will be issued at once to retire $500,000 of 6 per cent bonds due on May 1, 1911, and for improvements. The balance will be reserved to retire an issue of first mortgage 5 per cent bonds due in 1933 and for improvements.

Railway & Light Securities Company, Boston, Mass.—Stone & Webster, Boston, Mass., offer for subscription at 100 and interest $500,000 of collateral trust sinking fund 5 per cent gold bonds of the Railway & Light Securities Company dated Nov. 1, 1909, and due Nov. 1, 1939, interest payable on May 1 and Nov. 1 at the office of the Old Colony Trust Company, Boston, Mass., trustee.

Reading (Pa.) Transit Company.—The Reading Transit Company has been incorporated by H. G. Louser, Lebanon, Pa.; Geo. L. Roller, Reading; Chas. J. Easterly, Reading; J. C. Murray, Reading, and H. H. Reigel, Reading, with a nominal capital of $10,000, to lease the property of the United Traction Company, Reading, and the Schuylkill Valley Traction Company from the Inter-State Railways.

Rutland Railway, Light & Power Company, Rutland, Vt.—The Rutland Railway, Light & Power Company proposes to construct several extensions to its railway system aggregating about 7 miles and is planning to acquire water-powers. Two or three lighting properties have been added to the system during the year. The statement for the year ended Dec. 31 follows: Gross earnings, 1908, $250,403.20; 1909, $258,922.31; operating expenses, 1908, $133,486.16; 1909, $129,935.63; net earnings, 1908, $116,917.04; 1909, $128,986.68; interest on bonds, 1908, $75,000; 1909, $75,000; taxes, 1908, $5,617.42; 1909, $6,900; net income, 1908, $36,299.62; 1909, $47,086.68.

San José & Santa Clara Railroad, San José, Cal.—It is reported that L. E. Hanchett, president of the San José & Santa Clara Railroad, has exercised an option which he obtained recently on the San José Railway in the interest of the San José & Santa Clara Railroad.

South Side Elevated Railroad, Chicago, Ill.—Resolutions adopted by the stockholders of the South Side Elevated Railroad who attended the annual meeting personally require the board to "take up the matter of resuming dividends not later than April 1," on the ground that "the period of depression has passed, and the company accumulated during the suspension of dividends an available cash surplus of $340,000, and is earning 3 per cent on the stock."

Toledo & Indiana Railway, Toledo, Ohio.—Judge Brough, of the Common Pleas Court, has confirmed the sale of the property of the Toledo & Indiana Railway under foreclosure in Toledo on Jan. 18, 1910, to S. C. Schenck, formerly president of the company, who represented the bondholders, for $1,058,500.

United Railways, St. Louis, Mo.—W. J. Kinsella has been elected a member of the board of directors of the United Railways to succeed C. W. Wetmore, who was succeeded recently as president of the North American Company by James Campbell.

Traffic and Transportation

Increase in Fare Between Washington and Baltimore

The Washington, Baltimore & Annapolis Electric Railway has announced that on March 1, 1910, it will increase the one-way fare from Baltimore to Washington from 75 cents to $1, and that on the same date it will increase the round-trip fare between the cities from $1.25 to $1.50. In explanation of the increase, George T. Bishop and George W. Williams, receivers of the company, have issued the following statement:

"On March 1, 1910, when the Washington, Baltimore & Annapolis Electric Railway will be operating its cars through to the Treasury Building without change, with free transfer privilege in Washington, the receivers will put into effect a new schedule of passenger rates. While there will be no radical changes, it is hoped by the receivers that the new schedule of rates will result in increasing the gross receipts of the company about 10 per cent. The receivers now know that the revenue of the company must be increased. Even with this increase the gross earnings will still be inadequate to pay the operating expenses and fixed charges of the company, but the receivers believe that with the better facilities which they will furnish the traveling public after March 1, 1910, travel will increase until the earnings are sufficient to pay the interest on the capital invested.

"Since Oct. 28, 1909, the date on which the United States Circuit Court of the District of Maryland took charge of the property, and we were appointed receivers, we have made a close study of the situation and the conditions which resulted in the appointment of receivers. The property has been, and is being, economically managed.

"In order to pay 5 per cent on the present bonded indebtedness, it is necessary for the property to earn over and above taxes and operating expenses $327,800 per annum. From April 1, 1908, to April 1, 1909, which was the first year that the property was operated, the net earnings fell short of the amount required to pay the interest on the bonds $129,756.82, and in the same way from April 1, 1909, to the date of the appointment of the receivers, Oct. 28, 1909, the net earnings were insufficient to pay the interest on the bonded debt by the sum of $55,920.29. From the standpoint of conservative railroad management, every railroad should each year charge off and lay aside a sum to represent depreciation, so that when it becomes necessary to replace parts of the property worn out in service, there will be sufficient money in hand to make this replacement.

"That both of these items should be considered in arriving at what is a fair and proper rate has been held by the Supreme Court of the United States. In the recent Knoxville Water Works case, decided Jan. 4, 1909 (see page 13, United States Supreme Court Reports, volume 212), the court used the following language:

"'Before coming to the question of profit at all, the company is entitled to earn a sufficient sum annually to provide not only for current repairs, but for making good the depreciation and replacing the parts of the property when they come to the end of their life. The company is not bound to see its property gradually waste without making provision out of the earnings for its replacement. It is entitled to see that from earnings the value of the property invested is kept unimpaired, so that at the end of any given term of years the original investment remains as it was at the beginning. It is not only the right of the company to make such provision, but it is its duty to its bond and stockholders, and, in case of a public service corporation, at least, its plain duty to the public. If a different course were pursued the only method of providing for replacement of property which has ceased to be useful would be the investment of new capital and the issue of new bonds or stock. This course would lead to a constantly increasing variance between present value and bond and stock capitalization—a tendency which would inevitably lead to disaster either to the stockholders or to the public or to both.'

"As receivers of the company we decided not to recommend to the court any increase in rates until we had tried in every way to increase the net earnings of the property

to a sufficient amount to care for depreciation and a reasonable return on the investment. Having exhausted every alternative we submitted a statement of the situation to the court, and our proposed action has been approved by Judge Morris.

"While the rates are increased in certain particulars, still it must not be overlooked that the company will, at the time this new rate schedule becomes effective, give better and more convenient service in that the cars of the company will be operated to the Treasury Building in the city of Washington, which is 3 miles further than the present terminus. In addition, transfers will be given on all the intersecting lines of the Washington Railway & Electric Company, thereby enabling passengers to transfer to practically any point in the city. The new schedule for the operation of cars will increase the service by giving a limited car every half hour in both directions from each terminal, in addition to the present local service."

Proposal to Prevent Establishment of Through Rates

The bill introduced in the House of Representatives on Jan. 10, 1910, by Charles E. Townsend, of Michigan, designed to create an Interstate Commerce Court, contains a number of provisions of interest apart from the establishment of this court. Of these provisions, one of particular importance to electric railways is that which stipulates that the Interstate Commerce Commission "shall not establish any through route classification or rate between street, suburban or interurban electric passenger railways and railroads of a different character."

The proposed United States Court of Commerce, if the bill as introduced passes, will have jurisdiction over cases for the enforcement of orders of the Interstate Commerce Commission other than for the payment of money; of cases brought to enjoin, set aside, annul or suspend any orders of the Interstate Commission; of such cases as under the act to further regulate the commission with foreign nations and among the States would be maintained in the United States Circuit Court, and of such mandamus proceedings as under the provisions of the regulating commission would be maintained in the United States Supreme Court. The proposed court would be composed of five judges, to be designated by the Chief Justice of the United States from among the United States circuit judges.

The bill provides that no railroad shall acquire, directly or indirectly, any interest in the capital stock or purchase or lease the railroad of any competing railroad. Nothing in this section, however, would operate to prevent any such railroad which, at the date of the passage of the act, owns not less than one-half of the outstanding capital stock of any other railroad from acquiring any of the remainder of such stock in order to prevent any such corporation which is now operating under lease of any less than 20 years a railroad of any other corporation from ruining such lease by acquiring a reversionary ownership of the lessor railway. The words "railroad corporation" as used in this section would not apply to street, suburban or interurban electric passenger railway corporations.

Official Electric Railway Guide of Eastern & Western New York

The United Traction Company, Schenectady Railway, Hudson Valley Railway, Fonda, Johnstown & Gloversville Railroad, Utica & Mohawk Valley Railway, Otsego & Herkimer Railroad, Oneida Railway, Syracuse Rapid Transit Railway, Syracuse, Lake Shore & Northern Railroad, Syracuse & South Bay Electric Railroad, Auburn & Syracuse Electric Railroad, Auburn & Northern Electric Railroad, Rochester, Syracuse & Eastern Railroad, Rochester Railway; Rochester & Eastern Rapid Railway, Rochester & Sodus Bay Railway, Buffalo, Lockport & Rochester Railway and Buffalo & Lake Erie Traction Company have begun the publication of a monthly official electric railway guide of Eastern and Western New York entitled "How, Where and When to Go." The first issue is dated February, 1910. The publication is 8 in. x 9 in. and contains time tables of all of the companies mentioned.

For the purpose of showing the routes of the lines issuing the publication two double-page maps are presented. One includes the territory between Hudson and Utica on the south, Warrensburg and Oswego on the north, Pittsfield and North Adams, Mass., on the east and Ithaca and Auburn on the west, and embraces Albany, Schenectady, Saratoga Springs, Glens Falls, Little Falls, Utica, Rome, Coopertown, Oneida, Syracuse and Albany. The other map includes the territory between Utica, Auburn and Oswego on the east and Buffalo, Niagara Falls, St. Catherines and Erie on the west, Utica and Erie on the south and Lake Ontario on the north, and embraces Auburn, Utica, Geneva, Rochester, Lockport, Buffalo, Niagara Falls and Erie. Besides the routes of the electric railways operating in this territory the routes of the electric railways under construction, the routes of the steam railroads, the course of the new barge canal and the Erie canal are shown. The maps are entitled, respectively, "Electric Railways of Central New York" and "Electric Railways of Western New York." The publication is concluded with suggestions to passengers and indexes to the various railways. The statement is made that a union waiting room and ticket office has recently been completed at Syracuse from which cars of the Syracuse, Lake Shore & Northern Railroad, Syracuse & South Bay Electric Railroad and Oneida Railway start. Cars of the Rochester, Syracuse & Eastern Railroad also arrive and depart from this terminus over the Syracuse, Lake Shore & Northern Railroad.

Meeting of Central Electric Traffic Association

A. L. Neereamer, chairman of the Central Electric Traffic Association, issued on Feb. 4, 1910, the following call for a meeting of the members of the association at the Algonquin Hotel, Dayton, Ohio, on Feb. 19, 1910:

"In conformity with a resolution passed by the Central Electric Traffic Association at a meeting held in Columbus on Jan. 26, 1910, a meeting is hereby called for Feb. 19, 1910, at the Algonquin Hotel, Dayton, Ohio. The following subjects are scheduled for discussion and action:

"1. 'Matters Pertaining to Reissuing Joint Passenger Tariff No. 3.'

"2. 'Compilation and Issuing of Joint Express or Dispatch Freight Tariff.'

"3. 'Compilation and Issuing of Joint Tariff of Estimated Weights of Standard Commodities.'

"4. 'A Uniform Basis for Handling of Milk and Cream, and such Other Business as may be Properly Brought Before the Meeting.'

"It is urgently requested that each line be represented at this meeting so as not to delay any of the work. The meeting will convene promptly at 9 a. m. in order that the subjects may be thoroughly discussed and members be given a chance to return home that night."

Mayor of Pittsburgh Advises City to Retain Traction Expert

In a statement which he made recently to the press of Pittsburgh, Mayor Magee of that city said:

"About six weeks ago, at my instance, a resolution was introduced in Common Council providing for the employment of a competent engineer, or engineers, to study the whole subject of railway transportation in the present city of Pittsburgh and in territory that will logically become part of the city in a more or less distant future. The primary purpose of this, however, is to advise the city officials on the subway project, in view of the number of parties who are looking into that phase of the subject with the intention of asking Councils for a franchise.

"The city needs the counsel of the highest authority on this subject. If the city acts now without such advice the terms laid down by Councils might either by improvident, or, on the other hand, might repel the advances made by capital by prescribing terms so strict as not to be accepted, in either event resulting in loss to the city. Without such advice the city authorities might authorize the construction at the request of promoters in an illogical way and prevent in the future any further construction of similar nature.

"A complete study must be made of the present population and the probable trend of the future city growth, in connection with the present surface railways and the terri-

tory served by them. Such a study of the situation necessarily includes consideration of the management of the Pittsburgh Railways, both incidentally and fundamentally."

Increase in Wages in Harrisburg.—On Feb. 1, 1910, the Central Pennsylvania Traction Company, Harrisburg, Pa., increased the wages of its conductors and motormen 1 cent an hour to the following scale: First year, 18 cents per hour; second and third years, 20 cents per hour; fourth and fifth years, 21 cents per hour; after five years, 22 cents per hour.

Rerouting Plans Considered in Rochester.—Charles R. Barnes, electric railroad inspector of the Public Service Commission of the Second District of New York, has conferred recently in Rochester with E. J. Cook, general manager of the Rochester lines by the New York State Railways regarding plans submitted to the commission by Mr. Cook for rerouting lines in Rochester so as to overcome operating problems particularly in down-town Rochester.

Circular on Amended Rules in Indiana.—The Railroad Commission of Indiana has issued Circular No. 59, in which are given the amended and additional rules to be incorporated in the standard code in use by the interurban railways in Indiana. These additions and amendments were agreed upon at a conference of interurban railway officials and the commission held on Jan. 18, 1910. A report of this conference and the text of the amendments to the rules were printed in the ELECTRIC RAILWAY JOURNAL of Jan. 22, 1910, page 156.

Protest Against Increase in Fare in Pennsylvania.—The West Chester Turnpike Real Estate Improvement Association has protested to the Railroad Commission of Pennsylvania against the increase in fare by the Philadelphia & West Chester Traction Company, Philadelphia, Pa., from 25 cents to 30 cents which went into effect in October, 1909, on its line between Philadelphia and West Chester. The association alleges that the increase is in violation of an agreement entered into between it and the company in 1899.

Supreme Court of Oregon Sustains Commission in Fare Case.—The Supreme Court of Oregon has sustained the Railroad Commission of Oregon in ordering the Portland Railway, Light & Power Company, Portland, Ore., to reduce the fare between Portland and Milwaukee from 10 cents to 5 cents. The order of the commission was the result of an appeal to it by residents of Milwaukee about three years ago. The case was taken to the State Circuit Court, which decided that the order of the commission was reasonable, and was then appealed to the State Supreme Court.

Detroit-Saginaw Limited Service.—A new timetable for the Flint division of the Detroit (Mich.) United Railway announces three limited trains each way between Detroit and Saginaw, Mich., a run of 101 miles, which is made in 3 hours and 15 minutes. The limited trains and an additional one make the run from Detroit to Flint, 68 miles, in 2 hours and 15 minutes and the local trains in 3 hours. On Jan. 14, 1910, when the competitive steam railroads were much hampered by severe snow storms the Detroit United Railway satisfactorily handled an eight-car excursion from Saginaw to Detroit and return.

Enforcement of Front Platform Rule in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company has replied in part as follows to a communication from the Railroad Commission regarding the enforcement by the company of the rule of the commission against permitting passengers to ride on the front platform of cars: "We admit that this rule is not invariably observed. Our instructions to car crews and street superintendents are that passengers must not be allowed to ride on front platforms, but during the afternoon rush hour it is impossible to enforce this order without employment of physical force, and in such cases the commission's order and our rules are defeated, not through any desire on our part or any laxity on the part of our car crews, but because it would require the assistance of the police forcibly to remove passengers. We are confident, however, that the recent renewal of the commission's front-platform order and our own efforts have reduced front-platform riding very materially; in fact, it may now be considered exceptional."

Personal Mention

Mr. R. R. Smith has resigned as traffic manager of the Louisville (Ky.) Railway.

Mr. G. H. Dodge has been appointed acting superintendent of the Syracuse & South Bay Electric Railroad, Syracuse, N. Y.

Mr. William H. Evans has been appointed industrial agent of the Illinois Traction System, Peoria, Ill., a newly created office with the company.

Mr. D. W. Cooke, general traffic manager of the Erie Railroad, New York, N. Y., has officially denied the statement that he has accepted the presidency of the Kansas City Railway & Light Company, Kansas City, Mo., as reported in several of the daily papers.

Mr. J. S. Mills has resigned as master mechanic of the Lehigh Valley Transit Company, Allentown, Pa., which position has since been abolished and the office of superintendent of shops and equipment created, and to this new position Mr. C. E. Lenhart has been appointed.

Prof. D. C. Jackson, of the Massachusetts Institute of Technology, has been nominated by 72 prominent members of the American Institute of Electrical Engineers as president of that body. In a circular letter signed by these gentlemen the services of Professor Jackson to electrical engineering and to the Institute are mentioned.

Mr. Samuel Riddle, formerly general manager of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has been appointed superintendent of transportation of the Louisville (Ky.) Railway, effective on Feb. 15, 1910, in which position he will succeed to the duties of Mr. R. R. Smith, who has resigned as traffic manager of the company.

Mr. G. L. Estabrook has been elected assistant secretary and treasurer of the Grand Rapids (Mich.) Railway and will succeed Mr. Benjamin S. Hanchett as treasurer of the company. Mr. Hanchett, who was formerly treasurer and general manager of the company, has been elected president of the company and will continue as general manager of the company.

Mr. H. H. Roseman has resigned as traffic manager of the Illinois Traction System, Springfield, Ill. Mr. Roseman was formerly in charge of freight traffic on the Cairo division of the Chicago, Cleveland, Cincinnati & St. Louis Railroad. He began his railway career in 1885 as clerk to the master mechanic of the Baltimore & Ohio Southwestern Railroad in Vincennes, Ind.

Mr. J. F. Knowlen has resigned as superintendent of the City & Suburban Railway, Brunswick, Ga., to accept the position of electrician at the shops of the Louisville & Nashville Railroad, New Decatur, Ala. Mr. Knowlen was formerly connected with the North Alabama Traction Company, New Decatur, Ala., and supervised the conversion of the lines of that company from horse power to electricity.

Mr. C. E. Lenhart, whose resignation as master mechanic of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1909, has been appointed superintendent of shops and equipment of the Lehigh Valley Transit Company, Allentown, Pa., a new position with the company, the office of master mehanic having been abolished following the resignation of Mr. J. S. Mills from that position.

Mr. Alexander Rennick, second vice-president of the Philadelphia (Pa.) Rapid Transit Company, has been appointed assistant general manager of the company. He will retain the office of second vice-president. Mr. Rennick has been connected with the street railways in Philadelphia since 1878. He was appointed controller of the Philadelphia Rapid Transit Company in 1901, and in 1904 was elected third vice-president of the company. In 1909 he was elected second vice-president of the company.

Mr. H. C. Hoagland, formerly chief electrical and mechanical engineer of the Illinois Traction System, Peoria, Ill., has accepted a position with H. M. Byllesby & Company, Chicago, Ill., as special agent, and is at present at Muskogee, Okla., investigating the water-power of streams in that vicinity. Mr. Hoagland is vice-president and general

manager of the North Missouri Central Railway, St. Louis, Mo., which has recently awarded contracts for the construction of a 60-mile electric railway from Jefferson City to Mexico, Mo.

Mr. J. B. McClary has resigned as general manager of the Sheffield (Ala.) Company, which controls the railway, light and power systems and the water works of Sheffield, Florence and Tuscumbia, Ala., and Mr. W. R. Hall, formerly manager of the North Alabama Traction Company, New Decatur, Ala., has been appointed to succeed him. Mr. McClary has been connected with the Sheffield Company since December, 1904. Prior to that he was for 10 years general manager of the companies which were taken over by the Birmingham Railway, Light & Power Company, Birmingham, Ala., and for two years after the formation of the Birmingham Railway, Light & Power Company he was manager of the railway department of the company under Ford, Bacon & Davis, New York, N. Y. Mr. McClary was vice-president of the American Street Railway Association in 1901 and 1902. He leaves the Sheffield Company to devote all his attention to the interests of J. B. McClary & Company, Birmingham, Ala., in the selling field. At the annual meeting of the stockholders of the Sheffield Company in New York, resolutions were adopted commending Mr. McClary for the ability which he displayed as general manager of the company and expressing regret at his retirement.

Mr. Charles F. Propst, second vice-president and purchasing agent of the Denver & Inter-Mountain Railroad, Denver, Col., has recently been elected president of the company. Mr. Propst has been with the Denver & Inter-Mountain Railroad since the line was equipped with electricity between Denver and Golden about a year ago He was formerly in the lumber business with his brother in Paris, Ill., and later was manager of the Paris (Ill.) Traction Company. The Denver & Inter-Mountain Railroad is 22 miles long. The property of the company was described at length in the Electric Railway Journal of Oct. 2, 1909, page 513.



C. F. Propst

Mr. Britton I. Budd was elected president of the Metropolitan West Side Elevated Railway, Chicago, Ill., on Feb. 7, 1910, to succeed Mr. H. G. Hetzler, who has been elected president of the Chicago & Western Indiana Railroad, as announced elsewhere in these columns. Mr. Budd has been general manager of the Metropolitan West Side Elevated Railway since April 15, 1907, in charge of all matters pertaining to operation and the purchase of supplies. Mr. Budd has been connected with the company since the construction of the road in 1895. He started with the company as a clerk in the storekeeper's office, was storekeeper for five years, and in 1899 was appointed purchasing agent, a position he held until April, 1907, when he was appointed general manager. Mr. Budd retains the position of general manager of the company.

Mr. Howard G. Hetzler, who has been president of the Metropolitan West Side Elevated Railway, Chicago, Ill., for five years, has been elected president of the Chicago & Western Indiana Railroad, in which position he will have charge of terminal improvements in Chicago to cost about $30,000,000. Previous to his election as president of the Metropolitan West Side Elevated Railway Mr. Hetzler was superintendent of the Chicago division of the Chicago, Burlington & Quincy Railroad, in charge of freight and passenger traffic. Mr. Hetzler began his railway career in 1886 in the engineering department of the Chicago, Burlington & Quincy Railroad, and in 1893 went to Chicago in the capacity of roadmaster of the company. Mr. Hetzler is 46 years old and a graduate of the University of Michigan. He has been elected a vice-president of the Metropolitan West Side Elevated Railway and will continue as a director of the company.

Mr. Frank L. Butler has been elected vice-president and a director of the Denver & Inter-Mountain Railroad, Denver, Col., and was recently appointed general manager of the company. Mr. Butler was born in Terre Haute, Ind., in 1874. When 20 years of age he began service with the Vandalia Railroad and was employed in various capacities in several different cities along the Vandalia railroad until February, 1909, when he was appointed to the position of superintendent of the Denver & Inter-Mountain Railroad, which had just been converted for electric operation between Denver and Golden, a distance of 22 miles.



F. L. Butler

Mr. Benjamin S. Hanchett, treasurer and general manager of the Grand Rapids (Mich.) Railway, has been elected president of the company to succeed Mr. C. M. Clark, Philadelphia, Pa., and will retain the title of general manager of the company. Mr. G. L. Estabrook will succeed Mr. Hanchett as treasurer of the company and will have the title of assistant secretary and treasurer. Mr. Hanchett has been connected with the Grand Rapids Railway and its predecessors continuously since 1883, when he entered street railway service in the office of the company after leaving the Grand Rapids High School. Soon thereafter he was promoted to the position of assistant bookkeeper and then to bookkeeper. In 1888 he was made chief clerk of the company. Subsequently he was made paymaster of the company and later was elected secretary of the old horse car system. Shortly after this the Valley City Street & Cable Railway purchased all the local lines in Grand Rapids and changed the motive power from horses to electricity. Mr. Hanchett was elected secretary and assistant treasurer of this company. In 1900 the railways in Grand Rapids were taken over by the Grand Rapids Railway in the interest of the present owners and Mr. Hanchett was elected secretary and treasurer of the company. In May, 1904, Mr. Hanchett was appointed general manager of the company to succeed the late G. Stewart Johnson, and was continued as secretary and treasurer of the company.

Mr. George Whysall, whose election as president of the Central Electric Railway Association at the annual meeting of the association which was held in Columbus, Ohio, on Jan. 27, 1910, was noted in the Electric Railway Journal of Feb. 5, 1910, page 231, has been connected with public service corporations since 1879, when he entered the gas field. Mr. Whysall first became interested in electric railways in 1892, and since then has devoted a constantly increasing part of his time to electric railway interests. In 1903 he became connected with the Columbus, Delaware & Marion Electric Railroad, and later became general manager of the company. He is an ex-president of the Ohio Gas Light Association, which was merged a few years ago with other associations into the American Gas Institute. Besides being a member of the Central Electric Railway Association, Mr. Whysall is a member of the American Street & Interurban Railway Association, the American Gas Institute and the National Natural Gas Association of America, and acts as consulting engineer for several gas, electric light and railway properties.



G. Whysall

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Lakeview Street Car Company, Pensacola, Fla.**—Application for a charter will shortly be made by this company to build a street railway over certain streets of Pensacola. Capital stock, $20,000. Those interested are J. E. Baars, Jr., Theodore Baars and John W. Bullock, Jr., Pensacola.

***Chicago & Elmhurst Railway, Chicago, Ill.**—Incorporated in Illinois to construct an electric railway from Oak Park to a point in Addison Township in Dupage County. Incorporators: Henry Williford, Jr., Henry Fearing, F. D. Kilmer, A. J. Parker, F. W. Pringle and William Rawson.

***Hamilton, Carthage & Nauvoo Railway, Nauvoo, Ill.**—Incorporated in Illinois to build an electric railway from Carthage to Keokuk. Capital stock, $2,500. Incorporators: R. R. Wallace, E. F. Jolidon, Harry M. Cuerden and Henry K. Denton, Hamilton, and James T. Hendricks and James McCarthy, Carthage.

Cincinnati, Newport & Licking Valley Railway, Cynthiana, Ky.—Incorporated to build a 65-mile electric railway from Cynthiana to Newport. Capital stock $20,000. Incorporators: R. W. Ray, Scranton, Pa.; F. L. Fuller, New York, N. Y.; Wade Lail, Harrison Paterson, R. H. Rees, Cynthiana; and D. G. McVean, Covington. [E. R. J., Jan. 29, '10.]

***Westchester Northern Railroad, White Plains, N. Y.**—Incorporated with a capital stock of $1,000,000 to operate a steam or electric railroad 45 miles long, of which 35 miles is to be in New York and 10 miles in Connecticut. The main line is to be operated from the New York, Westchester & Boston Railway at White Plains to the line of the New York, New Haven & Hartford Railroad at Danbury, Conn. There will be a branch line 14 miles long from Pound Ridge, Westchester County, to the New York, New Haven & Hartford Railroad in Putnam County. Directors: L. S. Miller, W. A. Cokeley, New York; Allan Wardwell, Lawrence; R. P. Buell, Bayside; Robert T. Bird, Hartford, Conn.; James L. Crider, Mount Vernon; John C. Gleason, New Rochelle; Charles L. Nagle, Bayonne, N. J.

Reading (Pa.) Transit Company.—Incorporated in Pennsylvania with a nominal capital of $10,000 to lease the property of the United Traction Company, Reading, and the Schuylkill Valley Traction Company, Norristown, from the Inter-State Railways. Incorporators: H. G. Louser, Lebanon; Geo. L. Roller, J. C. Murray and H. H. Reigel, Reading.

Bradford County Traction Company, Towanda, Pa.—Chartered in Pennsylvania to build a 3-mile electric railway in Towanda. Capital stock, $5,000. Incorporators: G. L. Hill, Geo. W. Kipp, E. Whalen and T. L. Haverley. [E. R. J., Jan. 15, '10.]

***Wilkes-Barre (Pa.) Railway.**—Chartered in Pennsylvania to construct a 10-mile electric railway between Wilkes-Barre and Pittston. Capital stock, $100,000. Incorporators: Thomas J. Connelly, Ashley, president; J. L. Dunn and E. J. Loughran, Wilkesbarre.

***Brownwood North & South Railway, Brownwood, Tex.**—Incorporated in Texas for the purpose of building a 20-mile railway to connect Brownwood and May. Capital stock, $30,000. Headquarters, Brownwood. Incorporators: Brooke Smith, J. A. Walker, R. B. Rogers, Henry Ford and J. J. Timmins.

***Walking Wheel Traction Company, Spokane, Wash.**—Incorporated in Washington with a capital stock of $100,000. Incorporators: J. W. Wooley, Leo M. Casey, John T. Casey and O. W. Stone, Spokane.

FRANCHISES

***Pensacola, Fla.**—The Lakeview Street Car Company has applied to the City Council for a franchise to build a street railway on Sixteenth Avenue from Thirteenth to Fourteenth Streets; eastward on Fourteenth Street thoroughfare to Magnolia Street and thence to the city limits.

Beech Grove, Ind.—The Town Board has granted a franchise to the Beech Grove Traction Company to operate an electric railway through the streets of Beech Grove and to connect Beech Grove and Indianapolis. All of the right of way has been acquired and work will begin as soon as the weather permits. It is expected the railway will be in operation during the summer. W. H. Ogan, president. [E. R. J., Jan. 8, '09.]

Kokomo, Ind.—At an election held in Kokomo this week the voters refused subsidies to the Kokomo Western Traction Company, Kokomo, and the Kokomo, Frankfort & Terre Haute Traction Company, Frankfort. Each line asked for a subsidy of $35,000 to be used in building a railway through Howard County.

East Grand Forks, Minn.—C. H. Anderson, representing the Grand Forks Railway, has petitioned the Council for a franchise to operate an electric railway through some of its principal streets. This is part of a plan to build an electric railway between Grand Forks and Oslo. [E. R. J., Feb. 5, '10.]

Akron, Ohio.—Thomas Childs, promoter of the Turkey Foot Traction Company, has applied to the County Commissioners for an extension of the franchise which was granted him some time ago. [E. R. J., May 8, '09.]

Clairton, Pa.—The Peters Creek Street Railway, which is to connect Glassport, Coal Valley, Wilson, Blair and Clairton, has been granted by the County Commissioners a perpetual franchise over the county road in Jefferson Township between Wilson and Clairton Boroughs. W. G. Wilson, Dravosburg, president. [E. R. J., Jan. 29, '10.]

***Regina, Sask.**—The City Council has received proposals for street railway franchises in Regina from J. W. D. O'Grady, Winnipeg, Man., and Messrs. Cost and Grant, Montreal, Que.

Centerville, S. D.—C. A. Magee, president, Sioux City, Sioux Falls & Missouri River Railway, Parkston, has applied to the City Council for a franchise to build an electric railway through Centerville. The route as planned will be from Sioux City to Sioux Falls via Elk Point, Centerville, Leeville and Worthing. [E. R. J., Jan. 29, '10.]

Spokane, Wash.—The Spokane Traction Company has applied to the City Council for a franchise to double-track and extend some of its local lines.

Janesville, Wis.—The Rockford, Beloit & Janesville Railway, Beloit, has applied to the Council for a franchise giving it the right to extend its electric railway in Janesville.

TRACK AND ROADWAY

Pacific Electric Railway, Los Angeles, Cal.—This company has been given authority by the War Department to erect two trestles over Cerritos Slough northeast of Long Beach harbor.

***Denver, Col.**—Press reports state that Joseph Monnette, Lawrence, Mass., and J. W. Emard, Montreal, Que., representing Canadian interests, are engaged in securing a right-of-way for an electric railway from Steamboat Springs to Hahn's Peak, Farwell Mountain and the Three Forks mining district of Colorado and Wyoming. Water rights have also been secured on the Snake River for power to operate the new line.

West Chester & Wilmington Electric Railway, Wilmington, Del.—At the annual meeting of this company it is stated that definite plans were made for building an electric railway this year, connecting Wilmington and West Chester. Surveys are completed and all rights-of-way secured. Officers elected: Lewis Dalnios, Philadelphia, Pa., president, and C. P. Faucett, West Chester, Pa., secretary and treasurer. Directors: Howard Ross, Wilmington; Charles Gleason, Brandywine Summit, Pa., and Sidney Kenney, Philadelphia, Pa. [E. R. J., Oct. 23, '09.]

Bayboro Investment Company, St. Petersburg, Fla.—This company advises that it will commence construction about March 1 on its proposed electric railway connecting St Petersburg with its property. Officers: H. A. Murphy, president; C. A. Harney, vice-president; H. A. Kellam, secretary; H. C. Duet, treasurer; A. Welton, superintendent. [E. R. J., Jan. 29, '10.]

Decatur Southern Traction Railway, Decatur, Ill.—This company advises that it expects to commence construction within the next four months of its projected 35-mile electric railway which is to extend from Decatur to Elwyn, Macon, Walker, Moweaqua, Assumption, Dunkel and Pana. Surveys are made and all rights-of-way secured. Power station and repair shops to be built at Decatur. Capital stock, $25,000. Officers: Joseph Nordenschild, 29 Broadway, New York, N. Y., president; Peter Chase, Decatur, vice-president and general manager; Henry C. Simons, Virden, Ill., secretary; John J. Pierpont, Pana, treasurer. All communications should be addressed to the company at Decatur. [E. R. J., Jan. 29, '10.]

Murphysboro & Southern Illinois Railway, Murphysboro, Ill.—This company expects to place contracts during the next four weeks, for building 70 miles of single track to Carbondale, Herrin, Duquoin, Carterville and Shawneetown. This company has just closed contracts with the Itawamba Engineering Company, St. Louis, Mo., for the trestle work from Third Street and Walnut Street, in Murphysboro, to the Big Muddy River, and the construction of a 229-ft. bridge. C. H. Clay, general manager.

Evansville, Mt. Carmel & Olney Electric Railway, Evansville, Ind.—This company has let the contract for the construction of its 64-mile railway which is to extend from Evansville, Ind., to Olney, Ill., spanning the Wabash River near Mt. Carmel, Ill., to Burns & Company, Chicago. All material will be purchased through Burns & Company. The line will pass through Highland, Darmstadt, Cynthiana, Owensville, Mt. Carmel, Friendsville, Lancaster, Berryville and Olney. E. Q. Lockyear, secretary. [E. R. J., Mar. 27, '09.]

Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Ind.—It is stated that this company is planning to extend its railway from Crawfordsville to Veedersburg.

Covington & Southwestern Railway, Kingman, Ind.—At the annual meeting of this company recently held in Covington, J. J. Burns, Chicago, was elected president and added to the board of directors. The other officers were all re-elected. An order was placed with the Illinois Steel Company for 2500 tons of steel rails.

Southern Michigan Railway, South Bend, Ind.—It is stated that this company contemplates extending its railway 4 miles to Buchanan. M. P. Reed, South Bend, purchasing agent.

Motor Grand Traction Company, Belleville, Kan.—At a recent meeting of the directors of this company, which is promoting the construction of an interurban railway between Belleville and Wichita, E. N. Van-Hosen resigned as secretary and treasurer and was elected to the office of first vice-president and assistant manager. W. S. Ball was appointed treasurer, C. F. Davis, secretary. [E. R. J., Jan. 15, '10.]

Frederick (Md.) Railway.—Within the next few weeks this company will place contracts for building 2 miles of new track and a freight yard. W. S. Taylor, general manager. [E. R. J., Dec. 25, '09.]

Twin City General Electric Company, Ironwood, Mich.—During the next 3 months contracts will be placed by this company for building 6 miles of road bed. H. F. Pearce, purchasing agent. [E. R. J., Jan. 1, '10.]

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company advises that it has placed contracts for the construction of about 6 miles of track. W. F. Gorenflo, Gulfport, purchasing agent.

Mexico, Santa Fé & Perry Traction Company, Mexico, Mo.—This company has begun the construction of its power house in Mexico and also on its projected electric railway which will pass through the Counties of Andrain, Callaway, Boone, Monroe and Ralls, Mo. Mexico, Perry, Fulton and Columbia will be connected by the new line. Mathias Crum, president.

***Winston-Salem, N. C.**—Francis D. Degiers is negotiating with representative citizens along the proposed line regarding the building of a 75-mile electric railway which will extend from Leakville, through Rockingham and Stokes Counties, to Mt. Airy.

Ohio Electric Railway, Cincinnati, Ohio.—This company expects to extend its Lima-Defiance division from its present terminus in Defiance, 2 miles, to the Second Street Anglaize River Bridge, three blocks from the Court House and business section.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—The section of this company's railway between Nelsonville and Athens has been completed and will be put into operation this week. McKeen gasoline cars will be used. The line will be in the form of a loop, one side of which connects Nelsonville and Athens directly. The other connects these two towns by way of Murray City, Goucester and several other towns of the coal mining district. [E. R. J., Nov. 20, '09.]

Grand Valley Railway, Brantford, Ont.—This company advises that it expects to place contracts during the next three months for the construction of 116 miles of interurban railway and 12 miles of city line. William P. Kellett, chief engineer.

***Arnprior & Pontiac Railway, Ottawa, Ont.**—This company advises that it will begin construction this season on its projected 75-mile electric railway which is to connect Ottawa, Fitzroy Harbor, Arnprior and Campbell's Bay. The line will connect with the Canadian Pacific Railway at Campbell's Bay and New Arnprior and with the Grand Trunk Railway at Graham's Bay. Power station and repair shops will be located at Fitzroy Harbour. Arthur Prince, 75 Somerset Street, Ottawa, chief engineer.

Portland, Eugene & Eastern Railway, Portland, Ore.—This company has agreed to build, for a bonus of $35,000, several extensions to its lines, including a loop 5 miles in length out South Willamette Street past College Hill, then into the city again by way of Oregon Avenue, and at the intersection of Eleventh and Willamette Streets. A. Welch, purchasing agent.

***Pittsburgh, Butler, Slippery Rock & Grove City Railway, Butler, Pa.**—This company has recently been organized to construct a 20-mile electric railway between Butler and Slippery Rock via Prospect and West Liberty. Application for a charter will soon be made. Final surveys will be made during the next few weeks under the direction of F. E. Barrett, Pittsburgh. Connections will be made with the Pittsburgh & Butler Street Railway, and the Pittsburgh, Harmony, Butler & New Castle Railway at Butler, and with the proposed Slippery Rock & Grove City Railway. Officers: W. C. Thompson, Butler, president; J. A. Smith, Butler, secretary; W. C. McCandless, Butler, treasurer.

American Railways, Philadelphia, Pa.—This company expects to electrify the Scranton, Dunmore & Moosic Lake Railroad, 10 miles long, which it has recently leased.

***Orangeburg, S. C.**—Press reports state that William C. Wolfe and others are interested in a plan to build an electric railway to connect Orangeburg, North Springfield, Bowman, Elloree and Branchville. A plant on the Edisto River will generate the power.

***Austin, Tex.**—A syndicate composed of M. Hurley, J. S. Hansford and Paul Hurley is said to be considering plans for building a 50-mile electric railway between Fort Worth and Mineral Wells. The proposition is indorsed by the Board of Trade of Fort Worth. The survey for the proposed railway has been made.

***Quanah, Tex.**—It is reported that Wiley W. Lowry, Poteau, Okla.; Elmer S. Woods and Fox Woods, Fort Smith, Okla., are interested in a plan to construct a 35-mile electric railway from Quanah to Altus.

Metropolitan Steam & Electric Railway Company, San Antonio, Tex.—The Citizens' Club of Bandera has appointed a committee of three to confer with this company on a proposal to build an interurban railway from Boerne via Bandera to Hondo City. It is the intention of the club to donate the right-of-way through the county and terminal grounds. [E. R. J., Dec. 11, '09.]

Whatcom County Railway & Light Company, Bellingham, Wash.—This company states it contemplates the construction of a 33-mile interurban railway from Bellingham south to Skagit County. L. H. Bean, local manager.

***Sultan Railway & Power Company, Everett, Wash.**—Press report states that this company will construct a 16-

mile electric railway from the Great Northern power plant site, 8 miles, up the valley to the Forty-five, North Coast and Blackman mines. The company is under contract to the Government to begin construction of the railway before July 1, 1910. Judge Geo. D. Emery, promoter.

***Wenatchee, Wash.**—It is stated that A. J. Linville, C. B. Halbert and John Godfrey, Wenatchee; E. C. Long and Guy Long, Cashmere, are interested in a plan to construct an electric railway from Wenatchee through Cashmere and Peshastin to Leavenworth.

SHOPS AND BUILDINGS

Murphysboro & Southern Illinois Railway, Murphysboro, Ill.—This company expects to place contracts during the next four weeks for the erection of a new car house to have a capacity of 10 cars. C. H. Clay, general manager.

Southern Michigan Railway, South Bend, Ind.—This company is planning to build a new passenger station at Niles, Mich. M. P. Reed, South Bend, purchasing agent.

Lexington & Interurban Railways, Lexington, Ky.—The car house of this company, together with 13 cars and a snow sweeper were destroyed by fire on Feb. 4. Seven city cars, one freight car and the line construction car were also damaged. The loss is said to be $60,000, fully covered by insurance.

Frederick (Md.) Railway.—During the next few weeks this company will place contracts for building new car shops. W. S. Taylor, general manager.

Old Colony Street Railway, Boston, Mass.—This company expects soon to place contracts for building a storage car house at Brockton to have a capacity of about 65 cars. Robert S. Goff, general manager.

Grand Rapids (Mich.) Railway.—It is stated that this company is considering plans for the erection of a new car house between Front Street and Court Street to cost about $80,000.

POWER HOUSES AND SUBSTATIONS

San Francisco, Oakland & San José Railway, Oakland, Cal.—This company has placed an order with the General Electric Company for an additional 2700-kw railway generator set to be direct connected to Hamilton & Corliss engine furnished by Chas. C. Moore & Company.

Public Service Railway, Newark, N. J.—This company will build an addition to its power station at Marion, to be 75 ft. x 100 ft. and 75 ft. high. It is to contain ten boilers and will have a capacity of 18,000 kw. A. E. Sanford Company has been awarded the contract for the foundation piling, and the contract for the erection of the building has been let to the Hedden Construction Company. [E. R. J., May 20, '09.]

Oklahoma City & Suburban Railway, Oklahoma City, Okla.—This company expects to purchase 1 2000-kw turbine, 1 400-hp boiler and 5 500-kw motor generators. W. A. Haller, engineer.

Grand Valley Railway, Brantford, Ont.—This company advises that it expects to place contracts during the next three months for the erection of a new power house at Brantford to be equipped with 3 500-kw motor generator sets. Wm. P. Kellett, chief engineer.

Spokane & Inland Empire Railroad, Spokane, Wash.—This company has recently placed an order with the Westinghouse Electric & Manufacturing Company for a complete equipment of the second half of its power plant at Nine Mile, including 2 3000-kw generators, 2 3000-kw, three-phase, 6600-volt transformers, high-tension switches, apparatus, etc. The installation will be complete by June 1. The company has also contracted with the Westinghouse Electric & Manufacturing Company for 2 1500-kw synchronous motor generator sets, 4 2000-kw, 66,000-volt, single-phase transformers, switchboard and equipment. This apparatus is to be installed in the substation at Spokane.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—This company has awarded a contract to the Amburson Hydraulic Construction Company, Boston, Mass., for the construction of a dam and power station at Cedar Falls on the Red Cedar River. The construction will cost $300,000 and the equipment $200,000. It is expected that 8000 hp will be developed. [E. R. J., Jan. 29, '10.]

Manufactures & Supplies

ROLLING STOCK

Columbus, Marion & Bucyrus Railway, Delaware, Ohio, will buy two interurban cars, it is rumored.

Murphysboro & Southern Illinois Railway, Murphysboro, Ill., will buy five new double-truck cars within the next four weeks.

Indianapolis & Louisville Traction Company, Louisville, Ky., it is reported, is planning to buy several new cars in the near future.

Oklahoma Railway, Oklahoma City, Okla., has placed an order with the Niles Car & Manufacturing Company for six 45-ft. vestibuled steel cars.

International Railway, Buffalo, N. Y., is remodelling 35 cars for pay-as-you-enter operation. Consolidated electric heaters will be used on these cars.

Citizens Railway Company, Waco, Tex., has ordered three single-end, one-man pay-as-you-enter cars, 20 ft. 8 in. in length, from the American Car Company.

Wichita Falls (Tex.) Electric Railway has ordered from the American Car Company four 34-ft. pay-as-you-enter cars, and four 60-ft. pay-as-you-enter trail cars.

San Antonio Traction Company, San Antonio, Tex., has ordered six semi-convertible pay-as-you-enter cars, 28 ft. 10 in. long over all, from the American Car Company.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., is having six cars built in its Greenfield shops. Standard Motor Truck Company's trucks were bought for use under these cars.

Lexington & Interurban Railways, Lexington, Ky., suffered a loss by fire recently of 13 cars and one snow sweeper which were entirely destroyed. Seven city cars, one freight car and a line construction car were damaged.

Interstate Railways, Philadelphia, Pa., mentioned in the ELECTRIC RAILWAY JOURNAL of May 29, 1909, as contemplating the purchase of some cars, has ordered eight cars for the Trenton Street Railway from The J. G. Brill Company.

Washington Railway & Electric Company, Washington, D. C., reported in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1909, as expecting to order 50 cars for city service, has placed an order with The J. G. Brill Company for this number of pay-as-you-enter cars.

Grand Rapids (Mich.) Railway has placed an order for 12 pay-as-you-enter cars with the American Car Company. These cars are to be exact duplicates of the order for the same number of cars which was placed by this company in 1909. Peter Smith heaters were specified.

Seattle-Everett Traction Company, Seattle, Wash., mentioned in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1909, as having ordered six interurban motor cars from the Niles Car & Manufacturing Company, has prepared the following details: Length of body, 40 ft.; over vestibules, 51 ft.; over all, 52 ft.; width over all, 9 ft.; semi-steel body and underframe; Standard Steel Works Company's axles and Baldwin trucks.

TRADE NOTES

Gilsim Lubricator Works, Utica, N. Y., has moved from 67 Jay Street to 158 Genesee Street, Utica.

Railway Audit & Inspection Company, Philadelphia, Pa., has moved from 1013 Arch Street to 508 Brown Building, Philadelphia.

Standard Underground Cable Company, Philadelphia, Pa., has moved from the Betz Building to 1510 North American Building, Philadelphia.

Standard Varnish Works, New York, N. Y., have certified to the Secretary of State of New York that the capital of the company has been increased from $2,000,000 to $2,600,000.

Baldwin Locomotive Works, Philadelphia, Pa., received an order from the Portland Railway, Light & Power Company, Portland, Ore., which operates more than 225 miles of city and suburban railway, for two motor trucks.

Cooper Heater Company, Dayton, Ohio, elected the following officers at its semi-annual meeting last month: E. J. DeVille, president; W. L. Blackwell, vice-president; F. W. Gruen, secretary and treasurer. Mr. Blackwell, in addition to filling the office of vice-president, will for the present act as eastern sales manager. W. E. Hinmon has been appointed western sales manager.

New York Car & Truck Company, Kingston, N. Y., reports that the Supreme Court of the United States rendered a decision on Jan. 17, 1910, in the case of The J. G. Brill Company vs. the Washington Railway & Electric Company, Washington, D. C., based upon the alleged infringement of certain claims in patents 627,898 and 627,900 on trucks. The Peckham trucks used by the defendants were held by the court not to infringe these claims.

Michigan Steel Boat Company, Detroit, Mich., announces 20 different designs of rowboats for the coming season. The steel boat is especially well adapted for use in street railway parks as it needs no boat house, does not bother the owner with gunwales or broken oarlocks, and affords opportunity for the utmost grace in design. The company is offering for 1910 an unusual number of patterns of rowboats at low prices which are illustrated and described at length in new catalogs.

Mitsui & Company, Ltd., New York, N. Y., announce that they have transferred their business to a corporation formed in Japan with a capital of about $10,000,000, fully paid in, under the firm name of Mitsui & Company, Ltd., in America and Europe, Mitsui Bussan Kabushiki Kaisha in Japan, and Mitsui Bussan Kaisha, Ltd., in other parts of Asia. The head office of the company will be at No. 1 Suruga-cho, Nihonbashi-Ku, in Tokio. The incorporation of the company was decided upon for family reasons and will involve no interruption or change in management of the business.

J. G. White & Company, Inc., New York, N. Y., announces that to assist in caring for their increasingly important irrigation and hydraulic work, they have recently added I. W. McConnell to their staff of hydraulic and irrigation engineers, with the title of chief irrigation engineer. Mr. McConnell was recently supervising engineer of the United States Reclamation Service, and is well known in connection with the Gunnison tunnel. As chief irrigation engineer for J. G. White & Company, Mr. McConnell will have general supervision of all matters relating to irrigation undertakings, with headquarters at the main offices of the company, at 43 Exchange Place, New York, N. Y.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., is planning to build, this spring, a 56 ft. x 150 ft. extension one story high with gallery, to be used more particularly for the manufacture of gear cases. Accommodations will be provided, however, for handling the company's shop-tool specialties such as axle straighteners, pinion pullers, armature banding and heading machines, coil winders, armature trucks, pneumatic pit jacks, etc. The company's need for more room indicates that it has had a prosperous year. In fact, the company reports that during the last four months of 1909 the volume of business was as great as that previous to the depression of 1907.

International Steel Tie Company, Altoona, Pa., held its first annual meeting of stockholders on Jan. 14, 1910. W. P. Day, first vice-president and general manager of the company, in his report set forth at length the progress of the company and made a number of recommendations, among them a plan to issue $50,000 of stock to establish the manufacturing plants necessary for filling the orders already on the books. This was approved. The assembly factory at Johnstown will be pushed to completion as rapidly as possible. The location of the site for the fastener factory has not been settled. The following officers were elected: V. A. Oswald, president; George Harpham, secretary; S. M. Hoyer, treasurer; W. P. Day, manager.

H. M. Byllesby & Company, Chicago, Ill., held a convention of officers and department heads of the company at Chicago, in January. About 150 representatives from the 11 cities in which Byllesby & Company operate public utilities and from the home office in Chicago were in attendance. The purpose of the association, as stated in the constitution, is "the interchange of ideas and the promotion of acquaintanceship and good feeling among officers and employees." Arthur S. Huey, vice-president of Byllesby & Company, presided at the sessions, which were held in the Auditorium Annex. The convention was concluded with a dinner at the Auditorium Annex, at which C. A. Coffin, president of the General Electric Company; Samuel Insull, president of the Commonwealth-Edison Company, Chicago, and Charles G. Dawes, president of the Central Trust Company, made addresses. A number of very interesting papers were read, among them "Power House Construction and Economic Operation," by H. Boyd Brydon, "Successful Utility Management," by Arthur S. Huey, and "Street Railway Operation," by J. N. Walter Gillette. It has been decided to hold similar conventions hereafter twice a year, in January and July. The association will be known as the Association of H. M. Byllesby Companies. Officers have been elected as follows: F. H. Tidnam, Oklahoma City, president; H. J. Garrison, Fort Smith, Ark., secretary; Errett L. Callahan, Chicago, assistant secretary.

ADVERTISING LITERATURE

Hydrostatic Machinery Company, Rochester, N. Y., has issued a 24-page publication entitled "Hydraulic Machinery," in which its products are described and illustrated.

Wagner Electric Manufacturing Company, St. Louis, Mo., has issued Bulletin No. 89, dated December, 1909, in which its type B. W. polyphase induction motor is described and illustrated.

C. A. Wood Preserver Company, Austin, Tex., has issued a card on which is reproduced a photograph showing part of the equipment required in the manufacture of C. A. Wood Preserver.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has issued Booklet No. 201, in which the company's flush and non-flush types of inter-communicating telephones are described and illustrated.

Joseph Dixon Crucible Company, Jersey City, N. J., has published Graphite for January, 1910, which is the first issue of Volume 12. The principal article is by W. H. Wakeman on "The Prevention of Corrosion of Steel Machinery."

American Carbon & Battery Company, East St. Louis, Ill., has issued a price list of its street railway motor brushes effective Jan. 1, 1910, and a price list of its motor and generator brushes effective Jan. 1, 1910. A number of brushes of new grades are included in the publications.

Goheen Manufacturing Company, Canton, Ohio, has prepared an illustrated pamphlet showing a number of important steel structures which have been painted with its "Carbonizing Coating," a preservative paint which it is claimed will prevent rust and corrosion from fumes.

J. G. Brill Company, Philadelphia, Pa., in the *Brill Magazine* for January, 1910, has begun the publication of a series of biographical sketches accompanied by portraits. The subject of the first sketch is Gen. Geo. H. Harries, second vice-president of the Washington Railway & Electric Company, Washington, D. C. Among the feature articles are the following: "Conditions which Govern the Type of Car for City Service," "Eighteen-Passenger Motor Omnibuses," "Two Types of Coal and Ash Cars," "Passenger Cars for the American Railroad of Porto Rico," "Double-Deck Cars for Natal, South Africa," "Equipment for the British Columbia Electric Railway Company."

Western Electric Company, New York, N. Y., has issued a neatly arranged and illustrated booklet in which are described the company's various types of intercommunicating telephones, its cable terminal, connecting block, batteries and battery boxes used in connection with these sets. The company has also issued Bulletin No. 5230, in which its Hawthorn type of "SL" induction motor is described and illustrated. A new trade name has been adopted by the company for the telephones heretofore known as intercommunicating or private line telephones. They will be known hereafter as Western Electric inter-phones. Another publication of the company contains a detailed description of the company's Hawthorn carbon and flaming arc lamps and illustrations of the latest types of Hawthorn lamps and the Hawthorn works.

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Improved Insurance Conditions

The elimination or reduction of the fire insurance hazards in electric railway properties is receiving closer attention than ever before. It was not so very long ago than this matter was almost the last thing considered in the design of a great many of the buildings used for electric railway purposes. The operating and architectural features were looked upon as the predominant factors. The result was structures covering large areas and with roofs supported on light trestles, all pleasing to the eye, but very undesirable from an insurance standpoint. The fault was not entirely that of the architect or designer because the principles of fire protection as applied to buildings of this kind were not fully understood. Nevertheless, a great many of the car houses erected 10 years or more ago, and now in use, are of the character described.

It is safe to say that at present the question of the best method of protecting against fire is one of the most important, if not the most important, consideration in the design of structures of this kind. Large areas have given place to small areas, in which the property in one "risk" is reduced to a minimum. Improvements have been introduced in the roof construction so that if sprinklers are used they can be placed in the position where they are most effective. Fire hazards have been eliminated as far as possible and in general the car house or other building, housing valuable property, is a very different sort of affair from those constructed a decade or so ago. Many companies, however, still have a large number of the older class of buildings which are too valuable to be torn down, but can often be improved at slight expense so far as this feature is concerned.

It is an axiom in fire insurance that there is more profit in insuring a good risk at a low rate than a poor risk at a high rate. It is not surprising, therefore, that the insurance companies have taken an active part in pointing out how such property can be improved and then reinsured at a lower rate. An illustration how such a campaign has been carried out is given in the article elsewhere in this issue on the fire insurance practice of the Ohio Electric Railway. The methods followed by this road were not confined to physical changes in the buildings themselves, although this was an essential part of the program. Fire hazards often occur from wrong methods of doing work, from the careless storage of waste and other inflammable materials, from neglect in clearing away rubbish, from an inadequate system of extinguishing incipient fires or of the quick removal of cars after the fire has gained headway, and in many other ways. Good fire protection, consequently, can often be gained better, or in quite as great a degree, by a strict system of supervision and inspection as by a reconstruction of the property. The methods followed in these particulars by the Ohio Electric Railway are particularly interesting because the system is a duplicate of many others in the country in the

sense that all of its property is not new. Nevertheless by the establishment of a regular method of dealing with this problem, such as the organization of the men into squads for dealing with fires if they should originate, by removing the smaller fire hazards and by some reconstruction of the property, the insurance premiums to be paid were greatly reduced, in fact so much as to make a very large annual net saving.

Of course this was not the only benefit derived, because every reduction in rates means less chance of fire, hence less danger of an interruption to the continuity of the service, for which insurance cannot be procured. Considered from this point of view it is safe to say that the establishment by a railway company of any reasonable precautions against fire are fully warranted, whether there is an actual reduction in insurance premiums or not. It is doubtful whether the same amount of energy and engineering ability expended in any other direction on the average property, which has not been "rehabilitated" from this standpoint, will bring such large returns as when applied to improve insurance conditions.

Dasher Advertising

The value of the car dasher as an advertising medium needs little emphasis at this time, but there are certain limitations and opportunities invested in this method of publicity which are well worth considering. The problem is peculiarly that of making the most of a very limited space exposed to public view for a relatively short time, the exposure, however, being of an intense and striking character. Practice favors the restriction of dasher advertisements to announcements of events or attractions which can be reached by the company's cars, and the general opinion among experienced operating men is hostile to more commodity advertising on the outside of rolling stock. There is good reason for this attitude, for the public is interested in car externals chiefly from the point of view of directions and destinations, and is apt to resent the placarding of car body parts with printed or other illustrated matter having no direct connection with routes.

The impression of a good dasher sign is so sharp that the merest announcement of the attraction should ordinarily be sufficient to attract the desired riding. As the number of signs hung upon a single dasher increases, their effectiveness is certain to grow less. Hence one or two large, well-printed signs, with a reasonable space between them, are sure to be more effective than several posters covering the entire dasher area. Often it pays to put the time at which an event occurs on the sign, and if such posters are used throughout a city system, it may pay in some cases to designate specially those cars which pass the point of interest. Extreme brevity is imperative, but this may be combined with a suggestive design, as a lithographed baseball, to heighten the effect. It costs so little to employ effective stenciled signs for special events that there is little excuse for the failure to put them on, where there is ample room on the car. For night advertising, the cost of installing incandescent lamps for reflector service above the signs is also small, giving a handsome profit if one or two extra fares per car-hour are secured thereby. It is almost impossible to advertise specific events in detail on dashboards, but if the fact is concisely and emphatically brought to the attention of the public that the car serves particular attractions, the results are likely to be thoroughly satisfying from the standpoint of increased patronage.

Through Routing in Chicago

The chief argument of popular interest in favor of the proposed consolidation of the local transportation systems of Chicago is the possibility of a consolidated property being able to establish many through routes and thus serve the public better than individual roads, each confined to one section of the city. Through routing of cars on the surface and of trains on the elevated roads is held by its advocates to be the best method of relieving the present congestion of traffic in the central business district. Of course, such a combination as that proposed would make possible some operating economies, particularly on the elevated roads, where the chief problem is that of handling the trains on the loop during the rush periods. It is a debatable question, however, whether these economies would balance the loss in revenue if many rides of double the present length were made available for a single fare. It may not be uninteresting to look more closely into the Chicago situation, bearing in mind that the question of the practicability of through routing is largely the deciding factor.

In the case of the elevated roads, the question is complicated because of the proposal of the companies to increase the capacity of the Union loop by extending the loading platforms. If this should be done sufficiently to allow two seven-car trains to load at once, it is asserted by railway experts that the capacity of the loop would be increased 25 per cent and would relieve the worst of the congestion on the loop. On the other hand, they claim that through routing for one fare would be financially ruinous, certainly as long as the roads are now operated under diverse ownership, and of very doubtful practicability under one control. The "Loop Protective Association," composed of owners of property abutting on the loop, has taken a firm stand against the extension of the platforms on the plea of the probable increase of noise and darkness to their store windows, and in favor of the through routing of the elevated trains. Some of the members of this association have claimed that through routing would increase the capacity of the loop 180 per cent over the present plan of looping the trains. The present attitude of the local transportation committee of the Chicago City Council indicates that this body will withhold from the elevated railroads the privilege of extending their platforms simply as a means to force through routing. The situation now is practically a deadlock, with no promise of relief for the admittedly overcrowded loop.

The general public looks forward to the construction of a subway as a means of relief, but such an undertaking could not be completed short of two or three years, even though the city and the transportation companies were prepared financially to undertake immediate construction.

The surface railways also are deeply interested in a through-route problem of their own. At the time the traction rehabilitation ordinances of 1907 were drawn and accepted, it was generally thought that the through-route problem, so far as the surface traffic was concerned, had been fairly well settled. The ordinances specify that the railway companies interested in the 21 prescribed through routes shall make an operating agreement for the establishment, maintenance and operation of the through-routed cars. It also is specified in the ordinances that the Council shall have the right to prescribe new through routes as traffic conditions shall warrant. But after through-route operation had been begun in a small way, it became apparent that a number of obstacles of no small magnitude stood in

the way of its extension, when applied to the combined trackage of the Chicago Railways and the Chicago City Railway companies. Those of a physical nature, such as low viaducts, elevated railway posts and diverse special track work, though serious, were not irremovable. But a more serious difficulty lay in the apparent impossibility of the two surface transportation companies to decide upon mutually equitable operating arrangements. So far neither company has proposed a scheme for through operation which is acceptable to the other.

At present about 100 cars are through-routed over three temporary routes. Each company assumes the liability on all points of the route for accidents to its own cars and for accidents caused by them. In a number of instances injured passengers have sued both railway companies. A matter less easily settled, however, is the equitable division of the revenue on the through-routed cars. Up to this time, the proportion of cars supplied by each company is based upon its proportionate track mileage and each company retains the fares collected on its cars, no matter whether the cars are operating on home or foreign tracks. But this plan involves inequalities in receipts. For instance, the franchise districts of the main north and south trunk lines of the two railways meet in the middle of the Chicago River so that under the present method a large portion of the northbound traffic pays fares within the City Railway territory, although the greater part of the ride is over the Chicago Railways property. There are other objections which will occur to every railway manager to the practice of having the employees of one company collect money while on the tracks of another. Again, the ordinances provide that each company shall report the earnings of its entire property. This brings about another complication, because if a car of one company is earning money on the other company's tracks and there is not an equitable distribution of traffic over the entire through route, the earning power of the property will be changed. Questions of division of track mileages, density of population and trend of travel along the prescribed through routes enhance the serious character of the problem.

There has also been a division of opinion as to the proper assessment of the cost of removing physical obstacles to the operation of the cars. For instance, which should pay for raising a viaduct necessary in the case of the cars of one company, but not for those of the other? The city corporation counsel has said that the expense should be borne by both companies and the steam railroad company using the viaduct. The city will not admit its liability. Again, it has been found necessary to move about 80 elevated railway columns located along one property so that the through-routed cars of both companies can be operated. The apportionment of costs of this kind further complicates the problem of equitable through routing.

So far, the street railway companies have been unable to agree on the operating details of through routing. The ordinances specify that if an agreement cannot be reached at the end of the rehabilitation period, which still has about a year to run, the Board of Supervising Engineers of Chicago Traction shall prepare an operating agreement. If this agreement does not suit the contending companies, the matter shall be taken into court and the objecting company must prove to the court that the conditions laid down by the board are not reasonable.

The popular solution of the question of through routing, as stated, is consolidation, either of all the elevated properties in one company and of the surface lines in another, or in one large corporation owning or controlling both systems of transit.

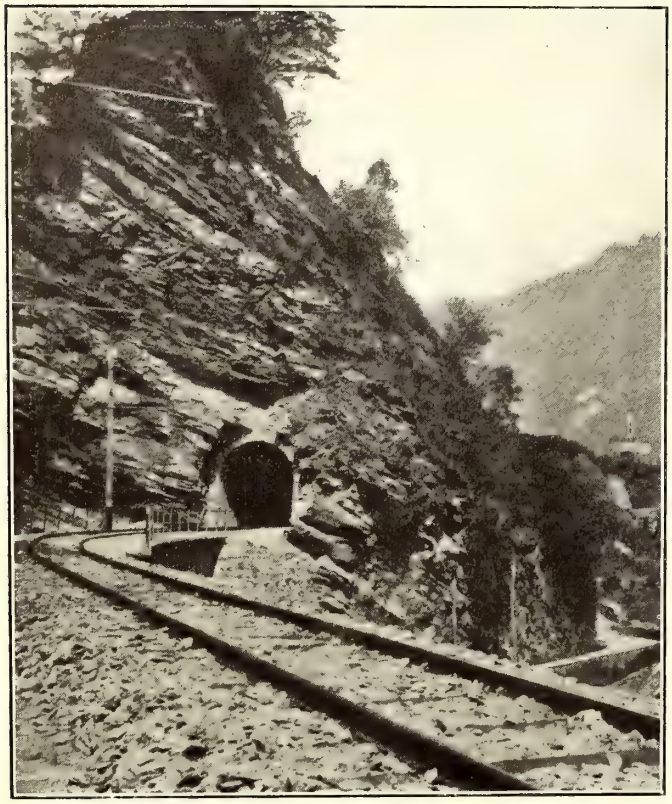
But if such a plan includes also any material reduction in the average receipts per passenger-mile on the consolidated system it would be most unwise. Consolidation might remove some of the present hindrances to good service, but all of them are of minor importance compared to any plan which involves an extension of the average ride given for 5 cents. Other companies are awakening to the necessity of reducing the distances for which they carry passengers for a nickel and it would be a backward step to adopt any other policy in Chicago. It has been claimed that as the greater part of the traffic in Chicago travels in radial lines from the business center, a general extension of the through-routing principle of cars would not increase greatly the average distance which a passenger is hauled. The truth of this contention could be determined only by careful study of the situation. We believe, however, that whatever the status at present, the result of the adoption of any extensive system of through routing would be to increase the amount of long-distance riding, and this would mean longer hauls for a single fare, the condition from which the traction systems in New York, Boston and practically every other large city are trying to free themselves.

Safeguarding Telephone Service

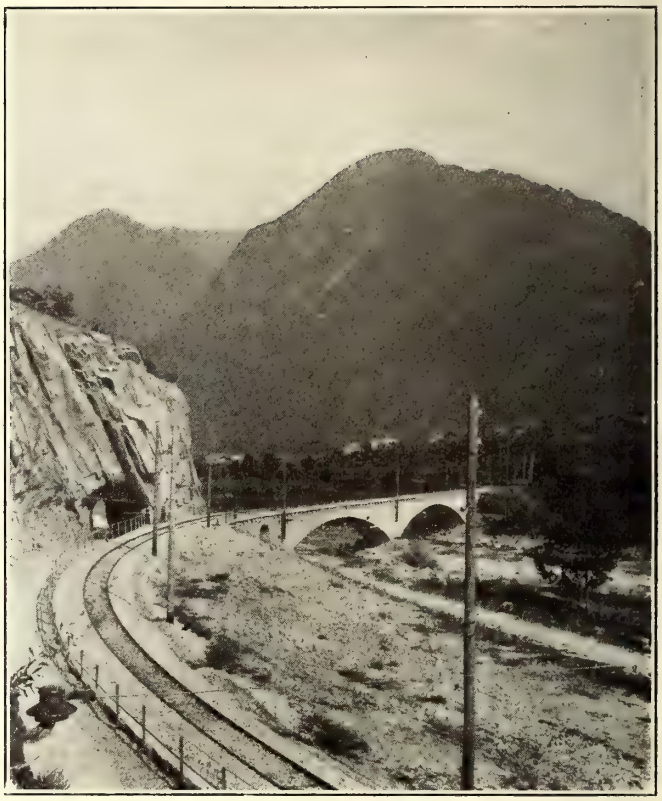
The lines of telephone communication of an interurban railway system are like the nerves in the body: when they break down co-ordination ceases and confusion reigns. In the early days of interurban construction small importance was attached to the telephone line, which was strung with light iron wire and built as cheaply as possible. Some of these old lines have given excellent service, but they are depreciating rapidly, and every storm results in broken wires and a more or less complete tie-up of operation until the breaks are located and repaired. As a general rule, the roads with the most unreliable company telephone lines have made the least provision for connecting up in times of emergency with the public long-distance telephone systems and the telegraph companies. One road in the middle West which operates over 100 miles of track went through the experience of trying to operate with a single, worn-out telephone line, and as a result of one severe winter's interruptions decided that a first-class duplicate line was none too good. It installed a copper despatcher's line and a company business line from end to end of the road, made an arrangement with the telegraph company whose wires were strung on a parallel steam railroad right-of-way to give preference to all emergency messages, and contracted with both the long-distance telephone companies to install their instruments in every station and substation, with the understanding that railway calls were to be rushed through. There has not been an occasion when it has been necessary to annul a train or flag through because the crews could not get into communication with the despatcher. A few times only both of the railway company's lines have failed together, but the long-distance service was immediately available and serious delays to trains were avoided. The cost of the duplicate long-distance service is considerable, but when it is needed it is well worth the price paid. The necessity for rule 203a in the standard code of interurban rules is not concurred in by the officers of this road nor would it be by any other company which had taken the same precautions against failure of the train crews to get into communication with the despatcher.

THE BELLINZONA-MESOCCO 1500-VOLT RAILWAY

The Bellinzona-Mesocco Railway is a 1500-volt d.c. line which runs through the Calanca Valley in the canton of Graubünden in southern Switzerland. The district now traversed by the electric railway was at one time the most popular highroad between Switzerland and Italy, but its importance greatly decreased after the opening of the St. Gothard tunnel. The population of the two valleys now hardly exceeds 5500, but it was believed that an electric line could be made a profitable undertaking because of the large tourist traffic and the transportation of lumber and local farming products. The last portion of the road was placed in service late in 1907. The Bellinzona terminal is the more important as it is only 1 mile from the St. Gothard Railway. Owing to the great additional cost which would have been required, there is no direct connection between the two stations in spite of the large interchange of traffic.



Bellinzona-Mesocco Railway—Entrance to Tunnel on Mountain Side



Bellinzona-Mesocco Railway—Bridge Over the Moësa River

The line is a single track 31½ km (19.2 miles) long. It is one of the few meter (39.37 in.) gage lines in Europe which not only has a trolley potential of 1500 volts d.c., but operates with multiple unit control. The profile conditions are not exceptionally severe for a mountain railway as the track usually closely parallels the highways or rivers. Fully 71 per cent of the line is on tangents. The maximum grade is 6 per cent and the minimum radius of curvature 80 meters (263 ft.). The difference between the highest and lowest points on the line is 619 meters (2031 ft.). Between Lostallo and Mesocco there is a 6 per cent grade fully 4.6 km (2.85 miles) long on which it was necessary to lay curves of the minimum radius mentioned. Naturally a large number of viaducts, tunnels, cuts and fills was required in constructing the road. Among the most interesting of the viaducts is one shown in an accompanying illustration. This crosses the Moësa River 9.9 km (6.14 miles) from Bellinzona and consists of two 30-meter (98 ft. 5 in.) stone arches. An illustration shows that a tunnel was cut through the mountain directly ahead of the viaduct. This



Bellinzona-Mesocco Railway—Motor Car, Trailer and Freight Car Near Bellinzona Station

tunnel accommodates both the public road and the railway and is 17 meters (55 ft. 10 in.) long. The excavated rock was used in the construction of the viaduct.

In general the track lay-out consists of a single track with a siding and stub at every station. The rails weigh 25 kg per meter (50 lb. per yard) and are usually laid on impregnated oak ties. Grooved rails are used only at one point where there is heavy freight and wagon traffic. On curves of 100 meters (328 ft.) radius, the outer rail is elevated 126 mm (5 in.) for a speed of 40 km (24.8 miles) an hour, the gage widening amounting to 24 mm (1.4 in.). Tangents at least 10 meters (37 ft. 10 in.) long connect all reverse curves. The profile conditions throughout the line are such that cars can be run by coasting on 46.7 per cent of the route. The running time of a standard 55-ton train for the 19.2 miles between the terminals is 90 minutes on the mountain trip and 78 minutes on the valley trip, allowing 15 minutes in each case for 13 intermediate station stops. These periods allow a schedule speed of 20.9 km (12.9 miles) an hour in the first case and 24.1 km (14.9 miles) an hour in the second case. The highest permissible speed is 45 km (27.9 miles) an hour.

ELECTRICAL FEATURES

When the construction of the line was being planned, various plans were brought forward to operate the line either by single-phase or three-phase motors. Single phase was not considered seriously at the time because it had not been sufficiently developed, while polyphase operation with stationary transformers for the several sections was rejected because of its unsuitability for the topographical and operating conditions. It was believed that with the ordinary parallel connection of three-phase motors the speed on the level sections would not be high enough or else the heavy grades would impose too much load on the power station. The advantages of three-phase motors for recuperating current on down grades were more than balanced by their fixed speed characteristics which would have been undesirable on a line of this kind. The principal objection, however, was the additional overhead work as it would have been necessary to install and maintain the wires under very unfavorable conditions.

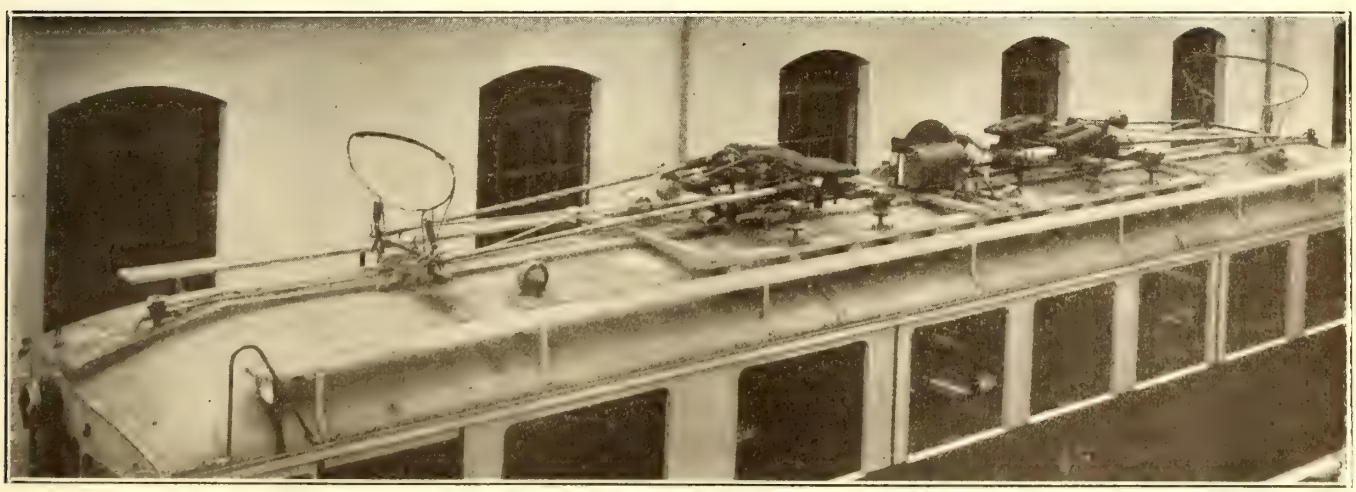
The power for the operation of the line is furnished by a hydroelectric station at Cebbia where both 1500-volt d.c. and 10,000-volt a.c. generators are installed. The current from the d.c. machines is fed directly into the trolley lines at Mesocco, 1½ km (.93 miles) distant, while the 10,000 three-phase 50-cycle current is transmitted 22.2 km (13.76 miles) to a motor-generator station at Roveredo. As the generators in the latter are operated in parallel with the 1500-volt machines in the power station, any cars between the two feeding-in points receive power from two sources. Thus the load is gradually shifted from one station to the other in accordance with the changing positions of the cars. The two d.c. machines in the power station are of 275 kw capacity each, when delivering 1650-volt current and running at 500 r.p.m. They are capable of operating up to 1800 volts with sparking. The two d.c. generators at the converter station are of similar design, but of 272 kw capacity each. They are driven by two 400-hp asynchronous three-phase motors.

LINE CONSTRUCTION

The overhead construction is of both the bracket and the span types with kyanized, iron-capped wooden poles set no further than 30 meters (98 ft.) apart. In some cases, as illustrated, it was necessary to attach the span wires to insulated rosettes set in solid rock. The trolley wire used throughout the route is of No. 00 round-section, hard-drawn copper. On the bracket sections the wire is carried on Mannesmann seamless steel tubing. All of the iron fittings for the trolley wire were given two coats of oil paint. The trolley is doubly insulated, the first protection being afforded by the insulated hangers on the bracket or spans and the second insulation by two porcelain suspension insulators between which the wire is carried. The clearance between the trolley wire and the top of the rails varies as follows: 6.3 meters (20.7 ft.) in the yards and at crossings, 5.8 meters (19 ft.) on right-of-way and 4.3 meters (14 ft. 1 in.)

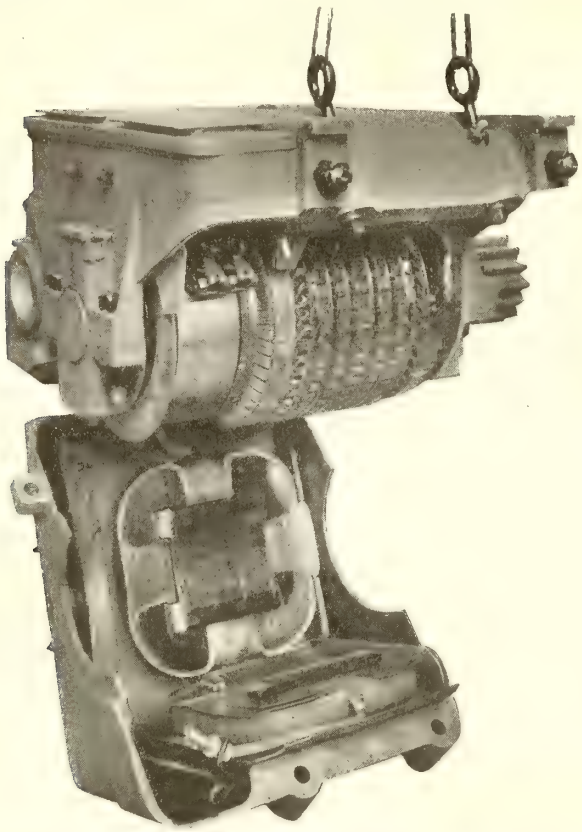


Bellinzona-Mesocco Railway—A Typical Rock Cut at Benabbia



Bellinzona-Mesocco Railway—Adjustable Bow Type Current Collectors

in tunnels. The span wires are of No. 4 steel except at anchorages where No. 3 wires are used. A telephone circuit with metallic return is installed in connection with instruments at



Bellinzona-Mesocco Railway—Standard 750-Volt Motor

every station. The overhead line is protected by Nonn lightning arresters placed every 2 km (1.24 miles). The overhead work was furnished by the Oerlikon Company, Zürich, Switzerland, which also supplied most of the other electrical equipment with the exceptions noted later.

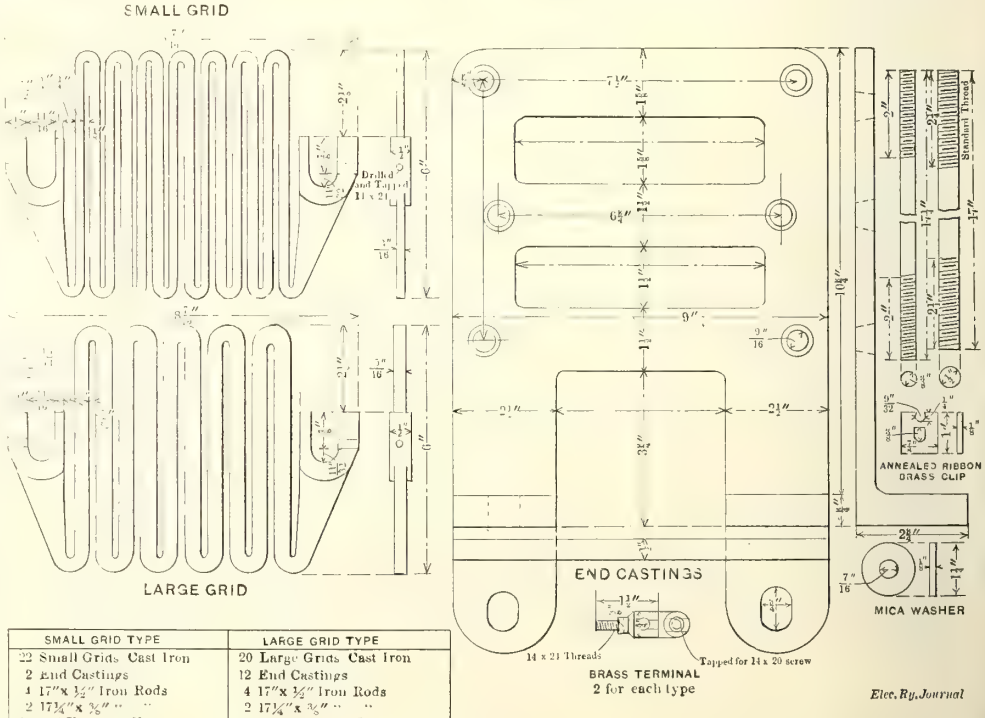
The cars are equipped with 750-volt motors and Siemens-Schukert multiple unit control, using 60-volt current from storage batteries. In addition to the ordinary connections, the controllers are provided with five steps for emergency electric braking. The four motors per car are rated at 65 hp and were designed to pull a train weighing 50 metric tons up a 6 per cent grade at 19.8 km (12.26 miles) an hour, assuming the rolling resistance to be 8 kg (17.6 lb.) per ton. The factory tests of these motors showed the following increases in temperature for 25 per cent overload for 30 minutes. Armature, 53.5 deg. C.; commutator, 58.5 deg. C.; field coil, 33.5 deg. C. The motors are so arranged that first the two armatures and then the two fields are connected in series. Thus the two motors per truck are considered as a double motor, and as such are connected in series and parallel. The performance of the motors is indicated by an ammeter and voltmeter in the motorman's cab. The latter also contains a voltmeter connected to the storage battery circuit.

Current is collected through sliding bows of the type illustrated. The bottom framing of the collectors is carried on four 10,000-volt insulators set in wooden blocks on the car roof. The lower half of each collector is adjustable for the greater variations in clearance while the upper part adjusts itself instantly for minor variations. This upper part is under separate spring tension and always tends to maintain a perpendicular position, but it is at a slight angle when the car is running. The tension of the trolley wire is 4 kg (8.8 lb.) under all conditions. The collectors are raised and lowered through gearing controlled from a hand wheel in the motorman's cab. This mechanism is carefully insulated from the collector framing and is also grounded. The contact piece of the collectors is of the well-known Siemens design consisting of a V-shaped piece of aluminum with a lubricated groove.

The motor cars have an overall width of 2.7 meters (8 ft. 10 in.), an overall length over the bumpers of 15.1 meters (49 ft. 6 in.) and seating capacity for 51 passengers distributed in several compartments. The empty weight of the car is 31,300 kg (68,985 lb.); the dead weight per passenger, 614 kg (1352 lb.); the weight of electrical equipment, 11,150 kg (24,575 lb.). The truck wheelbase is 2 meters (6 ft. 6 in.) and the diameter of the wheels 850 mm (33.5 in.). The cars are electrically heated and electrically lighted, the heating current being taken from the trolley, and the lighting current from the batteries which operate the contactors.

RESISTANCES WITH REMOVABLE GRIDS

The accompanying illustration shows the detail construction of a small and large grid resistance made by a foreign railway after the models of the Detroit United Railway. These grid resistances are arranged to give a first-step resistance of 5¾ ohms on single-truck cars and 3 ohms on double-truck cars. The rheostats are built so that broken grids can be removed without disturbing the others. This is done by slackening the outer and inner end bolts on the middle micanite tubes and the individual screw at the side. The ⅜-in. micanite tubes which carry the grids are insulated by mica from the end casting.



SMALL GRID TYPE	LARGE GRID TYPE
22 Small Grids Cast Iron	20 Large Grids Cast Iron
2 End Castings	12 End Castings
4 17″x ½″ Iron Rods	4 17″x ½″ Iron Rods
2 17¼″x ⅜″ " "	2 17¼″x ⅜″ " "
16 ½″ Hexagon Nuts	16 ½″ Hexagon Nuts
8 ⅜″ " "	8 ⅜″ " "
25 Mica Washers	23 Mica Washers
21 Brass Ribbon Clips	19 Brass Ribbon Clips
42 ½″x 1¼″x 24″ Machine Screws	38 ½″x 1¼″x 24″ Machine Screws

Details of Grid Resistances

Brass ribbon clips are used to insure good contact between the connecting ends of adjacent grids, and mica washers are employed on the opposite ends.

INSURANCE METHODS OF THE OHIO ELECTRIC RAILWAY COMPANY

Three years ago a systematic campaign for obtaining better fire inspection service was inaugurated by the officers of the traction lines that now compose the Ohio Electric Railway Company. This campaign included improving the property from a fire insurance standpoint and reducing the rate of insurance. The property then consisted of a number of separate companies, all under one management, viz., the Indiana, Columbus & Eastern Traction Company; Lima & Toledo Traction Company and Cincinnati Northern Traction Company. Each had been formed from the consolidation of a number of smaller companies either by lease or purchase, and before the final consolidation of the companies into the Ohio Electric Railway Company each individual risk was insured separately. This made it necessary to execute and handle more than 400 separate policies.

FORM OF POLICY

Under the present system all the property is covered by one general form and schedule, in which each building is described as to its construction and location, the values of the buildings are shown, and the contents are classified in separate columns as Buildings, Section A; Contents, not Electrical, Section B; Electrical Machinery, Section C. In the body of the form a full description explains just what is covered by each section (A, B, C), and what classifications of rates are made on each. Rolling stock is covered by Section D, with a full explanation as to how and when the cars are insured and what classification of rates apply. All property covered by Sections A, B and C is insured for 80 per cent of its value, while the rolling stock (Section D) is insured for its full or replacement value."

Each insurance company in writing a policy on this property covers a certain percentage of the total schedule, pastes a copy of the general form and schedule to its policy, charges the average rate, has the policy signed by agents in Ohio and Indiana (the property insured is located in both States), and charges the premium to the traction company.

The railway company pays each insuring company its premium at the average rate for the entire risk, and in accordance with the proportionate amount of the total value carried by that insuring company. If a loss occurs each insuring company pays its proportion of the loss prorated according to the ratio between the face value of its policy and the total amount of insurance carried on all companies. Proofs of the losses are made by the Western Adjustment & Inspection Company, and one copy is furnished to each insuring company. Such a proof describes the risk, as set forth in the form and schedule attached to the policy, and gives an account of the fire, a statement of the value, loss, insurance and a prorated apportionment of the claim among the participating companies. All the cost for adjusting losses is assumed by the insurance companies.

Under this method the number of policies has been decreased from 400 to about 60.

The Ohio Electric Railway Company has 617 miles of interurban and city tracks in Ohio and Indiana, extending from Cincinnati to Toledo via Hamilton, Dayton, Springfield, Urbana, Bellefontaine and Lima; from Richmond, Ind., to Zanesville, Ohio, via Dayton, Springfield, Columbus and Newark, with branches from Columbus to Morgans, Hebron to Buckeye Lake, Newark to Granville, and from Dayton to Union City, Ind.; from Lima to Fort Wayne, Ind., and from Lima to Defiance. Large power plants are located at Lindenwald, near Hamilton, Brookville, West Alexandria, Medway, Hebron, Zanesville and Lima. The principal car houses are at Hamilton, Trenton, Brookville, West Alexandria, Medway, Columbus, Newark, Zanesville and Lima, with smaller ones at other points. There are about 25 substations. The total insurance value, including rolling stock, is now over $3,250,000.

INSPECTION WORK

To carry out the plans formulated by the officers of the company, advantage was taken of the offer of Bruce E. Loomis, manager of the Fire Underwriters' Electrical Bureau, of New York, made in 1906 to the insurance committee of the American Street & Interurban Railway Association, to inspect the properties of electric railway companies and recommend improvements from a fire insurance standpoint.

In March, 1907, Mr. Loomis made a preliminary inspection of this property, and part of the improvements recommended by him were made at once. These changes resulted in a reduction of the rate of insurance from April 1 of that year. In October, 1907, the Electrical Inspection Bureau of Chicago made a complete survey of every risk on the Ohio Electric Railway system. In the report of this survey a map of the property in the neighborhood of each risk is prepared, as well as a large map showing the locations of the various risks along the interurban routes. Each risk is described in detail, and following the description of each is a list of suggested improvements which, if made, should reduce the hazard and make available a lower insurance rate. The report was made without any expense to the railroad company, and as it includes a full description of each piece of property, a summary of the hazards and existing protection methods and recommendations for the improvement of the risks, the report can be used by a rating bureau to determine the proper rate on any risk without the necessity of viewing the property. The Electrical Inspection Bureau of Chicago, which did this work, does not make rates, but carries on the work of making insurance surveys and suggesting improvements which will bring the risks up to the standards required by the insurance companies.

After the Ohio Electric Railway had obtained the survey report and its recommendations, still another survey was made, this time by the Ohio Inspection Bureau, representing the insurance companies doing business in Ohio. This survey was completed in December, 1907, and the information thus gained was used in fixing the rates on the individual risks. Subsequently, the report made by the Ohio Inspection Bureau, describing each risk and the controlling features of the whole property, was published, and copies were distributed to the insurance companies, so that each might determine what portion of the total risk it desired to carry.

METHODS AS APPLIED TO ONE RISK

To afford a clearer understanding of the methods pursued in placing the insurance of the Ohio Electric Railway on the basis described, an account will be given of the way in which one risk was handled. This risk comprised a car house and machine shop, with division offices above, and the quotation below shows the manner in which this risk was described in the report:

INSPECTION BUREAU REPORT SUMMARY

"A new one to three-story brick car barn, repair shop and office building, part of which is fireproof, and all of substantial construction. The structural features are such that the building may be classed as three separate and distinct risks; namely, the western, middle and eastern sections. The first two practically are fireproof, but the last is, structurally, much inferior. Hazards are few in the western and middle sections and rather poorly guarded in the eastern; unexposed; fair public and private protection, but both inadequate. With the hazards in the eastern section properly guarded it would be an excellent risk of its class.

"*Building Construction.*—New and in good repair; a one-story car storage section, 40 x 240 ft.; a one-story car repair section, 40 x 240 ft.; a three-story machine shop and office building, 40 x 240 ft., with side and end projections for office building, armature rewinding and blacksmith shop sections, making a total area of about 30,000 sq. ft. In addition a one-story, 10 x 15-ft. frame sand drying house adjoins the west section. Plain 12-in. brick walls pilastered inside to 16 in. every 15 ft. Front end of car barn consists of wooden doors hung to wooden frames, bolted to brick posts supporting steel I-beam headers, on which rests the brick wall above the doors; doors open outward. Reinforced concrete roof 6 in. in thickness; 10 wire glass skylights in metal frames, size 6 x 14 ft

over car storage section; 10 skylights, same size and construction, over car repair section; also machine shop and office section, making 30 in all. Earth and cinder floor in west section, concrete and 2-in. plank on 4 x 5-in. wooden timbers resting on flanges of rails in middle section; 2-in. plank floor on 2 x 10-in. joists, resting on foundation and boiler wall in blacksmith shop; wooden floor on joists in machine shop, armature rewinding room, paint and carpenter shop, also office sections; earth in oil room. Open concrete ceilings, except wood laid and plaster finish in office section. Two open stairways from first to second floors, one open, second to third. Twelve-inch brick division walls between the three main sections; also one between blacksmith shop and machine shop, one between machine shop and armature rewinding department, one between the latter and carpenter and paint shop, also between the latter and office section. One opening in division wall between west and middle sections covered with an automatic, double tin-clad fire door; two openings in wall between middle and east section, one covered by single, the other a double, standard tin-clad fire door, but could not close because obstructed by electric light wires; openings in walls on both sides of armature department covered with single, standard, tin-clad fire doors; wooden sills under some fire doors.

"*Supply House.*—New and in good repair; two-story; are 20 x 140 ft., equaling 2800 sq. ft.; plain brick walls, except finished with wood in office part; tile roof on wooden sheeting on light wooden trusses; single 1-in. wooden floors on joists; open trussed ceilings except office ceiled with wood; open stairway first to second; wooden platform and bins along east side of building.

"*Occupancy.*—Car barn, west section; three tracks running full length of barn with no stop blocks; track used to house 13 city cars and one flat car; car storage only.

"*Middle Section.*—Three tracks running almost full length of barn, with no stop blocks; pits under all tracks; section used for inspecting and repair work, also barn for interurban cars, where five 55-ft. cars are housed; also three city cars.

"*East Section.*—Boiler, forge, power hammer, two emery wheels, buffing wheel, shaper, three lathes, wheel press, drill press, hack saw, two 13½-hp, 500-volt motors, pit, armature rewinding oven, band saw, rip saw, grindstone, two tracks, storage of two to three cars while under repair, 10-hp, 500-volt motor, oil house and general offices.

"*Supply House.*—General electrical and traction supplies of all kinds; also offices.

"*Exposures.*—None.

"*Hazards.*—Motors operate on 500-volt trolley circuits; one in machine shop elevated almost to roof on wooden platform, not accessible. Rheostat mounted on wooden base; wiring very poor; unsafe; motor in carpenter shop open and subject to flying sawdust; rheostat not properly mounted; considered hazardous. Steam heat; boiler in basement of blacksmith shop; metal breeching to brick flue; 3-in. clearance from wooden floor; strip of asbestos on floor, but not safe. Electric incandescent lighting; current from 110-volt a.c. circuit; also some from trolley circuit; wiring as a whole poor; wires not sufficiently supported; single braided wire in iron pipe, non-standard (No. 9171) receptacles used; wires not properly insulated; pendant cords used for miscellaneous purposes, and other common defects. Trolley wires well supported; hangers supported by stranded cable fastened to brick wall. Shafting in machine shop hung on wooden beams supported by unprotected iron columns on concrete foundation and 3 x 5-in. studding at side walls; well aligned. Wooden floor in machine shop, becoming oil soaked; no metal receptacles under metal working machine; two metal waste cans; two waste cans in middle section, but oily waste found on floor, in pit, and in wooden bench in rear part. Five barrels of roof and floor paint in carpenter shop; surroundings fairly clean; border lights in paint shop not properly wired; floor in this department dirty; gas furnace in carpenter shop fairly safe. Armature rewinding, baking done in oven constructed of wood and partially lined with metal; heated with electricity by placing a number of lamps in series; crude and unsafe; also a gas solder furnace; small amount of paint and slack and an a.c. transformer (110-1100) for testing purposes in armature department; one gas and one gasoline solder furnace in basement of blacksmith shop; fairly safe. No means for taking care of dust from buffing and woodworking machines; no stop blocks at rear end of tracks in barn; tracks incline slightly and run clear to main line; no transfer table nor switches inside. Car wiring fair to good; the cars heated both by electricity and hot water, Peter Smith system; fires banked in stoves all night; smoking prohibited in barn; an automatic cut-out switch for all trolley circuits entering risk installed on pole across the street from the barn; oils mostly kept in fireproof oil house adjoining office building. Other hazards negligible.

"*Protection.*—Two Knight & Thomas chemical fire extinguishers in west section; two in middle section; one in machine shop; one in armature department; one in carpenter shop; one in paint shop and one in office. City fire protection; a triple hydrant on 8-in. city main 80 ft. distant, with fire department house available; three men on duty every night, but no regular watchman service.

"Recommendations

"1. Correct electrical defects so as to comply with requirements of the National Electric Code. (See hazards.)

"2. Provide metal receptacles where needed in machine shop.

"3. Instruct employees to use waste pans supplied.

"4. Provide fireproof oven for baking rewound armatures.

"5. Provide blower and metal pipes for buffing machine, venting outside.

"6. Install stop blocks on tracks 4 ft. from rear wall of car barns.

"7. Provide a standard V. P. and hose system for east section of risk.

"8. Install 24 sand pails in repair car barn and two in each carpenter, paint and machine shop and armature room.

"9. Increase supply of approved chemical extinguishers to four in each section of barn and two in office, with one in each shop, as at present.

"10. Provide concrete or iron sills under each fire door.

"11. Make doors from machine shop to repair barn double doors.

"12. Provide five standard waste cans in repair barn and two in each paint and machine shop, and empty daily. At present open cans are used for oily waste.

"13. Have watchman make hourly rounds all night.

"14. Install fire alarm box.

"15. Protect flooring in blacksmith shop in better manner above boiler than at present. As now fixed the asbestos is apt to be kicked off.

"16. Keep papers, etc., out of basement with boiler.

"17. Seal all clock keys."

RESULTS FROM REPORT

It will be noted that this report, made by the Ohio Inspection Bureau, covers practically every detail that may affect the judging of the risk for insurance purposes. The type of construction is described in detail, including the materials of which the walls, floors and roofs are built. Such features as the openings in division walls and the use of wooden sills under some fire doors are pointed out. Under the head of "Occupancy" the machinery and nature of the work carried on in the different divisions are set forth. A rather strict examination seems to have been made and reported under the head of hazards. The long list of shop equipment details which were classed as hazards may offer suggestions applicable to a large number of other shops and prove valuable for bringing about a reduction both in insurance premiums and in shop costs. The protection apparatus was listed in the report. Probably the most valuable part of the report, so far as the improvement of shop conditions was concerned, is given in the definite recommendations made by the insurance surveyor. Here are found 17 features in which changes are recommended. A con-

siderable number of these changes was made by the railway company, and in each instance the change brought about a reduction in the insurance rate on this risk.

DETERMINING THE RATES

After a survey of each separate risk of the Ohio Electric Railway Property had been made and the reports were available for consideration, the officials of the railway company secured careful estimates of the cost of each improvement recommended by the inspection bureau. The advisability of carrying out the individual recommendations was based on two views: First, what the company consistently could do from the standpoint of protection; and, second, whether it would be cheaper to make the improvement or pay the additional premium required by the hazard. In the case of the building described a number of recommendations were adopted, because they were found to be advisable from the operating standpoint, and also because they would bring about a saving in premiums in excess of the interest charge for making the change or addition.

The insurance carried on the risk in 1906 was more than $5,600, which included the valuation of the buildings and

THE OHIO ELECTRIC RAILWAY COMPANY

AS OWNERS, LESSORS OR LESSEES, AS INTERESTS MAY APPEAR

This Policy covers $.....being a pro rata of each of the following amounts:

DIVISION "A"—BUILDINGS

(Whether leased or otherwise held by insured as and to the extent the interest and obligations to insure the same may require.)

$ 652,255. On buildings as shown in schedule below; the term "buildings" not to include foundations below the level of the lowest floor, but to include all additions, attachments, extensions, adjoining or communicating, whether constructed in whole or in part of brick, stone, concrete, wood or iron, all piping, shelving, plumbing work, heating apparatus, gas and electric light fixtures, partitions, stalls, tanks, awnings, signs elevators, conveyors, cranes, automatic sprinkler apparatus, metal smoke stacks, coal hoisting, conveying and storing apparatus, bins, fence, shifting tables, tracks in buildings, turnatiles, platforms and water tanks in or on building, ladders attached to buildings, and all permanent fixtures and appurtenances contained therein or connected therewith, or on premises within one hundred (100) feet thereof.

It is understood and agreed that this item also covers engines, boilers and machinery pertaining to the service of the building.

DIVISION "B"—CONTENTS

(Other than Electrical Equipment Power and Sub-stations)

(Whether leased or otherwise held by insured as and to the extent the interest and obligations to insure the same may require.)

$ 517,700. On contents, the term "contents" to include and cover engines, boilers, and pumps, including their settings and connections, dynamos, electric generators, regulators, switchboards and connections and appurtenances, storage batteries and their connections and appurtenances, electrical apparatus of every description (but not to cover electrical equipment in power or sub-stations, which is covered under Division "C"), motors and armatures, car bodies and parts of cars when detached, indicators, machines and machinery of all kinds, shafting, belting, gearing, pulleys, hangers, hay, straw, grain, feed, feed bags, harness, halters, blankets, whips, robes, paints, oils, varnish, horseshoes, iron, lumber, timber, ties, fuel, wheels, axles, furniture, fixtures and safes, stationery, printed books, blanks, clocks, and on horses and mules; in case of loss, no one animal to be valued in excess of $250; wagons, sleds, trucks, carts (excluding automobiles), forges, anvils, bellows, lamps, blacksmith tools and implements, patterns and drawings (not more than 10 per cent. of the amount insured under this item shall apply on patterns and drawings), hose, stable furniture, tools, implements, utensils, freight, materials and supplies, and all other property of the insured, or for which they or either of them may be held liable, not otherwise specifically insured.

DIVISION "C"—CONTENTS

(Power and Sub-Stations)

(Whether leased or otherwise held by insured as and to the extent the interest and obligations to insure the same may require.)

$ 877,150. On electrical generating and storing apparatus and equipment of, and in Power and Sub-stations of the Assured, including dynamos, generators, storage batteries, transformers, converters, boosters, switches, switchboards, switchboard instruments, and transmission wires from generating or storage apparatus to switchboard and from switchboard to outlets from building.

DIVISION "D"—ROLLING STOCK

(Whether leased or otherwise held by insured as and to the extent the interest and obligations to insure the same may require.)

$1,103,000. On motor cars, locomotives and their tenders, sub-station power cars and their electrical equipment, snow plows, sand and salt cars, sweepers, sprinklers, supply cars, ash cars, dump cars, test cars, mail cars, line cars, freight cars of all kinds, parlor cars, funeral cars, private cars, office cars, trail cars, grip cars, and other cars of every description, whether finished or unfinished and in process of construction, including all fittings, vestibules, electric heating apparatus, air brakes and whistle apparatus, equipments and fare recording apparatus entering into the construction of cars, belonging to same wherever they may be on the tracks or in any buildings or sheds, or while outside of buildings on the lines or sidetracks of the assured or on the lines or side tracks of any other electrical railroad company, whether such rolling stock is owned or leased or otherwise held by the insured, as and to the extent the interest of the insured therein or its obligation to insure the same may require.

REDUCED RATE CLAUSE

Applying on Divisions "A," "B" and "C"

In consideration of the rate at and/or form under which this policy is written, it is expressly stipulated and made a condition of this contract that this company shall be held liable for no greater proportion of any loss than the amount hereby insured bears to 80 per cent. of the actual cash value of the property described herein at the time when such loss shall happen, nor for more than the proportion which this policy bears to the total insurance thereon.

If this policy be divided into two or more items, the foregoing conditions shall apply to each item separately.

REDUCED RATE CLAUSE

Applying on Division "D"

In consideration of the rate at and/or form under which this policy is written, it is expressly stipulated and made a condition of this contract that this company shall be held liable for no greater proportion of any loss than the amount hereby insured bears to 100 per cent. of the actual cash value of the property described herein at the time when such loss shall happen, nor for more than the proportion which this policy bears to the total insurance thereon.

If this policy be divided into two or more items, the foregoing conditions shall apply to each item separately.

DYNAMO CLAUSE

This company shall not be liable for any loss or damage to dynamos, wiring, lamps, motors, switches or other electrical appliances or devices, resulting from any electrical injury or disturbance, whether from artificial or natural causes, unless fire ensues, and then for the loss by fire only.

LIGHTNING CLAUSE

(Excluding Damage to Electric Apparatus)

This policy shall cover any direct loss or damage caused by lightning (meaning thereby the commonly accepted use of the term "Lightning," and in no case to include loss or damage by cyclone, tornado or wind storm), not exceeding the sum insured nor the interest of the insured in the property and subject in all other respects to the terms and conditions of this policy. Provided, however, that if there shall be any other insurance on said property this company shall be liable only pro rata with such other insurance for any direct loss by lightning, whether such other insurance be against direct loss by lightning or not; and provided further that, if dynamos, wiring, lamps, motors, switches, or other electrical appliances or devices, are insured by this policy this company shall not be liable for any loss or damage to such property resulting from an electrical injury or disturbance, whether from artificial or natural causes, unless fire ensues, and then for the loss by fire only.

GENERAL PROVISIONS

WORK AND MATERIALS CLAUSE.—Permission granted for the use of the premises as at present and for other purposes not any more hazardous, and to keep and use all articles and materials usual to the business conducted herein, but the use, handling or storing of benzine, benzole, gasoline, naphtha, calcium carbide or fire-works is prohibited unless a specific permit is attached hereto.

GASOLINE STORAGE PERMIT.—Permission is hereby given for the use and handling of gasoline; the same to be handled, and all reservoirs and receptacles to be filled by daylight only, and when the apparatus is not lighted; warranted by assured that no artificial light be permitted in the room when the reservoirs or receptacles are being filled or gasoline is being handled.

Permission is specifically granted to keep and use not to exceed five gallons of either benzine, benzole, gasoline, or naphtha, to be kept in approved metal safety cans, in each building insured under this policy; also to handle fire-works.

Permission granted to make ordinary alterations and repairs, same to be covered by this insurance under their appropriate divisions, for other insurance; to use artificial or natural gas, coal, electricity or oil for lighting, heating or mechanical purposes, or for lighting or heating cars; to remain vacant as occasion may require; to cease operations and to do such work at such hours and to employ such power, heat, light and fuel as are necessary in their business.

The validity of this policy shall not be questioned because of any mortgage, lease or other incumbrance or contract that may now be in force or that shall hereafter be effected, upon or affecting the property above described whether or not endorsed hereon, nor because of any of the buildings standing on leased ground.

It is understood that tracks, pits and foundations of buildings and of machinery below the under surface of the basement floor and the cost of excavations are not covered by this policy.

It is understood that the word "Noon" in the commencement and expiration of this policy means the noon of Central Standard Time.

LOSS CLAUSE

Loss, if any, payable to the trustees, mortgagees under the several mortgages or deeds of trust now existing or which may hereafter be created upon the properties owned or leased by the above assured, as their respective interests may appear therein.

It is understood and agreed that when in the following schedule an amount attaches on Division "A," "B" and "C," it attaches in accordance with form of respective division as above given, and that the amount of insurance under each item is divided so as to apply and cover as follows:

Item No.	LOCATION.	CONSTRUCTION AND OCCUPANCY.	Buildings, Section "A."	Contents Not Electrical, Section "B."	Electrical Machinery, Section "C."	Rolling Stock Section "D"
	MUSKINGUM COUNTY, OHIO.					
1	Southeast Corner Main and 6th Streets, Zanesville	Brick Office Building	$7,500 00	$12,000 00	$	
2	West side North 4th Street, near Fountain Alley, Zanesville	Transformer Station	.....	.....	.....	
3	Island in Muskingum River, near approach of "Y" Bridge, Zanesville	Brick Power House	80,000 00	40,000 00	130,000 00	
4	Nos. 371-375 North 6th Street, Zanesville	Brick Power House	6,000 00	1,000 00	.....	
5	Corner Woodland Avenue and Arthur Street, Zanesville	Fair Oak Shed	1,000 00	.....	.....	
6	Southwest Corner Adams Avenue, Zanesville	Frame Slate Roof, Car Barn and Office	13,500 00	1,000 00	.....	
	[illegible] COUNTY, OHIO.					
102	Lot No. 47 South side Defiance Street	One and [illegible] story, shingle roof Dwelling and Barn	900 00	.....	.....	
194	Leipsic	Brick, tile roof, Transformer Station	3,000 00	1,000 00	7,500 00	
	WOOD COUNTY, OHIO.					
196	No. 121 east side of Center Street, Weston	One, and one and a half story, shingle roof, frame Dwelling	750 00	.....	.....	
198	North side Oak Street, Lot No. 120, East End, Weston	One story, metal roof, frame Dwelling	150 00	.....	.....	
197	Lot No. 74, Milton Street, Weston	One and two story, frame Dwelling	650 00	.....	.....	
198	Lot No. 89 north side Milton Street, Weston	One and a half story, shingle roof, frame Dwelling	200 00	.....	.....	
199	Lot No. 70-71 north side Milton Street, Weston	One and a half story, shingle roof, frame Dwelling	800 00	.....	.....	
200	Lot No 66 west side Milton Street, Weston	One and a half story, shingle roof, frame Dwelling	800 00	.....	.....	
201	Lots Nos 72-73 west side Milton Street, Weston	One and a half story, shingle roof Dwelling	400 00	.....	.....	
202	Along right of way between Lima and Toledo, O.	Portable Transformer Station (on flat Car)	800 00	.....	7,500 00	
203	Lot No 78 Broad Street, Tontogany	One and a half story, shingle roof, frame Dwelling	400 00	.....	.....	
204	Custer, Lot No. 58	Shingle roof, frame Barn	100 00	.....	.....	
205	Custer	Brick, tile roof, Transformer Station	3,000 00	1,000 00	7,500 00	
206	Haskins	Brick, tile roof, Transformer Station	3,000 00	1,000 00	7,500 00	
	LUCAS COUNTY, OHIO.					
207	South Toledo	Brick, tile roof, Transformer Station	3,000 00	1,000 00	7,500 00	
	ALLEN COUNTY, INDIANA.					
208	South Street, Monroeville, Ind	Brick, tile roof, Freight and Waiting Station and Transformer Station	3,000 00	1,000 00	7,500 00	
209	New Haven, Ind	Brick, tile roof, Freight and Waiting Station and Transformer Station	3,000 00	1,000 00	7,500 00	

Insurance carried on Buildings "A"	$ 652,255 00
Insurance carried on Contents, not Electrical, "B"	517,700 00
Insurance carried on Electrical Machinery, "C"	877,150 00
Insurance carried on rolling stock in barns or on tracks of this or any other company, "D"	1,103,000 00
Insurance on liability as common carrier of freight, express and baggage in cars or buildings of company	5,000 00
	$3,155,105 00

The amount of this policy being $ _____ covers a pro rata part of each of the above named amounts of insurance.

Attached to and forming part of Policy No. _____ of _____ Fire Insurance Co.

Countersigned _____

AGENTS. AGENTS.

PERMIT REQUIRED FOR SURVEY.

MARSH AND McLENNAN, INSURANCE BROKERS,
New York and Chicago.

April 1st, 1909

Ohio Fire Insurance—Policy Rider Form and Schedule

fixtures at 80 per cent, and the valuation of the cars at 100 per cent. The average rate on this risk in 1906 was $2.10. After about $450 had been spent in making improvements, this rate was reduced to 69 cents.

All of the recommendations of the insurance inspectors were not carried out, because some of them, in the eyes of the officials of the company, did not seem to be warranted. For example, the insurance people recommended that a water plug be installed in the car house, but the company did not follow the recommendation because a city fire station is located across the street, but 80 ft. distant from the building.

DETERMINING THE RATES

The following table will give an idea of the method of determining the rate on each of the 209 risks included in the Ohio Electric Railway insurance schedule. The figures are those for the car house, shop and office building already described:

OHIO INSPECTION BUREAU.

Risk—Car barn and repair shop Item .....
City of ....., Ohio.
Owner and occupant—Ohio Electric Railway Company.
Inspected 10-19-09.

Car Barn Schedule.

Basis		$1.00
Floors		.10
Car heating		.15
Barn wiring		.25
V. P. and hose		.10
Occupancy		.25
		$1.85
Improvements: Barn wiring	$0.25	
V. P. and hose	.10	
		.35
		$1.50
15 per cent for fire walls and good construction		.22
		$1.28
40 per cent reduction for 80 per cent clause—building		.76
Waived—car heating		.07
Net rate		$0.69

It will be noted that, according to the method of calculating the rate, a basis for the particular risk is first adopted; in this instance $1. To this rate additions are made in accordance with the schedule of defect charges for various hazards. These additions bring the rate up to $1.85. The fulfillment of recommendations made by the inspector reduced this rate by 35 cents, and from the resultant rate of $1.50 a deduction of 15 per cent was made on account of the good character of the fire walls and building construction; then 40 per cent of the net rate was deducted because the property was insured for only 80 per cent of its full value. Finally, one-half of the defect charge for car heating was waived. These reductions as here shown in tabular form served to reduce the rate to a final figure of 69 cents.

AVERAGE PREMIUM RATE

All the insurance policies under this method of handling the business expire on April 1 of each year and the average premium rate is determined each year for the following year. This average is found by means of an estimate sheet made in part as shown below, this example being also for the car house and shop, already described.

AVERAGE ESTIMATE SHEET.

Form item.	Name and location.	Section.	Amount.	Rate.	Premium.
.....	Car barn and repair shop.	A	$63,000	$0.69	$434.70
.....	Rolling stock in barn...	D	88,400	.69	609.96
.....	Rolling stock outside barn.	D	115,636	.50	578.16

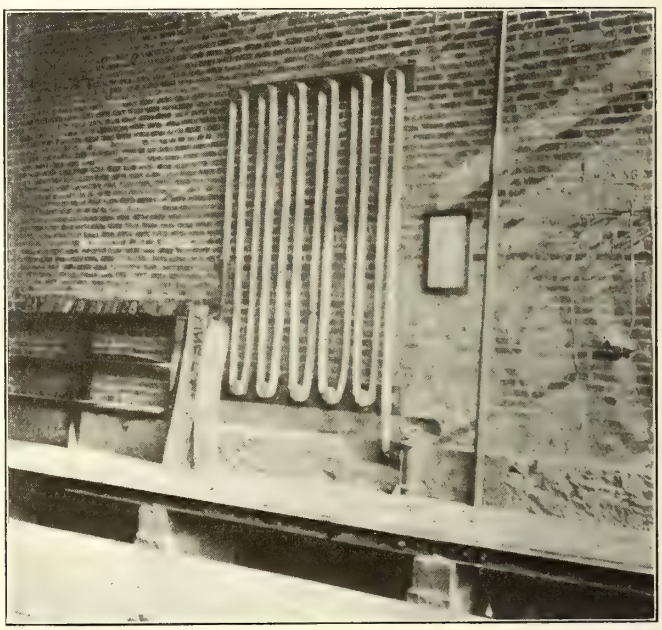
The figures presented on this sheet show the name and location of each risk, the division or section to which it belongs, the amount, the rate as determined according to the existing condition of the risk, the occupancy and protection and the premium on each risk. From the total amount of all risks and the total premium, the average rate for the property is obtained by division and this is the rate at which each participating insurance company takes its proportion of the insurance.

IMPROVING RISKS

As already stated, the rate sheets prepared by the Ohio Inspection Bureau show the schedule of, and charge for, every defect, and the company has secured large reductions in its premiums each year by remedying these defects and thus obtaining a better average rate. This work has been done with particular regard to operating as well as to insurance conditions.

In compliance with the requirements of the insurance body, a fire protective department with local squads at every shop and plant has been organized and every risk on the property is inspected once a month by a general inspector. The inspector is employed constantly and by means of a continuous system of reports sent by him to the general offices the fire risks are kept up to the standard requirements of the insurance companies. Two forms of report are made by the inspector. One report shows the risks that he has inspected each day, arranged according to the item number shown on the schedule form used in connection with the policies. A second report is an itemized statement of the actual conditions of each risk as found by the inspector. Both good and bad features are included in this report.

Those reports from the inspector which require attention are taken in hand by the executive in charge of insurance matters and letters are written to the different operating officials, calling their attention to the irregularities found by the inspector. In some instances it is necessary for the division officials to instruct their subordinates to make slight changes in the arrangement of the building fixtures, and in others it is necessary for them to see that certain practices of the men, such as the careless handling of waste or other inflammable materials, are discontinued. A frequent irregularity found by the inspector is the blockading of doors with materials or supplies in course of use.



Ohio Fire Insurance—Hydrant, Hose Stand and Fire Rules in Vine Street Car House

One of the duties of the general insurance inspector of the company is to instruct foremen in fire drills and insist on thorough training in this part of the work. Periodical test drills are called for from both night and day squads and the results from the fire department of the railway company have been excellent. At one time a dwelling house near a car house caught fire and the railway shop squad reached the house and put out the fire before the city fire department, located on the next lot, got under way.

The rules posted in each building follow:

GENERAL FIRE RULES.

1. Men in charge of buildings, or sections thereof, will be held responsible for the proper condition of fire apparatus and for the clean and tidy condition of premises. They must make frequent inspections thereover, repair minor defects at once and report serious ones immediately to the proper authorities.
2. Free access to fire pails, extinguishers, hose reels, standpipes, alarm boxes and all other fire equipment must be had at all times.
3. Fire pails and all other fire apparatus will be used only for fire purposes.

4. Electric circuits must not be changed nor tampered with, except by the electrician in charge.
5. Rubbish and debris of every sort must be put in the proper receptacles.
6. Ashes must be placed in metal receptacles, which must be emptied once a day. Ashes must not be allowed to accumulate under the grate bars of boilers or stoves.
7. Oily or greasy waste, greasy rags and paper, or other inflammable material must be put in the covered metal cans supplied for the purpose. Such supplies must not be mixed with clean material of like character.
8. Oils, paints, surplus supplies of oily waste and similar material must be kept in fireproof rooms provided for this purpose, except when actually being used. Benzine, gasoline, naphtha or other similar highly inflammable substances must not be allowed on the premises except where actually needed. At such places only the minimum quantities necessary will be kept on hand. These substances will be handled with the greatest care, being kept in fireproof rooms whenever possible.
9. If oil or like substances are on fire, use sand; never use water, for water spreads the burning material. Use sand when live wires, short circuits or charged rails are involved.
10. Sand only must be used on floors, spittoons, or for catching drippings.
11. Smoking is prohibited in all buildings except in club rooms.
12. All clothing must be kept in lockers provided for the purpose and only clothes actually used and needed may be kept on the premises.
13. Trolley poles must be removed from wire and left in a trailing position when cars are laid up out of service. Heat must be turned off before cars are run into barn.
14. Remember that most fires are caused by neglect and carelessness. Familiarity with these rules is required upon the part of all employees.

....., General Manager.

Approved:

....., President.

Under this system of inspection and following the plans for improvements which have been systematically continued since January, 1907, the proportion of losses and damages to this property to the total amount of premium paid has been less than 15 per cent. In September, 1908, the firm of Marsh & McLennan, of New York and Chicago, was appointed brokers of record of this property and has entire charge of the insurance business, furnishes the inspection service, places all insurance, settles all losses and relieve the company of all worry and responsibility.

F. A. Healy, secretary and treasurer of the Ohio Electric Railway, an old steam railroad man, with wide experience in handling insurance matters, inaugurated the insurance department of his company and successfully carried out the details of the plan here described. President Shaw of the American Street & Interurban Railway Association has appointed Mr. Healy to the insurance committee for 1910.

WHAT CONSTITUTES A LEGAL TENDER FOR A FARE

BY HOWARD C. LAKE, OF THE NEW YORK CITY BAR

In the ELECTRIC RAILWAY JOURNAL for Aug. 14, 1909, page 256, I discussed the question, "What Constitutes a Legal Tender for a Fare," and briefly reviewed the three leading cases in the courts of Tennessee, California and Vermont, which had then been decided and reported. It was therein set forth that New York had decided that a rule of the company requiring its conductors to make change to a passenger to the amount of $2 was a reasonable rule, while the other two States had held that a five-dollar bill or coin was a reasonable amount to tender in payment of a 5-cent fare on a street car. The California decision was prompted, it was stated, by prevailing local conditions because it was then a well-known fact that the $5 gold piece, which, was tendered, was then practically the lowest gold coin in use in that section of the country.

Now comes a recent decision in Georgia (Burge vs. Georgia Railway & Electric Company, 65 Southeastern Reporter, 879), which follows the Barker case in New York, cited as a precedent. The facts were briefly these: Burge boarded a car in company with two companions. He tendered to the conductor a $5 gold piece in payment of the three fares. The conductor replied that he could not change the money and that the three must leave the car. Plaintiff was thereupon forcibly ejected and he claimed that the conductor, in an "offensive manner," had ordered him to leave the car. Plaintiff's testimony at the trial was to the effect that the gold piece was the smallest amount of money that he or any of his companions had. The company proved that it had a rule requiring its conductors to make change when the amount tendered was not above $2, but not to furnish change for a greater amount for passengers. The question was, of course, as to the reasonableness of the amount tendered.

The views of the court are perhaps best expressed in its own language:

"It would not be right to require conductors to carry such an amount of small change as would be necessary to change any denomination of money, nor would it be proper to require passengers to tender the exact amount of fare; hence the law requires that the conductor go prepared to change an amount that is reasonable. Street railways have the right to enact a reasonable rule in regard to such matters, so as to fix an amount which conductors are required to carry and which the public may expect them to carry for the purpose of supplying change to passengers. . . .

"The public, as well as the corporation, are interested that some fixed rule should exist, and it is proper that it should be a question of law whether the rule is a reasonable one. What might appear reasonable to one jury might not so appear to another; and if it were a question of fact, to be determined by a jury, no fixed rule by which the corporation and the public should be governed could exist. To require conductors to carry an amount sufficient to change $5 for all passengers who might tender that amount to pay the fare charged for transportation within the city would require all conductors at all times to carry a considerable amount of change. To require conductors to obtain, count out, and deliver change for $5 for every passenger who might tender that amount would make slow the collection of fares, with the probable result of delaying the progress of cars and subjecting the traveling public to the inconvenience of frequent waits and delays, made necessary by the changing of such a denomination of currency. Such a requirement might not only result in great inconvenience to the public, but impose a heavy and unnecessary burden on the railroad company. . . .

"To require conductors to change $5 for every passenger tendering that amount would prevent the company from performing its public duty with proper caution and with proper expedition. The rule requiring the conductors to change no amount greater than $2 works no great hardship on the passenger, although a rule requiring the changing of larger amounts might prove very burdensome to the company.

"The fact that the plaintiff asked that the fares of his two companions be also taken out of the $5 coin tendered does not place plaintiff in any better position than if only one fare was taken out, since the amount of change which the conductor would be required to furnish in order to collect the three fares, or the fare of the plaintiff alone, would still be greater than $2."

The conclusion of the Georgia court that a rule requiring change to the extent of $2 was justified by the Barker case in New York, discussed in my previous article and cited by the Georgia court. The Barker case is undoubtedly the leading authority on the subject in this country, coming as it did from the highest tribunal of our foremost State.

There was no question in the recent Georgia case as to the gold piece not being money in the nature of legal tender and so far as we have been able to learn authoritatively this question has never been squarely presented, although it was incidentally passed upon in the California case discussed in the previous article.

The Compañia Hidroelectrica é Irrigadora del Chapala (Hydro-Electric & Irrigating Company of the Chapala) has been formed to execute the contracts entered into by Manuel Cuesta Gallardo with the Department of Internal Affairs for using the waters of Chapala Lake and Santiago and Lerma Rivers for irrigation and motive-power purposes, and for draining the lands in the lake basin. The company has acquired the property of the Compañia de Tranvías, Luz y Fuerza de Guadalajara, S. A. (Guadalajara Tramway, Light & Power Company), and will continue the business of that company.

VALUATION OF PUBLIC SERVICE INDUSTRIES*

BY PROF. HENRY C. ADAMS, IN CHARGE DIVISION OF STATISTICS AND ACCOUNTS, INTERSTATE COMMERCE COMMISSION

The paper covers not only railways but municipal enterprises as well. I shall take no illustrations, however, outside of steam railways which stand for public services with perpetual charters or electric municipal railways which stand for public service industries of limited charters. The article attempts no definition of public service industry, nor does it consider the details of a physical valuation of properties or the proper methods of arriving at the value of unexpired franchises. It is, on the contrary, an argument for valuation in the broadest sense of that term.

The three points made by this paper are as follows:

First.—An authoritative valuation is essential for determining the reasonableness of the price paid by the public for services rendered.

Second.—Without an authoritative valuation it would not be possible to administer in an equitable manner laws for the control of the issue of securities by public service corporations.

Third.—The amount which a public service industry should pay over annually to the public treasury, commonly, though erroneously, called taxes, cannot be determined independently of an analysis of the value of the industry considered as a commercial concern.

In discussing the first of the above points I express my doubt as to the pertinency of the cost accounting principle in dealing with rate questions, and say that if the argument for valuation must rest on the pertinency of this principle the argument is essentially weak. In place of cost accounting I substitute the proposition that the owner of railway property exhausts his right to protest against the reduction or modification of a rate, provided it can be proved that the aggregate revenues cover aggregate expenditures, including a reasonable return upon investments. Beyond that point the rate question is a question of public interest, and the owner of railway property has no standing in court. The distribution of the total burden between various classes of commodities and service is no concern of the stockholder, except upon the assumption that the distribution threatens to depress the aggregate gross revenues below the constitutional limit.

In the development of this argument for valuation attention is called to the fact that the item, balance sheet cost, can be viewed from the point of view of either of three interests, namely, the interest of the stockholder who desires that the commercial valuation should be accepted as a measure of balance sheet assets; second, the interest of the management, whose chief interest is in establishing and maintaining the credit of the corporation in order that the corporation may easily borrow money; and, third, the interest of the public, which is chiefly concerned in arriving at a figure which can be accepted as the measure of what the corporation can legally collect as pay for services rendered. The public insists that investment is the measure of a reasonable schedule of rates. The conclusion of the analysis is that the balance sheet should furnish at all times a correct measurement of current investment. This the balance sheets do not now do, and one of the fundamental arguments in favor of valuation is that the accounting system for which Congress made provision in 1906 may be made effective.

It is also submitted in this connection that a valuation of the physical properties of municipal electric railways and a comparison of that valuation with commercial valuation is the surest method of determining whether or not a municipal railway can be profitably operated on less than a 5-cent basis.

With regard to the control of capitalization, this paper maintains the proposition that the control of capitalization of public service industries is not possible without a valuation of the property made along lines peculiarly adapted for that purpose. It is not enough to know commercial value; the economic character of the various elements which contribute to that value must also be known and properly measured. It is not enough, in order to determine whether a corporation doing a public service business is warranted in the issuance of additional securities, to prove that the revenues of the company are adequate to support the burden of increased capitalization. The public may retain equities, or analysis of the industrial conditions upon which the commercial valuation rests may make it clear that capitalization to the full extent of the commercial valuation could not be justified.

Perhaps the chief argument in support of a formal and authoritative valuation of public service industries is found in the fact that many of the questions of public and private equity, which at the present time are more or less loosely expressed, would, as the result of a proper analysis of commercial valuation, become clearly defined and receive judicial treatment. The truth is that the public is in partnership with public service industries, and the public is vitally interested that the value which pertains to it should not be made the basis for the issue of securities.

Under the head of taxation this paper undertakes to prove that a comparison of the commercial value of a public service industry with its investment value is the only means of measuring the equitable contribution which such an industry should make to the public treasury. The fact, commonly overlooked when discussing the rate problem or the taxing problem in connection with public service industries, is that these industries, although in competition with one another, are not, and from the nature of the case cannot be, of the same grade or class. What would be a reasonable rate or a reasonable tax for a high-grade industry would bankrupt a low-grade industry; on the other hand, what would give a low-grade industry only a reasonable return upon its investment would result in a surplus revenue to its competitor, a high-grade industry. Under such circumstances the usual constitutional rule that all property should be taxed at the same basis results in discrimination of the worst sort as between these various classes of industries.

Considerations of public utility will always force railway commissions or Legislatures, in prescribing a reasonable rate or in imposing a tax, to do this in view of the necessities of the poorest railroad which should be maintained because it renders a useful public service. The first step, therefore, in arriving at an equitable adjustment of the amounts to be contributed by the railways to the State, must be the valuation of their physical properties and a comparison of this valuation with the commercial value of the corporation holding title to the property, in order that railways may be properly classified with a view to demanding from them a differential contribution which will tend to equalize investments in the different classes of properties taxed.

In general, then, the argument of this paper is that the valuation of railway property is defensible, not only because of the practical advantage which such a valuation must be to Legislatures, commissions and courts that have to do with the formulation, administration and interpretation of the policy of public control, but because the analysis necessarily incident to a satisfactory valuation will throw additional light upon conditions under which that policy is now being operated, and lead possibly to more perfect legislation, more fruitful administration and more reasonable interpretation than at present seems to be the case. Up to the present time this country seems to have proceeded on the assumption that value is a simple idea. One cannot go far in the consideration of the process of valuation, however, without being forced to recognize that value is a highly complex idea, and that the process of valuation is in a marked degree an analytical process, and, further, the necessity of formulating definitions, and of presenting the aggregate valuation arrived at under appropriate heads, will result in a new point of view, from which the problem of the relation of public service industries to the political organization may be regarded.

*Abstract of paper read before American Economic Association, Dec. 30, 1909, New York.

HEARING ON SERVICE IN THE NEW YORK SUBWAY

The hearing before William R. Willcox and John E. Eustis, of the Public Service Commission of the First District of New York, in regard to the method of operation and the equipment of the subway lines of the Interborough Rapid Transit Company was continued on Feb. 7, 1910. H. H. Whitman acted as counsel for the commission and James L. Quackenbush and Theodore L. Waugh represented the company in a similar capacity. Frank Hedley represented the company in his capacity as vice-president and general manager.

In connection with the testimony given by him at the previous hearing regarding the 250 cars ordered by the Interborough Rapid Transit Company, Mr. Hedley said that the first contract under this order was placed with the American Car & Foundry Company on June 4, 1909, for 110 cars; that the next order was placed with the Standard Steel Car Company on June 5, 1909, for 40 cars, and that the remaining order for 100 cars was placed with the Pressed Steel Car Company on June 10, 1909. The American Car & Foundry Company had promised to deliver 30 cars in September, 40 in October and 40 in November. The Interborough Rapid Transit Company had agreed to pay $200 more a car to secure a promise of early deliveries, but the car builders would not accept any penalty clause.

The 100 cars ordered from the Pressed Steel Car Company were not needed to comply with the order of the commission of May 11, 1909, but they had been ordered in anticipation of favorable action by the Board of Estimate in authorizing the lengthening of station platforms so as to increase the number of cars in each train. At the time of the order of the commission, in May, 1909, the company had 823 cars available for service, of which 504 cars were in use in the express service and the remainder in the local service. With 64 additional cars for express service the company would be able to meet the order of the commission imposing a headway of 1 minute and 30 seconds. By Oct. 15, 1909, the company had equipped 72 cars with side doors, and by Feb. 7, 1910, it had changed 179 cars for side-door operation, thus anticipating the order of the commission, which specified that 16 cars a month should be equipped with side doors. Of these 179 cars 95 were steel cars and 84 composite cars.

Regardless of the use of the side-door cars and the lengthening of the platforms, the installation of the speed-control system at Ninety-sixth Street had increased the capacity of the subway track at Ninety-sixth Street at least 33 1/3 per cent. The speed-control system had been installed on the express tracks between Ninety-sixth Street and Brooklyn Bridge.

The company offered in evidence a table to show that the total number of seats was 94,000 and the number of passengers 69,960 during the period when, according to the testimony given by E. G. Connette, transportation engineer of the commission, at the previous hearing, 60 per cent of the trains carried standing passengers. The testimony of the company also tended to show that there were more seats than passengers during other periods about which testimony was offered on behalf of the commission. The present equipment of the company would not make it possible for the company to increase its service before and after the rush periods in accordance with the recommendations of Mr. Connette.

The hearing before the commission was continued on the afternoon of Feb. 11, 1910. Mr. Quackenbush had Mr. Hedley identify various letters from the correspondence between the car builders and the Interborough Rapid Transit Company and offered copies of them in evidence to show the efforts which had been made by the Interborough Rapid Transit Company to secure the delivery of cars as early as possible. The orders for the cars were placed early in the summer of 1909, but the contracts were not finally executed until Oct. 1, 1909. The car builders all insisted that the clause covering the infringement of patents of special devices which the Interborough Rapid Transit Company demanded should be installed be changed so as to place with the Interborough Rapid Transit Company the burden of any suit for infringement that might arise.

Mr. Hedley explained that in the case of large orders manufacturers began work as soon as they were notified that their bids were accepted and were instructed how to proceed. The formal execution of the contract was a matter of detail, and frequently contracts were not executed until many months after orders had been placed. The delay in signing the contracts did not retard work on the cars as inspectors of the company at the works of the car builders reported from time to time about the progress of the work on the cars. At the time that the orders for the cars were awarded contracts were placed for equipment, including motors, trucks, wheels, etc., and about $400,000 worth of equipment was now in the company's shops awaiting the receipt of the car bodies. Five steel car bodies were received on the day of the hearing, and made a total of 10 bodies received up to that date. The practice with large transportation companies was to install their own equipments and wire their own cars, as it was of great advantage for a company to do this work under its own supervision and in accordance with practices which it had found best suited to its own needs.

Mr. Quackenbush explained that the omission to notify the commission of the inability of the company to secure deliveries from the car builders was chargeable to the legal department of the company. The Interborough Rapid Transit Company was a very large organization, and at the time contracts for car bodies and equipments were placed the personnel of the legal department was reorganized, and he had been derelict in this matter on account of the pressure of other work.

In answer to questions concerning service in the subway, Mr. Hedley said that 19 platform men and special officers were detailed to the Grand Central station for duty for two hours in the morning, 20 to the Fourteenth Street station, 10 to the Brooklyn Bridge station, and 17 to the Ninety-sixth Street station. Approximately the same number of men were detailed to these stations for the evening rush. A station master instructed the platform men in their duties, and the station master was in turn subject to the orders of the station inspectors and the superintendent. The company realized the value of courtesy on the part of station employees and impressed the men with the necessity of being civil and treating the public with consideration.

Sixty-three eight-car trains were in use for the express service with the present schedule of 1 minute and 48 seconds, and 71 eight-car trains, or a total of 568 cars, would be needed for the proposed schedule of 1 minute and 30 seconds, making necessary 64 more cars than were now in use. Forty-five five-car trains were now in use in the local service with the schedule of 1 minute and 45 seconds, and 53 five-car trains would be needed for the proposed schedule of 1 minute and 30 seconds for the local trains, making necessary 40 more cars than were now in use. With the lengthening of the station platforms two additional cars would be needed for each of the 71 express trains called for according to the schedule of 1 minute and 30 seconds, making 142 more cars needed for this service, or 710 cars in all. For the local service with 1 minute and 30 seconds schedule, 318 more cars would be needed in order to increase the local trains from five cars to six cars. There were on hand at present 823 cars available for service, and 250 were on order, making 1073 cars in all, or 45 more than were needed for the actual requirements of the company. It would take more than a year to lengthen the station platforms. The company had already asked when 75 more cars could be delivered.

Mr. Hedley said that according to the schedule of Jan. 1, 1905, the company was using 408 cars; according to the schedule of Jan. 1, 1906, 480 cars; according to the schedule of Jan. 1, 1907, 555 cars; according to the schedule of Jan. 1, 1908, 716 cars; according to the schedule of Jan. 1, 1909, 723, and according to the schedule of Jan. 1, 1910, 737 cars. The initial equipment of the subway consisted of 500 cars. Two hundred more cars were ordered in 1906 and 100 were ordered in 1907. The 200 cars were of steel, and were the first steel passenger cars ever placed in service, so far as Mr. Hedley knew. The deliv-

ery of cars on this order did not begin until about eight months after the order had been placed. No cars had been ordered in 1908 because the question of the type of car to be used was before the commission for settlement and the company did not feel that it would be advisable to order cars until a decision had been reached by the commission in this matter. In explanation of the record made by the company in handling 1,200,000 passengers in one day during the Hudson-Fulton celebration, Mr. Hedley said that the traffic was evenly distributed over a period of from 18 to 20 hours, but that the running time of trains was much slower.

At 5:15 an adjournment was taken until Feb. 15 in order that the officers of the company might have an opportunity to look over the transcript and submit any additional evidence that might occur to them as being important.

COMMITTEES OF THE ENGINEERING ASSOCIATION

W. J. Harvie, first vice-president and acting president of the American Street & Interurban Railway Engineering Association, has announced the following standing committees of the association for 1910:

COMMITTEE ON WAY MATTERS

E. O. Ackerman, chairman, engineer, maintenance of way, Columbus Railway & Light Company, Columbus, Ohio.

Martin Schreiber, engineer, maintenance of way, Public Service Railway Company, Newark, N. J.

M. J. French, engineer, maintenance of way, Utica & Mohawk Valley Railway Company, Utica, N. Y.

J. M. Larned, engineer, maintenance of way, Pittsburgh Railways Company, Pittsburgh, Pa.

C. L. Crabbs, engineer of way and structure, Brooklyn Rapid Transit Company, Brooklyn, N. Y.

George Weston, assistant chief engineer, Board of Supervising Engineers, Chicago Traction, Chicago, Ill.

COMMITTEE ON POWER GENERATION

W. S. Twining, chairman, chief engineer, Philadelphia Rapid Transit Company, Philadelphia, Pa.

G. H. Kelsay, superintendent of power, Indiana Union Traction Company, Anderson, Ind.

J. D. Andrew, superintendent of power stations, Boston Elevated Railway Company, Boston, Mass.

C. E. Roehl, electrical engineer, Brooklyn Rapid Transit Company, Brooklyn, N. Y.

H. G. Stott, superintendent of motive power, Interborough Rapid Transit Company, New York, N. Y.

E. D. Smith, superintendent of power stations, United Railways Company of St. Louis, St. Louis, Mo.

COMMITTEE ON POWER DISTRIBUTION

James Heywood, chairman, superintendent of lines and cables, Philadelphia Rapid Transit Company, Philadelphia, Pa.

William Roberts, master mechanic, Northern Ohio Traction & Light Company, Akron, Ohio.

S. L. Foster, chief electrician, United Railways of San Francisco, San Francisco, Cal.

E. J. Dunne, superintendent of distribution, Public Service Railway Company, Newark, N. J.

E. J. Burdick, superintendent of power, Detroit United Railway Company, Detroit, Mich.

A. F. Hovey, cable engineer, Interborough Rapid Transit Company, New York, N. Y.

COMMITTEE ON STANDARDS

Paul Winsor, chairman, chief engineer, motive power and rolling stock, Boston Elevated Railway Company, Boston, Mass.

John Lindall, superintendent of rolling stock and shops, Boston Elevated Railway Company, Boston, Mass.

E. O. Ackerman, engineer, maintenance of way, Columbus Railway & Light Company, Columbus, Ohio.

W. S. Twining, chief engineer, Philadelphia Rapid Transit Company, Philadelphia, Pa.

James Heywood, superintendent of lines and cables, Philadelphia Rapid Transit Company, Philadelphia, Pa.

H. H. Adams, superintendent of rolling stock and shops, Metropolitan Street Railway Company, New York, N. Y.

G. W. Palmer, Jr., electrical engineer, Boston & Northern Street Railway Company, Boston, Mass.

J. H. Hanna, chief engineer, Capital Traction Company, Washington, D. C.

W. S. Murray, electrical engineer, New York, New Haven & Hartford Railroad Company, New Haven, Conn.

COMMITTEE ON EQUIPMENT

John Lindall, chairman, superintendent of rolling stock and shops, Boston Elevated Railway Company, Boston, Mass.

H. A. Benedict, chief and electrical engineer, United Traction Company, Albany, N. Y.

M. V. Ayres, electrical engineer, Boston & Worcester Street Railway Company, South Framingham, Mass.

R. C. Taylor, superintendent of motive power, Indiana Union Traction Company, Anderson, Ind.

Terrance Scullin, master mechanic, the Municipal Traction Company, Warren Bicknell, receiver, Cleveland, Ohio.

A. T. Clark, superintendent of shops, United Railways & Electric Company, Baltimore, Md.

The representatives of the Engineering Association on the joint committee on shop accounts, to be composed of three members of the Engineering Association and three members of the Accountants' Association, have not yet been announced.

NOTES ON TRANSFERS

BY A CONDUCTOR

When a conductor punches the day of the month in 20 or 30 transfers at the same time the tickets are apt to sag, and he is liable to punch a day ahead on a number of them. Hence it is better to have this date punched before the transfer tickets are issued to the conductor, provided the date is not printed on the ticket. It is also desirable to allow the conductor some latitude in punching the destination in the transfers ahead of their actual use when he expects a rush, as it saves his time and helps in accuracy of punching. Some companies object to this plan, but any real objection to it can be overcome by requiring the conductor to deposit promptly in the transfer box on the car all transfers which have been punched but not issued at any point.

A saving in time and gain in accuracy can also be secured by not requiring the conductor, when he makes up his day card, to enter on the card the number of the last transfer which he has issued. A simpler and more effective way of checking up the number of transfers issued by him is to require him to deposit in the envelope with the transfers which he has received the top transfer of the last package used by him. This is an indisputable check of the number issued, and as the transfers on different routes should be of different colors, this transfer can easily be distinguished from the other transfers in the envelope.

Another point regarding transfers, seemingly small, but really important, is the use of glazed or unglazed paper. The type on unglazed paper is much more easily read, and companies should insist upon having it. It is a mistake also to use paper which is very thin, because when several transfers on thin paper are handed to a conductor at the same time he cannot easily tell by the feel the number which have been given him. Passengers should also be instructed to hand their transfers to the conductor unfolded. A notice to this effect could be printed on the transfer. When working on the running board of a crowded open car it is often very difficult for a conductor to unfold a transfer.

Except in emergencies, no car should ever be transferred from one conductor to another unless the transfer box is emptied of its contents. A record should also be kept of the time the transfer box is emptied. This can be done on a slip dropped in the box. The front of the transfer box should be of glass.

MEETING OF MASSACHUSETTS STREET RAILWAY ASSOCIATION

The regular monthly meeting of the Massachusetts Street Railway Association was held at Young's Hotel, Boston, on Feb. 9, with President R. S. Goff in the chair. The speaker of the occasion was E. G. Connette, transportation engineer of the Public Service Commission, First District, New York, his topic being "Some Impressions of New York City Street Railways." Mr. Connette reviewed the impression which the magnitude of the transportation problem in New York City had made upon him, and contrasted the different types of service now being given in the metropolis, which includes the most primitive and the most modern facilities. There are still 282 horse cars in operation in the city, while at the other end of the scale the Interborough subway provides the most modern urban transportation in the world. At present this subway has an underground length of 19 miles, with 5 miles of elevated construction. The subway carries 90,000 persons per hour in the rush period. Express cars are run in eight-car trains, the seating capacity being 50 per car and the headway 1 minute 48 seconds. Local trains of five cars each are also operated on the same headway.

Mr. Connette stated that there are now 32 operating companies in the city, covering 1600 miles of track and carrying 1,500,000,000 passengers per year, or 60 per cent more than are carried on all the steam railroads in the country. In addition to these there are 500,000,000 transfer passengers. This traffic amounts to 4,700,000 passengers per day, or practically one ride per capita every 24 hours. These lines earn about $75,000,000 per year. The travel is growing steadily in spite of all the facilities offered, and the demand for transportation is continually greater than the supply. Two years ago the Williamsburg Bridge was opened to Brooklyn, and more lately a subway was placed in operation under the East River to the above borough. About two months ago the new Queensboro bridge to Brooklyn was opened, and still the trains are crowded beyond their capacity. The new Belmont tunnels, two in number, under the East River to Long Island City, and the four tunnels of the Pennsylvania Railroad will not be able to eliminate the congestion. A recent count of the Public Service Commission showed in one day 443,000 people going from Brooklyn to Manhattan and 439,000 persons traveling in the reverse direction, not including vehicular traffic. The Public Service Commission has laid plans for a new subway from the end of the Manhattan Bridge in Brooklyn and out Fourth Avenue toward Coney Island, with branches to Brighton Beach and the Brighton Parkway, to connect with the proposed Lexington-Broadway subway in Manhattan, giving a 20-mile trip on a 5-cent fare.

Speaking of the desire of the public for a 5-cent fare and universal transfer in the limits of New York, Mr. Connette said that he cannot see how this can be secured unless under a semi-municipal arrangement. That is what the people want ultimately, and in some way it will probably be attained. It is almost impossible to construct any more north and south surface lines in Manhattan, and elevated lines are objectionable. A subway represents practically an underground street. An important step is to secure a contractor who will operate a subway built under the supervision of the commission and pay a reasonable interest plus 1 per cent upon a sinking fund for amortizing the cost. Subway construction in New York costs from $750 to $1,000 per foot. The present Interborough Company is able to pay 4 per cent interest and 1 per cent toward a sinking fund to amortize the cost in 50 years, and also to pay 9 per cent dividends, earning 13 per cent over all fixed charges and having a profit and loss surplus above dividends. The density of the traffic is tremendous, and while a 17.5-mile trip can be made on a 5-cent fare, the average haul per passenger is practically 8 miles. This subway runs through a very populous district, and as a result of its construction real estate has increased a hundredfold in value in the northern part of the Bronx. In 5 or 10 years population will be almost as dense up to 242d Street as it now is south of the Harlem River. Thousands of acres are yet to be built upon on Long Island. When a comprehensive subway system is completed it will create an exodus to Long Island and will establish people within the limits of the city instead of in New Jersey. Even at present transportation is not as good to New Jersey as to Brooklyn. The Hudson & Manhattan Railroad has two tubes under the Hudson River, and within three or four months trains will be brought into New York from Jersey by the two tubes of the Pennsylvania system. From 30 to 40 stub tracks are provided for train service in the great terminal station at Thirty-fourth Street, and the company also is building four tubes under the East River to Long Island City, where connection is made with the Long Island Railroad. Frequent trains will be run between Jamaica and Newark via the Pennsylvania tunnels, and quick transit will be provided between the center of the borough of Queens and Manhattan.

Mr. Connette then considered from a financial point of view the rehabilitation of surface lines which is now going on under the supervision of the commission, and stated that if the board had never done anything else, it would deserve praise for taking into hand the condition of the street railways and putting them on a basis where stocks and bonds issued under the reorganization represent a dollar's worth of property for every dollar put upon paper. Under the public service act, a company cannot issue stock or bonds unless it has the *quid pro quo* to back them up. The best policy in the long run is for securities to represent what has been put into the property. Mr. Connette said that he had absorbed many of his ideas regarding regulation from Massachusetts commission practice. The New York commission has greater powers than the Massachusetts board. In the former case the power to direct and order is practically equivalent to a statute. While it has been charged that the New York commission has been very severe upon the companies, it is now conceded by some companies formerly opposed to the work and methods of the commission that the board was right, and these managements are now co-operating with the board. If an inspector of the board finds that not enough cars are run, a hearing order is promulgated, and the board then issues an order requiring for predetermined periods a sufficient number of seats past a specified point for a given number of passengers. Mr. Connette said that he had taken up many of these matters informally with the companies, and has thus been able to regulate the service without a public hearing. The general manager of one large company stated recently that before the Public Service Commission's methods of inspection were adopted the superintendents of the system had really been the men who operated the property, and often without any scientific regard for the riding. The inspection charts furnished the company by the board have helped the management to know what it is doing, and has led to the institution of an independent system of checking up service by the company's own men. There are decided advantages in combining the old practical ways of doing things with scientific methods, the result being increased earnings through better service and a more satisfied public. Mr. Connette attributed whatever success he had attained in street railway operation to the plan of taking the public into his confidence. If a manager can get the people on his side it leaves little for public utility commissions to do. Better accommodations do much to increase riding. This is illustrated in the New York subway, which began operation with 400,000 passengers per day, and now handles 800,000. Mr. Connette then spoke briefly of the benefit of the center side doors on the subway cars, and of the function of speed control signals in increasing the capacity of the express tracks. These improvements are calculated to increase the capacity of the subway 25 per cent, and the extension of platforms for 10-car trains adds still more carrying power.

In conclusion, Mr. Connette described the organization of the commission, stating that there are five commissioners and three executive departments: Legal, with a general counsel in charge; construction, headed by a chief engineer, with spe-

cial supervision of subway building, and the transportation department, under the transportation engineer, supervising the operation of trolley, steam, elevated and underground railway companies, gas and electric light companies. Under the third department are a bureau of transit inspection, bureau of equipment inspection, accident bureau and appraisal bureau. Immediately in charge of the bureau of transit inspection is a general inspector, and under him is a force of 50 men in three squads under an assistant general inspector. These men are constantly observing the traffic and service in Manhattan, Brooklyn, Bronx, Queens and Staten Island. The staff of the equipment inspection bureau includes electrical engineers and other men familiar with cars, power house apparatus and other physical plant. The accident bureau is open from 8 a. m. to 11 p. m., and under the law companies are required to telephone to the commission all serious accidents or delays, and follow this by a written report within three days. A bureau chief and inspector handle this work. Closing, Mr. Connette said that the companies in New York have greatly improved their snow-fighting abilities during the present winter, and emphasized once more the value of scientific operating methods.

REPORT ON PITTSBURGH TRAFFIC CONDITIONS

A report on the Pittsburgh street railway situation, prepared by Bion J. Arnold, Frederick Law Olmsted and John R. Freeman, has been made public by the Pittsburgh Civic Commission. This is preliminary to a more comprehensive report and is intended to be a statement of the problem and not the solution. The commission engaged Messrs. Arnold, Olmsted and Freeman to make a study and recommendations concerning the transit situation, the water supply and a proposed city plan, and the report now made public is the first to be issued. Mr. Arnold is at present employed directly by the city, making a study of the surface lines and the proposed subway situation.

The preliminary report on the electric railway situation says:

"A thorough study should be made of the most rapid, convenient and economical methods for handling the passenger traffic throughout the district. This study should include the requirements for the immediate improvement and the future extension of the local street car service in each center of population, for convenient connections between these centers by means of interurban and suburban lines and for the ultimate development of a rapid transit system by means of subways, elevated roads or other methods.

"There are a number of improvements which could be made at once in connection with the local street car system, to which it may not be out of order to refer briefly at this time. Most of these immediate needs and necessary improvements have been referred to in one or all of three reports which have recently been made. One of these reports is by Stone & Webster to the State Railroad Commission, another is a report by Henry C. Wright to Mayor Magee, and the last comprises the recent recommendations by the State Railroad Commissioners.

"There are certain conclusions and recommendations in these reports which should receive the support of those officially interested in securing the best service with the present systems. The expenditure necessary to carry out these suggestions would not be large and the results would be immediate. The effectiveness of the present system as a transportation agency can be greatly increased while the careful study is being made for future possibilities."

The improvements which, the report says, should be made at once and which can probably be effected best by the city administration in co-operation with the street railway management are stated in part as follows:

"1. Regulate street traffic.—Rules patterned after the best experience of other cities should be adopted and a police traffic squad should be trained. It would seem advisable to give the street cars the right of way at certain places during the rush-hour periods.

"2. Control steam-road crossings.—Conference should be held with the steam road managers and every effort should be made to reduce the delays due to switching at crossings. Inspectors should be placed at the more important crossings.

"3. Maintain schedules.—Inspectors should be placed at critical points to check delays and every effort made to insure that the street cars are run on time.

"4. Automatic electric switches.—Much time can be saved by switches or by the use of switch operators at certain points.

"5. More cars and larger cars.—A systematic check should be kept upon the service on each line and a comprehensive and consistent effort should be made to reduce the crowding to a minimum. More cars and longer cars during the rush hours is the greatest immediate improvement that could be made.

"6. The heating, ventilating and lighting of the cars should receive better attention.

"7. Improved rail and pavement, particularly at critical points. The tendency of vehicles to stick to the car rails can best be discouraged by installing a proper rail and a proper pavement, each upon a suitable foundation, and this improvement should be started at once in many parts of the downtown district.

"8. Increased clearances.—In many places where it is impossible to keep vehicles clear of the tracks steps should be taken to increase the clearance.

"9. Smithfield Street Bridge.—Ways of improving conditions over Smithfield Street Bridge should be studied and the delays to the movements of cars and vehicles reduced.

"10. Grade separation.—The delays at steam-road crossings to freight, trucking, street car and pedestrian traffic can best be reduced by grade separation.

"It will take time and careful study to investigate and conclude upon the possibilities in Pittsburgh of 'through routes,' 'universal transfers,' and 'one city, one fare'—principles which are in use in other American cities, and the 'zone system' as used abroad. The question of rapid transit by means of subways, elevated railroads and electrification of steam roads should be approached with caution as its development affects all the fundamental principles of city planning. To make a comprehensive study and report upon the future development of passenger transportation facilities in the Pittsburgh district it will be desirable to collect data as hereinafter set forth, in order to furnish a basis for answering the following questions:

"1. How much better service can the Pittsburgh Railways Company afford to give at once?

"2. What equipment should be provided for a service which should increase with growing demands in order to secure safety, reasonable comfort and maximum capacity?

"3. What possibilities are there for through routes?

"4. Will it be reasonable to expect universal transfers and one fare for the entire city?

"5. What density of traffic will justify the development of a subway, elevated road or other rapid transit system?

"6. What should be the financial policy in promoting rapid transit? To build with private capital or city credit? To assess the cost upon the districts benefited? To anticipate needs and influence the character of the city's growth or to await developments and build to relieve congestion?

"7. For a comprehensive rapid transit system which is better: Through routes or loops? Universal 5-cent fare or zone system of fares? Train operation or single cars? Competition or a system of transfers between surface lines and rapid transit systems?"

The following data for electric railway problems will be secured:

"1. Flow of traffic. Inward and outward bound, by the hour, day, month and year, over each route, over each bridge, through each 'throat' of the electric roads and over each suburban division of the steam roads.

"2. Rates of fares now charged to reach each district.

"3. Length of time required to reach each district from the business center.

"4. The history of the present system showing for a period of years passengers carried, transfers used, car-miles operated, miles of track, income, rides per capita, operation expenses, depreciation, fixed charges, surplus, etc.

"5. A comparison of these records with similar records of other street car systems serving cities of about the same size as Pittsburgh.

"6. An estimate of the cost to reproduce the physical plant of the street car system and an estimate of the overhead development charges which would be allowed in order to determine a fair investment upon which a reasonable return should be allowed.

"7. A study of the company's equipment as to its efficiency for present needs and its value for future development.

"8. A study of the economy and benefits and limitations of rapid transit lines in other cities, elevated, subway or private rights-of-way."

METHOD OF MEASURING AND CHARGING FOR REPLACING STREET PAVEMENT IN CHICAGO

Late last fall the street railway companies in Chicago made objections to the board of local improvements regarding the methods then used by city paving contractors in charging for the replacement of pavement under reserve which had been disturbed when reconstructing the street railway tracks. As a result of a conference in which the Board of Local Improvements, the Board of Supervising Engineers, Chicago Traction, the Chicago Railways Company and the Chicago City Railway took part, definite rules were formulated for measuring and charging for the work of relaying pavement.

The ordinances under which the surface traction lines in Chicago are being rebuilt, require that before a railway company disturbs the surface of a street it shall obtain permission for the work from the commissioner of public works of the city, and the permit secured contains a condition requiring the railway company to restore the surface of the street and maintain it for one year after restoration. The city of Chicago has certain contracts outstanding under which the contractors who constructed the paving on many of the streets occupied by the railway tracks, have guaranteed the paving and agreed to maintain it at their expense during periods of time which have not yet expired. On account of these contracts and because the railway companies found it necessary that the paving in many places be torn up outside of its right of way through the middle of the street, the contractors made claims that unless they themselves, respectively, did the work of restoring the pavement, they would be released from their obligations and guarantees to the city under the original paving contracts. The city of Chicago did not admit these claims and a difference of opinion also arose as to the amount of paving required when new track were laid on a grade established above or below that of the existing pavement. The representatives of the city, the contractors and the corporations involved finally agreed to proceed with their work if the Board of Supervising Engineers would pass a resolution which had been jointly formulated and which included the rate per yard to be paid for repaving and specified the method of determining the amount of paving to be done outside of the right of way.

Inasmuch as the points involved in this controversy, which finally was settled by the adoption of the resolution, frequently come before railways in other cities, an abstract of the resolution of Board of Supervising Engineers, Chicago Traction, settling the difficulties is of interest.

The resolution of the Traction Board stipulates that the measurements shall be made and the quantities agreed upon by the interested parties before any paving work is done by the street contractor. An arrangement is approved whereby the railway company shall employ the paving company to restore such of the streets as it originally paved and to maintain the replaced pavement for one year or for such longer period as might have been provided in the contract under which the contractor orignially laid the pavement for the city. The contractor is required to execute the work so that it will meet the provisions of the rehabilitation ordinance and receive the approval of the commissioner of public works. The railway companies shall pay the paving contractors as follows:

"Where the grade of the track is changed the company will pay for repaving all pavement outside of the right of way made necessary in order to properly connect the undisturbed pavement and the pavement of the right of way at the rate of $2.25 per sq. yd. For the first inch or fraction of an inch of elevation of the outer rail above the existing pavement the railway company will pay for the repaving of 18 in. from the outside edge of the rail; and for every additional inch of elevation beyond the first inch the railway company will pay for the repaving of one additional foot outside of the 18 in. and proportionately for fractions thereof, except that in cases where the brow paving is laid by the railway company, this portion will be deducted unless the outside edge of the brow paving is as high or higher than the rail, when the measurements shall be taken from the outer edge of the brow paving instead of from the rail.

"If the average of all the elevations taken (10 ft. apart) on the outside edge of the brow paving blocks in any 100-ft. section gives an elevation level with or higher than the average elevation of the rail in said section, then the measurements are to be made from the outside edge of the brow; but where the average elevation taken on the outside of the brow in any 100-ft. section is lower than the average elevation of the rail in said section, the measurements shall be taken from the outside edge of the outside rail."

It is stipulated that if the railway company opens the street pavement outside of its right of way and outside of the limits as provided above, the surface of such an opening shall be measured and added to the foregoing quantities. If the grade of the track is not changed the railway company shall pay the paving contractor $2.25 per yard for repaving all openings actually made in the street outside of the right of way.

When the railway company installs additional rails or special track work and where this installation materially changes the contour of existing pavements so as to require the building of additional catchbasins or changing the drainage of the pavement, the cost for this work shall be paid by the railway company, provided that the necessity for making the change is approved by representatives of the Board of Local Improvements, Board of Supervising Engineers, the railway companies and the contractor who is to make the change. In case of a disagreement the finding of a majority of the parties at interest shall rule. The cost of such changes must first be estimated in writing by agreement of the representatives before the changes are made. In no event shall the amount paid by the railway company exceed the estimate. If these changes of street surface or structures required for drainage purposes necessitate in turn the repaving of portions of the street in addition to the work required on account of the new tracks, this paving shall be paid for at the rate earlier stated; provided that the contractor, according to his contract with the city, is obliged to do such repaving. If the contractor who has the street under reserve is not required to do work of this kind, then the price shall be that stated for repair work in the contract under which the pavement originally was laid by the contractor. Openings made by the railway company outside of the right of way for laterals and conduit are to be paid for as repair work and the railway company must turn over to the contractor all of the paving materials removed in making the openings, or substitute materials equal in quantity and quality for those removed.

The resolution concludes as follows:

"This board is of the opinion that a restoration of the pavement for the respective distances hereinbefore mentioned, and in accordance with the foregoing provisions is sufficient for a discharge of the said obligations of the said company under said ordinance; but the work to be done by the contractor shall not necessarily be to restore and maintain the actual yardage so measured, but the contractor shall in every case restore and maintain the street, including the pavement thereof, so as to comply with the obligations of the company under the said provisions of the said ordinance in such a manner as to secure the approval of said work by the said Board of Local Improvements and the said commisioner of public works

as being a compliance with said provisions and with the obligations of said contractor under his original paving contract; but the company shall not be obliged to pay for any additional paving other than that measured and determined under the foregoing provisions of this resolution."

THROUGH ROUTES AND JOINT RATES BETWEEN ELECTRIC AND STEAM LINES

Mention was made in the issue of the Electric Railway Journal for Feb. 12, 1910, page 296, of the provision in the Townsend bill as it is now pending before Congress that the Interstate Commerce Commission shall not establish any through route classification or rate between street, suburban or interurban electric passenger railways and railroads of a different character.

At hearings before the committee on interstate and foreign commerce of the House of Representatives in the last week, testimony has been given by officials of electric railways concerning the effect of this stipulation if the bill should be enacted into law as it stands. Representatives of Iowa electric lines, who have been greatly interested in the situation, appeared before the committee to testify in relation to the effect which the enactment of this clause would have on their traffic arrangements. The president of one company stated that electric railways should not be deprived of the privilege to transact commercial railroad business simply because they had an electric wire over their tracks instead of relying upon steam locomotives for motive power.

Dispatches from Washington state that conferences concerning the clause of the bill affecting electric railways have taken place recently between President Taft, Attorney-General Wickersham and Congressman Townsend, of Michigan, who introduced the bill in the House of Representatives. It is stated that when the bill was originally framed by the Attorney-General it provided that the Interstate Commerce Commission should have power to prescribe through routes and joint rates over a combined electric and steam railway route. Later, however, the clause was changed so as to prevent absolutely the exercise of authority by the Interstate Commmission in cases of this character where combined steam and electric routes were involved. Congressman Townsend, it is stated, has taken the position that electric lines should not be exempt from the operation of the law, as they would be brought under the jurisdiction of the Government eventually and that a start might as well be made now as at any other time. He is said to have expressed the opinion that the commission would be able to exercise sufficient discretion to prevent any injury being done to electric lines.

CHICAGO ELEVATED LOOP SITUATION

The Union Elevated Loop continues to receive a considerable amount of publicity in the Chicago newspapers. A conference at which the managers and directors of all the elevated railways in Chicago were invited to be present and meet the local transportation committee of the Chicago City Council was announced for Feb. 15. It was planned to discuss the question of through routing as outlined in these columns last week. The city officials are stated as being ready to submit to the elevated companies evidence that through routes and transfers over all the elevated lines will benefit both the companies and the city. Even if opposition is forthcoming, a fair trial of the through-route plan is hoped for as a practical demonstration of the principles of operation as set forth by the city's engineering experts.

At a meeting of the Chicago City Council on Feb. 14 the local transportation committee was instructed to consider a plan for having side-door entrances for the elevated cars. Alderman W. F. Lipps, who proposed this feature, stated that two-thirds of the delay on the Elevated Union Loop was caused by loss of time in loading and unloading the cars. He thought a simple solution of the problem would be had by compelling the elevated railroads to remodel their cars and install center side entrances. The problem of the best way to relieve congestion has precipitated an acrimonious controversy between the Loop Protective Association and the elevated transportation committee of the Chicago Association of Commerce over the question of lengthening the platforms at the Union Loop stations. A third element has appeared demanding that through routes be established as the only means of overcoming the loop congestion. The type of car which Alderman Lipps had in mind at the time the matter was presented to the Council and the instructions made to the local transportation committee of the Chicago City Council was that adopted by the Illinois Central Railroad for its local service. This car has cross seats with an aisle along either side wall and an entrance door opposite each pair of seats. The doors are all controlled from the ends of the cars and automatically lock when the last door is in place.

The elevated railroad managers have suggested stopping the trains at every other station on the Union Loop.

QUARTERLY MEETING OF NEW YORK ASSOCIATION

J. H. Pardee, secretary of the Street Railway Association of the State of New York, has just announced the program of the eleventh quarterly meeting of the association, which will be held in Rochester, N. Y., on the evening of Tuesday, March 1, and on Wednesday, March 2, 1910.

The Tuesday evening session will be opened with an informal dinner at 8 o'clock at the Hotel Seneca, after which the remainder of the evening will be given to a general discussion of one of the subjects on the program as given below. There will be a morning and afternoon session on Wednesday, March 2, at the Rochester Club, on East Avenue, at which the rest of the program will be followed.

Arrangements have been made with the Hotel Seneca for accommodations for those who apply directly to the hotel management prior to the date of the meeting.

PROGRAM

Reports of Committees:

Committee on remuneration for handling United States mail. J. K. Choate, chairman, E. S. Fassett and C. L. Allen.

Committee appointed to confer with the executive committee of the A. S. I. R. A. and representatives of Street Railway Associations from other States. E. F. Peck, C. Loomis Allen, J. W. Hinkley and J. H. Pardee.

Papers:

"Block Signaling on Electric Railways," to be presented by Charles R. Barnes, railway expert of Public Service Commission, Second District.

"Near-Stop Operation," to be presented by W. R. W. Griffin, general superintendent transportation, New York State Railways.

"Educational Methods Used in Placing New Systems of Transfers in Operation," to be presented by W. C. Callaghan, superintendent of transportation, New York State Railways.

"Changes in Transfer Systems," to be presented by E. J. Cook, vice-president and general manager, New York State Railways.

"Methods of Checking Tickets and Other Passenger Revenue," to be presented by J. C. Collins, secretary, New York State Railways.

Questions for Discussion:

To be presented by John E. Duffy, superintendent Syracuse Rapid Transit Company: (a) "Selection of Platform Employees"; (b) "Fare Collection and Registration"; (c) "Interdepartment Relations."

To be presented by Charles H. Smith, superintendent United Traction Company, Albany: (a) "Should the Inspectors' System of the Operating Department Include Special Traveling Motormen?" (b) "Should Waiting Shelters be Provided at Transfer Points on City Lines Where Cars are Operated at Frequent Intervals?" (c) "What is the Best Method of Handling Conductors' Receipts?"

NEW SYSTEM OF FARE COLLECTION IN NEW BEDFORD

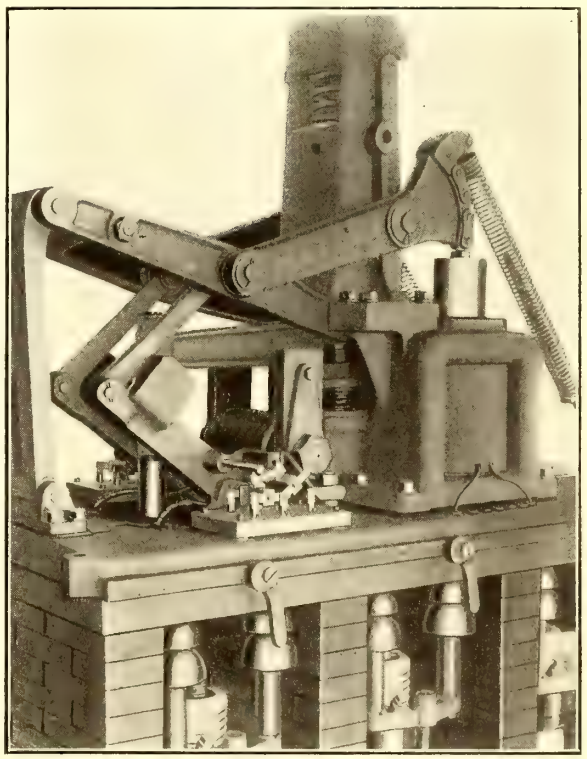
On Feb. 6 the Union Street Railway of New Bedford put in service on all divisions of its lines the Rooke system of fare collection, which has been in use for several years in Providence. Concurrently it placed advertisements in the local papers and posted bulletins explaining the new system. Emphasis was laid in these notices to the public upon the advantage to passengers of having their nickels ready and thus facilitating the collection of fares. At the same time, the company announced that aluminum tickets the size of a nickel and sold 21 for $1 could be secured at the main office of the company. The introduction of the system was attended with no troublesome features. The public was prepared for the change and the daily papers complimented the company on the success which attended its inauguration.

Equal care was given to instructing the conductors in the use of the apparatus. The following summary of a letter, signed by General Superintendent Elton S. Wilde and approved by President H. H. Crapo, was sent to each conductor before the system was placed in operation to explain its object and the advantages which it possessed from the conductor's standpoint:

"It can hardly be necessary to tell you that our decision to change our fare-collecting system has not been reached without painstaking investigation. Constant improvements in business methods are desired by all progressive business men. The street railway business is especially one where the best modern methods are desirable since it is a business singularly open to the observation and supervision of the public. We believe this new system to be a distinct improvement over the old from the standpoint of the conductor, the company and the public. You have, of course, always had a device for registering and accounting for fare collections. This has been intended distinctly for your protection as well as the company's. This new system must necessarily operate in a manner to insure greater accuracy and, therefore, greater protection. * * * As you well know, the failure of conductors properly to register fares, owing to mistakes, lapse of memory or otherwise, has caused a considerable portion of the unthinking public to hold your honesty rather lightly and to indulge in many undeserved slurs against conductors as a class. * * * This new system of registration relieves you of these unwarranted imputations and in doing so becomes as great a boon to you as can well be imagined. Something more is involved in this change than the substitution of a new type of registering device for an old one. Under the old system you were made responsible not only for the collection, but for the registration of every fare. You had these two distinct duties to perform in order properly to conclude each separate money transaction on your car. * * * Under this new system you have but one duty, i.e., the collection of fares. You are relieved of personal responsibility of registering them. The fact of proper payment insures proper fare registration. This means accuracy in accounting. This constitutes your protection. You surely would not prefer being employed under a lax method of accounting and at the same time be held responsible for mistakes. * * * If you obey your simple rules, there can be no possible question raised of accuracy in registration of fares. A failure to obey your rules, on the other hand, leaves no possibility of doubt that your offense is deliberate. * * * Doubtless at first when this new system is introduced, you will be met by annoying remarks from fresh individuals who are none the less conscious of the insult contained in such words as: 'How can you beat it?' and similar slurs. It will be hard to ignore the insult of such remarks, but you can well afford to ignore them in the consciousness that the failure to 'ring up' can no longer be charged against you, and that passengers who have a grudge against you will hereafter find it difficult to make plausible reports to the general office based on mere suspicion and accusation. * * * There are other objections which some of you will very likely make to this new system, some few with substantial justification, since no system can be ideal in all its aspects, but the greater number of objections which may occur to you will be due simply to the few days' inconvenience of changing from the old to the new. We ask and expect your earnest co-operation in introducing the new system as smoothly as possible. No good railway man, or any other kind of a man, 'loses his head,' 'goes lame' or 'plays dead' simply because something new or different takes a place in his routine day's work. Reserve your own judgment as to the system until you are competent, by the experience of an earnest trial, to pass one."

NO-VOLTAGE RELEASE TYPE "C" OIL CIRCUIT BREAKERS

For instantaneously opening its standard type "C" circuit breakers, the Westinghouse Electric & Manufacturing Company, Pittsburgh, makes the no-voltage release device shown in the accompanying engraving. This release has been applied to eight large 6600-volt, type "HF," three-phase, induction motors, ranging over capacities of 3200, 2500, 2000 and 650 hp, in the new merchant mills of the Indiana Steel Company at Gary, but it is, of course, equally well adapted to the high-tension side of transformers, since it opens the gravity-operated contacts when the control voltage is interrupted. As shown,



No-Voltage Release for Circuit Breakers

one of the toggle-joint members of the standard switch-gear is fitted with an armature which engages and is held by the pole pieces of the no-voltage coil just before the toggle passes its central position. In the ordinary type "C" breaker furnished without this no-voltage release the contacts are held closed by carrying this toggle over its dead center, a position where it locks.

In the no-voltage type the toggle is detained by the attraction of the pole pieces for the armature while still on the operating side of its center, so that in case of any interruption to the control voltage the breaker immediately opens and cannot be closed except in the usual manner. Full protection is thus afforded to the motors connected through their circuit breakers, and in the case of overload on the rolls or failure of the power house their circuits are immediately opened, so that the machines must be gradually accelerated in the usual way.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES

New York.—Eminent Domain—Taking Property—Use of Streets — Additional Burden — Trespass — Damages — Right of Recovery—Injunction—Relief—Damages Additional to Injunction—Rights of Property Owner—Damages to Property Not Taken—Elements.

A street surface railroad is an additional burden to the land of adjoining proprietors who own to the center of the street, and a street railway company cannot impose the added burden without making compensation, and, when it commences to lay its tracks without agreeing with the adjoining proprietors or instituting condemnation proceedings, it is a trespasser.

The right to damages for a trespass depends on legal, and not equitable, rules.

Damages for trespass are allowed as an incident to injunctive relief, since equity, having jurisdiction of the cause, will grant legal as well as equitable relief for the purpose of settling all matters of difference in one suit.

One suing for a trespass committed by a street railway company constructing and operating a street surface railroad is entitled to such damages as he has suffered from the trespass, and is entitled to an injunction unless the company as an alternative will pay him such sum as would be awarded in condemnation proceedings.

In condemnation proceedings the owner is allowed not only the value of the property taken, but compensation for the effect of the taking on the residue, considered with reference to the use which the property taken is to be put.

A street railway company built a surface street railroad track without condemnation proceedings. Some years thereafter it began to operate cars thereon. Held, that an adjoining landowner could not recover as damages for the trespass in laying the track the loss in rental value resulting from the fear that some time cars would be operated on the track, because damages for such trespass would only occur when the trespass actually occurred.

A street railway company constructing, maintaining, and operating a street surface railroad is answerable for the damages caused thereby to abutting property, but not for a shrinkage in fictitious value resulting from other causes, and it is not liable for depreciation in the market value of abutting property, due to the character of the street, which had become fixed before the track was constructed.—(Duncan v. Nassau Electric R. Co. et al., 111 N. Y. Sup., 210.)

New York. — Statutes—Construction—Legislative Intent—Street Railroads—Municipal Corporations—Powers—Construction of Subway—Nature of Power—Eminent Domain—Compensation—Appropriation to Additional Use—Streets—Railroad Rights of Way—Presumptions—Nature—Rights of Abutters—Legislative Power—Constitutional Law—Determination of Constitutional Questions—Underground Railroad—Rights of Landowners—Measure of Damages—General Rules—Measure of Damages to Fee—Purpose of Condemnation—Materiality — Elements of Damage—Jurisdiction of Commissioners — Judicial Notice — Population — Condemnation Proceedings—Extra Allowances—Counsel Fees—"Just Compensation."

A thing within the intention of a statute is within the statute, though literal construction excludes it.

Laws 1894, p. 1873, c. 752, amending the rapid transit act of 1891 (Laws 1891, p. 3, c. 4), authorizing New York City to construct a subway, did not enlarge the city's governmental functions but merely invested it with the powers and franchises it unsuccessfully attempted to sell under the act of 1891, and made it a railroad corporation for the purposes of constructing a subway, with no more rights in the highways and public places of the city than would belong to any other corporation, and with no other or higher right to take private property than would belong to an ordinary railroad corporation.

Railroads, surface or general, constitute an added burden upon the streets of a municipality, which the owners of the fee can prevent by injunction until compensated for the taking of their property.

In construing Rapid Transit Act 1894 (Laws 1894, p. 1886, c. 752), § 39, as amended by Laws 1901, p. 1423, c. 587, § 1, to determine whether New York City is liable to abutters for damages through the construction of subways under streets, where the fee is not in the city, the Legislature is to be presumed to have known the law and the right of the owners of the fee to compensation for extra burdens placed upon it.

Streets are part of the highway system of the State, kept open for the benefit of the State and not the municipality; the municipality being an agent of the State respecting them.

As to matters which abutters have reasonable opportunity to foresee will be done in legitimate use of streets for public purposes, no liability for consequential damages, not due to negligence, is incurred by a municipality acting within statutory authority; but the rule is otherwise as to unforeseen burdens upon the street, which the courts have held not involved in the original taking.

The Legislature cannot constitutionally authorize a municipality, in conducting a business enterprise, to appropriate private property rights in streets without payment of just compensation.

Statutes are presumed to be constitutional, it being assumed that the Legislature intended to act within its limitations; and where one of two constructions, each equally reasonable, will render an act valid, it should be adopted.

Rapid Transit Act 1894 (Laws 1894, p. 1886, c. 752) § 39, as amended by Laws 1901, p. 1423, c. 587, § 1, authorizing New York City to condemn "real estate and any rights, terms and interest therein, any and all rights, privileges, franchises and easements, whether of owners or abutters or others to interfere with the construction or operation of" an underground railroad, authorizes compensation for all property taken for purposes of the road, and contemplates the taking of the property rights remaining in the owners of the fee of a street, as well as those abutting upon the same, where the fee is in third persons.

Under Rapid Transit Act 1894 (Laws 1894, p. 1886, c. 752) § 39, as amended by Laws 1901, p. 1423, c. 587, § 1, authorizing New York City to condemn property for underground railroad purposes, and section 47, amended by Laws 1895, p. 912, c. 519, § 20, providing that title to condemned property shall vest upon the filing of the oaths of the commissioners of appraisal, title does not vest, so as to defeat the city's liability for damages accruing to property after that date.

The rules as to the measure of damages for taking of or injury to land is the same, whether arising in equitable actions or in condemnation proceedings.

Under the Rapid Transit Act of 1891 (Laws 1891, p. 3, c. 4), as amended by Laws 1894, p. 1873, c. 752, and 1901, p. 1423, c. 587, authorizing New York City to condemn property for underground railroad purposes, the measure of damages to the owner of the fee of a street in which the road is constructed is the full value of the property actually taken, without deduction, and just compensation for injury to the remainder, considering the market value of the property before and after the taking.

Where the fee in a New York City street is in a third person, an abutter must be deemed to have had an easement or right of subjacent support for his premises, which the city could not take away without just compensation in constructing an underground railroad under the rapid transit act of 1891 (Laws 1891, p. 3, c. 4), as amended by Laws 1894, p. 1873, c. 752.

In condemnation proceedings, the purposes for which the property is to be used may be considered in determining whether property not taken is damaged by the taking.

In a proceeding under the rapid transit act of 1891 (Laws 1891, p. 3, c. 4), as amended by Laws 1894, p. 1873, c. 752, to condemn property for underground railroad purposes, the commissioners of appraisal were bound to consider everything that, if known to a proposed purchaser when title vested in the city, would tend to increase or diminish the market value of premises remaining after the taking.

In a proceeding under the rapid transit act of 1891 (Laws 1891, p. 3, c. 4), as amended by Laws 1894, p. 1873, c. 752, to condemn property for underground railroad purposes, abutters evicted from their homes by undermining of foundations, etc., are entitled to have the fact that the premises were rendered untenantable for a long time considered in an assessment of their damages, the measure not being the cost of restoring the buildings.

While damages inflicted upon abutters in the performance of a public work, reasonably and properly conducted, are damnum absque injuria, where a railroad corporation enters a street and sinks great shafts in carrying on the construction work, the fact may be considered in determining what the market value of abutting premises would be if the condition were known to be involved in the taking of the property of the owners of the fee.

In a proceeding under the rapid transit act of 1891 (Laws 1891, p. 3, c. 4), as amended by Laws 1894, p. 1873, c. 752, to condemn property for underground railroad purposes, the commissioners of appraisal have jurisdiction of every fact growing out of the construction and operation of the road without negligence, so far as such facts affect the market value of the property.

The Appellate Division takes judicial notice that New York City is the only city in the State having more than 1,000,000 population.

The rapid transit act of 1891 (Laws 1891, p. 3, c. 4), as amended by Laws 1894, p. 1873, c. 752, authorizing cities of more than 1,000,000 inhabitants to take property for public purposes, etc., is an act authorizing the acquisition of property for any public purpose in New York City, within three Laws 1901, p. 425, c. 466, § 998, as amended by Laws 1904, p. 1885, c. 736, § 1, permitting additional allowances in proceedings under such acts.

Rapid Transit Act 1894 (Laws 1894, p. 1896, c. 752) § 62, expressly authorizes the allowance of counsel fees in proceedings to condemn land under the act.

The term "just compensation," as used in connection with the taking of property for public use, involves placing the property owner in the same position financially that he would have been if his property had not been taken on a given date.—(In re Low et al., 112 N. Y. Sup., 619.)

New York. — Equity — Bill — Reasoning — Monopolies — "Monopoly" — Railroads — Operation — "Business" — Street Railroads—Consolidation — Corporations — Corporation Law—Construction—Courts — Rules of Decision—Intermediate Courts of Appeal—Federal Courts —"Comity" — Suit by Stockholder — Ninety-Fourth Equity Rule—Action Against Corporation—Pleading— "Shareholder" — "Share" — "Stock" — Parties—Receivers—Illegal Combination.

On demurrer to a bill to avoid an alleged conspiracy in restraint of trade, consisting of a monopoly created by a consolidation of street railway lines, the court could not adopt the reasoning of the bill and its deductions from the facts stated in order to find a conspiracy or monopoly, but must find its existence from the facts alleged.

Stock Corp. Law N. Y. (Laws 1890, p. 1069, c. 564) § 7, as amended by Laws 1892, p. 1828, c. 688, declares that no domestic stock corporation shall combine with any other corporation or person to create a "monopoly" or the unlawful restraint of trade, or to prevent competition in any necessary of life. Held, that the word "monopoly" was not used in such section in its strict sense as requiring a control of all present existing means of carrying on a business, or doing a particular thing generally or in a particular place or locality, and the right to possess, own, or control all means of doing that thing in that place in the future, but was satisfied by an exclusive privilege to carry on a traffic or the possession or assumption of anything to the exclusion of other possessors, as where a man has acquired complete control of a business, and therefore embraces any combination or contract the tendency of which is to prevent competition in its broad and general sense.

The operation and management of railroads in carrying passengers is a "business," and part of trade and commerce.

Several street railroad companies, including all the railway lines between the points mentioned, operated lines of railway from various points in the Bronx to the Battery in New York City under legislative franchises giving to each an exclusive right to its line and territory. A combination of all of such corporations was effected by means of a transfer of stock to a business corporation created for that purpose by which the real ownership, control, and management of the previous competing parallel lines between substantially the same points or localities was merged. Held to constitute an illegal monopoly in violation of Stock Corp. Law N. Y. (Laws 1890, p. 1069, c. 564) § 7, as amended by Laws 1892, p. 1828, c. 688, providing that no domestic stock corporation shall combine with any other corporation or person to create a monopoly or the unlawful restraint of trade or to prevent competition in any necessary of life, and this though the consolidated road is still subject to such control as the New York Public Service Commission may see fit to exercise over it.

Stock Corp. Law N. Y. (Laws 1890, p. 1073, c. 564) § 40, authorizing corporations other than moneyed corporations to purchase, hold, and dispose of stocks, bonds, and other evidences of indebtedness of any other corporation, etc., engaged in a similar business, if authorized to do so by a certificate of incorporation, or if a corporation with which it is authorized to consolidate, is limited by section 7, prohibiting the combination of corporations to create a monopoly, or the unlawful restraint of trade, or the prevention of competition in any necessary of life.

A federal court sitting in New York is not required to follow decisions of the different Appellate Divisions on the construction of a state statute merely because they refused appeals to the Court of Appeals, or in the exercise of discretion refused leave to prosecute actions.

The lower federal courts are bound by decisions of the highest court of the state in which they are sitting, construing the Constitution or statutes of the state, except when the United States Supreme Court has decided otherwise, but are not bound by state decisions on questions of general commercial law.

Lower federal courts are bound by the decisions of the Supreme Court of the United States and by those of the Circuit Court of Appeals in their own circuit, but are not bound by decisions of a federal court of co-ordinate jurisdiction, or even the decisions of a federal Circuit Court of Appeals in another circuit.

A bill by a stockholder to avoid an alleged illegal consolidation of street railroad companies was verified by the president of complainant company, the president giving the grounds and sources of his information and belief. The bill alleged that complainant was, at and prior to the time of the unlawful plan, combination, and conspiracy objected to, and then was the bona fide and lawful owner "of record" of 300 shares of the stock of one of the defendants, which was one of the companies alleged to have entered into the combination and alleged conspiracy. The bill then charged that the suit was not collusive to confer jurisdiction on a court of the United States, and that plaintiff had made demand on a specified date on the corporation and its then president and on its board of directors to take steps to dissolve the consolidation, a copy of which written demand was attached. The bill also alleged that the demand was subsequently repeated, and recited in detail the reasons why action was not secured. Held, that the bill sufficiently complied with the ninety-fourth equity rule providing that every bill by one or more stockholders of a corporation against the corporation and others founded on rights which might be asserted by the corporation must be verified by oath and must contain an allegation that plaintiff was a shareholder at the time of the transaction of which he complained; that the suit was not collusive to confer federal jurisdiction; and should allege particularly plaintiff's efforts to secure action by the directors of trustees, and, if necessary, by the shareholders and the cause of his failure.

In an action by a stockholder against a corporation and others, an allegation that complainant is the bona fide and lawful owner "of record" of certain shares of the corporation's stock constituted a sufficient allegation that complainant was a bona fide and lawful stockholder, as the words "of record" did not detract from the force of the statement nor render it evasive.

A shareholder is one who holds or owns a share or shares in a joint-stock or incorporated company in a common-fund or in some property, as a shareholder in a railway, mining, or banking company.

"Share" specifically is one of the whole number of equal parts into which the capital stock of a trading company or corporation is or may be divided, as shares in a bank or shares in a railway.

"Stock" is the share capital of a corporation or commercial company; the fund employed in carrying on of some business or enterprise divided into shares of equal amount, and owned by individuals who jointly form a corporation.

In a stockholder's bill to avoid a consolidation of several street railroads as creating a monopoly, receivers of cer-

tain of the roads appointed prior to the commencement of the suit were proper but not necessary parties.

Where certain street railroad corporations entered into an illegal combination and consolidation, the appointment of receivers for two of the constituent companies was ineffective to remove them from the illegal combination.—(Continental Securities Co. v. Interborough Rapid Transit Co. et al., 165 Federal Rep., 945.)

Pennsylvania.—Street Railroads—Use of Street—Rights of Abutting Owners—Rights Under Charter.

Where a street railway company used a street already occupied by an existing railway, and did not intend to construct a branch of its own on the street, an abutting property owner had no ground to complain.

Where a street railway under its charter has a right to build branches and extensions, it has the right to use the tracks of another company for a short distance under a contract with such company to connect its main line and the proposed extension.—(Hannum v. Media, M., A. & C. Electric Ry. Co. et al., 70 Att. Rep., 847.)

LIABILITY FOR NEGLIGENCE

Illinois.—Street Railroads—Action for Injury to Driver of Vehicle—Pleading and Proof—Variance—Trial—Instructions—Collision with Vehicle—Action—Evidence—Contributory Negligence—Speed of Car.

Under an allegation in a declaration for injuries to the driver of a vehicle that he was driving on a street "at or near the tracks" of defendant's railway, evidence that he was driving longitudinally on the track is not a variance.

In an action for injuries to the driver of a vehicle from collision with a street car, no witness except plaintiff saw the wagon immediately before the collision. The conductor was in the back part of the car, and did not see the wagon until after the crash, and after he got off the rear end. He testified that he then saw it about 50 ft. or more from him "going kind of across the street like, toward the north side of the street." Held, that this evidence did not tend to prove that plaintiff drove in the way of the car suddenly, and an instruction based on such an assumption was properly refused.

In an action for injuries to the driver of a vehicle from collision with a street car, evidence that the street outside the track was unpaved, rough, uneven and could not be driven over is competent to show the condition of the roadway outside of the tracks, as affecting his care in driving on the street and track.

In an action for injuries to the driver of a vehicle from collision with a street car, a witness for plaintiff testified that he got on the car five blocks west of where the accident occurred, and the car started fast; that it stopped two or three blocks west of the place of the accident, and then started again, and continued at fast speed until the collision occurred. Held, not subject to an objection that the speed several blocks from the accident did not tend to prove what it was at and shortly before the time of the accident, as the testimony, while showing an intervening stop, also showed that the fast rate of speed continued up to the time of the accident.—(Murphy v. Evanston Electric Ry. Co. et al., 85 N. E. Rep., 334.)

Illinois.—Damages—Evidence—Personal Injuries—Carriers—Injury to Passenger—Contributory Negligence—Question for Jury.

In an action for damages for dislocating plaintiff's shoulder, where it appears that the shoulder was twice subsequently dislocated, it may be shown by medical testimony that a dislocation of the shoulder would create a predisposition to subsequent dislocation.

The question whether undertaking to board a street car while in motion is or is not negligence is a question of fact for the jury.—(Donnelly v. Chicago City Ry. Co., 85 N. E. Rep., 233.)

Missouri.—Carriers—Personal Injuries of Passenger—Negligence in Starting Car—Appeal and Error—Harmless Error—Error Cured by Instructions—Argument of Counsel—Action of Court—Appeal—Harmless Error—Objections to Evidence—Objections in Trial Court—Instructions — Effect of Failure to Request — Carriers—Carriage of Passengers—Personal Injuries—Action—Variance —Trial — Instructions—Propositions of Law—Pleading—Amendment of Complaint.

Although a passenger on a street car is attempting to alight before the car has come to a stop, yet it is culpable negligence in the conductor, knowing what the passenger is doing, to cause the car to be suddenly started forward with such suddenness and force as to throw the passenger to the ground.

Plaintiff, while attempting to alight from a street car, was injured by the sudden starting of the car, which threw her to the ground. In an action to recover for her injuries, plaintiff testified that she asked the conductor, when he came to her assistance, "Why did you start the car up?" and that he replied, "That frisky motorman is so frisky he won't stand still long enough." The court withdrew the testimony from the consideration of the jury. Held, that the withdrawal cured the error in admitting it, as the evidence was not of such a character as to make it reasonably probable that its effect would survive a warning not to consider it, and there was nothing to suggest a design to influence the mind of the jury by getting in improper evidence of a prejudicial nature.

In an action against a street railway company to recover for injuries received by a passenger, thrown from the car from which she was attempting to alight, plaintiff testified that after the injury she sat upon the street where she had been thrown; that she became blind, and sat there in the street until she was nearly over her blindness, and then walked down to the subway and sat on a rock. On cross-examination she was asked if she had not testified on a former occasion that she had stopped two or three times on the road going to her sister's. An objection by plaintiff's counsel to the question as immaterial was sustained. Held, that the exclusion would not justify a reversal, as plaintiff had just testified in chief that she sat and rested a while, and then walked some more and rested again until she got to her sister's, and the question objected to did not suggest a variance in her testimony as to her blindness.

Where a court, in an action against a street car company to recover for injuries sustained by a passenger, gives an instruction requiring an exercise of the highest degree of care on the part of the defendant's servants, defendant cannot object to the court's failure to further explain that instruction, where no request was made for such explanation.

The petition, in an action to recover for injuries received from being thrown from a street car by the sudden starting of the car while plaintiff was attempting to alight, alleged that plaintiff was riding on the trailer, but there was evidence introduced at the trial that she was riding on the front car. Held, that the variance was not important.

The petition of a passenger, in an action against a street railway company to recover for injuries, alleged that the acts of defendant's servants were "carelessly, negligently, wilfully and maliciously" done. Held, that it was not error to permit an amendment striking out the words "wilfully and maliciously."—(Peck v. Springfield Traction Co., 110 S. W. Rep., 659.)

Missouri.—Street Railroads—Collision with Vehicle—Actions—Discovered Peril—Negligence—Operation in Nighttime—Care Required—Question for Jury—Appeal and Error—Review—Harmless Error—Admission of Testimony—Worry.

If those in charge of a street car discovered, or should by the exercise of ordinary care have discovered, plaintiff's peril while driving a wagon on the track in time to have avoided a collision, and did not do so, plaintiff's negligence in failing to look back for an approaching car would not preclude his recovery.

A motorman operating a street car in the nighttime in a populous part of a city must look out for the safety of persons who may be on the track, and have his car under control in anticipation of any danger that may arise.

Whether defendant's motorman in charge of a street car which collided with plaintiff's vehicle made proper efforts to avoid the collision after he saw, or by the exercise of ordinary care could have seen, plaintiff's peril, held, under the facts, to be for the jury.

In a personal injury action, the admission of testimony of plaintiff that he worried because of his belief that he would not be able to work again, if error, because making worry a ground for damages, was so insignificant as not to be ground for reversal. (Funck vs. Metropolitan St. Ry. Co., 113 S. W. Rep., 694.)

Missouri.—Street Railroads—Injuries—Collisions—Evidence—Ownership of Car.

In an action against a street railway company for the death of a child in a collision with a car, the ownership of the car may be shown by reasonable inferences from the facts of the case.

In an action against a street railway company for injuries in a collision with a car, evidence held not to establish defendant's ownership of the car, essential to a recovery, in view of the fact that other companies operated street railroads at the place of the accident.

In an action against a street railway company for injuries in a street car collision, the evidence must support the allegations of ownership and operation of the car at the time of the injury, and where it does not appear that the car was in use by defendant, and where it is not shown that the car was running on defendant's road and the connection between defendant and those in charge of the car is not shown, there can be no recovery. (Frisby et ux. vs. St. Louis Transit Co., 113 S. W. Rep., 1059.)

Missouri.—Death—Last Chance Doctrine—Nature—Negligence—"Ordinary Care"—Definition—Trial—Instructions—Applicability of Evidence—Appeal and Error—Harmless Error—Prejudicial Effect—"Accident"—Contributory Negligence—Concurrent Negligence—Comparative Negligence—Street Railroads—Injuries to Person on Track—Rights in Streets—Question for Jury.

Where plaintiff in an action for death bases his right to recover on the humanitarian doctrine, he admits decedent's negligence, and places his reliance on defendant's negligence in failing to discover decedent's peril in time to avoid striking him.

The usual definition of "ordinary care," as the care which an ordinarily careful and prudent person would exercise under the same or similar circumstances, has become a "maxim" in the law.

"Negligence" is the failure to use that care which an ordinarily careful and prudent person would exercise under the same or similar circumstances.

Where either the company's or decedent's negligence caused the latter's death by being struck by a street car, and there was no evidence whatever that the accident was caused by the street lamps being put out by a third person before the collision, it was error to instruct that plaintiff could not recover if the injury was caused by a mere "accident."

Though an instruction that plaintiff could not recover if decedent's death was caused by an accident was inapplicable under the evidence, it was not prejudicial, in connection with the instruction, to define "accident" as a casualty occurring without any one's fault, and without assignable cause.

Mutually concurrent negligence by both parties defeats recovery.

The doctrine of comparative negligence is not recognized in Missouri.

One driving on a street car track need not look constantly in front and to the rear, but must exercise due care to prevent injury.

A motorman must exercise due care to prevent injury to persons on the track, after he sees their peril, regardless of their negligence in getting on the track.

A street car company has not an exclusive right to the use of the street, its rights and the rights of the public being at most mutual.

In an action for decedent's death by being struck by a street car while driving on the track, whether the motorman could have seen plaintiff on the track in time to have stopped the car, by exercising due care, held a jury question. (Felver vs. Central Electric Ry. Co., 115 S. W. Rep., 980.)

New York.—Carriers—Carriage of Passengers—Injuries—Questions for Jury—Words and Phrases—"Couple of Minutes."

In an action against a carrier for injuries to a passenger by the sudden starting of the car, held, that the question of defendant's negligence in starting the car was for the jury under the evidence.

The expression, a "couple of minutes," used by a plaintiff in an action against a carrier in her testimony that, after getting on the car she waited a "couple of minutes" before attempting to reach her seat, is not necessarily a statement that she desisted for 120 seconds in the act of seeking a seat, but it should be construed to mean a brief space of time, as a second or a few seconds, and the Century Dictionary is authority for the statement that a minute is loosely speaking but a "short space of time."

It is a question for the jury whether it is want of ordinary care to start a street car before a woman passenger has obtained a seat. (McGlynn vs. Nassau Electric R. Co., 113 N. Y. Sup., 119.)

New York.—Street Railroads—Collision with Vehicles—Evidence—Sufficiency.

Where, on the first trial of an action against a street railway for damages from a collision with plaintiff's wagon, plaintiff testified that as he was turning on the track he looked back once before he was run into, but on a second trial testified that he looked back four times to determine whether any car was approaching, and no satisfactory explanation of such change in evidence was given, a judgment in his favor was unauthorized. (Bang v. New York & Queens County Ry. Co., 112 N. Y. Sup., 530.)

New York.—Street Railroads—Collisions with Animals—Questions for Jury.

Whether a motorman exercised due care in running his car without taking any precautions to avoid a collision with a cow at the side of the track held for the jury. (Craft v. Peekskill Lighting & R. Co., 113 N. Y. Sup., 235.)

New York.—Railroads—Crossing Accident—Negligence—Interlocking Switch and Signal Devices—Master and Servant—Injury—Fellow Servants—Evidence.

Plaintiff, in an action against a railroad company and a street railway company for death of her intestate from collision of a railroad train with a street car, may not give evidence of the existence, at other railroad intersections at grade, of interlocking switch and signal devices, by the proper operation of which a crossing collision is impossible; the crossing, though on a highway, being within the yards of the railroad company, only one of its five tracks there being used by through trains, and only seven or eight trains passing over it daily, while the other tracks were constantly being used for switching, and the evidence being that it is impracticable to use such devices in railroad yards, because they would congest traffic and seriously interfere with the usefulness of the yards for switching purposes, and, while the interlocking device might have been installed between the main track and the street railroad, the only effect which it would have had would be to protect against a small fraction of the danger, and thereby possibly increase the danger of collision on the other tracks, and it not being probable that the board of railroad commissioners, had their attention been called to the situation, would have directed the erection of such devices under section 36 of the railroad law (Laws 1890, p. 1095, c. 565, as amended by Laws 1898, p. 1174, c. 466).

One stationed by a street railway company at a railroad crossing to make observations and signal the motormen when the railroad tracks were clear, the rules of the street railway company requiring its cars to wait for such signals, on receiving which they might proceed, is not a vice principal, but the fellow servant of motormen and conductors of the street cars.

A railroad company, in an action against it for collision of its trains at a crossing with a street car, killing the street car conductor, may show, as bearing on the question of its freedom from alleged negligence in approaching the crossing at a high speed without ample warning, an agreement made under section 12 of the railroad law (Laws 1890, p. 1087, c. 565, as amended by Laws 1892, p. 1382, c. 676) between it and the street railway company for intersection of the roads, providing that it should be under no obligation to guard, warn and protect at the crossing the cars and employees thereon of the street railway company, and this, though it be shown that the street railway company in fact employed a signal man at the crossing; the railroad company being entitled to show that it was not relying on a mere gratuitous precaution, but on an agreement whereby the street railway company was obliged to take such precaution. (Cox vs. Delaware & Hudson Co. et al., 112 N. Y. Sup., 443.)

News of Electric Railways

Transit Affairs in New York

William R. Willcox, chairman of the Public Service Commission, gave a dinner at his home on Feb. 10, 1910, to Mayor Gaynor at which the members of the Board of Estimate and the other members of the Public Service Commission were present. Mr. Willcox was the authority for the statement that there was nothing formal about the discussion of the rapid transit situation, but that the general question of the need of subways and the Interborough Rapid Transit Company connection via the East River bridges received considerable attention. It was arranged to hold the first official conference between the board and the commission on Feb. 16, 1910. It is understood that both Mr. Gaynor and John Purroy Mitchel, president of the Board of Aldermen, laid emphasis on the necessity for starting subway construction just as soon as possible, mentioning April 1, 1910, as a suitable time for advertising for bids for the first section. The special committee of the board which is to confer with the commission formally is composed of Mayor Gaynor, President Mitchel and Comptroller Prendergast.

The Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad Company informed the Public Service Commission on Feb. 14, 1910, at a hearing on the application for a franchise by the Manhattan Bridge Three Cent Line to carry passengers from the Hudson River to the business part of Brooklyn, that they had applied to the Board of Estimate for permission to operate a service across the Manhattan Bridge on a 3-cent fare basis.

The Brooklyn Rapid Transit Company has paid $604,000 in franchise taxes levied against the constituent companies of that corporation and the Coney Island & Brooklyn Railroad has paid $139,000 in franchise taxes. The payments close the accounts of the companies in connection with franchise assessments, except for a few claims which are in dispute.

The Public Service Commission has formally approved a report by Commissioner McCarroll, favoring a plan for the construction of an extension to the proposed subway under Eastern Parkway, Brooklyn, the cost to be assessed upon the property benefited. This is the first formal approval of the construction of a rapid transit railroad by the assessment plan, which is provided for by the Travis-Robinson bill passed by the last Legislature.

The Chamber of Commerce has informed the Public Service Commission that it favors the principle of subway construction by local assessment and that for the purpose of general equity in the various boroughs the principle should be applied to all further developments of subway extensions in outlying districts. The special committee on rapid transit conditions has submitted a report covering the "Livonia Avenue route" in Brooklyn, along which more than half the property owners signified their intention to pay by local assessment as permitted through the passing of a recent law. In recommending this procedure the Chamber of Commerce states that it considers it unfair to property owners in districts which are to be so served, if other districts are given new transportation facilities without sharing in the cost and the expenditures placed on the city.

Cleveland Traction Situation

The referendum on the Tayler grant to the Cleveland Railway was to take place on Feb. 17, 1910. On Feb. 12, former Mayor Johnson issued a statement opposing the grant, principally on the plea that the maximum fare fixed in the franchise is too high. Early in the week Mayor Baehr stated that he had not decided whether to issue a statement. He had hoped that the people might be permitted to decide for themselves, without any campaigning. The grant has the approval of the Chamber of Commerce and the committee of one hundred which was organized to fight the low-fare franchise passed under the Johnson administration.

Judge Tayler has issued a statement in reply to the claim that the company, by an alliance with the Cleveland Electric Illuminating Company, could evade the limitation for cost of operation. He said that no arrangement would enable the company to change the ordinance, although there could be no objection to securing power from the lighting company if it is found desirable to do so. Placards were put in all the cars on Feb. 14, stating that the fare on all lines will be 3 cents with 1 cent for a transfer within the city, if the grant was approved.

The report of Receiver Bicknell for January, 1910, follows:

Gross receipts		$521,205
Operating expenses:		
Maintenance	$103,297	
Transportation	195,147	
General	35,184	
Total		333,628
Net		$187,577
Deductions:		
Neutral street railway rental	$937	
Taxes	26,462	
Interest rental	38,399	
Dividend rental	73.378	
Total		139,176
Surplus		$48,401

A sufficient number of names has been obtained to the petitions for a referendum vote on the grants made to the Cleveland Underground Rapid Transit Company by the Johnson administration to assure an election. The City Council has already repealed the act granting the company rights in the city.

New Mayor of Boston on Transit Matters

In his inaugural address on Feb 7, 1910, John F. Fitzgerald, Mayor of Boston, made the following references to rapid transit affairs in that city and problems confronting the public service corporations:

"I have strongly favored the improvement and extension of transit facilities within the city, particularly the construction of subway or tunnel connections to the South Station, South Boston and Dorchester. The report which the joint board consisting of the Massachusetts Railroad Commission and the Boston Transit Commission has recently made to the Legislature distinctly favors a subway connection between the Park Street station and the South Station and recommends preliminary action looking toward its construction, and this or some like project I shall heartily support. In spite of the unfavorable report of this joint board upon proposed subway extensions to South Boston and Dorchester, I believe that the need of such extensions is so great, and that they will have such an effect in increasing the taxable value of property in those districts, that some way should be found to secure their construction. The people of these sections are entitled to as good facilities of rapid transit as the people of Cambridge, who have secured both a subway and an elevated line.

"The elevated structure along Washington Street and through Charlestown is admitted to be an injury to property in those important districts. The development of underground transportation should render it unnecessary to resort to this form of construction in the future and opens up the question whether it may not prove possible, upon terms fair to all interests involved, to remove the present unsightly structures.

"I believe it should be feasible to do in Boston what has been done in other cities. The elevated structures, at least along Washington Street, should be removed and the subways extended. Equitable assessments, adjusted to the consequent rise in values, should be levied upon the adjoining property; many of the owners, I am assured, would be glad to contribute their share to the cost of this great improvement.

"I have suggested the desirability of adopting in this State the plan introduced in New York, on the recommendation of Gov. Hughes, in respect to the supervision and

regulation of public service corporations. Under this plan all such corporations come under the jurisdiction of a single tribunal within a given territory, and the State is divided into two districts, one of which includes the metropolitan area and the other the rest of the State."

Bonds Voted for San Francisco Municipal Line.—The supervisors of San Francisco, at a meeting on Feb. 7, 1910, passed the ordinance providing for the issuance of the $2,020,000 of municipal bonds voted at the election on Dec. 30, 1909, to cover the cost of reconstructing the Geary Street, Park & Ocean Railroad as a municipal railway.

Chicago Subway Plans.—Bion J. Arnold, recently appointed engineer to formulate plans for the system of subways in Chicago, is organizing an office force for the work. Draftsmen already have started making maps of the subway district which Mr. Arnold will submit to the local transportation committee of the City Council, and later to the City Council of Chicago.

Ball of Brooklyn Rapid Transit Employees.—The annual ball of the employees of the Brooklyn (N. Y.) Rapid Transit Company was held at Prospect Hall on Feb. 10, 1910. Music was furnished by the band composed of employees of the company. The affair was under the direction of the officers of the Brooklyn Rapid Transit Employees' Benefit Association, of which George W. Edwards is secretary.

Association News.—The American Street & Interurban Railway Association has published during the week Vol. I of its Proceedings, which includes the reports of the Engineering Association and of the Transportation & Traffic Association at the Denver meeting. It has also issued in pamphlet form the revised codes of rules for city operation and for interurban operation with the amendments adopted at Denver.

Hearing Continued on Boston & Providence Electric Railroad.—The hearing upon the plans of the Boston & Providence Electric Railroad for a high-speed interurban railway between Boston and Providence was continued before the Railroad Commission of Massachusetts on Feb. 9, 1910. The company has already been granted a certificate of exigency by the commission and the locations of the tracks and roadbed through the intervening municipalities are now being considered in detail. At the above hearing interest centered upon the plans of Town Engineer Norris of Hyde Park, for a subway through Hyde Park in place of the line proposed by the company.

Electric Railway Exhibit at Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company exhibited its new gasoline emergency wagon at the Philadelphia Electric Show, held in the First Regiment Armory, Broad and Callowhill Streets, Philadelphia, Pa., Feb. 14-26. The vehicle is fitted with a tower equipped with a raising mechanism operated by a worm gear driven from the engine shaft. The company also exhibited a miniature elevated railroad structure on a scale of 1 ft. to 20 ft. with a model car, which was operated back and forth, and a full-sized semaphore signal such as is used on the Market Street elevated road, which was set by the car as it passed in and out of the various blocks. Sections of various sized cables used by the company in feeding its network of power distribution were also exhibited.

Stevens Alumni Dinner.—The ninth annual dinner of the Alumni of Stevens Institute was held at the Hotel Astor on Feb. 12, 1910. Nearly 300 were present. The speakers included President Humphreys, Dr. H. S. Pritchett, president of the Carnegie Foundation; Col. E. A. Stevens, Hosea Webster, H. M. Brinckerhoff and E. H. Peabody. President Humphreys announced that he had recently received $63,500 of the $1,250,000 which he expects to raise for the purchase of the Castle Point estate, for the erection of several buildings, including a dormitory, a mechanical laboratory and an electrical laboratory, and to provide an adequate endowment fund. The alumni is now raising $400,000 for paying off the debt remaining on the athletic field and for other real estate necessary to meet the growing needs of the institute.

Southern Pacific Electric Suburban Lines.—It has been announced by officials of the Southern Pacific Company that electric trains will be running on the Alameda (Cal.) main local lines to the Alameda Mole, by April 1, 1910. The power house, which will supply power for all the electric lines on the east side of the bay, will not be finished until Aug. 1, 1910, but the company has a contract with the Great Western Power Company to supply current for the electric trains until the power house can be put into operation. Seven new stations on the local lines are under course of construction. As soon as the Alameda lines are electrified work will commence on the extension across the estuary to the Franklin street station. It is also stated that about March 1, 1910, the Southern Pacific Company will start the construction of its California Street line in Berkeley. The company is now building its North Street line through West Berkeley. This is to be a part of the enlarged electric suburban system in Berkeley, which is opposite San Francisco.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—Attorney-General Straus appeared before the judiciary committee of the Legislature on Feb. 11, 1910, to explain the provisions of the public utilities bill. The principal public service corporations have been asked by the committee to agree on a date for a hearing on the bill.

Massachusetts.—The following bills have been introduced: To amend the street car heating law by specifying that cars shall be heated under the direction of the Railroad Commission; to require that electric railways granted a certificate of exigency shall do no construction and take no property until the amount of capital stock named in the agreement of association has been subscribed and 10 per cent of the par value of each share has been paid in in cash, and unless these matters are arranged to the satisfaction of the Railroad Commission within six months after the certificate is granted the certificate shall become void; to require street railways to equip all their cars with a lifting jack and other emergency tools to be specified by the Railroad Commission; to require the Boston Elevated Railway to establish a free transfer station at the intersection of Huntington Avenue and Massachusetts Avenue, Boston; to provide that the construction of any electric railway shall be commenced and at least 10 per cent of the capital stock authorized shall be expended within one year from the date of fixing the entire original route and location, and that operation shall be begun within two years from the date of fixing the entire original route; to prohibit street railways from allowing passengers to ride on the running boards of open cars; to give aldermen or selectmen the right to direct street railways to establish waiting stations for the convenience of the public; to "compel the reasonable interchange of passenger, freight, property, traffic and cars between street railways, including through routes and fares, subject to the supervision of the Railroad Commission."

Mississippi.—A bill has been introduced in the lower house to require all street railways in Mississippi to operate cars equipped with vestibules between Nov. 15 and March 15.

New Jersey.—The committee on municipal corporations of the Assembly will give a hearing on Feb 21, 1910, on the public utilities bills introduced by Assemblymen Sullivan, Pierce and Scharff. A bill has been introduced in the House which confers upon the highway board or board having charge of roads the right to grant a franchise for connecting links in sections of a city street railway without requiring the consent of property owners, unless the link is more than half a mile in length. It limits the term of any such franchise to 50 years and provides that it shall be granted only after a public hearing.

New York.—Assemblyman Filley has introduced a substitute bill for his so-called "full-crew" bill which amends the Public Service Commissions law by extending the power of the commission for each district, upon its own motion or complaint, to determine the just, reasonable, safe, adequate and proper regulations, practices, equipment, appliances and service to be enforced, to be observed and to be used, and to fix and prescribe the same by order directed to common carriers. The present provisions are made to apply to the number of employees composing the crews engaged in the operation of trains.

Financial and Corporate

New York Stock and Money Market

February 15, 1910.

For the past week the tendency of the market has been upward, and from the very low prices of Feb. 8 there has been a recovery of from 3 to 8 points. The feature of the market is the seeming disappearance of the nervous uncertainty that marked the previous week.

The money market continues to be satisfactory. Rates are low and the banks are liberal. Quotations to-day were: Call, 2¾ to 3 per cent; 90 days, 3¾ per cent.

Other Markets

Rapid Transit stock displayed considerable more activity in the Philadelphia market last week. The offerings were quite liberal, but there fortunately appeared to be even more buyers than sellers, so that at the end of the week the price was fractionally higher than at the beginning. Other tractions were moderately active at prices that were practically unchanged.

In Boston, Massachusetts Electric and Boston Elevated were the traction features of the market. There was considerable activity in each of these issues, and Massachusetts Electric, both preferred and common, advanced several points.

There was practically no trading in traction shares in the Chicago market. With the exception of a few odd lots of Chicago Railways Series 2 and Kansas City Railway & Light preferred there was nothing doing.

In Baltimore, the bonds of the United Railways Company continued to be active at former prices. Some of the stock of the same company was sold during the week, the prevailing price being 13½.

Quotations of various traction securities as compared with last week follow:

	Feb. 8.	Feb. 15.
American Railways Company	a47	*46¾
Aurora, Elgin & Chicago Railroad (common)	a57¾	a57½
Aurora, Elgin & Chicago Railroad (preferred)	*91	a92
Boston Elevated Railway	129½	129¼
Boston & Suburban Electric Companies	15	15
Boston & Suburban Electric Companies (preferred)	73	72
Boston & Worcester Electric Companies (common)	a11½	8
Boston & Worcester Electric Companies (preferred)	42	a45
Brooklyn Rapid Transit Company	68⅞	72⅝
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	82½	83¼
Capital Traction Company, Washington	a133½	a134
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a106¼	a108
Chicago Railways, ptcptg., ctf. 2	a30	a29
Chicago Railways, ptcptg., ctf. 3	a14	a14
Chicago Railways, ptcptg., ctf. 4s	a9	a9
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a105½
Detroit United Railway	*63	*63
General Electric Company	148½	153⅜
Georgia Railway & Electric Company (common)	a107	107½
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	18½	20¾
Interborough-Metropolitan Company (preferred)	46	53½
Interborough-Metropolitan Company (4½s)	79	81¾
Kansas City Railway & Light Company (common)	a30	a30
Kansas City Railway & Light Company (preferred)	a70½	a72¼
Manhattan Railway	*136¾	*136¾
Massachusetts Electric Companies (common)	a16	a18¼
Massachusetts Electric Companies (preferred)	a80½	a84
Metropolitan West Side, Chicago (common)	a17	a17
Metropolitan West Side, Chicago (preferred)	a53½	a52
Metropolitan Street Railway	18	*18
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	76	79½
Northwestern Elevated Railroad (common)	a17½	a17½
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a49	*50½
Philadelphia Company, Pittsburg (preferred)	a45	*43¾
Philadelphia Rapid Transit Company	a25¾	*26¾
Philadelphia Traction Company	*89	*89
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅞
Public Service Corporation, ctfs	a105	a105
Seattle Electric Company (common)	a115	a115
Seattle Electric Company (preferred)	a106	a106
South Side Elevated Railroad (Chicago)	a51	a53
Third Avenue Railroad, New York	11	10
Toledo Railways & Light Company	10¼	11¾
Twin City Rapid Transit, Minneapolis (common)	111	112
Union Traction Company, Philadelphia	a51	*51½
United Rys. & Electric Company, Baltimore	a13	a13¾
United Rys. Inv. Co. (common)	*33	*33
United Rys. Inv. Co. (preferred)	60	67
Washington Ry. & Electric Company (common)	37	37
Washington Ry. & Electric Company (preferred)	a88	a87⅛
West End Street Railway, Boston (common)	a93	a95
West End Street Railway, Boston (preferred)	a108	a109
Westinghouse Elec. & Mfg. Company	63	68
Westinghouse Elec. & Mfg. Company (1st pref.)	*120	120

a Asked. * Last Sale.

Report of the Metropolitan West Side Elevated Railway

Gross earnings of the Metropolitan West Side Elevated Railway, of Chicago, in the year ended Dec. 31, 1909, were $2,818,430, an increase of $71,590, or 2.6 per cent, over the record of the previous year. Of the total gross revenue $2,695,230 was received from passenger earnings. The expenditures for operating expenses aggregated $1,418,076, or 50.31 per cent of gross earnings as compared with $1,410,801, or 51.36 per cent, in the preceding year. The expenditures for maintenance of way and structure and car equipment amounted to $299,522 in the last year, as compared with $289,784 in the preceding year. The division of the maintenance expenditures as between way and structure and car equipment was somewhat different in the two years. Last year less was expended on maintenance of way and structure than in 1908, but more was applied to the maintenance of car equipment. For the first five months of 1909 traffic averaged 2 per cent less than for the same months for 1908, but beginning with June there was a steady increase over 1908, reaching 7.06 per cent for December. The total number of passengers carried was 52,519,609, a daily average of 143,899, as compared with the daily average of 140,950 for 1908. As announced in the Electric Railway Journal of Feb. 12, 1910, Britton I. Budd, who has been general manager of the company since 1907, was elected president of the company, to succeed Howard G. Hetzler, who resigned to become president of the Chicago & Great Western Railroad, and a director to succeed Fred W. Smith. Mr. Hetzler will continue with the company as a director and vice-president. The earnings, expenses and income account for the years ended Dec. 31, 1909, and Dec. 31, 1908, follow:

Operating Earnings.	1909.	1908.
Passenger earnings	$2,695,230	$2,643,634
Other operating earnings	123,200	103,205
Gross earnings	$2,818,430	$2,746,840
Operating Expenses.		
Maintenance of way and structure	$134,350	$155,625
Maintenance of car equipment	165,172	134,159
Maintenance and operation of power plant	312,706	329,637
Conducting transportation	605,095	585,514
General expenses	103,348	101,301
Loop operation and maintenance	97,405	104,565
Total	$1,418,076	$1,410,801
Net earnings	$1,400,354	$1,336,039
Income from operation	$1,400,354	$1,336,039
Other income	11,160	10,126
Gross income	$1,411,514	$1,346,165
Interest first mortgage bonds	$399,960	$399,960
Interest extension mortgage bonds	161,216	151,304
Interest collateral loan	20,252	27,960
Interest equipment notes	.....	8,643
Other interest	601	4,152
Miscellaneous rentals	37,048	37,048
Loop rentals	262,626	257,947
Taxes, car licenses and special assessments	180,893	197,736
Total charges	$1,062,596	$1,084,750
Available for dividends	$348,918	$261,415
Dividends declared	.....	.....
Balance carried to surplus	$348,918	$261,415
Per cent of surplus to outstanding preferred stock	4.07	3.00

The statement of surplus for the fiscal year ended Dec. 31, 1909, follows:

Balance as of Jan. 1, 1909	$1,281,706
Surplus for year ending Dec. 31, 1909, as per income account	348,918
Total	$1,630,624
Charged off for depreciation and losses	$50,000
Surplus as of Dec. 31, 1909	1,580,624
Total	$1,630,624

The comparative balance sheet of the company as of Dec. 31, 1909 and 1908, follows:

Assets.	1909.	1908.
Cost of road equipment and property	$32,331,208	$32,265,153
Capital stock in treasury, preferred	292,100	292,100
Capital stock in treasury, common	35,900	35,900
Extension mortgage bonds in treasury	967,000	983,000
Union Consolidated Elevated bonds owned	41,400	.....
Cash on hand and in banks	249,283	156,190
Material and supplies	75,220	52,321
Accounts receivable	96,922	62,020
Prepaid insurance	11,826	21,389
Advances, Union Consolidated Elevated Railroad	27,385	53,720
Unadjusted accounts	20,076	15,233
	$34,148,320	$33,937,026

LIABILITIES.	1909.	1908.
Capital stock, preferred	$9,000,000	$9,000,000
Capital stock, common	7,500,000	7,500,000
First mortgage bonds (4 per cent)	10,000,000	10,000,000
Extension mortgage bonds (4 per cent)	5,000,000	5,000,000
Collateral loan	300,000	400,000
Equipment Notes	.....	.....
Notes payable	.....	.....
Unpaid vouchers, payrolls and accounts	134,990	110,618
Interest coupons due, not presented	6,880	6,620
Interest on extension mortgage bonds due Jan. 1	80,660	80,320
Dividend checks out	.....	241
Interest accrued, not due	170,479	171,650
Rentals accrued, not due	8,750	8,750
Taxes accrued, not due	101,873	101,873
Depreciation reserved	264,065	275,248
Balance surplus	1,580,624	1,281,706
	$34,148,320	$33,937,026

Mr. Hetzler, in presenting the report, said in part:

"That part of Chicago served by the company continues to improve rapidly. The West Side of Chicago is spoken of as the industrial territory of the city, due to the number and variety of its industries, many of which are located adjacent to the lines of the company, especially in the outlying territory. The employees of these establishments are using the trains moving in the reverse direction of travel during the rush hours, and also producing considerable traffic in both directions during the middle of the day. These conditions when fully developed will eliminate largely the empty mileage which has existed in the past. The traffic has increased materially during the year.

"The mileage operated during the year has not been increased, being at this time 50.5 miles, exclusive of sidetrack. Four passenger coaches have been converted into control coaches, otherwise no changes or additions have been made to the equipment. The equipment has been well maintained and consists of 225 motor cars, 179 coaches, 83 control coaches and 17 miscellaneous cars. The power house, tracks and structure have been well maintained. Twelve thousand track ties and 3,000 guard-rails were used during the year and 6½ miles of structure were painted.

"The company's property at Paulina Street beneath the elevated structure has been leased, necessitating the removal of the superintendent's office and shop building of the road department. Additional property was purchased at 421-423 Marshfield Avenue and remodeled to serve the purpose of an office building, and the buildings and shops for the road department reconstructed on the company's property opposite Laflin Street station. This change has resulted in a better office and shop arrangement and when completed will add to the receipts of the company."

Report of The J. G. Brill Company

On Feb. 9, 1910, James Rawle, president of The J. G. Brill Company, presented his annual report to the stockholders of that company. An abstract of the report follows:

"The output from the five plants owned and operated by The J. G. Brill Company for the 12 months ended Dec. 31, 1909, amounted to $4,261,204.90. For comparison the amounts of the combined sales of the five companies for the four years last past are here given: 1906, $6,908,346.22; 1907, $9,211,825.72; 1908, $3,845,173.91; 1909, $4,261,204.90.

"The result of the operation of the Brill plant for the year 1909, in spite of an output far below normal, and in spite of the very low prices at which work necessarily had to be taken in the latter part of 1908 and during most of 1909, showed a substantial profit. The net result of the operation of the subsidiary companies showed a loss. Of the four subsidiary companies, one, the Stephenson plant, was closed during almost the entire year; the others were operated at only a small part of their capacity. As shown by my report of Feb. 10, 1909, your company had a surplus or reserve from which the regular quarterly dividends on the preferred stock were declared by your directors during the year. At the directors' meeting held on Jan. 26, 1910, the regular dividend of 1¾ per cent on the outstanding preferred stock, amounting to $80,150, was declared, which was paid Feb. 1, 1910. In the operations of your company and its subsidiary companies during the year, no change was made in the liberal policy of keeping the properties in good physical condition, and large amounts for this purpose have been expended and charged to operating expenses. The physical condition of the plants is excellent, and they are all well equipped in organization to handle the increased business which they now have on their books.

"The great depression which prevailed during 1908 continued, so far as the general business of your company was concerned, almost entirely throughout the year 1909, and this is indicated by a combined output greatly below an average normal output. As stated in my report of Feb. 10, 1909, the general fixed overhead charges, such as insurance, depreciation and taxes, are practically unchangeable, and the necessity for keeping up an effective organization, always ready to obtain and execute work, made it impossible to decrease materially the overhead expenses during the year. It is obvious that in times of depression, when competition is increased, the selling expense is increased somewhat in proportion to the difficulties attending the obtaining of orders. I am glad to say the outlook for profitable work is much improved. On Dec. 31, 1908, the combined work on hand amounted to $1,717,338. On Feb. 1, 1910, the combined companies had orders on the books and in process of completion amounting to $2,755,776, an increase of $1,038,438.

"I submit the following combined balance sheet and a statement of sales and expenses of the Brill plant, the latter showing also the combined surplus of all your companies:

THE J. G. BRILL COMPANY AND SUBSIDIARY COMPANIES.

COMBINED BALANCE SHEET, DEC. 31, 1909.

ASSETS.

Cost of properties	$8,468,673
Materials, raw and in process	1,980,841
Bills and accounts receivable	1,319,480
Investments	90,431
Cash	193,092
	$12,052,517

LIABILITIES.

Preferred stock	$4,580,000
Common stock	5,000,000
Bonds (John Stephenson Company)	400,000
Bills and accounts payable	987,513
Surplus	1,085,004
	$12,052,517

SALES AND EXPENDITURES OF BRILL PLANT, AND COMBINED SURPLUS FOR YEAR 1909.

Total sales (Brill plant)		$2,868,396
Less operating, selling and administration expense		2,630,417
Operating profit		$237,979
Profit from other sources (exclusive of dividends from subsidiary companies)		52,909
Total profit		$290,888
Less reserve set aside for depreciation		56,302
Net profit (Brill plant)		$234,586
Loss of subsidiary companies	$52,753	
Add their reserve for depreciation (taken from surplus)	51,049	
Net loss of subsidiary companies		103,802
Net profit to surplus		$130,784
Surplus from previous year		$1,339,449
Less adjustments		64,629
		$1,274,820
Add profit (Brill plant)		234,586
		$1,509,406
Less loss of subsidiary companies		103,802
		$1,405,604
Less dividends paid during year on preferred stock of The J. G. Brill Company		320,600
Surplus Jan. 1, 1910		$1,085,004

Distribution of Each Five-Cent Fare in Boston

The Boston News Bureau has prepared from the annual reports of the Boston (Mass.) Elevated Railway for Sept. 30, 1909, and Sept. 30, 1908, the following comparative summary of the distribution of each 5-cent fare:

	1909, cents.	1908, cents.
General expenses, including insurance, pensions, etc.	0.223	0.208
Cost of power	0.422	0.583
Wages and conducting transportation	1.340	1.439
Other transportation expenses	0.128	0.133
Maintenance way	0.488	0.278
Maintenance equipment	0.360	0.407
Depreciation	0.069	0.070
Damages and legal expenses	0.291	0.290
Taxes	0.367	0.350
Rental subways and tunnels	0.171	0.090
Interest	0.365	0.360
Rentals surface lines	0.486	0.493
Dividends	0.277	0.284
Surplus	0.013	0.015
Total	5.000	5.000

Ocean Shore Railway

Judge Van Fleet in the United States Circuit Court in San Francisco, Cal., on Jan. 26, 1909, appointed Virgil Bogue, formerly vice-president and chief engineer of the Western Pacific Railway; Col. Wm. Heuer, U. S. A., F. C., retired, formerly in charge of rivers and harbors in California, and A. W. Foster, formerly president of the Northwestern Railway, as a committee of three to furnish the court with the following information in the interest of the Ocean Shore Railway, now in the hands of F. S. Stratton as receiver:

"1. Cost of completing the road with a single track and laying of rails thereon, to connect the completed section between the terminus of the line south from San Francisco and northerly from Santa Cruz; 2, cost of acquiring terminal facilities for the necessary purpose of operating the completed road; 3, cost of ballasting the entire road, and whether such ballasting is necessary; 4, cost for fully equipping the road with rolling stock and other necessary appurtenances; 5, annual cost of operating and maintaining the present road until the completion of the entire road. The commission shall place separate estimates as to the operation of the road southerly from San Francisco and northerly from Santa Cruz; 6, estimate of revenue derivable from the road when completed; 7, cost of maintenance and operation of road when completed between San Francisco and Santa Cruz; 8, present value of that portion of the road operated from San Francisco including terminal facilities; 9, present value of road from Santa Cruz, including terminals; 10, value of all other work done on the right-of-way; 11, estimate of values of all properties now owned by the road, not covered by sections 8, 9 and 10."

American Railways, Philadelphia, Pa.—The Scranton, Dunmore & Moosic Lake Railroad, which, as stated in the issue of the Electric Railway Journal for Feb. 12, 1910, page 294, has been taken over by the American Railways, has filed a certificate of increase in its capital stock from $100,000 to $250,000.

Brunswick Terminal & Railway Securities Company, Brunswick, Ga.—At the annual meeting of the Brunswick Terminal & Railway Securities Company the board of directors was increased from 8 to 11, and the following new directors were elected to fill two vacancies in the board and to provide the three additional members: E. H. Mason, F. D. M. Stratchan, F. D. Aiken, T. D. Rhodes and Willard B. King.

Camden & Trenton Railway, Camden, N. J.—The United States Court of Trenton has issued an order for the sale of the property of the Camden & Trenton Railway under foreclosure.

Citizens' Electric Company, Eureka Springs, Ark.—The property of the Citizens' Electric Company will be offered for sale on Feb. 26, 1910, at the court house in Eureka Springs in accordance with a decree of the Carrol Chancery Court entered on Jan. 19, 1910. The sale is to satisfy a judgment for $208,000 rendered in favor of the Fidelity Trust Company.

Macon Railway & Light Company, Macon, Ga.—A. L. Dasher was elected as an additional member of the board of directors of the Macon Railway & Light Company at the recent annual meeting of the company.

Manila Electric Railroad & Lighting Corporation, Manila, P. I.—The Manila Electric Railroad & Lighting Corporation has filed at Hartford, Conn., a certificate of the increase of its authorized capital stock from $6,000,000 to $8,000,000. The Manila Suburban Railways, which is controlled by the Manila Electric Railroad & Lighting Corporation, has also filed notice of an increase of its authorized capital stock from $500,000 to $1,000,000.

New York, New Haven & Hartford Railroad, New Haven, Conn.—In his report for the year ended Jan. 19, 1910, Attorney-General Malone of Massachusetts says that since the ownership and control of the stock of the Boston & Maine Railroad by the New York, New Haven & Hartford Railroad have been sanctioned by the Legislature of Massachusetts the bills in equity against the Worcester & Webster Street Railway and the Webster & Dudley Street Railway to prevent their control by the New York, New Haven & Hartford Railroad may properly be dismissed.

North American Company, New York, N. Y.—The North American Company has voted to prepay $1,000,000 of its 5 per cent gold notes which mature in 1912 and is offering to redeem them at par and interest.

Ontario & San Antonio Heights Railroad, Ontario, Cal.—The Ontario & San Antonio Heights Railroad has applied to the Secretary of State of California for permission to increase its capital stock from $50,000 to $1,000,000, to provide funds for improvements and for the construction of an extension to connect with the lines of the Pacific Electric Railway, at Pomona.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—The Pittsburgh, Harmony, Butler & New Castle Railway has applied to the Secretary of State for authority to increase its capital stock from $3,000,000 to $3,500,000 for the purpose of extending its line and purchasing new equipment.

Providence & Danielson Railway, Providence, R. I.—The introduction of a bill in the Rhode Island Legislature to form the Southern New England Railway with authority to issue $3,000,000 of stock and $6,000,000 of bonds to build a railroad from Palmer, Mass., to Providence, has given rise to the rumor that the Grand Trunk Railway of Canada has acquired control of the Providence & Danielson Electric Railway, the president of which, together with officers of the Grand Trunk Railroad, is among the incorporators mentioned for the Southern New England Railway.

Stark Electric Railroad, Alliance, Ohio.—The directors of the Stark Electric Railroad have declared the usual quarterly dividend of ¾ of 1 per cent and a stock dividend of 25 per cent payable April 1, 1910, on stock of record on March 25, 1910. The capital stock of the company is $1,000,000, and the stockholders will be asked to authorize an increase in stock to $1,500,000.

Toledo & Indiana Traction Company, Toledo, Ohio.—Articles of incorporation for the Toledo & Indiana Traction Company have been filed in Ohio by Charles F. Chapman, Jr., George D. Welles, Frank W. Caughling, Eugene H. Winkworth and Frank E. Miller. The company has a preliminary capital of $10,000 and will succeed the Toledo & Indiana Railway, the property of which was sold under foreclosure recently to C. S. Schenck representing the bondholders.

Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y.—Newell Martin, who was appointed referee in proceedings brought by the Central Trust Company to foreclose a mortgage of $1,500,000 on the Twenty-eighth & Twenty-ninth Street Crosstown Railroad and to determine whether the mortgaged property should be sold entire or in parcels, reported on Feb. 10, 1910, that the property should be sold entire. According to Mr. Martin the amount due under the mortgage is $1,639,167. He directed that the property be sold on the default of interest in October, 1908, and April, 1909. The mortgage, which was made in 1896, was guaranteed by the Metropolitan Street Railway.

West Penn Railways, Connellsville, Pa.—The stockholders of the West Penn Railways will vote on Feb. 23, 1910, on substantially the following proposal from the American Water Works & Guarantee Company: "To take over the common stock of the railways and issue therefor 5 per cent cumulative preferred stock of a new company to the amount of 50 per cent of the face value of the common stock of the West Penn Railways, the new preferred stock to be guaranteed by the American Water Works & Guarantee Company as to dividends for a period of 21 years and also to give the holder of common stock of the company an amount of the common stock of the new company equal to the face value of his holdings in the West Penn Railways. The American Water Works & Guarantee Company would also take over the bonds that may be issued for improvements during the next two years at a price satisfactory to the West Penn Railways."

Traffic and Transportation

Conclusions of New York Commission in Case Upholding Collection of Excess Fare

In the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, the conditions were given under which the Public Service Commission of the Second District of New York, in the case of James Morris, Albion, N. Y., against the Buffalo, Lockport & Rochester Railway, held that an interurban electric railway was justified in charging an excess fare to passengers boarding a car at a station who had failed to secure tickets. The conclusions of the commission on which the conditions were prescribed follow:

"Although the arguments in this case are partly based upon provisions in the Railroad Law fixing maximum fares for railways and permitting steam railroads to charge an excess fare when a ticket has not been purchased by the passenger, the real question presented is whether, under all the circumstances, the charging by respondent of an excess above its regular ticket fare is reasonable and just.

"If respondent had a ticket office at each of the points where its cars stop to take on and let off passengers and every such ticket office were kept open at all times when the cars are running, the complainant's contention that respondent's practice of charging an excess above the ticket fare when no ticket is presented on the car to the conductor should be dismissed with little consideration. An interurban railroad is entitled to make proper regulations for the collection of its fares, and requiring a passenger at a ticket station to purchase a ticket for delivery to the conductor with provision in case of failure for collection of an excess charge of 5 cents to be refunded at any ticket office upon demand seems to be entirely reasonable.

"The facts show, however, that the respondent has 12 ticket stations on its line of 54 miles. The other stops made by its cars, outside of incorporated villages, are 47 in number and these include every highway crossing. Apparently, therefore, at every point where respondent's line may be reached by street or road its cars will stop to take on and let off passengers. Upon such showing the general convenience of the public in using the road seems to be fully served.

"In the very nature of the situation it is impracticable for the respondent to maintain a ticket office at every point where a passenger may board its cars.

"The tables do not show that the respondent is reaping an excessive revenue from unredeemed excess fares. These tables show an aggregate of 81,097 duplex tickets issued in a period of three months, and 76,200 redeemed in the same period, leaving 4,897 receipts unredeemed. During that period the redemption value of duplex receipts issued was $4,054.85, and the value of those redeemed was $3,810, leaving a balance of $244.85 in the hands of the company as excess revenue. This balance would probably have been somewhat reduced if the company had not in practice limited the time for redemption to 30 days. The great number of redemptions tends strongly to indicate that the travel is very largely to and from ticket selling points where duplicate receipts may be redeemed. In June, as the tables show, there were nearly as many duplex receipts redeemed as were issued, the excess of issue above redemption being only 233.

"Most interurban railways covering a considerable distance have adopted methods whereby a check may be obtained upon cash fares. Of those used from time to time none has proved so effective in the judgment of the railway managers as the duplex excess fare receipt, which is in fact a redemption certificate. The system operates to furnish the interurban railway with a check upon all but a few of its cash fares. When a passenger gets on a steam train at a non-ticket station the law forbids collection of the excess fare of 10 cents, and this prohibition applies to any ticket station where tickets may not be purchased during half an hour previous to the schedule time of the train. The steam railroad train stops at regular stations as a rule. The interurban railway stops its cars at numerous convenient points along its line, and in cities and most villages a passenger may board the car at any street corner. The conditions differ so greatly that comparison for the purpose of applying a like rule to both is inadmissible. The right of the interurban railway to insist upon the use of tickets at ticket stations, the impracticability of maintaining ticket offices at all points where passengers—for the convenience of the public—are and should be received for transportation, and the importance to the company of having a check or tally upon its cash fares which corresponds as nearly as may be to the check or tally afforded by a ticket, are controlling considerations.

"In our view, where the interurban railway has provided a sufficient number of ticket stations properly distributed along its line, with numerous stops at non-ticket points to take on and discharge passengers, and where the percentage of unredeemed duplex receipts for required excess cash fares is small, showing that convenient opportunities for redemption of duplex receipts exist and are actually used by passengers paying the excess fare, a complaint that the exaction of a 5-cent excess fare with redeemable duplex receipt issued thereon is unreasonable or unjust should not be sustained. In so holding we, of course, express no opinion that respondent is now maintaining a sufficient number of ticket stations for all purposes, but it does appear, so far as indicated by the evidence in this case, that the number of ticket stations and their location are sufficient to afford convenient opportunities for redemption of these duplex receipts.

"The complainant challenges only the legality of the excess fare practice. He does not contend that any fare is unreasonable in amount. Therefore, the question whether the cash fare as collected by respondent for very short distances is unreasonable or is in contravention of any provision of the Railroad Law when by addition of the 5-cent excess charge it exceeds 3 cents per mile is not distinctly presented and no opinion thereon is expressed. We say now merely that the matter should be given careful consideration by the respondent company.

"In our opinion, the time limit of 30 days in respondent's tariff of passenger fares for redemption of the duplex receipts is too short. The time limitation should be sufficiently long to cover inadvertent omissions to promptly present the duplex receipts for redemption. We see no reason why a limitation period of three months may not be specified in the tariffs as a reasonable regulation, in case a time limitation upon the redemption of these excess fare receipts is considered necessary by the company. The duplex receipt as issued by the company does not specify the 30 days' limitation for redemption. The company should amend its tariff, either by striking out the time limit for redemption altogether or by inserting a time limit of not less than three months, and in case a time limitation for redemption is continued by the respondent such limitation should appear upon the duplex receipt itself.

"The complaint so far as it challenges the legality of the collection by respondent of an excess cash fare of 5 cents and the issuance of redeemable duplex receipts therefor should be held not sustained, but the respondent should be required to redeem such duplex receipts for excess cash fares at any time within three months after issue or such longer time as it may elect and amend its tariff by providing such time limitation of not less than three months or by striking from the tariff any limitation clause whatsoever; and it should also, in case it continues the time limitation, plainly show such limitation of not less than three months upon its duplex receipts."

Wheel Guard Order Modified

As a result of rehearings held before Milo Roy Maltbie, of the Public Service Commission of the First District of New York, on Jan. 15, Jan. 17, Jan. 19, Jan. 26 and Feb. 1, Feb. 4 and Feb. 8, 1910, the commission has entered the following order respecting wheel guards, abrogating the order of Dec. 24, 1909:

"Ordered, that said order of Dec. 24, 1909, as respects said Brooklyn Heights Railroad, said Brooklyn, Queens County & Suburban Railroad, said Coney Island & Graves end Railway, said Nassau Electric Railroad, said South Brooklyn Railway and said Sea Beach Railway, be and the same hereby is in all respects abrogated; and it is further

"Ordered: 1. That on or before Oct. 15, 1910, said last-

mentioned companies equip all passenger cars operated by them except what are generally known as elevated cars, with wheel guards of a type or types to be approved by the commission and shall not thereafter operate any cars unless equipped with such wheel guards in a good operating condition.

"2. That until Oct. 15, 1910, said last-mentioned companies make a report in writing to the commission on or before the fifteenth day of each and every month stating how many of their cars have been equipped with wheel guards during the preceding month, giving the numbers thereof.

"3. That as soon as any of said last-mentioned companies shall have equipped with such wheel guards any of its cars operated over the Brooklyn Bridge, over the Williamsburg Bridge, on what is known as the Broadway Shuttle line, on what is known as the Montague Street Line, on Fulton Street (from Greene Avenue to Tillary Street), on Flatbush Avenue (from Fifth Avenue to Fulton Street); on Broadway (west of Ralph Avenue), on Livingston Street (from Flatbush Avenue to Court Street), on Lafayette Avenue (from Fulton Street to Flatbush Avenue), on Washington Street and on Adams Street, then such company shall have the right to fold up fenders on cars so equipped when passing over said bridges, lines and streets, within said limits, and be relieved from maintaining fenders on cars so equipped, operated exclusively over said bridges, lines and streets, within said limits.

"4. That all of said last-mentioned companies on or before March 15, 1910, submit to the commission for its approval complete drawings and specifications showing, among other things, all measurements and the method of attachment to the car of the type or types of wheel guards desired to be used by them in compliance with this order; and it is further

"Ordered, that this order shall take effect on Feb. 11, 1910, and shall remain in force until modified or abrogated; and it is further

"Ordered, that within five days after service of a copy of this order said last-mentioned companies notify the Public Service Commission for the First District whether this order is accepted and will be obeyed."

Statement of Trips by Interurban Cars Into Indianapolis for Year

The following comparative statement of the number of round trips made in Indianapolis by the cars of the interurban railways operating into that city has been made public from the records of the controller of Indianapolis:

	1909.	1908.
Indiana Union Traction Company:		
Muncie division	9,636	9,088½
Logansport division	8,882	8,401
Broad Ripple division	11,840	11,381
Army Post division	6,917	3,518½
Indianapolis & Cincinnati Traction Company	14,524	13,724
Indianapolis, Columbus & Southern Traction Company	12,699	9,517
Indianapolis, Crawfordsville & Western Traction Company	6,935	6,738
Terre Haute, Indianapolis & Eastern Traction Company:		
Northwestern division	6,913	7,830
Eastern division	8,203½	8,088½
Martinsville division	7,077½	7,249
Brazil division	7,308	6,966½
Danville division	5,373	6,182
Grand totals	106,308	98,686

During 1909 5,156,875 passengers arrived and departed from the interurban terminal station at Indianapolis.

Decision of Massachusetts Commission in Hamilton Fare Case

The Railroad Commission of Massachusetts has issued a decision sustaining the Boston & Northern Street Railway in regard to its through fares on the Gloucester division, acting upon the petition of citizens of Hamilton for a reduction in fares between Hamilton and adjacent towns. The decision of the commission follows:

"The petitioners request a readjustment of fares on the Gloucester division of the Boston & Northern Street Railway, viz.: Hamilton to Essex, 5 cents; Hamilton to Ipswich, 5 cents; Hamilton to transfer station on Cabot Street, Beverly, 5 cents, and within the limits of Hamilton, 5 cents.

"A careful study of the amount of riding to and from Hamilton on the Gloucester division of the Boston & Northern Street Railway, taken in connection with the established fares, fare limits and territory served in Hamilton, discloses no sufficient reason, in our opinion, for a reduction in the fares between Hamilton and the towns and cities named in the petition.

"The distance between the Ipswich and Wenham boundary lines in Hamilton is about 16,000 ft., and while there are few houses near the railway tracks in this distance, we are of the opinion that the citizens of Hamilton are entitled to a 5-cent fare upon this line within the township.

"We therefore dismiss so much of the petition as relates to fares between Hamilton and points outside, but recommend a reduction of the fare within Hamilton."

Freight Service on Pennsylvania Line.—The Southern Cambria Railway, Johnstown, Pa., announced that beginning on Feb. 15, 1910, it would operate a package express service between Johnstown, South Park and intermediate stations.

Service Between Warsaw and Peru.—C. O. Johnson, vice-president and general manager of the Winona Interurban Railway, Warsaw, Ind., announced that beginning on Feb. 14, 1910, the company would inaugurate service between Warsaw and Peru on its new line. The first service was to consist of a car operated to Akron from Warsaw and another from Akron to Peru, making Akron the transfer point. The freight service will consist of one car, making a round trip daily between Warsaw and Peru.

Shelters on Staten Island.—The Public Service Commission of the First District of New York held a hearing recently to determine whether the Staten Island Rapid Transit Company and the Staten Island Railway should be required to construct additional shelter and waiting rooms at St. George terminal. The companies hold that the city is obliged to provide waiting rooms. The Dock Department maintains that the city has provided adequate rooms for ferry passengers and is under no obligation to provide waiting rooms for the railroads.

Increase in Wages in Columbus, Ga.—The Columbus (Ga.) Railroad announced at a smoker tendered recently to its employees that the company had decided to increase the wages of its motormen and conductors, the increase to date from Jan. 1, 1910. The new scale follows: First 6 months, 14 cents an hour; next 18 months, 15 cents an hour; next 24 months, 16 cents an hour; thereafter, 17 cents an hour. Under the old scale the men received 13 cents an hour the first year; 14 cents an hour the second year, and 15 cents an hour the third year and thereafter. A bonus of 10 per cent is added for efficiency.

Ticket Inspectors in Columbus, Ohio.—The Columbus Railway & Light Company, Columbus, Ohio, has arranged to employ inspectors to look over the tickets, transfers and other property in the possession of conductors at any time, and conductors have been notified to exhibit such property to the inspectors on demand. The conductors have also been directed to punch tickets and transfers as soon as received under penalty of discharge for infractions of the rule. This action has been taken by the company to prevent a repetition of the theft of used tickets by conductors which was discovered some time ago.

Five-Cent Fare Sought to Points Now Part of Birmingham.—In a special message addressed recently to the Aldermen of Birmingham, Mayor O'Brien of that city said: "In view of the fact that Greater Birmingham is united and knit together with one street railway system and we all enjoy a 5-cent fare to and from any point on its line with the exception of Ensley, Pratt City and contiguous territory, I recommend to your honorable body that you instruct the city attorney to investigate all franchises and contracts with the Birmingham Railway, Light & Power Company thoroughly, to the end that if it is possible all sections of Birmingham be in the 5-cent fare limit and that this be accomplished at once if possible."

Change from Near-Side to Far-Side Stops.—The Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne,

Ind., changed on Feb. 1, 1910, the method of stopping its cars from the near side to the far side of the street. The following notice was addressed to the public: "Beginning on Feb. 1, 1910, the practice of stopping cars on the near side of the street will be discontinued and on and after that date cars will stop at the far cross-walk, as formerly, such stopping points being indicated on nearest trolley or telephone pole by newly painted white band. This change is being made primarily because of request of the public, and we must ask the pedestrian and vehicle driver to use utmost caution in crossing tracks because of this change of stopping point."

Service Recommendations in Kansas City.—The recommendations of the Utilities Commission of Kansas City regarding service over the lines of the Kansas City Railway & Light Company, Kansas City, Mo., which were mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, page 262, as having been referred by the City Council to the committee on streets, alleys and grades, prescribe a schedule of from 2 minutes to 8½ minutes on 27 lines between 6 a. m. and 8.30 a. m., from 3 minutes to 10 minutes through the day and from 2 minutes to 8½ minutes from 5 p. m. to 7 p. m. The commission also recommends that the company operate trailers from 6 a. m. to 8.30 a. m. on 33 1/3 per cent of its cars and from 5 p. m. to 7 p. m. on 50 per cent of the cars on all lines where curves or grades do not make the operation of trailers dangerous.

Bulletin on Courtesy.—The Evansville & Southern Indiana Traction Company, Evansville, Ind., has recently addressed the following bulletin on courtesy to its employees over the signature of F. M. Durbin, general manager: "The public judges a railroad corporation very largely by the attitude of the representatives with whom they come in immediate contact. Kindly courtesy upon the part of subordinate officials and employees costs nothing to the employee, but to the railroad it is an asset of great value. The good-will and friendship of the communities served by this company are greatly desired, and the strongest recommendation for promotion an employee in any department can have is the fact that by uniform courtesy and accommodation of patrons he has secured for himself and for the road the good-will and friendship of the community in which he is located. For this reason the employees of the Southern Indiana lines are earnestly urged to extend to patrons of the road every courtesy, and to bear in mind the fact that the whole purpose of the road is to furnish the public the highest class of service possible and that the character of the service—its acceptability to the public—depends in a great measure upon the spirit in which it is rendered."

New York Central Advertises Electrified Suburban Service.—The New York Central & Hudson River Railroad is calling attention to its electrified suburban service out of New York in the daily papers in an advertisement 6 inches wide by 8½ in height, entitled "New York's New Uptown," the places referred to being North White Plains, White Plains, Hartsdale, Scarsdale, Crestwood, Tuckahoe, Bronxville and Mt. Vernon. At the bottom of the advertisement there is a line engraving of an electric train of the company, with the caption "New York Central Electric Suburban Train—Steel Cars—Insuring Safety, Speed and Cleanliness." The statements made in the advertisement follow: "About March 15 the New York Central & Hudson River Railroad completes electrification to White Plains, doubling the territory reached by electric service. This virtually brings into Greater New York, and within night and day reach, two smaller cities, two small towns, two large towns, two villages. Homes to suit all tastes and purses. This solves the problem of living both in the city and out of it. It is only a matter of a few more minutes in the cars to secure lower rents—or your own home or farm—with sure and easy access to the life of the great city when desired. You keep the city income and make only the country expenditures. 'Suburban Homes on the New York Central Lines,' which tells all about available homes, gives complete list of real estate dealers in this territory, as well as the territory served by the Hudson River and Putnam Division, and the West Shore Railroad. Address Advertising Dept., Room 701, Grand Central Station, New York."

Personal Mention

Mr. A. S. Balsdon has resigned as general manager and electrical engineer of the St. Thomas (Ont.) Street Railway.

Mr. Frank Dabney has been appointed controller of the Seattle (Wash.) Electric Company and subsidiary companies.

Mr. L. F. Vosburgh has been appointed assistant general passenger agent of the New York Central & Hudson River Railroad.

Mr. T. M. Childs has been appointed electrical engineer of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., to succeed Mr. Fred Hume.

Mr. Fred Hume has resigned as electrical engineer of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., to engage in the electrical contracting business in Nashville, Tenn.

Mr. A. H. Ford, president and general manager of the Birmingham Railway, Light & Power Company, Birmingham, Ala., has been elected president of the Chamber of Commerce of Birmingham.

Mr. J. B. Copeland has been appointed general manager of the Covington & Oxford Street Railway, Covington, Ga., to succeed Mr. R. C. Guinn, who will continue with the company as secretary and treasurer.

Mr. Geo. H. Earle, Jr., president of the Real Estate Trust Company, Philadelphia, Pa., and a director of the Philadelphia Rapid Transit Company, is the subject of a character sketch in *The Munsey* for February, 1910.

Mr. Joseph Jordan, general manager of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, has been elected second vice-president and a director of the company. Mr. Jordan will also continue as general manager.

Mr. A. W. Q. Birtwell, assistant treasurer of the Tacoma Railway & Power Company, and the Puget Sound Electric Railway, Tacoma, Wash., has been appointed assistant treasurer of the Seattle (Wash.) Electric Company.

Mr. George G. Rose has been appointed passenger agent of the Mahoning & Shenango Railway & Light Company, New Castle, Pa. Mr. Rose was formerly excursion agent of the company in charge of the parks and excursion traffic.

Mr. R. H. Tillman has been appointed industrial engineer with the Consolidated Gas, Electric Light & Power Company, Baltimore, Md. Mr. Tillman was formerly associate engineer of the Rochester Railway & Light Company, Rochester, N. Y.

Mr. George C. Graham resigned as master mechanic of the United Traction Company, Albany, N. Y., on Jan. 15, 1910, to become superintendent of car equipment and shops of the Los Angeles Pacific Company, Los Angeles, Cal., on Feb. 1, 1910.

Mr. Thomas A. Leach, superintendent of Division 1 of the Worcester (Mass.) Consolidated Street Railway, has been appointed superintendent of employment and inspection of the company and will have charge of the school of instruction maintained by the company.

Mr. C. H. Allen, formerly in the auditing department of Stone & Webster, Boston, Mass., has been appointed auditor of the Seattle (Wash.) Electric Company, to succeed Mr. W. E. Wilmot, who has been appointed assistant treasurer of the Puget Sound Electric Railway and the Tacoma Railway & Power Company, Tacoma, Wash.

Mr. W. E. Wilmot, formerly auditor of the Seattle (Wash.) Electric Company, has been appointed assistant treasurer of the Puget Sound Electric Railway and the Tacoma Railway & Power Company, Tacoma, Wash., to succeed Mr. A. Q. W. Birtwell, who has been appointed assistant treasurer of the Seattle (Wash.) Electric Company.

Mr. Fred G. Buffe, in charge of the publicity department of the Illinois Traction System, Peoria, Ill., has contributed an article entitled "W. B. McKinley and His Interurban and Public Utility Work" to *Public Service* for February, 1910. Portraits of Mr. McKinley and Mr. H. E. Chubbuck, general manager of the Illinois Traction System and executive vice-president of the McKinley properties, are reproduced.

Mr. Cyrus A. Whipple has been appointed assistant electrical engineer of the British Columbia Electric Railway, Ltd., Vancouver, B. C., in charge of the company's Fraser Valley extension, which will be more than 60 miles long. Mr. Whipple has recently been engaged in developing the power system of the United States Navy Yard at Bremerton, Wash.

Mr. J. B. McClary, whose resignation as general manager of the Sheffield (Ala.) Company to devote his entire attention to the interest of J. B. McClary & Company, Birmingham, Ala., was noted in the Electric Railway Journal of Feb. 12, 1910, was presented a silver service by the employees of the Sheffield Company on Feb. 7, 1910, as a token of esteem.

Mr. J. B. Gorman, superintendent of Division 2 of the Worcester (Mass.) Consolidated Street Railway, has had his authority extended to Division 1 of the company, Mr. T. A. Leach, the superintendent of that division, having been made superintendent of employment of the company. Mr. Gorman has been given the title of superintendent of transportation of the company.

Mr. Samuel Whinery, a member of the commission appointed by Governor Fort of New Jersey to revalue railroad and canal property in New Jersey, has been retained by Mr. Charles E. Bird, city counsel of Trenton, N. J., to investigate street railway conditions in Trenton and make recommendations to the Council for changes in the operation of the lines in Trenton which he thinks will result in improving the service in that city.

Mr. H. T. Edgar, vice-president and resident manager of the Northern Texas Traction Company, Ft. Worth, Tex., tendered a dinner to the heads of the departments of the company at the Hotel Seibold, Ft. Worth, Tex., recently. Among the officers of the company who attended were: Mr. J. H. Du Fresne, assistant treasurer; Mr. W. C. Forbes, general passenger and claim agent; Mr. G. H. Clifford, general superintendent; Mr. W. L. Weston, assistant to the general superintendent; Mr. M. F. Mills, purchasing agent; Mr. E. E. Nelson, electrical engineer; Mr. E. L. White, engineer of the power station; Mr. Theodore Taylor, and Mr. J. E. Gallagher, master mechanics, and Mr. W. L. Hunter, roadmaster.

Mr. William H. Evans, whose appointment to the newly created position of industrial agent of the Illinois Traction System, Peoria, Ill., was noted in the Electric Railway Journal of Feb. 12, 1910, page 297, will devote his attention to stimulating the grain business along the lines of the company, and to installing elevators at regular intervals from which grain will be shipped over the lines of the Illinois Traction system by way of the Chicago & Eastern Illinois Railroad, connecting at Glover to Chicago. Mr. Evans is a prominent farmer of Logan county and a large shipper of grain and is well known among the farmers of the corn belt of Illinois. The Illinois Traction System has built a number of grain elevators along its line and is preparing to handle large quantities of grain.

Mr. E. C. Foster, whose resignation as second vice-president of the New Orleans Railway & Light Company, New Orleans, La., was announced in the Electric Railway Journal of Jan. 22, 1910, has become associated with Sanderson & Porter, New York, N. Y., and is prepared to examine street railway, electric light and gas properties and to advise concerning their value and operation. Mr. Foster became connected with the public utility companies in New Orleans in May, 1903, when he resigned as vice-president and general manager of the Boston & Northern Street Railway, Boston, Mass., to accept the position of president and manager of the New Orleans (La.) Railways Company. Subsequently, the New Orleans Railway & Light Company was organized and Mr. Foster was elected president of the company and continued in that capacity until about a year ago, when he was elected to the position of second vice-president of the company. Mr. Foster has always taken an active interest in the work of the American Street Railway Association and of the American Street & Interurban Railway Association, and on several occasions has contributed valuable discussions to their proceedings and to the technical press. He was the author of an article on "Early Railroading in New England," which appeared in the historical number of the Street Railway Journal in October, 1904.

Mr. H. E. Chubbuck, general manager of the McKinley Syndicate properties, has also been elected executive vice-president of the properties. Mr. Chubbuck is next in authority to Mr. William B. McKinley, president, in the 39 public service companies owned by the Illinois Traction System and the Western Railways & Light Company, which have a combined trackage of 700 miles and serve the principal cities of Central Illinois. Mr. Chubbuck was appointed general manager of these properties in October, 1908, and his election as vice-president is in recognition of the work which he has done in cementing the personnel of the many McKinley properties into a harmonious organization. Mr. Chubbuck has been associated with Mr. McKinley for 12 years, first as general manager of the Quincy property and later as general manager of the Illinois Valley Railway. In early life Mr. Chubbuck gained a knowledge of electrical matters from his association with the Telegraph Manufacturing Company, of which his father, Mr. A. S. Chubbuck, was one of the organizers. This company built the first telegraph instruments used in commercial service. Subsequently Mr. Chubbuck served with the Thomson-Houston Company and the General Electric Company for a number of years. During his connection with the General Electric Company Mr. Chubbuck installed and managed plants at Auburn, N. Y.; Springfield, Ohio; Omaha, Neb.; Pueblo, Col.; Quincy, Galesburg and La Salle, Ill. He is secretary of the Illinois State Electric Association.



H. E. Chubbuck

Changes in the Organization of the McGraw Publishing Company

James M. Wakeman, for the past 11 years vice-president of the McGraw Publishing Company, resigned this office at the recent annual meeting of the company. While not in serious ill-health, Mr. Wakeman feels it desirable to be relieved from business cares in order to recover his former physical condition, and his future plans include a visit of a year or more to Europe for a complete rest. After a successful connection of some years with the *American Machinist* and *Locomotive Engineering*, Mr. Wakeman joined the McGraw Publishing Company at its formation in 1899 and was one of its incorporators. As the chief assistant in the management of the company he has been a strong factor in the success which it has achieved, and has guided its business career along the broadest lines and with rare ability. The departure of Mr. Wakeman will be a source of the keenest regret to his associates, and without doubt also to the host of friends he has made in the electric railway field. Mr. Wakeman will not retire immediately, but will continue for several months as a director of the company and in active work.

Hugh M. Wilson will occupy the office of vice-president of the McGraw Publishing Company made vacant by the resignation of J. M. Wakeman. Mr. Wilson needs no introduction to the readers of the Electric Railway Journal. The greater part of his active business of 23 years since graduation from college has been passed in technical journalism, and as publisher of *The Railway Age* and the Electric Railway Review he gained an enviable reputation as an enterprising, successful and constructive manager of newspaper properties. He sold his interest in these publications early in 1908 and later became vice-president of the Barney & Smith Car Company, an office which he has just resigned to take up his present work. A biographical sketch of Mr. Wilson was published in the personal column of this paper on July 17, 1909.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Decatur Southern Traction Railway, Decatur, Ill.—To cover some legal technicalities this company has been reincorporated under the same name and with the same officers. [E. R. J., Feb. 12, '10.]

Davenport-Muscatine Railway, Davenport, Ia.—Chartered in Iowa for the purpose of building an electric railway between Davenport and Muscatine. Capital stock, $100,000. Officers: J. F. Porter, president; J. R. Lane, vice-president, and H. E. Weeks, secretary and treasurer. Directors: John G. Huntoon and R. R. Lane. [E. R. J., Dec. 11, '09.]

***Minster & Loramie Railway, Minster, Ohio.**—Incorporated in Ohio for the purpose of building an electric railway from Loramie to Minster. It will connect with the Minster branch of the Western Ohio Railway at Minster and, it is said, will be operated as part of that system. Capital stock, $100,000. Incorporators: F. D. Carpenter, E. C. Riddie, C. C. Collins and E. L. Herr, Minster.

Toledo & Indiana Traction Company, Toledo, Ohio.—Articles of incorporation have been filed in Ohio by this company which will succeed the Toledo & Indiana Railway, the property of which was sold under foreclosure recently to C. S. Schenck representing the bondholders. Initial capital stock, $10,000. Incorporators: Charles F. Chapman, Jr., George D. Welles, Frank W. Caughling, Eugene H. Winkworth and Frank E. Miller.

Chickasha (Okla.) Street Railway.—Incorporated in Oklahoma to construct a 6-mile electric railway in Chickasha and into parts of Grady County. Capital stock, $150,000. Directors: Charles F. Woodward and W. Raymond Emerson, Wakefield, Mass.; Lawrence Martin, R. D. Welborne and W. P. Weston, Chickasha. [E. R. J., June 12, '09.]

***Albany (Ore.) Interurban Railway.**—Chartered in Oregon for the purpose of building an electric railway from Albany to Sweet Home via Lebanon, Brownsville and Holley. Capital stock, $25,000. Incorporators: P. A. Young, C. E. Sax and J. F. Hawkins.

***Spartanburg & Greenville Railway, Greenville, S. C.**—Chartered in South Carolina to build a 31-mile electric railway from Greenville to Butler, Chick Springs and Spartanburg. Headquarters, Greenville. The railway will haul both passengers and freight. Capital stock, $400,000. Officers: Charles W. Ellis, president; H. H. Price, vice-president, and C. H. Yates, secretary and treasurer.

FRANCHISES

Albany, Cal.—M. R. Jones, representing the East Shore & Suburban Railway Company, Richmond, has applied to the Albany trustees for an electric railway franchise. This is part of a plan to connect Richmond, Stege, San Pablo, Rust, Albany, and Point Richmond with the Southern Pacific Company's electrified lines.

Los Angeles, Cal.—The City Council has sold a franchise to the Los Angeles Railway for an extension of its line on Thirty-ninth Street from Agricultural Park, 1 mile west.

Pomona, Cal.—The Pacific Electric Railway, Los Angeles, has been granted a 30-day extension on its franchise for the construction of its railway in Pomona.

San Bernardino, Cal.—The Board of Supervisors has granted a 49-year franchise to W. W. Pool to operate a railway over certain streets in San Bernardino County. [E. R. J., Jan. 1, '10.]

Jacksonville, Ill.—The Morgan County Commissioners have granted a franchise to the Springfield & Jacksonville Electric Railway to build a railway through Morgan County. It is the intention of this company to have the interurban railway between Springfield and Jacksonville in operation by July 1. [E. R. J., Jan. 15, '10.]

Ottawa, Ill.—The Northern Illinois Light & Traction Company has been granted a 20-year franchise by the City Council to operate its railway throughout the city and also to furnish power for lighting purposes. The ordinance also empowers the company to operate its cars over the new Illinois River bridge.

Fremont, Neb.—The Nebraska Transportation Company, Omaha, has applied to the City Council for a franchise to build an electric railway through Fremont. The proposed railway will connect Omaha and Fremont. C. W. Baker, president. [E. R. J., Nov. 20, '09.]

Englewood, N. J.—The Hudson River Traction Company, Hackensack, has applied to the Common Council for a franchise to continue to extend its railway to Highwood.

Altoona, Pa.—The committee on public works has made a favorable report permitting the Johnstown & Altoona Railway to enter Altoona using the tracks of the Altoona & Logan Valley Electric Railway for a period of 65 years. The Council of Cresson has granted the company a franchise to use some of its principal streets for its projected railway. Wallace Sherbine, Wilmore, president.

Butler, Pa.—The Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, has applied for a franchise to build a single-track railway over a number of highways.

Dunmore, Pa.—The City Councils have granted a franchise to the Scranton & Lake Shore Railway for a street railway over East Drinker Street, it being the plan of the company to build a line from Scranton to Lake Ariel. Among those interested are: William F. McGee, Walter Haslan, Scranton; J. J. Reagan, Dunmore, and Richard Foote, Archbald. [E. R. J., Jan. 29, '10.]

***Provo, Utah.**—It is stated that A. J. Evans, S. L. Chipman, Geo. C. Whitmore and Geo. W. Craig, Provo, have applied to the County Board for a franchise to construct an electric railway through Utah County. Application has also been made to the Council of American Forks for a franchise.

Kent, Wash.—The Valley Railroad & Power Company has applied to the City Council for a 35-year franchise to operate an electric railway in Kent. The proposed railway will connect Kent and Renton. A. T. West, Seattle, general manager. [E. R. J., Feb. 12, '10.]

TRACK AND ROADWAY

Northern Electric Railway, Chico, Cal.—This company has secured rights-of-way across Los Molinos colony, 12 miles below Red Bluff. The deeds were granted free on condition that the railway be extended from Chico to Los Molinos by the end of the year and on to Red Bluff before the close of 1911. The company expects to soon build from Yuba City to Hamilton City via Meridan and Colusa. As soon as the company secures permission of Sacramento and Yolo Counties and the Government to erect a bridge across the Sacramento River the extension of the line to Woodland will be undertaken.

Peninsular Railway, San José, Cal.—F. E. Chapin, vice-president and general manager of this company, announces that the electric railway between Palo Alto and San José has been completed and will be ready for operation about March 1.

Georgia Railway & Electric Company, Atlanta, Ga.—Improvements contemplated by the Georgia Railway & Electric Company call for the expenditure of approximately $700,000. The work to be done includes the construction of 8 miles of new track practically as additional or double track along parts of the present system.

Griffin, Ga.—B. R. Blakely, Griffin, confirms the report that he is interested in a plan to construct an electric railway in Griffin, and states that a charter will be applied for within the next few days. [E. R. J., Feb. 12, '10.]

Chicago, Ottawa & Peoria Railway, La Salle, Ill.—The eastern extension of the Illinois Valley division of the Chicago, Ottawa & Peoria Railway between Seneca and Morris, Ill., 10.5 miles, was put into operation on Feb. 2, with cars on 90-minute headway. This extended service gives the McKinley Syndicate properties a line to within 20 miles of Joliet. Current is distributed to the cars over a No. 000 trolley wire supported from a 7/16-in. messenger by five-point suspension on private right-of-way and nine point suspension in towns. The Electric Railway Equip

ment Company, Cincinnati, Ohio, furnished the catenary material.

*Sterling & Northern Railway, Sterling, Ill.—This company is said to have been organized by William Osborne and others of Sterling for the purpose of constructing an electric railway from Sterling to Savanna and Freeport. Application will soon be made for a charter for the line. Capital stock, $300,000. Headquarters, Sterling.

Dixon, Rock Falls & Southwestern Electric Railway, Tampico, Ill.—This company advises that as soon as the weather permits, work on the extensions will be begun to complete the line from Tampico into Rock Falls and Dixon, and from Hooppole to Geneseo, Ill. The general contract of construction work on this railway has been given to Burns & Company, which purchases all supplies and awards all sub-contracts. An order has been placed with the Illinois Steel Company for 40 miles of steel rails. A portion of this order is for the Dixon, Rock Falls & Southwestern Railway.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind.—This company, which proposes to build a 40-mile electric railway from Bluffton to Celina, Ohio, advises that it expects to resume work on the line in the spring. It will also pass through Vera Cruz, Linn Grove, Geneva, New Corydon, Ind., Sheels and Dublin, Ohio. Surveys have been completed from Bluffton to Geneva, 18½ miles, and the remainder of the route from Bluffton to Geneva, 21½ miles, is now being surveyed. Grading and overhead work have been completed from Bluffton to Geneva. Eleven bridges will be built, including one across the Wabash River. It is intended to distribute power to the cars at 600 volts d.c. Headquarters: Bluffton. L. C. Justus, Bluffton, president; Fred Davenport, Bluffton, chief engineer. [E. R. J., Dec. 4, '09.]

Louisville & Northern Railway & Light Company, New Albany, Ind.—This company is considering plans for building a new bridge to replace the Indiana & Kentucky bridge which now controls the route into Louisville from the north.

Hannibal Railway & Electric Company, Hannibal, Mo.—This company states it intends to build 3 miles of new track this year. J. S. Mainland, purchasing agent.

Kansas City, Ozarks & Southern Railway, Kansas City, Mo.—This company which is now operating between Mansfield and Ava will extend the line this year from Ava to Gainsville, a distance of 35 miles.

Whitefish & Polson Electric Railway, Kalispell, Mont.—This company has begun the preliminary surveys for its projected electric railway from Kalispell northward to Whitefish and southward through Somers to Polson on the west shore of Flathead Lake. G. H. Adams, J. H. Stevens and Peter Nilson are interested. [E. R. J., Jan. 8, '10.]

*Fredericton (N. B.) Street Railway.—This company is said to be considering a plan to construct an electric railway which will connect St. Mary's, Gibson, Marysville and Nashwaasksis on one side of the river and Springhill and Victoria Mills on the other side. The company will soon apply for a charter. H. H. Hanson, Fredericton, solicitor.

*Hicksville, N. Y.—Raymond Smith, Oyster Bay, and other prominent business men of Oyster Bay and Hicksville are considering plans to build an electric railway from Oyster Bay to Hicksville, Central Park and Farmingdale, connecting with the cross-island line at Amityville.

Columbus, Marion, Upper Sandusky & Toledo Traction, Marion, Ohio.—Surveyors are at work on this projected railway between Toledo and Columbus via Upper Sandusky, Carey and Fostoria. Frank M. Ohl, Toledo, is interested. [E. R. J., Aug. 1, '08.]

Oklahoma (Okla) Railway.—This company advises that it is building 3 miles of track using 100-lb. rails and steel ties in a concrete base. W. A. Haller, engineer.

Shawnee (Okla.) Electric Railway.—This company states that work will be begun within a few days on its projected 40-mile electric railway to connect Shawnee, Dale, McLoud, Harrah, Choctaw City, Spencer and Oklahoma City. Contracts for the construction of the railway have been let to the Shawnee Railway Construction Company. Power will be purchased. It is planned to build repair shops at McLoud and nine cars will be operated. Franchises have been obtained in the towns of McLoud, Harrah and Choctaw, and arrangements have been made for entrance into Oklahoma City over the Oklahoma Railway Company's tracks and into Shawnee over the local city railway tracks. Two surveys have been made and parties are now in the field making permanent location. Most of the right of way over the entire route has been secured. Capital stock authorized and issued, $1,300,000, of which $1,000,000 is common and $300,000 preferred. Bonds, authorized, $1,000,000. Standard Trust Company, New York, will act as trustee under mortgage. Officers: C. T. Edwards, Shawnee, president; J. W. Ruby, Shawnee, first vice-president; J. C. Chrisney, second vice-president; R. E. Pugh, Shawnee, secretary, and A. Hardgrave, Shawnee, general manager and purchasing agent. [E. R. J., Jan. 29, '10.]

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—This company has applied for permission to increase its capitalization from $3,000,000 to $3,500,000 to provide for contemplated extensions in the Butler district. The company will extend its tracks to Lawrence Avenue, Ellwood. It is said that an extension to Beaver via Koppel is also probable. This line would be about 6½ miles in length and would connect with the Pittsburgh Railways.

Montreal & Southern Counties Railway, Montreal, Que.—This company, which recently placed part of its line in operation, announces that it will construct 10 miles of new track and will electrify a section of steam railroad track, 15 miles long.

South Dakota Interurban Railway, Centerville, S. D.—This company announces that most of the right-of-way from Bijou Hills to Sioux City has been secured and that work will be started as soon as the weather permits. Steps are being taken to have Chamberlain made the western terminus. The projected electric railway will extend from Chamberlain to Bijou Hills, Parkston and Sioux City. Officers: W. E. Miller, president, and F. E. Graves, secretary and treasurer. [E. R. J., Nov. 13, '09.]

Dallas (Tex.) Traction Company.—This company announces that it will begin construction within two months on its proposed street railway from Mount Auburn addition to a point where connection will be made with the consolidated lines of the city. Power to operate the line will be leased. The company has not yet been incorporated. Capital stock, $25,000. Main office, 334-336 Commerce Street. E. L. Lancaster, general manager. [E. R. J., Jan. 29, '10.]

Fort Worth, Mineral Wells & Western Railroad, Fort Worth, Tex.—This company is closing up all preliminary matters preparatory to awarding the contracts for the construction of its proposed 54-mile electric railway from Fort Worth to Mineral Wells via Weatherford, and later on to Roswell, N. M. About $80,000 have been subscribed. J. S. Hanford, Beaumont, president. [E. R. J., Oct. 23, '09.]

Valley Railway & Power Company, Kent, Wash.—This company advises that it has not yet definitely decided when it will begin work on its proposed 7-mile railway between Kent and Renton. It is probable that work will be started about Aug. 1. The project is being financed entirely by local capital. The motive power has not as yet been determined upon. Capital stock, $300,000. Officers: H. B. Madison, Kent, president; Robert Bridges, Orillia, vice-president; Isaac P. Calhoun, Kent, secretary; Thomas Chipman, O'Brien, treasurer; A. T. West, Seattle, general manager; A. S. Leeper, Kent, chief engineer. [E. R. J., Jan. 29, '10.]

Spokane & Inland Empire Railroad, Spokane, Wash.—This company proposes to double track 12 miles of its Cœur D'Alene division, and will relocate 1 mile of track on the same section.

Vancouver (Wash.) Traction Company.—This company has nearly completed its 6-mile extension from Vancouver to Orchards. It is expected to have this new line in operation by March 1. A. Welch, purchasing agent.

SHOPS AND BUILDINGS

Phoenix (Ariz.) Railway.—This company's car house in Phoenix was recently destroyed by fire. Four cars and 3000 ties which were stored in the building were burned. The total loss is said to have been $22,000.

Georgia Railway & Electric Railway, Atlanta, Ga.—This company will build machine shops in Atlanta to be 100 ft. x 150 ft. in size.

Chicago, South Bend & Northern Railway, South Bend, Ind.—This company has leased the Albright Building in Goshen and will remodel it into an interurban station to be used by the Northern Indiana Railway, South Bend, and the Winona Interurban Railway, Winona Lake.

Indianapolis & Louisville Traction Company, Louisville, Ky.—This company has awarded a contract for building a new freight and passenger station at Scottsburg, Ind., to John T. Wiley & Son, Louisville, Ky. The Cincinnati, Madison & Western Traction Company, Indianapolis, when completed, will also use the new station with offices on the second floor. A special siding will be built to facilitate the handling of freight.

Interborough Rapid Transit Company, New York, N. Y.—This company has filed plans for the building of a new car house at the northeast corner of Spuyten Duyvil road and 242d Street. The building will be two stories high, 530 ft. x 89 ft. and is to cost $100,000.

People's Railway, Dayton, Ohio.—This company has begun work on its new car house in Dayton, to be 115 ft. x 245 ft. in size. The Hall-Cronan Company has the contract. [E. R. J., Jan. 22, '10.]

Pittsburgh (Pa.) Railways.—This company has purchased property 400 ft. x 400 ft. at Forbes Street and Croft Avenue, in the Oakland district, on which it will erect a car house to have a storage capacity of 250 cars. Plans for the building have not yet been completed.

POWER HOUSES AND SUBSTATIONS

Nelson (B. C.) Electric Tramway.—This company has awarded a contract to the Allis-Chalmers-Bullock Company, Montreal, for a 250-kw motor generator set. [E. R. J., Jan. 1, '10.]

Athens (Ga.) Electric Railway.—This company advises that it has contracted with the Amburson Hydraulic Construction Company, Boston, to build a reinforced concrete dam of the gravity type at the site of its power plant at Barnett Shoals. [E. R. J., Nov. 20, '10.]

Georgia Railway & Electric Company, Atlanta, Ga.—The appropriation of $700,000 by the Georgia Railway & Electric Company for improvements to be made during 1910, includes the setting aside of $200,000 for improvements to the light and power plants of the company. Out of this sum $85,000 is for additional machinery for the steam-electric plant and the balance, $115,000, is for the extension of the distribution system for the light, power and steam heat to care for new business of the company.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company will install a new substation on its Dunreith-Newcastle division. D. F. Roach, Terre Haute, purchasing agent.

Sioux City & Spirit Lake Railway, Sioux City, Ia.—This company is reported to be contemplating the construction of a new power house and substations and will require equipment for same, including steam turbines and generators with a rating of 4000 hp, tubular boilers, condensers, pumps, heater, transformers, rotary converters, switchboards, etc. J. D. Browning, Sioux City, general manager. [E. R. J., Nov. 6, '09.]

Boston & Northern Street Railway, Boston, Mass.—This company will reconstruct its power plant on Merrimack Street. Among the improvements to be made are the installation of two high-pressure boilers and a 1200-kw generator. A 150-ft. chimney with a 19-ft. base will also be erected. G. W. Palmer, Jr., Boston, electrical engineer.

Durham (N. C.) Traction Company.—This company is considering the purchase of 2 250-hp water-tube boilers of 175-lb. steam pressure. An order has been placed recently for 1 1000-hp Hamilton-Corliss engine, direct connected to a General Electric 600-kva, 2300-volt, 3-phase, 60-cycle generator.

West Penn Railways, Pittsburgh, Pa.—This company has placed an order with the Westinghouse Electric Manufacturing Company for 2 12,000-hp steam turbines and 2 200-hp turbines. [E. R. J., Feb. 5, '10.]

Manufactures & Supplies

ROLLING STOCK

American Railways, Philadelphia, Pa., is in the market for a pair of electric motor trucks.

Pittsfield (Mass.) Electric Street Railway will buy a number of new motor cars soon.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., is considering the purchase of five suburban cars.

Ocean Electric Railway, Far Rockaway, N. Y., has ordered six cars from The J. G. Brill Company.

Interborough Rapid Transit Company, New York, N. Y., is contemplating the purchase of 75 additional cars equipped with side doors.

Emigration Canyon Railroad, Salt Lake City, Utah, has ordered an electric locomotive from the Westinghouse Electric & Manufacturing Company.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., has ordered two steel cars from the Standard Steel Car Company, it is reported.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., is in the market for two cars, to be equipped in the company's shops. The cars may be bought second-hand.

Brooklyn Heights Railroad, Brooklyn, N. Y., has ordered an electric locomotive from the General Electric Company. The company expects to build a car in its shops for the collection of rubbish.

Gustave Testart, Domaine des Deux Frances, Chemins Gouin, Quebec, Can., is making inquiries regarding three locomotives weighing not more than 6000 lb., six passenger cars, six box cars, six gondolas and six flat cars.

Grand Valley Railway, Brantford, Ont., will buy 10 50-ft. passenger and four 36-ft. motor freight cars within the next three months. Report of the contemplated purchase of some cars was made in the ELECTRIC RAILWAY JOURNAL of June 5, 1909.

Winona Interurban Railway, Warsaw, Ind., mentioned in the ELECTRIC RAILWAY JOURNAL of Nov. 27, 1909, as expecting to buy a number of cars, has ordered five interurban passenger cars, eight city cars, one line car, one baggage car and eight freight cars.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill., mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1910, as being in the market for interurban cars, has placed an order with the Danville Car Company for four interurban cars. The rolling stock will be equipped with Peter Smith Heater Company's No. 2-C heaters.

Los Angeles-Pacific Railroad, Los Angeles, Cal., reported in the ELECTRIC RAILWAY JOURNAL of Feb. 5, to have ordered 125 cars from the American Car & Foundry Company, will have 65 cars equipped with motors and 65 trailer cars. The 130 motor trucks and 120 trailer trucks are being built by Baldwin Locomotive Works.

British Columbia Electric Railway, Vancouver, B. C., mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 29, 1910, as expecting to build 100 freight cars, 200 passenger cars and five electric locomotives in its shops, will build 12 city passengers cars, six suburban cars, one express car, three box cars and three cabooses in its shops. Seventy-five flat cars, one locomotive and two electric locomotives will be purchased. The company is completing 22 city cars and four large box cars.

TRADE NOTES

Griffin Wheel Company, Chicago, Ill., is planning to enlarge its plant at Tacoma, Wash.

American Car & Foundry Company, St. Louis, Mo., contemplates building an addition, 120 feet wide and 1,800 feet long, to its steel coach plant at St. Charles, Mo.

Buda Company, Chicago, Ill., has elected L. M. Viles, vice-president and treasurer in charge of manufacturing, and Wm. P. Hunt, Jr., vice-president and secretary in charge of sales.

American Automatic Brake Company, Baker City, Ore., has been incorporated with a capital stock of $500,000, by

F. W. Eppinger, H. A. Mitchell and E. B. McDaniels, to manufacture an automatic air brake.

Peter Smith Heater Company, Detroit, Mich., has received an order from the Indiana Union Traction Company for 20 heaters to replace other makes. This company has adopted the Smith heaters as standard on all its lines.

Standard Coupler Company, New York, N. Y., has elected Edmund H. Walker vice-president. Prior to Mr. Walker taking a position with this company in 1905 as assistant to the president, he had 16 years' experience in various departments of a number of railroads.

Covington Machine Company, Covington, Va., has arranged with the Wiener Machinery Company, New York, N. Y., to manage its Eastern sales office. A large stock of machines will be carried in Jersey City, N. J., so that the company can make prompt deliveries.

Wonham, Magor & Sanger, New York, N. Y., have arranged with the Franklin Steel Company, Franklin, Pa., which manufactures, and controls the patents of, the Improved Tripartite steel pole, to act as New York agents and as export agents of the Franklin Steel Company.

Adreon Manufacturing Company, St. Louis, Mo., has received an order from the United Railways of St. Louis for 1300 dozen hickory pick, sledge and tool handles. The Gideon Handle Company, Gideon, Mo., which has a complete plant for manufacturing this class of material, will make the goods.

Ackley Brake Company, New York, N. Y., has received an order from the Havana (Cuba) Electric Railway, through F. Steinhart, general manager, for 500 Ackley adjustable brakes, 14 to 34 gear ratio, and 12 Ackley adjustable brakes with 12 x 36 small winding drum with chain complete, following a trial of two months with the Ackley brake.

Whipple Supply Company, New York, N. Y., incorporated recently with a capital stock of $50,000, and elected the following officers: A. L. Whipple, president and general manager; J. L. McDuffie, vice-president; H. E. Oesterreich, secretary and treasurer. Among various electric railway and steam specialties which this company handles is the Hedley anti-climber.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., reports that the Charlotte (N. C.) Consolidated Construction Company was so pleased with the four Millen illuminated reversible car signs which it ordered for trial that the company has placed an order with the Columbia Machine Works & Malleable Iron Company for 30 more Millen signs.

P. D. Wagoner has been elected president of the General Vehicle Company, Long Island City, to succeed J. Howard Hanson, who has withdrawn from the company. Mr. Wagoner brings to his new work a wide experience in engineering and commercial affairs and under his administration the outlook for the future of the General Vehicle Company appears very bright.

St. Louis Surfacer & Paint Company, St. Louis, Mo., has elected A. D. McAdam vice-president, with headquarters at 1101 Fisher Building, Chicago, Ill. Mr. McAdam was formerly vice-president of the Damascus Brake-Beam Company, Cleveland, Ohio, and was connected with the American Car & Foundry Company and the Michigan Malleable Iron Company, Detroit, Mich., for several years.

Titan Steel Castings Company, Newark, N. J., has taken over the business of Benjamin Atha & Company, but will continue to operate the plant as in the past, manufacturing cast-steel bolsters, manganese steel railway motor gears and pinions and other castings. The officers of the Titan Steel Castings Company are: Benjamin Atha, president; Louis A. Shepard, vice-president and general manager; Henry G. Atha, treasurer, and C. W. Owston, Jr., secretary.

Leroy M. Harvey, sales manager of the Milwaukee district office of Allis-Chalmers Company, died on Jan. 19, 1910, at Augusta, Ga. Mr. Harvey was about 37 years old and was born in Oak Park, Ill. He was graduated from the University of Michigan in 1898, and was connected with the Westinghouse Electric & Manufacturing Company, Siemens & Halske and the Northern Electric Manufacturing Company, before becoming associated with the Allis-Chalmers Company.

Ohmer Fare Register Company, Dayton, Ohio, has closed a contract for a term of years with the Southern Pacific Company for registers to be used on the lines of that corporation, now and hereafter owned or controlled by it. The contract is a blanket one covering the entire system, which includes its electric cars, gasoline motor cars, and accommodation steam trains, and provides for the installation of Ohmer's two-fare, four-fare, six-fare, twelve-fare, thirty-fare and sixty-fare registers. This contract was obtained after the Southern Pacific Company had operated Ohmer registers on several of its lines for a considerable period of time. The Ohmer register system, which was originally designed for city and interurban railway service, has thus proved to be equally adapted to steam railroad service.

ADVERTISING LITERATURE

Frank Ridlon Company, Boston, Mass., has issued its list of second-hand electric machinery for February, 1910.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued two circulars, one containing a price list of the various sizes of gong whistles; the other describing the double clutch car mover.

Electric Storage Battery Company, Philadelphia, Pa., has described the installation of chloride accumulators on the Otsego & Herkimer Railroad, Hartwick, N. Y., for a.c-d.c. regulation in Bulletin No. 118, dated December, 1909.

Franklin Filter Company, St. Louis, Mo., is distributing two folders in which the company's oil refiner and purifier are described and illustrated. A list of the users of this apparatus throughout the country is given in one of the folders.

Joseph Dixon Crucible Company, Jersey City, N. J., has published Graphite for February, 1910, which contains the second installment of an article by W. H. Wakeman on the "Prevention of Corrosion of Steam Machinery." On the back cover are presented several illustrations showing structures of the Rochester, Syracuse & Eastern Electric Railroad protected with silica-graphite paint.

General Vehicle Company, Long Island City, N. Y., has published the first issue of "Elec-Tricks," a 24-page booklet in which the merits of the company's vehicles are described and illustrated, and testimonials, published in an appropriate article entitled "When It Snows." Several snap-shots which are reproduced show the doubling up of teams made necessary everywhere to prevent a total tie-up of horse transportation.

Franklin Steel Company, Franklin, Pa., has issued an attractive 16-page catalog which has for its subject Tripartite steel poles and rolled steel specialties. The method of constructing these poles is briefly described. Illustrations are presented showing various styles of fittings manufactured by the company, also several types of poles adapted to some of the more common installations. The publication also contains a list of some of the prominent users of Tripartite poles, among which are the Pennsylvania Railroad, Santa Barbara (Cal.) Consolidated Railway and J. G. White & Company, New York, N. Y.

General Electric Company, Schenectady, N. Y., has issued a pamphlet on the subject of building lighting which contains references to a number of important installations of tantalum and tungsten filament lamps. Some of the installations to which reference is made in this pamphlet are those of the old-style tungsten lamp. In place of these lamps there are now being supplied the G. E. Mazda lamp, which is described in Pamphlet No. 3907, just issued by the company. Bulletin No. 4689, recently issued by the company, is devoted to the subject of ornamental street lighting, and contains views of street lighting and ornamental posts in various large cities. This bulletin is enclosed in a very artistic cover. Another bulletin, No. 4714, contains a description of the railway signal volt-ammeter, type S, which has recently been designed by the company. To the practical railway man, Bulletin No. 4715, recently issued by the company and describing its GE-210 railway motor, should be of considerable interest. The bulletin enters into a detailed description of this motor and contains a speed table, characteristic curves and dimension diagrams.

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Requisitions for Material

The preparation of orders and requisitions in connection with rolling stock maintenance is necessarily a burdensome task, but it has a direct relation to economical operation. Apart from the connection between requisitions and the amount of stock purchased and stored, with resulting interest, insurance, taxation and rental charges, as well as depreciation, the manner in which such forms are filled out has no little influence upon the cost of clerical work in the motive power department. If orders and requisitions are obscure, time is lost in filling them, the company's telephone and inter-department mail service tends to become clogged with correcting inquiries, and as a result the cost of clerical labor is higher and the amount of material carried as a standing charge becomes greater than when material forms are filled and handled properly. If minor officials appreciated the promptness with which orders that are filled properly can be passed through department channels, there would be a more general understanding of the true obstructive effect of vague and incomplete requisitions. The need of accuracy and specific definition in orders for electric railway material is surpassed in scarcely any branch of the electrical industry except telephony, so numerous, varied and changing are the parts of equipment in their relation to progress in design and construction. It is not only natural, but right, for an executive officer to sort out orders which are plain and to hold back those which are obscure, but it is expensive to do this. Improvements in order-making may be made in two places: First, where the style of forms is decided, and second, at local points where the blanks are used. Trite as this topic seems to the busy operating man, the management of one large company recently made it the subject of an evening's discussion for car house foremen, and on other properties time similarly spent might be found profitable.

Prospects of Terminal Electrification in Boston

A noteworthy feature of the present session of the Massachusetts Legislature is the increasing public demand for electrification of the steam railroads serving the Boston Metropolitan district. A number of bills designed to effect legislation on this subject have been introduced and the remarks of President Charles S. Mellen of the New York, New Haven & Hartford Railroad before the New England Boot & Shoe Club regarding the specific problem presented in electrification at Boston, as published elsewhere in this issue, are of timely interest. Mr. Mellen recognizes that electrification for all the standard trunk lines, especially those with congested traffic, is a certain development of the future. He recommends, however, that no legislative action be taken to force the improvement at Boston, stating that his company is proceeding as rapidly as possible to determine the best methods and equipment for the service with the desire of decreasing the costs for a

given section of line as compared with the expense of the initial installation at New York.

While Mr. Mellen estimates that the fan-shaped location of the suburban lines at Boston, which branch to many diverse points, will make the total cost of electrification much greater than it has been in New York, the company is nevertheless planning to make the improvement. In view of its studies to determine the best engineering practice for both passenger and freight service, it is felt by the company that haste as a result of legislative action would lead to excessive costs for the investment, which might be overcome by the use of further time in investigation.

The recommendation of the joint commission at Boston a few weeks ago that the present Legislature pass a resolve requiring the companies entering the city of Boston to investigate and report upon the subject by next fall shows the attitude of the public on this problem. A settlement of the unsatisfactory conditions prevailing in the Boston terminal should be reached in a reasonable time. It is probable that if the public sees that the companies concerned are making definite studies designed to develop the method best adapted to their needs, radical action by legislative bodies may be forestalled. The public agitation and the evident railway recognition of the desirability of improvement certainly point to definite steps in the substitution of electricity for steam in the Boston terminal and suburban lines within a few years.

A New Experiment in Cleveland

The vote of the people of Cleveland approving the franchise for the Cleveland Railway Company assures an experiment with the low rate of 3 cents plus 1 cent for a transfer. This experiment is to last presumably through a period of eight months, but higher fares can follow if it is found that the requirements of the ordinance cannot be met with the revenues available at this rate of fare. Under the conditions created in Cleveland by the passage of the ordinance embodying the ideas of Judge Tayler for the settlement of the long standing street railway difficulties, the prescribed status of affairs is made radically different from that which exists in most large cities. The connection between the inter-related fare, dividend and service requirements is such that it is necessary first, that an experiment be made with a low rate of fare; second, that the dividend be met, and third, that, consistent with these provisions, the service, presumably, shall be satisfactory.

It is therefore necessary that the service be so adjusted as to meet the fare provisions which may be in force at the time and to assure the promised 6 per cent dividend upon the outstanding capital stock. As the trial at a low rate of fare which has been placed in effect was an inevitable result of the ordinance so the provision of this measure which enforces this experiment was in its turn an inevitable result of the agitation fostered by Mayor Johnson and continued even after the failure of the Municipal Traction Company to establish itself during its operation of the property with a low rate of fare.

A charge of 1 cent for a transfer will, of course, make the average rate of fare per revenue passenger something in excess of 3 cents during the period of experimentation, but just how much cannot be stated in the absence of statistics showing the recent extent of the transfer traffic. In the early part of the experimentation period of the Municipal Traction Company with the property the number of transfers issued aggregated about 22 per cent of the total cash fares compared with about 39 per cent during the time just preceding when the old company controlled the property. Transfer traffic, however, fluctuates and may have varied considerably in the intervening months, particularly as the receivers who have been in charge since the failure of the Municipal Traction Company have instituted various changes in routes and in other features of the service which would tend to disturb old avenues of traffic. Whether the restricted service which will be rendered the public of Cleveland at the experimental low rate of fare will be satisfactory or whether a better service with a resultant higher rate of fare will be demanded, are questions which will now be solved without much delay.

The Philadelphia Strike

The waste and destruction of property, the loss of life, the serious interruption to business and the general defiance of law which have taken place and are still occurring in connection with the strike in Philadelphia constitute an economic and political crime.

In this twentieth century there should be other means for settling differences of opinion between employer and employee than riot and bloodshed, which are abhorrent to every right-minded person, and this feeling is emphasized when such acts occur in a city founded upon the principles of brotherly love. Any cause which requires to be bolstered up by the violence and disorder which have characterized the Philadelphia strike must receive general condemnation. The strike leaders, in public, disclaim active participation in or encouragement on their part of the lawless acts continually being committed, but their statements of the extent of the interruption to the company's service, caused in large part by these acts, show that they are giving at least their tacit approval to the assaults and destruction which are occurring in various parts of the city. Fortunately for the reputation of Philadelphia the municipal and State authorities seem alive to the necessity of preserving law and order. Already the chief imported agitator has been arrested on a charge of inciting to riot, and if protection is given to the company, we have no doubt it will have little difficulty in operating its cars on schedule.

It is unfortunate that sober councils do not more often prevail in labor organizations. There is an almost irresistible tendency among them to choose as leaders those who are reckless and irresponsible and have little at stake in any controversy which may arise. One reason for this undoubtedly is that the more sensible and conservative men among the employees do not join the organization at all. Then there is still a middle class consisting of those naturally opposed to the purposes of the union, its leaders and the means by which it accomplishes its ends, but too weak to stand out against a misguided sense of loyalty to their fellow employees and for what they themselves know is right. These men at first refuse to join, but finally become members after all the offices are filled and the reckless element is in control. Then they have little to say as to how the affairs of the organization shall be conducted, yet upon them falls the full brunt of any disaster caused by a mistake in policy. It is this condition, which seems almost inevitable in associations of this kind, which is being exemplified in Philadelphia this week. The domination there of the lawless and disorderly element among the strikers contains a moral which we trust will not be lost elsewhere.

Trunk Line Electrification

The ever-recurring subject of steam railroad electrification is once more under discussion, as we notice from an article in the *Engineering Magazine* by F. Darlington, and a paper in the current *Journal* of the American Society of Mechanical Engineers by L. R. Pomeroy. The fact that two utterances on the same subject appear simultaneously and in many respects express opposite points of view offers temptation to try to find some standpoint from which their statements can be compared.

The first paper encouragingly recounts the well-known technical advantages of electric power for transportation and refers among other benefits to its value in the collection and distribution of local freight traffic. This important field, the author states, has been consistently neglected by the steam roads, whose efforts have preferably been confined to saving a cent on their long hauls. Undoubtedly the easy subdivision of the electric train into small units suggests its application to what might be called the "retail" department of railroad freight transportation as supplementary to the "wholesale," or through type of long-haul freight business, which is so advantageous in cost per ton-mile and forms the backbone of steam-railroad earning power. Such a retail business is being conducted on a more or less limited scale now by many electric interurban railways to the benefit of both the companies and the communities which they serve. But it is a debatable question whether such roads, with their single freight cars operating at more frequent intervals than the trains on the parallel steam road really make more money in proportion to their investment in freight facilities than do the steam lines with their one local freight train each way per day in the same territory. That is, the long-train unit is still the most economical for the service which it does. Undeniably each method has its field, but unless the two can be combined, which does not seem practicable, an extension of the electric service has no immediate bearing on the broader field of trunk-line electrification.

Mr. Darlington admits that for through line service there are many cases where the greatest economy will be obtained by continuing the use of steam, but believes that the single-phase system is vastly widening the commercial possibilities of the electric agent, especially where cheap water-powers are available. Some persons may claim that certain of his figures on cost with electric operation were based upon conditions favorable to the use of electric power. But we believe a larger number will disagree with the remark of Mr. Pomeroy that "the only cases where electric operation is commercially justified is in congested local passenger situations where the conditions closely approach those of a 'moving sidewalk,' and the records show that these cases have been profitable only when a large increase in business has been realized." Later Mr. Pomeroy qualifies this statement, especially as regards mountain divisions and urban and suburban lines. But any effort to confine electrification to roads where the question of capacity is practically the only consideration would exclude such examples as the Rochester division of the Erie Railroad, where a larger patronage can be secured for single or two-car trains run at short intervals than for the longer infrequent trains which is the only service commercially practicable with steam locomotives.

Both papers emphasize the importance to the engineering world of the publication of complete operating data of the roads now electrified. We realize, of course, that the most conspicuous examples of this kind, while in operation for several years, are by no means completed, from causes entirely apart from their electrical equipment. For this reason, their present statistics would not exhibit as fully the differences in operating expenses and traffic with electric power and steam as in the case of the Manhattan Elevated Railway. At the same time as these conditions are known, proper allowance could be made for them, and we sincerely trust that such statistics could soon be made available, either in the form of an Institute paper or in some other way.

The Effect of Single-Phase Development on D. C. Line Construction

It was recognized at the very beginning of the single-phase railway movement that the adoption of a tenfold and even twentyfold greater trolley wire potential would require radical variations from the types of bracket and span construction then in use for direct-current railways. Nevertheless, few people foresaw that the new construction would react in revolutionary fashion on the apparently fixed standards of the older lines. The alternating-current catenary construction was evolved primarily to satisfy more onerous electrical conditions, but its mechanical advantages have become so pronounced that there is now a strong feeling that the two-wire suspension should be considered also for low-tension, direct-current roads operating in open country. The New Orleans Railway & Light Company appears to have been one of the first railways to use the catenary for 500-600-volt work since it built a suburban extension on that system as early as 1905. It is interesting to recall that on this pioneer line the poles were placed only 100 ft. apart, instead of having the 150-ft. spacing used on later lines. The hangers also were closer than has been considered needful in recent work. In the early installation of the Utica & Mohawk Valley line on the West Shore tracks, near Ilion, in the cut-off around that city and Mohawk, the poles were spaced only 80 ft. apart. Since that time the spacing of bracket poles has been increased to 150 ft., as with the three-point suspension of the Buffalo, Dunkirk & Lake Erie Traction Company's line just outside of Buffalo, and of bridges to 300 ft., as on the direct-current lines of the Syracuse, Lake Shore & Northern Railroad and the new Port Byron-Syracuse link of the Rochester, Syracuse & Eastern Railroad.

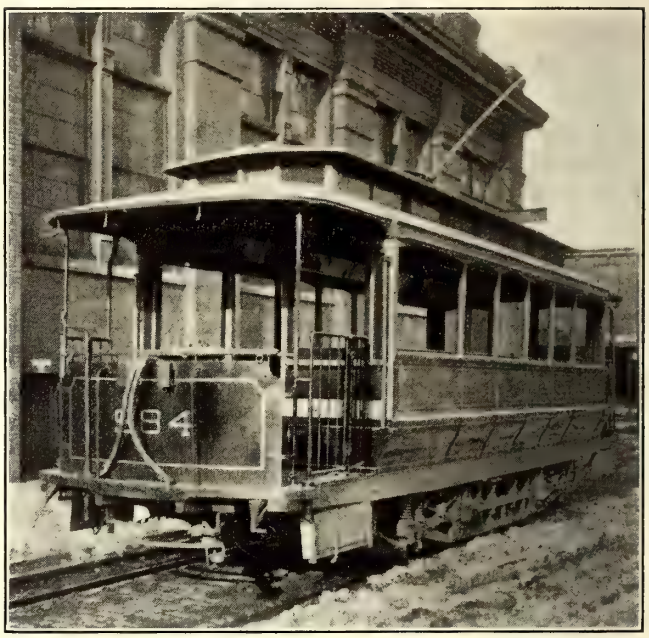
Advantageous as the catenary suspension may be, however, there is still a wide divergence of opinion as to the details of construction. Until some general standards have been fixed many railways will refuse to leave the companionable road of custom. In this connection the Connecticut Company's experimental work described in this number deserves particular notice. It was undertaken to try out six important catenary designs under practically the same conditions on successive sections of a 2-mile d.c. line near Middletown, Conn. It is hoped that the observations to be taken on this division will make it possible for the company to draw up eventually a standard form of specification which will satisfy the requirements for direct-current interurban railways operated at moderate speeds. An examination of the numerous hangers, brackets, insulators, pull-offs, steady strains and other devices submitted shows that some standards are sorely needed in these items, although it is apparent that catenary constructions are tending toward a decrease in the number of parts, especially in hangers per span.

TRAILER MOTOR CARS IN PHILADELPHIA

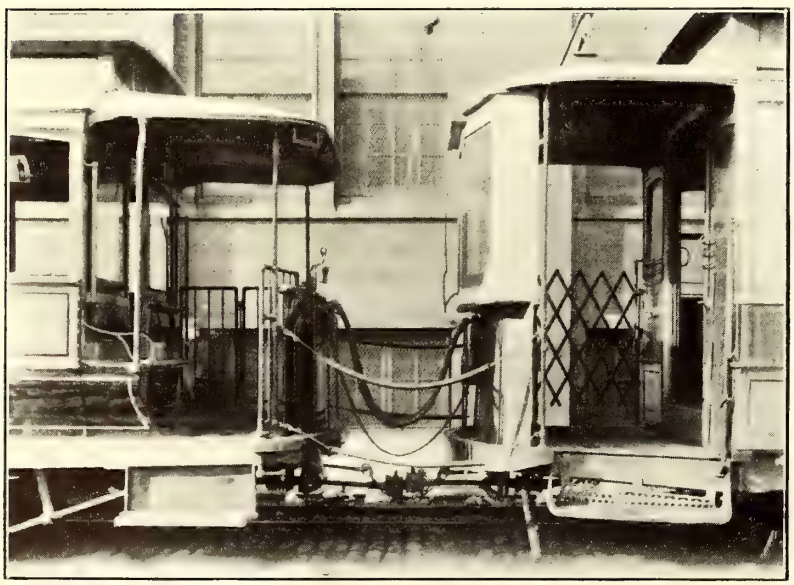
In the summer of 1909 the Philadelphia Rapid Transit Company equipped 50 standard semi-convertible motor cars and 50 rebuilt single-truck open trail cars for train operation. The motor cars have 28-ft. bodies and are equipped with four GE-70 motors and two K-28 controllers. The trail cars were old 18-ft., 10-bench open cars with short platforms at both ends and a center aisle. Panels were built in between the side posts up to the level of the seat backs and swinging gates were provided on the platforms. Each trail car was equipped with a trolley stand and pole, one K-2 controller and one GE-800 motor. The trailers were operated as smoking cars during the morning and evening rush hours. As they had no windows or heater equipment they were not suitable for operation in cold weather and were withdrawn from service for the winter on Dec. 1.

The fast schedules, steep grades and sharp curves of the lines in Philadelphia over which it was desired to operate trail cars during the rush hours made it necessary either to increase the capacity of the four 40-hp motors on the leading car or to add a fifth motor on the trailer car. The latter course was decided upon as it had a number of important advantages, the principal one being that the motor on the trailer car will give sufficient acceleration when power is applied to eliminate the jerking on the drawbar, which has always been an objection to trailer operation. The use of an air-brake cylinder on the trailer car, operated in conjunction with the brake on the motor car, reduces the momentum of the trailer car, keeps the drawbar tight and eliminates the jerk in stopping. It also keeps the slack out of the drawbar, which would cause a jerk in starting. No change was necessary in the motor equipments of the standard semi-convertible cars which could be operated singly by any motorman and cared for by any car-house force without special instruction. Four 50-hp motors would have added more weight in excess of the weight of the present equipment of four 40-hp motors than the single 25-hp motor and controller which was mounted on the trail car and this excess weight and power would have served no useful purpose when the motor cars were operated singly. The addition of a trolley and operative controller on the trail car provided against a breakdown of the trolley or controllers of the motor car. Finally, the fact that the trail cars could be moved in and out of the car houses under their own power made it possible to pick them up and drop them at any convenient point with a minimum loss of time.

The connections of the fifth motor on the trail car to the circuits on the motor car are shown diagrammatically in Figs. 1 and 2. Normally No. 5 motor is fed through the trolley and front platform controller of the motor car. It should be stated here that the practice of the Philadelphia Rapid Transit Company is to feed the fields of all motors first and the accompanying diagrams have been drawn accordingly. In the series grouping motors Nos. 2, 4 and 5 are in series with Nos. 1 and 3, the tap for No. 5 being made ahead of the field of No. 4. In the multiple grouping Nos. 2, 4 and 5 are fed from a tap ahead of Nos. 1 and 3, and all five motors are connected direct to ground. Motors Nos. 2, 4 and 5 have permanent grounds on the motor frames. In both the series and multiple groupings motor No. 5 takes proportionately the same amount of current for each step of the controller as Nos. 2 and 4. No trouble has been experienced in operating together in this manner two GE-70 motors of 40 hp each and a GE-800 motor of 25 hp.



Philadelphia Trailer Cars—End View of Trailer





Philadelphia Trailer Cars—Views Showing Jumpers, Coupling and Safety Guards Between Motor Car and Trailer, Also End of Trailer

In Fig. 3 are shown the wiring connections to all motors when operating both the motor car and trailer from the front platform of the motor car. Current enters the reverser at 19 and has two paths to ground, through A_1, AA_1, F_1, 15, A_2, AA_2, F_2 to G and through 19, A_3, AA_3, F_3, 15, A_4, AA_4, F_4 to G. From AA_4 in the front platform controller a tap is run to the

junction box on the front dasher. The path of the current fed to the trailer motor is shown by the heavy line. From A_4 in the front platform controller one of the main motor cables leads to terminal AA_4 in the rear platform controller and the tap to the junction box on the rear dasher is run from AA_4 exactly the same as on the front end. A_4 of the rear controller is likewise connected to AA_4 on the front controller.

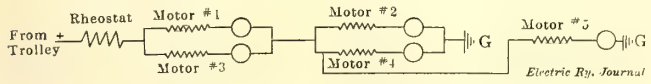


Fig. 1—Motor Circuits, Series Position

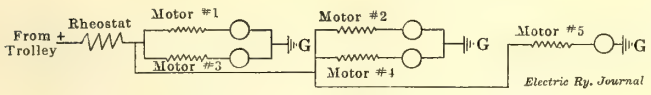


Fig. 2—Motor Circuits, Multiple Position

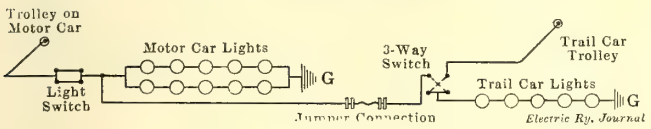


Fig. 4.—Lighting Circuits

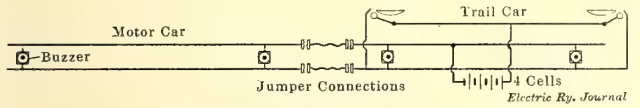


Fig. 5—Bell Circuits

The power wire jumper, which also carries the light wire, has two plugs which fit into the junction boxes on the rear dasher of the motor car and the front dasher of the trail car. The motor car plug has two terminals, one for the power wire and the other for the light wire, but the trailer car plug has four terminals, the two center ones, X and Y, being permanently connected together. From the power wire terminal in the trailer junction box current flows through the field of No. 5 motor to terminal X to Y through No. 5 armature to ground. The permanently connected twin terminals X and Y in the trailer plug permit the reverse handle of the controller on the trail car to be left in the neutral position with all contacts on the reverser open. When the plug is removed from the junction box the connections for the first five series steps in the control of No. 5 motor can be effected in the controller in the usual manner by moving the reverse handle to either the forward or back positions.

It is not possible to reverse No. 5 motor from the controller on the motor car, but when Nos. 1, 2, 3 and 4 have been reversed No. 5 is fed after the field of No. 4 and therefore receives so little current as to be practically inoperative. By disconnecting the trailer plug of the jumper, however, and putting up the trolley on the trail car, No. 5 motor can be reversed from the trailer controller and operated backward simultaneously with the four motors on the motor car. Motor No. 5 on the trailer and Nos. 2 and 4 on the motor car can be operated forward with current taken from the trolley on the trail car through the controller on that car, provided the reverser of the controller on the front platform of the motor car is set for forward running. The path of the current is then from trolley on trail car to 19 on trail car controller, to A_1, to field of No. 5, to X, to Y, to armature of No. 5, to ground. The terminal A_1 on the trailer controller is also connected to the power wire in the jumper leading to A_4 in the motor car controller. From A_1 current flows through motor No. 4 to ground and also to No. 15 and through A_2 to motor No. 2 to ground. Motors Nos. 1 and 3 which are also connected to 15 have no path to ground, and hence are inoperative.

The lighting circuits are shown in Fig. 4. Current for the lights may be taken from the trolley on either the motor car or trailer. Normally current is taken from the trolley on the motor car through an ordinary light switch. Between the switch and the lamps on the motor car a tap is run to a cable connecting the terminal sockets for the light wires in the junction boxes at both ends of the motor car. A single light wire in the power cable jumper connects in the trailer junction box to a cable leading to a three-way lighting switch on the trailer. This switch is connected to the trailer trolley and to the trailer lights. In one position the lights on both cars are fed from the trailer trolley, in another the trailer lights are fed from the motor car and in the third the trail car lights are cut out from both sources of supply.

An ingenious arrangement for giving signals from the trailer to the motorman and conductor on the motor car has been installed. The connections are shown diagrammatically in Fig. 5. A loud buzzer is mounted on the outside of the end bulkheads at each end of both the motor cars and trailers. These buzzers are connected in multiple across a common pair of wires, carried from car to car by a separate two-wire jumper cable. The clappers of both signal bells on the trailer are connected to one terminal of a battery of four cells carried on the trailer and spring contacts are attached to the gongs so that an electrical connection is made when the gong is struck by the clapper. These spring contacts are connected on one of the common buzzer wires and the second terminal of the battery is connected to the other common wire of the buzzers. When either of the signal gongs on the trailer is struck by its clapper all four buzzers ring. The instructions to motormen are to stop on either a buzzer signal from the trailer or the usual bell signal from the conductor on the motor car and not to start until both the buzzer signal and the bell signal are given. The buzzers in the motor car do not sound except when a signal is given from the trailer.

The motor and trailer cars are coupled together with ordinary link and pin drawbars. Lying on top of each drawbar is a round iron rod fastened at the back end to the swivel pin and terminating at the outer end in an eye. Two safety chains are hooked into these eyes when the cars are coupled together as a precaution against break-in-twos. The motor and trailer cars have been regularly operated without serious trouble with the couplings around the loop at the foot of Market Street. The inner rail of this curve has a radius of only 27 ft.

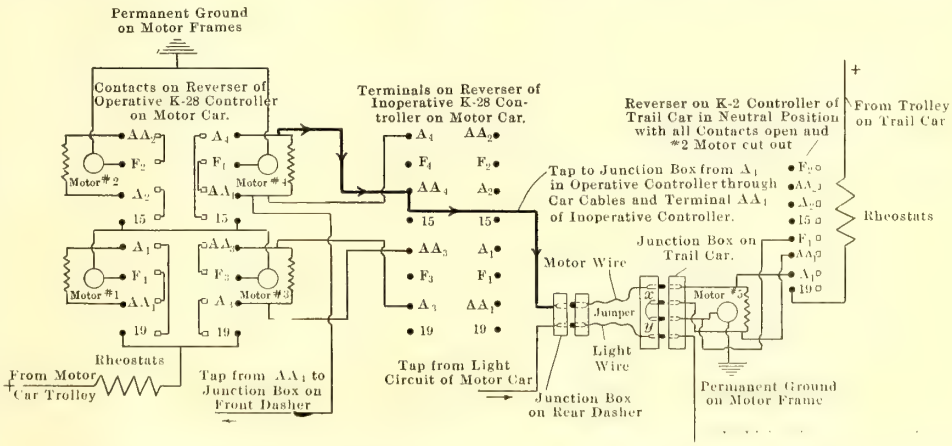


Fig. 3—Circuits and Jumper Connections on Motor and Trail Cars

The motor cars which were equipped for train operation originally had Christensen straight-air brake valves, pump governors and compressors. As this equipment has no emergency features the Westinghouse Traction Brake Company devised a modification of its SME brake equipment, which was applied in connection with the Christensen apparatus already installed on the motor cars. The SME equipment includes a brake pipe and a control pipe with hose connections

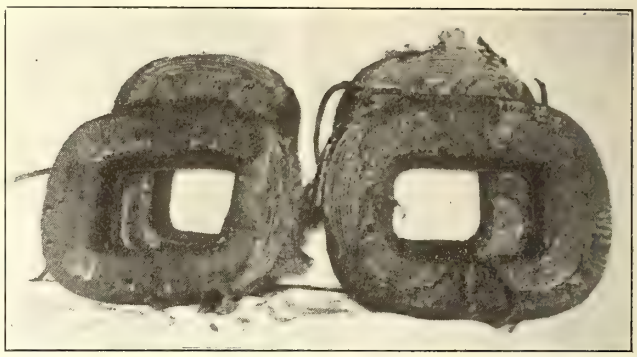
between cars and an emergency valve on both cars. In case the cars break apart the emergency valves come into action on both cars and set the brakes with full reservoir pressure. The hose connections are attached to the brake pipe and control pipe near the top of the dasher.

POSTING THE WORK OF CARELESS EMPLOYEES

On a very large electric railway there are often differences of opinion between the mechanical and transportation departments as to the ultimate responsibility for pull-ins, and in many cases it is not easy to designate the individual responsible for the trouble. One railway has in use quite an effective photographic method which not only avoids questions of this kind, but also tends to make every shopman and motorman exercise greater care in the handling of equipment.



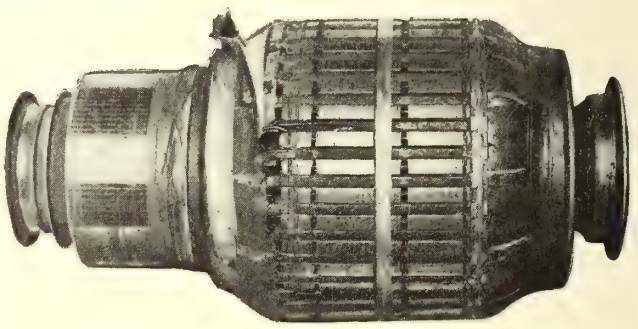
A Broken Motor Suspension Bar Which Was Responsible for An Accident



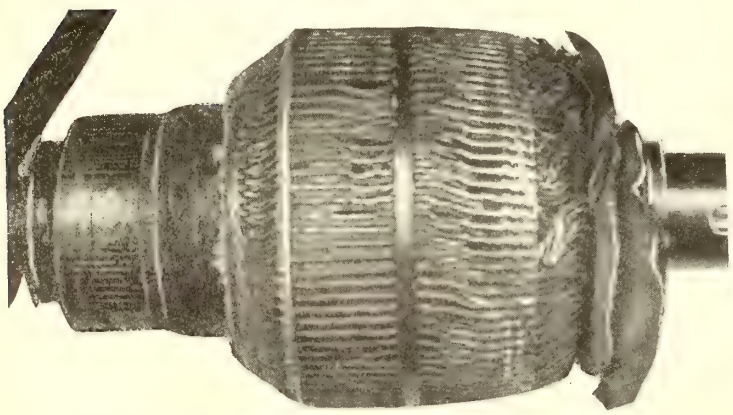
Field Coils Ruined Through Neglect in Cutting Out a Damaged Motor



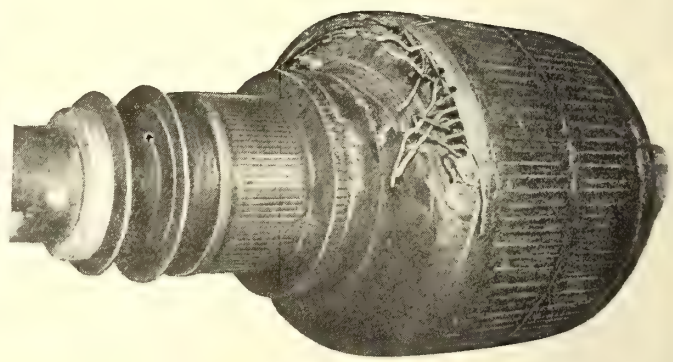
Armature Injured Through Neglect of Oiler



Injury Due to a Loose Armature Bearing



Result of Motorman's Negligence in Permitting the Broken Lugs of the Lower Half of a Motor Case to Strike the Paving



Another Result of Not Cutting Out a Defective Motor

It is the practice on this road, whenever a car is brought into the general repair shop, to take a photograph of the armature, field, controller or other apparatus which shows undue neglect. This print, together with a brief account of the trouble and the name of the negligent employee, is posted for 10 days at the division shop or car house. Some sample photographs of defective shop work, or of careless running, are reproduced in the accompanying illustrations. Two of these views illustrate the bad results to the armature and the field coils of an equipment because the motorman failed to cut out a defective motor. Another shows the battering of an armature as the result of permitting the broken lugs of a motor case to strike the paving. Two other views illustrate cases where the responsibility was traced to the shopmen. Thus one armature was injured on account of a loose bearing and another through failure to lubricate. Like publicity is given to mechanical troubles, as in the example of the broken motor suspension bar illustrated.

It may be added that this practice of posting illustrated records of bad work has had a most beneficial effect, so that within the last year there have been very few examples of gross carelessness either at the car controller or in the shop.

The Public Service Commission, Second District, New York, report of the delays to passenger trains in the State during December shows 60,385 trains were run. Of these 75 per cent were on time at division terminals; the average delay for each train was 39.7 minutes; average delay for each train run 10 minutes. Principal causes of delay were: Waiting for trains on other divisions, 40.9 per cent; waiting for connections with other roads, 14.4 per cent; train work at station, 12.2 per cent; trains ahead, 8 per cent; meeting and passing trains, 4.8 per cent; engine failures, 4.3 per cent; wrecks, 3.8 per cent.

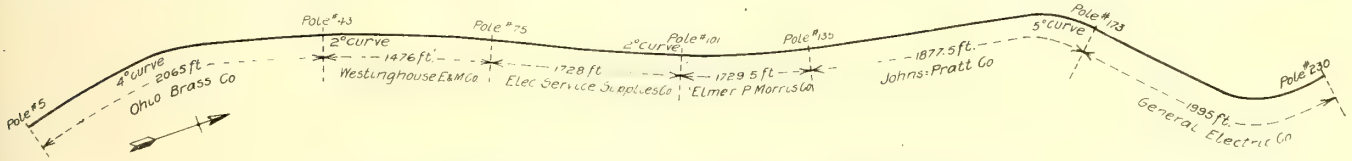
THE EXPERIMENTAL CATENARY LINE OF THE CONNECTICUT COMPANY

Since May, 1909, the Connecticut Company has been conducting an elaborate service test of catenary suspension systems on a line between Middletown and Hartford, Conn. The total trial section is about 11,000 ft. long, of which 10,050 ft. are over the Valley Branch (steam) of the New York, New Haven & Hartford Railroad, and 950 ft. over public highways.

GENERAL

The purpose of this installation is to develop the characteristics of commercial catenary line material. Six prominent manufacturers, the Ohio Brass Company, the Westinghouse Electric & Manufacturing Company, the Electric Service Supplies Company, the Electric Railway Equipment Company (through Elmer P. Morris Company), the Johns-Manville Company (through the Johns-Pratt Company) and the General Electric Company—in the order of the assignments from south to north—were each requested to erect an installation of about 1700 ft. of single catenary for wheel operation at speeds of 40 m.p.h. The messenger sag, the types and spacings of hangers and the general details of design and installation were left to the manufacturer, subject, however, to the following conditions:

The poles were to be spaced 150 ft. apart on tangents and 75 ft. apart on curves with the nearest face of the pole distant at the level of the top of the rail, 10 ft. 6 in. from the center line of the steam track and 7 ft. 6 in. from the center line of the track in the highways. Bracket construction was specified for tangents, and both span and bracket construction for curves.



Catenary Test Line—Order and Length of the Six Installations

For bracket work, the poles were to have a rake of 6 in. in 24 ft.; for span work, 12 in. in 24 ft. However, the Connecticut Company offered to install additional poles if the manufacturers desired them. All poles on the line are numbered consecutively from Middletown northward, with the odd numbers on the westerly side of the track.

With the exception of the General Electric Company's division, it was ordered that the trolley wire should be of No. 0000 grooved copper and the messenger wire of 7/16-in. extra galvanized, seven-strand Bessemer steel. For experimental purposes the General Electric Company's section was equipped with a trolley wire of No. 0000 grooved mild steel and a messenger of No. 0000 hard-copper cable made of 19 wires, each of 0.1055 in. diameter. The trolley wire clearances on the right-of-way were fixed at 22 ft. and the clearance above the rails on the highways at 18 ft. The trolley was to be continuous, each section to be anchored at the ends and elsewhere, if desired; the messenger to be independent for each section and adjacent messengers passing over a common support and dead-ending in the following section. The supports of pulling-off curves were to be designed by the manufacturers, but it was specified that the chords were to be of equal length and that no exposed composition was to be used for strains. All the feed connections were made by means of a composition ear soldered to the wire and into which the No. 0000 feed tap was soldered in turn.

The manufacturers furnished the full drawings and instructions for erection, and were invited to have representatives present at the installation. The work, however, was done by a single contractor, furnished by the Connecticut Company. As far as possible, this erection was done under written instructions and without assistance from the representatives, in order to determine the relative simplicity of the systems offered.

The work was performed under the direction of E. H. McHenry, vice-president of engineering and construction, New York, New Haven & Hartford Railroad, and Edward Gagel, chief engineer, by Charles Rufus Harte, assistant engineer in charge, and R. E. Wade, assistant. The actual installation was made by C. W. Blakeslee & Sons, general contractors, of New Haven, Conn.

EXPERIENCE TO DATE

Up to the present time the behavior of this installation has been very satisfactory. Some time ago it was reported that certain hangers were too light and were bending. An investigation brought out the interesting fact that these bent hangers occurred on either side of the steam-railroad tell-tales. The trouble arose from the winding of the tell-tales around the trolley wire thereby throwing off the wheel, which on its return to the wire frequently struck it a severe blow. Similar trouble was caused at a point where an anchor was located in the middle of a span which was so long that the guys were almost horizontal. In this instance a little slack permitted one guy to come down alongside the trolley wire and caused the same disturbance as at the bridge tell-tales. The tell-tales were removed, the guys pulled up and the hangers straightened. As no further bending has occurred at these points, it is quite evident that the company's surmise as to the cause of the trouble was correct.

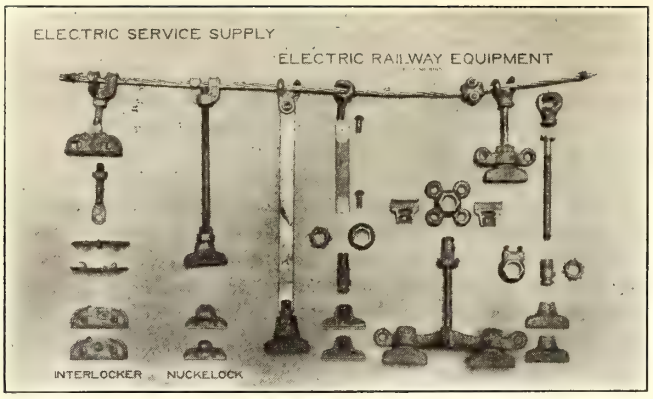
In regard to the behavior in service, it is reported that all types are standing up well. In a few cases one of the types of mechanical clamps gave some trouble due to the working-out of the short screws with which it was furnished. With these exceptions, the entire line continued to remain in first-class condition. Of course, the apparatus may still be considered as brand new, but when the present winter is over there should be some definite evidence of the behavior of the material under severe weather conditions.

INSTALLATION OF THE OHIO BRASS COMPANY

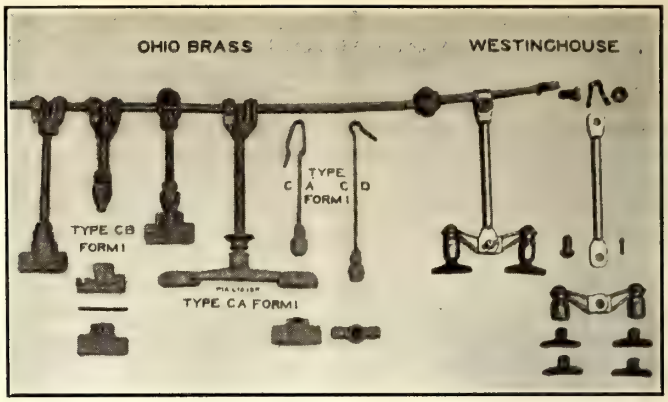
As shown on the accompanying map, the installation of the Ohio Brass Company is the first when starting from Middletown. It is 2065 ft. long. All of the construction is of the bracket type with a hanger spacing of 15 ft. The sag of the messenger wire is 4 in. for 75-ft. spans and 16¾ in. for 150-ft. spans. The distance from the messenger to the trolley at the messenger support is 23 in., at the center of 150-ft. spans 6¼ in., and at the center of 75-ft. spans 19 in. The principal apparatus of this section is described in the following paragraphs.

The pole bracket consists of a 2¼-in x 2½-in. x ¼-in. T-bar arm, with a ⅝-in. support rod with fittings as shown in the accompanying drawing. All of the bracket-arm castings completely surround the T-bar and the support rod and insulator-pin castings are adjustable along the arm. For convenience in erecting the bracket is so arranged that the messenger wire can be lifted over the end of the arm without having to thread it under the support rod. The messenger insulator pin is known as type C.E., form 1, and is made of black japanned malleable iron. The base of the pin completely surrounds the T-bar to make accidental disengagement impossible.

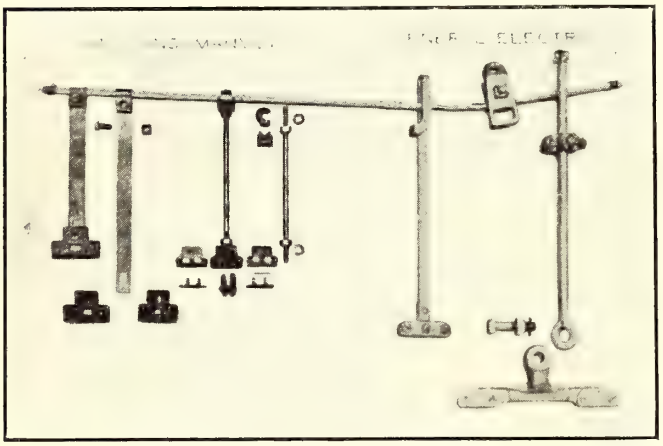
The hangers have hinged clamp ears closed by a conical wedge screwing down into conical jaws. There are three types, as follows: C.A., form 1, with a loop-top strap hanger; type C.B., form 1, with a sister-hook-top rod hanger; C.D., form 1, saddle-top strap hanger with a hinge at the ear. The pull-off hangers are of type C.A., form 1, having sister-hook-top, rod hanger, double-grip screw curve ear and a spool above the ear for the bridle. The anchor hangers, located at the brackets, are known as type C.B., form 1, and also have a sister-hook-top and rod hanger, as well as special half-ears of



Hangers of the Electric Service Supplies Company and E. P. Morris



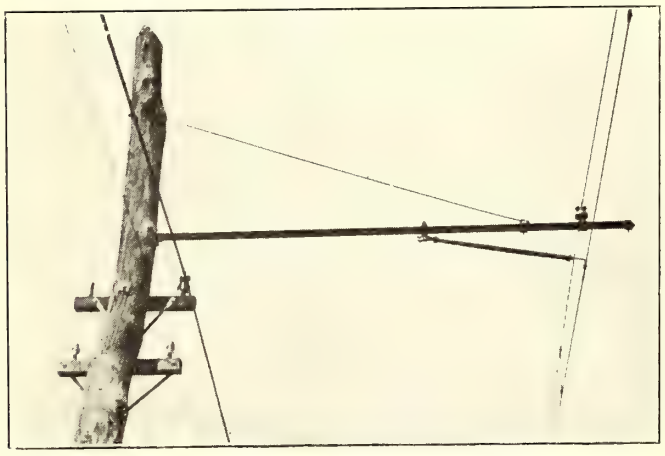
Hangers of the Ohio Brass and Westinghouse Companies



Hangers of the H. W. Johns-Manville and General Electric Companies



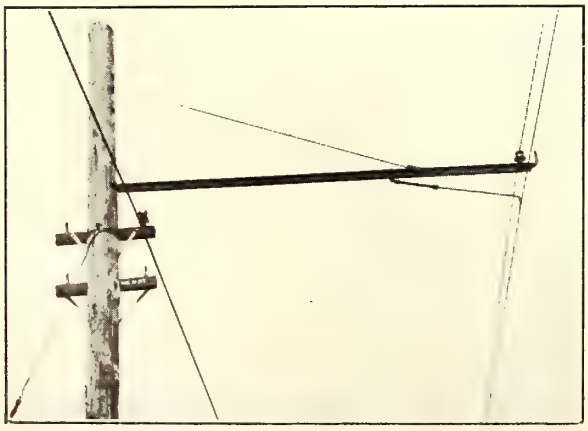
Johns-Manville Bracket and Steady Strain on Curves



Electric Service Supplies Company's Bracket



Elmer P. Morris Company's Bracket



Westinghouse Company's Bracket



Ohio Brass Company's Bracket

Catenary Test Line—Types of Hangers and Examples of Bracket Construction

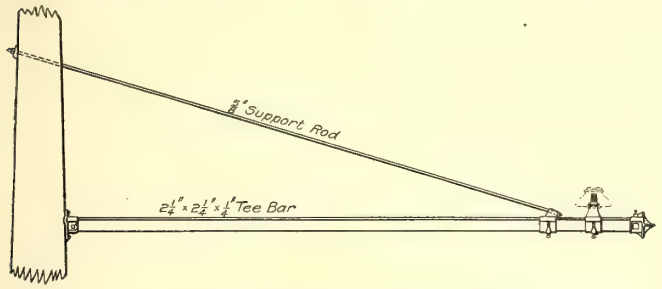
the soldered type with an eye at the butt end. From this eye a guy with a turnbuckle leads over the insulator to the anchorage on the next pole. No steady strains were used by this company. One of the final tables shows in detail the arrangement of poles, of span lengths, and the number of hangers and pull-offs installed on this division. Similar tables are presented for all the other installations.

INSTALLATION OF THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

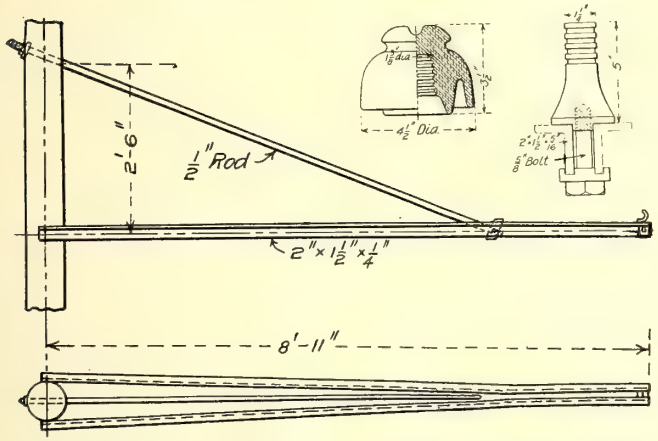
The installation of the Westinghouse Electric & Manufacturing Company is 1476 ft. long and follows that of the Ohio Brass Company. All of the construction is of the bracket type with a hanger spacing of 37 ft. 6 in. on 75-ft. spans and 50 ft. on 150-ft. spans—in other words, two-point suspension is used on the short spans and three-point suspension on the long spans. The sag of the messenger wire is 3½ in. on the 75-ft. spans and 16 in. on the other spans. The distance from the messenger wire to the trolley at the messenger support is 20 in.; at the center of the 50-ft. spans, 4 in.; at the center of the 75-ft. spans, 16½ in.

The pole bracket is the maker's 3-in. I-beam design with upturned ends and ½-in. tension rod, as shown in the accompanying illustration. The latter also includes details of the various fittings, such as the steady strain and its clamping ear, main line insulator, insulator clamps, etc. The weights of the several parts are as follows: Bracket arm, without main line insulator or steady strain, 64 lb.; main line insulator, 4 lb.; steady strain with clamp, 14 lb.; clamping ear for steady strain, 0.8 lb.; total weight, 82.8 lb.

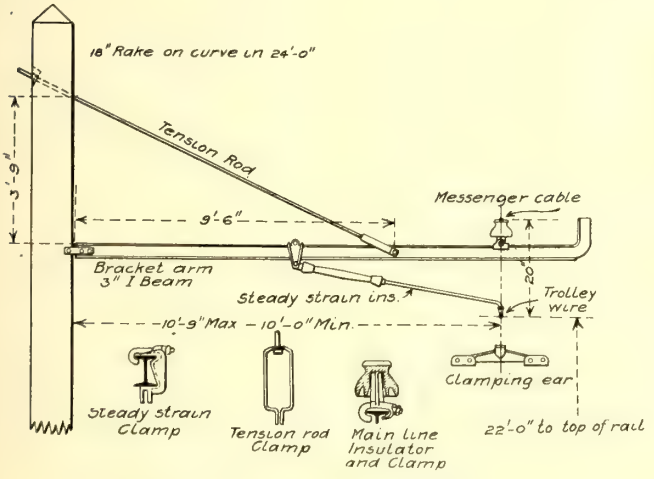
Other drawings show the anchor hanger, the anchor clamp and the new rocker type trolley hanger. The anchor hanger is provided with heavy clamp grips for the trolley wire and the messenger cable. The trolley-wire jaws have eyes for the attachment of guy cables. The rocker hanger has two ears, each consisting of a pair of jaws screwing into a socket. These sockets are mounted at the ends of the rocker arm at the center of which the hanger rod is connected by a hinge pin. The hanger is of the rod type, with flattened ends and saddle top. The trolley is tied to the messenger by an anchor clamp, which also ties to the messenger four head guys leading to adjacent poles.



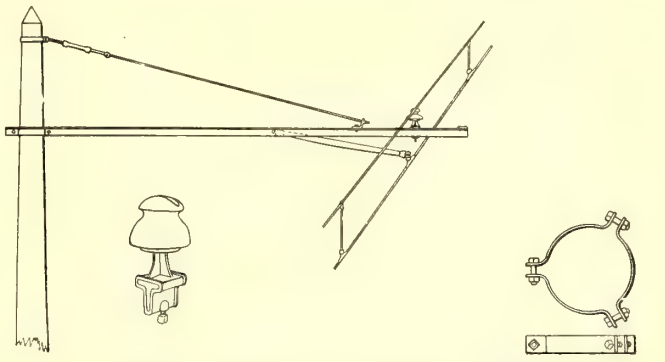
Ohio Brass Company's Standard Bracket



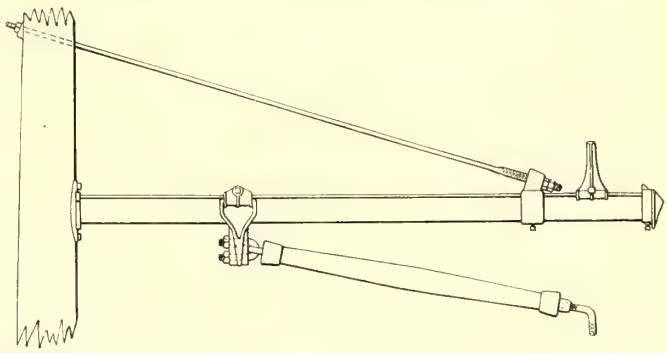
General Electric Company's Bracket, Messenger Insulator and Pin



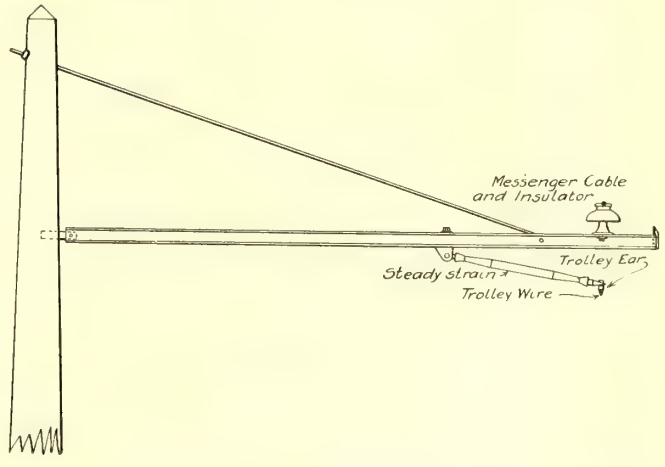
Westinghouse Company's Bracket and Fittings



Details of Elmer P. Morris Company's Bracket



Electric Service Supplies Company's Bracket with Wood, Steady Strain and Steel Goose Neck



H. W. Johns-Manville Company's Bracket Construction with Steady Strain

Catenary Test Line—Details of the Different Types of Brackets

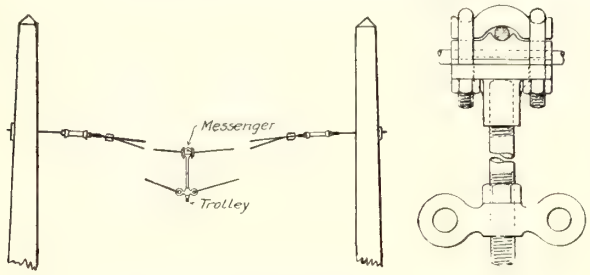
INSTALLATION OF THE ELECTRIC SERVICE SUPPLIES COMPANY

The installation of the Electric Service Supplies Company is 1728 ft. long and is made up of both span and bracket con-

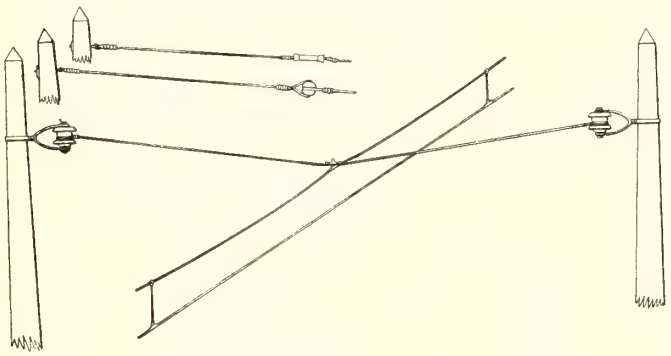
struction. The hangers are spaced about 15 ft. throughout. The sag of the messenger wire is 4 in. on 75-ft. spans and 16 in. on 150-ft. spans. The distance from the messenger wire to the trolley at the messenger support is 22 in.; at center of the 75-ft. spans, 18 in.; at the center of the 150-ft. spans, 6 in.

The brackets are of the maker's T-bar type with an end-piece and tension rod, as illustrated. They carry Locke No. 5-A insulators for the messenger. The weight of a standard bracket equipment is 60.76 lb., distributed as follows: T-iron, 2¼ in. x 2¼ in. x 9 ft. 6 in., 40 lb.; pole socket, with bolt, 2.13 lb.; two lag screws for pole socket, 0.22 lb. each; guy-rod clamp with set-screw, 2.63 lb.; guy rod and fittings, 8.17 lb.; cast-iron angle washer, 0.5 lb.; insulator pin and bolt, 5.36 lb.; and outer end ornament, 1.53 lb.

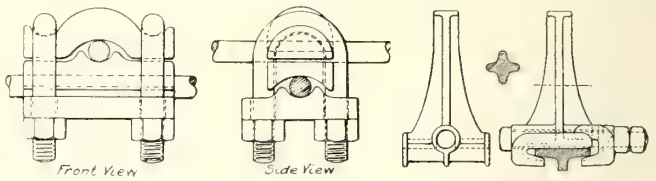
Two styles of hangers are used, known, respectively, as the "Interlocker" and the "Nuckelock." The first is of the rocking type, consisting of stamped-steel ear-plates with interlocking fingers, a rod hanger with flat ends, a pin-hinged bottom and a saddle top; the second is of the rigid type with jaws rocking on a ball-and-socket joint and locked by means of a lug on one of the jaws. The steady strains shown are used in curves only. An anchorage as made in the center of the span consists of a single strain ear on the trolley wire either side of the center each having a guy with a turnbuckle tied to the messenger by a clamp anchor plate with four head guys from corners of the latter to adjacent poles, as illustrated. No pull-offs are used on this section.



Electric Service Supplies Company's Span and Steady Strain Fixture



Elmer P. Morris Company's Three Types of Spans



Electric Service Supplies Company's Span Wire Clamp and Insulator Pin



Elmer P. Morris Company's Span Work

Catenary Test Line—Specimens of Span Construction and Miscellaneous Fittings

INSTALLATION OF THE ELMER P. MORRIS COMPANY

The installation of the Elmer P. Morris Company is 1729.5 ft. long and is made up of both span and bracket construction, as illustrated. The material was made by the Electric Railway Equipment Company principally in accordance with the designs of Elmer P. Morris. The hanger spacing is 19 ft. for 75-ft. spans and 30 ft. and 37.5 ft. for 150-ft. spans. The sag of the messenger wire is 4½ ft. on 75-ft. spans and 17 in. on 150-ft. spans. The distance from the messenger wire to the trolley at the messenger support is 21 in.; at the center of the 75-ft. spans, 16½ in.; at the center of the 150-ft. spans, 4 in. The brackets are of galvanized double angles bent to clamp the pole, with a guy rod and a special three-bolt pole clamp, as illustrated. The messenger is carried on Thomas No. 1037 insulators. The steady strains are installed only on curves. Several specimens of span construction were installed as follows: One span with spool type insulators; four cases in which the span was made up with an eye-bolt in the pole head and porcelain goose eggs on either side of and close to the messenger; and the 10 remaining spans having wood strains instead of goose eggs.

All of the hangers embrace what the designer calls the "Sure Grip" clamp. This consists of two clamping jaws, a threaded and tapped stud and a compression cup and hexagon nut for locking all parts together and clamping the trolley wire. The locking is completed by bending down one of the small clinch points on the hexagon nut. The forcing nut acts directly on the 1-in. stud, so that no strain is imposed on the threaded end of the hanger rod. The clamp has no exposed threads nor pockets to retain moisture.

The straight-line hangers installed are of both the rod and strap types, including the clamp described and sister-hook tops. The sister-hooks are secured to the messenger wire and locked in place by two small clinching points. The latter are directly under the main holding points and when bent up in position serve to bind the messenger wire together instead of forcing it out of shape. The ½-in. suspension rod has a T-head which so engages the sister-hook that the rod can retain its perpendicular position by adjusting itself to the unequal expansion or contraction of the messenger and trolley wire. In the case of the straight-line, strap-type hanger the sister-hook top and the trolley-wire clamp are attached to the strap by ¼-in. rivets, the whole making a very flexible suspension. The pull-off hangers are modifications of the straight-line rod hangers in having one or two eyes on the compression cup and in substituting one or two-eye messenger clamps for the sister hooks. The curves were pulled off with equal chords, the bridle being led back to a backbone stretched from pole to pole in accordance with the standard practice of the Connecticut company.

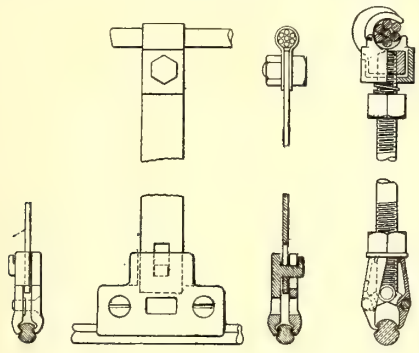
On one side of a bracket an anchorage consists of a half-strain ear on the trolley with a guy led to a turnbuckle attached to a strain plate on the bracket and a guy wire clamped to the messenger over the strain ear also leading to the same turnbuckle. On the other side of the bracket guy wires from the opposite turnbuckle lead to the top and bottom of an anchor hanger. The anchor hanger illustrated is also used on curves. An anchorage on the span section consists of a two-clamp trolley ear, with a four-eyed compression cup at the top of the hanger rod. A guy wire is led from each side of the ear to the clamps on the messenger, and from the four-eyed compression cup guys are led in four directions to adjacent poles.

INSTALLATION OF THE H. W. JOHNS-MANVILLE COMPANY

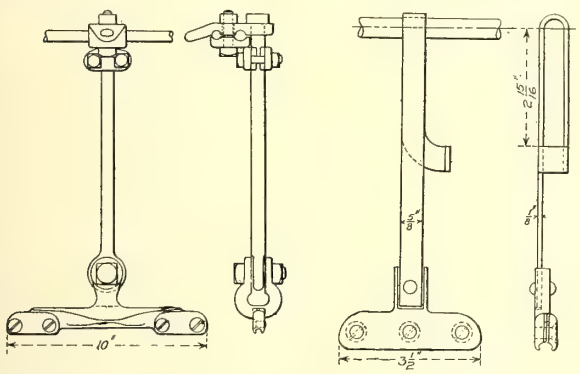
The installation of the H. W. Johns-Manville Company, which was furnished by the Johns-Pratt branch, is 1877.5 ft. long and is made up of bracket construction throughout. Both flexible and rigid material were furnished as specified hereinafter. The hanger spacing is 10 ft., 12 ft. or 15 ft. for spans ranging in length from 75 ft. to 150 ft. The sag of the messenger wire is 5 in. on the 75-ft. spans and 16 in. on 150-ft. spans. The distance from the messenger wire to the trolley at the messenger supports is 20 in.; at the center of the 75-ft. span, 15 in.; at the center of the 150-ft. span, 5 in.

Two types of brackets are installed for the curved and tangent sections, respectively. The curve bracket is provided with a steady strain, as illustrated. It is 14 ft. long, and is composed of two rolled-steel channels 2 in. deep and 1 in. wide and weighing 2.6 lb. per foot. These channels are riveted together with spacing blocks between to increase the strength of the bracket as a strut. The blocks offer excellent means for fastening the various fittings by passing bolts between the channels and holding them in place with a washer, lock washer and nut. The tension rod is made of ½-in. hot-rolled steel, having a head on one end and being threaded at the other. This rod passes up through a casting riveted between the channels, the head engaging the lower side of the casting. The tangent bracket differs from the curve bracket in being made of two steel channels 3 in. deep and 1 in. wide pressed from ⅛-in. sheet stock. The tension rod is fastened to the bracket by a bolt passing through the two webs of the channels and an eye at the end of the rod. The messenger insulator is of the ordinary petticoat porcelain type with a malleable-iron pin cemented into the porcelain. The pin is held to the bracket by means of a bolt passing up between the channels and screwing into the bottom of the malleable-iron pin.

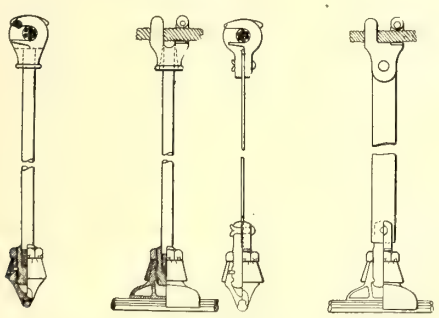
Both flexible and rigid hangers have been provided, the former being of the bottom slide strap type with a two-screw ear and the latter of the rod type with a toggle clamp ear. The flexible hanger is made up as follows: The strap is stamped



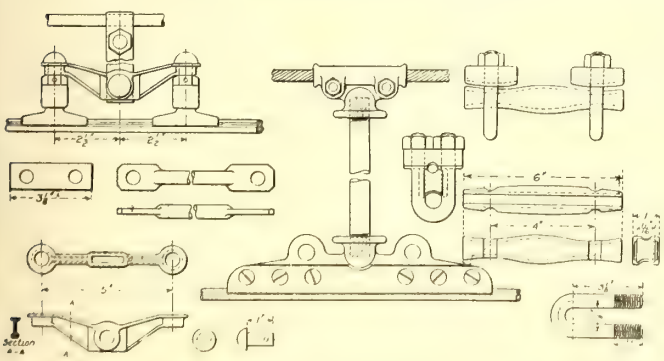
H. W. Johns-Manville Company's Flexible and Rigid Hangers



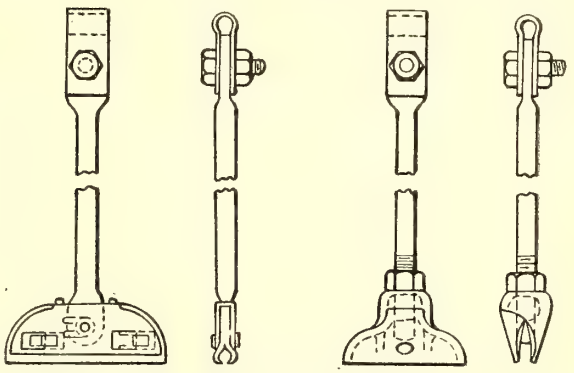
General Electric Company's Curve Pull-off Ear and Form CF Catenary Hanger



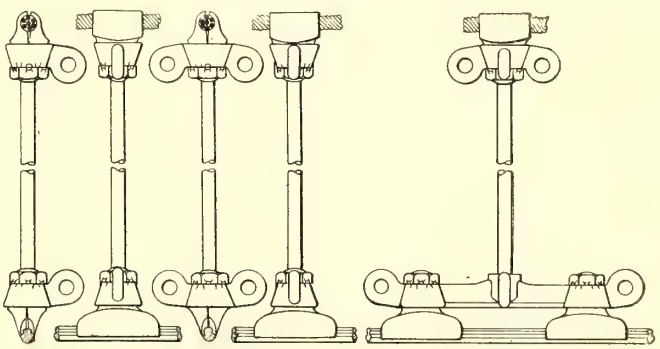
Elmer P. Morris Company's Straight Line Rod and Strap Hangers



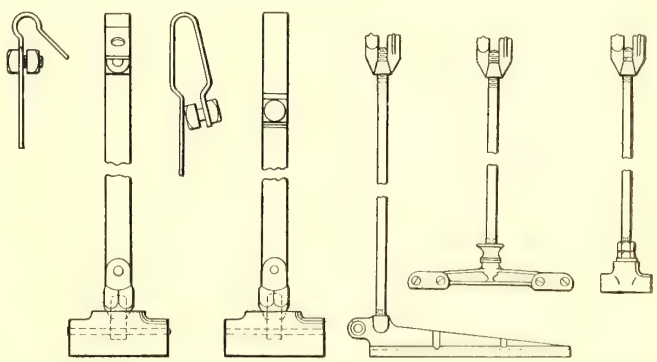
Westinghouse Company's Trolley Hanger, Pull-off and Anchor Clamp



Electric Service Supplies Company's Interlocker and Nuckelock Hangers



Elmer P. Morris Company's Single and Double Strain Hanger and Curve or Anchor Hanger

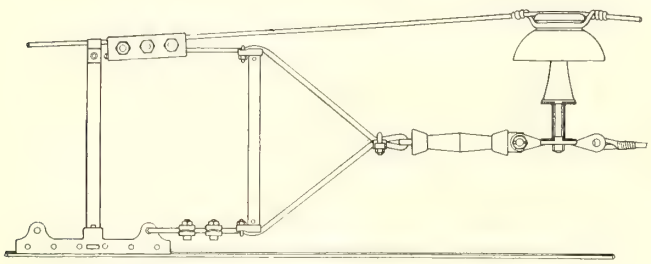


Ohio Brass Company's Form 1, Hangers, Type CD, Type CA, Type CB (anchor), Type CA (curve pull-off), Type CB

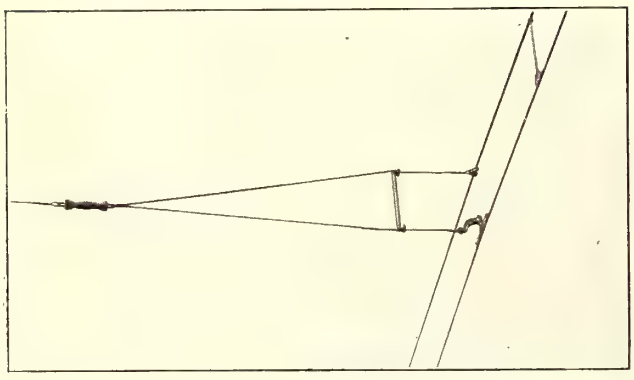
Catenary Test Line—Different Types of Hangers and Fittings

from steel stock 1 in. x ⅛ in. in section, a thickness which has been found stiff enough to prevent buckling from the blows of trolley wheels. Flexibility is obtained by a finger passing from one of the clamping plates through a rectangular slot at the lower end of the strap and through a rectangular hole in the other plate, the two plates being held together by flat-head machine screws. The strap is fastened to the messenger cable by a loop of flat stock, a bolt passing through the two loops and the upper end of the strap. In the rigid hanger the holding power of the trolley-wire clamp is secured by a pair of toggles. It will be noted from the accompanying drawing that the weight of the trolley wire comes directly on the first point of the toggle arms so that the clamping effect on the wire increases automatically with the load. The nut and lock washers above the jaws prevent the opening of the latter with the upward pressure of the wheel. The messenger clamp consists of a malleable-iron hook screwed to the end of the hanger rod and having a grooved, hollow casting forced upward by a nut to hold the messenger firmly and to prevent its slipping from the hook.

Both flexible and rigid pull-offs are used, corresponding to the sections with flexible and rigid hangers. The flexible pull-off construction illustrated is used to avoid hard spots at pull-off points. Its messenger clamp consists of two interlocking plates clamping the messenger cable between them, the pull-off cable passing around grooves at the middle of the plates and holding them together on the messenger cable. The trolley wire is held by means of an ordinary single-curve yoke and curve clamp ear. A spacing bar is placed between the pull-off cables at a distance of about 15 in. from the line, beyond which they converge and fasten to a wood strain.



H. W. Johns-Manville Company's Anchor Scheme



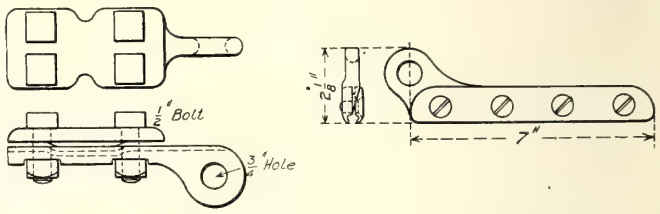
H. W. Johns-Manville Company's Flexible Pull-Off

The rigid pull-off illustrated is made up of a steel tube with a clamp at the upper end similar to the messenger clamp of the flexible pull-off. The lower end of the steel tube is provided with a four-screw clamp ear. The pull-off cable loops around a shoulder at the lower clamp and loops over the two plates at the messenger cable. The steel tube is fastened to the messenger and trolley clamps by necks extending into the ends of the tube and being riveted to it. The two pull-off cables converge to a wood strain.

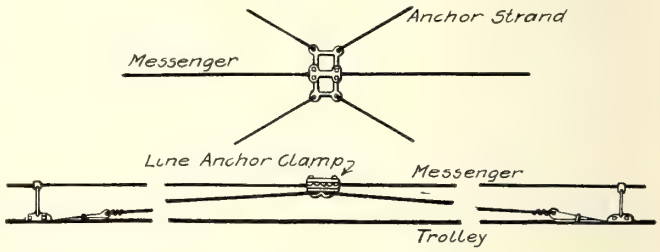
Two of the accompanying drawings illustrate the anchorage scheme. The messenger cable and trolley wire are anchored to a plate held against the bottom of the bracket by the messenger insulator bolt. This plate is then anchored to the adjoining poles. The eye for attaching the anchor cable is placed far enough from the strain clevises to avoid the formation of a pocket to catch the trolley wheel. A spreader is placed between the cables attached to the messenger cable and trolley wire to avoid cupping the latter when the strain is applied. This construction also permits the use of a flexible hanger at this point to prevent hard spots.

INSTALLATION OF THE GENERAL ELECTRIC COMPANY

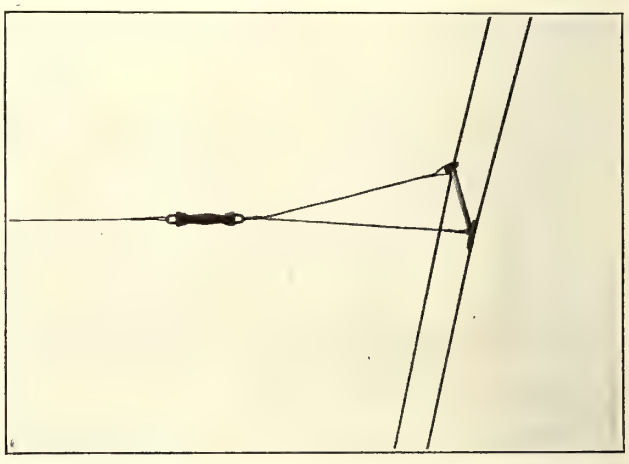
The installation of the General Electric Company is 1995 ft. long, and is made up of both span and bracket construction, the latter being used over the steam tracks and the former on the highway portion, where the ordinary overhead construction is terminated. The hanger spacing varies from 17 ft. to 50 ft. The sag of the messenger wire is 6 in. for 75-ft. spans and 24 in. for 150-ft. spans. The distance from the messenger wire to the trolley at the messenger support is 30 in.; at the center of the 75-ft. spans, 24 in.; at the center of the 150-ft. spans, 6 in. Steady braces were not used on this section. In this installation the trolley wire is of No. 0000 grooved mild steel, and the messenger of No. 0000 hard copper cable, made of 19 wires, each of 0.1055 in. diameter.



General Electric Company's Messenger Clamp and Strain Clamping Ear



Electric Service Supplies Company's Trolley and Messenger Anchor



H. W. Johns-Manville Company's Rigid Pull-Off

Catenary Test Line—Pull-offs, Anchors, Etc.

The brackets consist of two pieces of 2-in. x 1½-in. x ¼-in. angle irons, 11 ft. 6 in. long, joined at the extreme end by a space block and rivet, and by a second space block 2 ft. nearer the pole. The ½-in. steel guy rod which supports the bracket from the pole top passes through this second space block, the weight resting on the large button head on the end of the rod. The inner ends were sprung apart to span the pole and fastened with lag screws. The slot formed between the angle irons

by the space blocks is used for attaching a malleable-iron insulator pin to the bracket. The base of the pin is shaped to engage the slot and secured by a bolt passing up between the angles, thus providing means for transverse adjustment of the messenger with respect to the track. A standard single-piece, one-petticoat porcelain insulator, 4½ in. in diameter by 3½ in. high, was cemented to the pin for supporting the messenger cable. A piece of No. 8 iron wire was used for tying in. The end space block is provided with a lug which prevents the messenger cable from dropping off the end of the bracket in case the porcelain insulator is broken. It is also valuable during construction while pulling up the wires.

The span construction is located on the village highway, as mentioned. The messenger support consists of two malleable-iron castings, one of which is sprung on the span wire similar to a round-top hanger, the other casting having sister hooks for gripping the messenger cable is adjustable so as to accommodate the varying angles of the cross-spans. On curves this support was not located over the center of the tracks, but directly over the trolley wire, the alignment of the trolley and messenger being made by the adjacent pull-offs. A wood strain insulator was inserted in the span wire 2½ ft. to 3 ft. either side of the messenger support.

The straight line hangers are of the flexible type and consist of a 3½-in. three-screw clamping ear, similar to the well-known screw clamp grooved-wire ear, and a ⅛-in. cold-rolled steel strap ⅝ in. wide. The supporting strap is bent so as to form an open loop 2½ in. long at the upper end, and is shaped to prevent the hanger from becoming unhooked, no bolts or clamps being used. The extreme lightness of these hangers, the heaviest weighing 8 oz., and the long loop allow maximum flexibility.

The pull-off hangers are of the semi-flexible type, consisting of a 10-in. curve screw-clamp ear, a ⅝-in. stem and clamps for gripping the messenger wire and for adjusting the hanger lengths. The stem is provided with an eye at one end and a "T" at the other, the eye being bolted to a clevis on the trolley clamp to allow movement parallel to the trolley wire, and the "T" end is passed through the messenger clamp and limits the travel of the stem after a wheel has passed under the hanger. On curves of large radius appreciable flexibility is obtainable, and on small radius curves the adjusting clamp is used to maintain the proper distances between messenger and trolley. The loop hangers and the jointed pull-offs permit taking out the slack in the messenger and trolley wires independently.

The anchor scheme shown is designed to give maximum flexibility by avoiding hard spots in the line, and at the same time providing for the independent adjustment of both the trolley and the messenger wires. A special malleable-iron two-piece clamp, with eye, was used for anchoring the messenger wire, and a single and soldered strain ear was employed for anchoring the trolley wire. A turnbuckle was used in each anchor wire, these, in turn, being attached to the bracket. The strain plate is fastened to the bracket by the insulator pin bolt. A separate plate is bolted to the bracket, from which the guys are run to adjacent poles. A space of 5 in. was left between the plates to avoid a pocket for the trolley wheel.

A special condition was encountered on this division and was overcome as shown in one of the accompanying drawings. The height of the trolley wire over the steam tracks was 22 ft., and after turning on the highway the wire descended while passing over a level section of 400 ft. to a height of 18 ft. above the rail. At this point ascending grades of 1 per cent for a short distance and 5 per cent for several hundred feet were encountered. It was desired to keep the height of the trolley wire 18 ft. above the track through this low section and up the grades. The whole structure tended to lift 12 in. to 18 in. Hence a pull-down was installed, located at the base of the 5 per cent grade, consisting of a standard pull-off hanger guyed on either side to the poles supporting the span wires and pulling the wires down to the desired height above the rail. The weight of the structure was sufficient after the pull-down was attached to give the desired height above the rail at the base of the 1 per cent grade. A hard spot is formed in the line by this method, but recent inspection shows no excessive wear upon the wire.

TABLES

The following tables give the details of the span numbers, pole numbers, span length, hangers, anchors, etc., as installed on each of the six sections:

OHIO BRASS COMPANY.

Span No.	Pole No.	Span length in ft.	
1	5-7	97	6 type CB form 1 rigid hangers, one type CB form 1 one-way anchor.
2	7-9	143	10 type CB form 1 rigid hangers; feed tap at pole No. 7.
3	9-11	74	4 type CB form 1 rigid hangers, one type CA form 1 curve pull-off.
4	11-13	99	5 type CB form 1 rigid hangers, two type CA form 1 curve pull-off.
5-13	13-31	73-77	3 type CB form 1 rigid hangers, two type CA form 1 curve pull-off.
14	31-33	74	5 type CB form 1 rigid hangers.
15	33-35	151.5	10 type CA form 1 loop-top flexible hangers.
16	35-37	150	10 type CD form - hinged-bottom rigid hangers; feed tap at pole No. 35.
17	37-39	154	6 type CB form 1 rigid hangers.
18	39-Bridge	70	5 type CB form 1 rigid hangers.
19-20	Bridge-41	135 & 90	6 type CB form 1 rigid hangers.
21	41-43	151	9 type CB form 1 rigid hangers, one type CB form 1 one-way anchor.

Alignment, curve right, 1433-ft. radius, spans Nos. 3 to 12.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY.

Span No.	Pole No.	Span length in ft.	
22	43-45	75	2 Cat. No. S 48612 anchor hangers; two-way anchor in center of span; messenger dead ends on pole No. 42.
23-32	45-65	73 to 77	2 sketch No. 18915 rocker hangers; 1 Cat. S 119658 steady brace on each pole.
33	65-67	75	2 sketch No. 18915 rocker hangers.
34-36	67-73	123-152	3 sketch No. 18915 rocker hangers; feed tap at pole No. 69.
37	73-75	150	2 sketch No. 18915 rocker hangers; 2 Cat. No. S 48612 anchor hangers; two-way anchor in center of span; messenger dead ends on pole No. 76.

Alignment, curve right, 2865-ft. radius, spans Nos. 22 to 33.

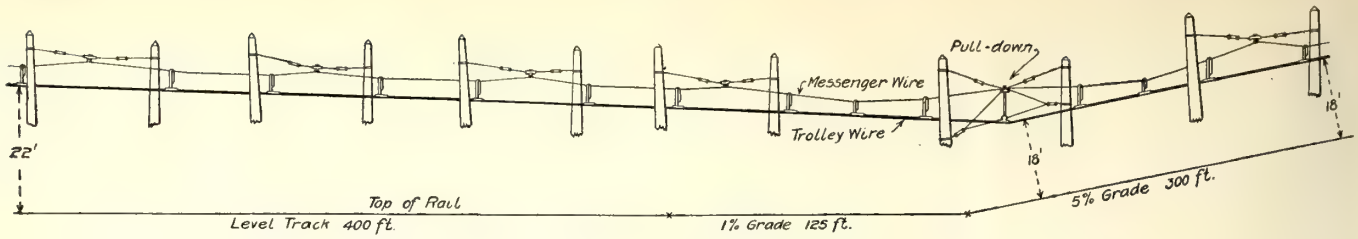
ELECTRIC SERVICE SUPPLIES COMPANY.

Span No.	Pole No.	Span length in ft.	
38	75-77	150	8 Interlocker rocking hangers; two-way anchor in center of span; messenger dead ends on pole No. 73; bracket construction.
39-40	77-81	150 & 151	9 Interlocker rocking hangers; steady brace on pole No. 77; bracket construction.
41-47	81-95	149 & 151	9 Nuckelock rigid hangers; steady brace on poles Nos. 85 and 93; feed tap at pole No. 83.
48-50	95-101	73 & 76	4 Nuckelock rigid hangers; span construction; steady strain fixture consisting of messenger clamp, hanger rod, double strain eye and 12-in. two-clamp curve ear at each span; two-way anchor in center of span No. 49; messenger dead ends on pole No. 104.

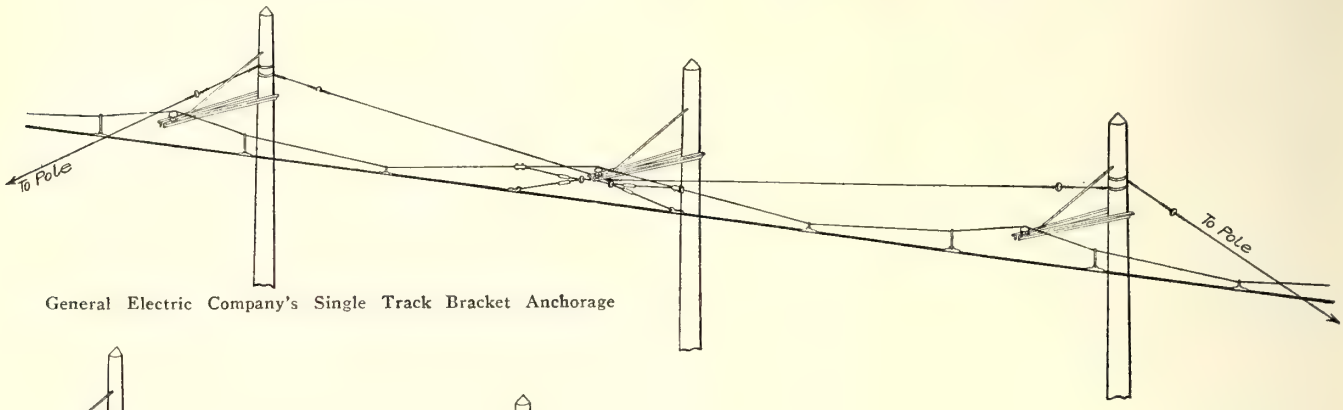
Alignment, curve left, 2865-ft. radius, spans Nos. 48 to 50.

ELMER P. MORRIS COMPANY.
ELECTRIC RAILWAY EQUIPMENT COMPANY.

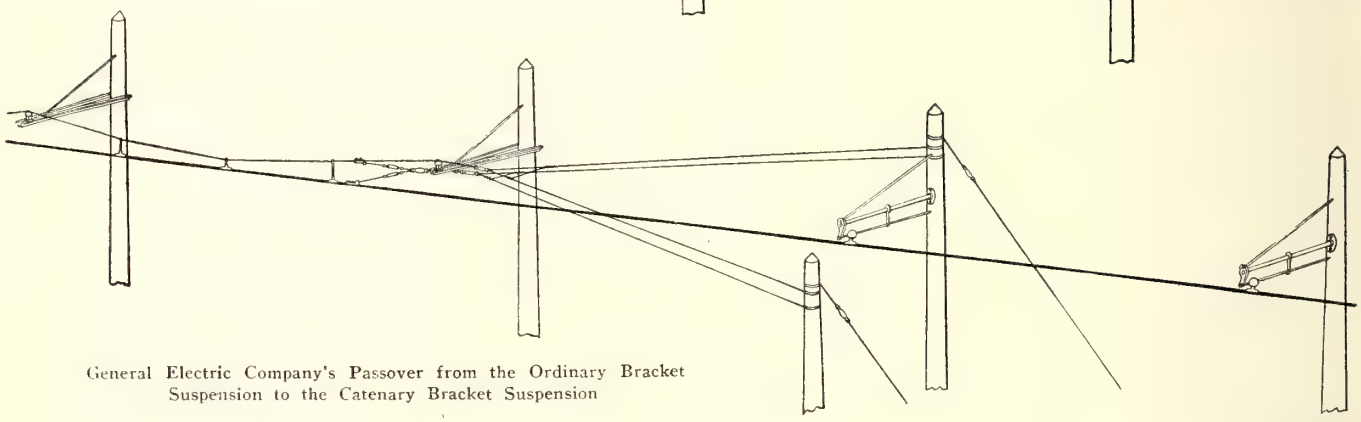
Span No.	Pole No.	Span length in ft.	
51	101-103	75	4 top-and-bottom-hinged, strap type "Sure Grip" hangers, three being regular form and one pull-off form; span construction, with pole clamp having Thomas No. 7023 spool type strain insulator on poles Nos. 103 and 104; no trolley anchor; messenger dead-ended on pole No. 99.
52-54	103-109	76	4 top-and-bottom-hinged, strap type "Sure Grip" hangers, two being regular form and two pull-off; span construction, with Thomas No. 362 goose egg type strain insulators.
55	109-111	74	4 top hinge T-rod type "Sure Grip" hangers, two regular form and two pull-off form; span construction, with 9½-in. wood strain insulators.
56-59	111 119	75 to 77	4 top hinge T-rod type "Sure Grip" hangers, two regular form and two pull-off form; span construction, with Thomas No. 362 goose egg type strain insulators.
60	119-121	69	4 top hinge T-rod type "Sure Grip" hangers, three regular form and two pull-off form; span construction, with 9½-in. wood strain insulators.
61	121-123	80	4 top-and-bottom hinged, strap type "Sure Grip" hangers, regular form; span construction, with 9½-in. wood strain insulators; two-way anchor in center of main span.



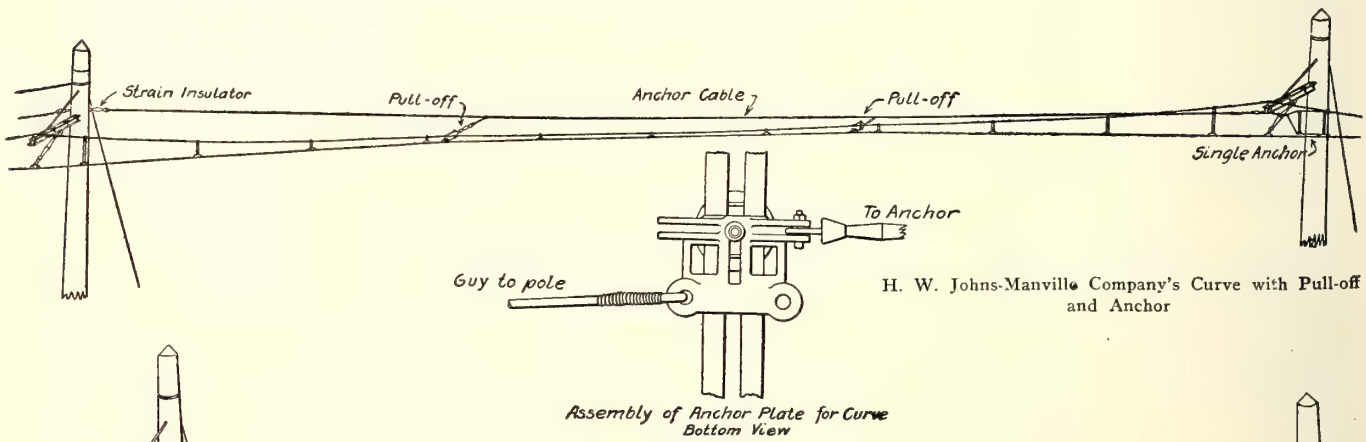
General Electric Company's Special Pull-down Scheme to Allow for a Change in Trolley Clearance



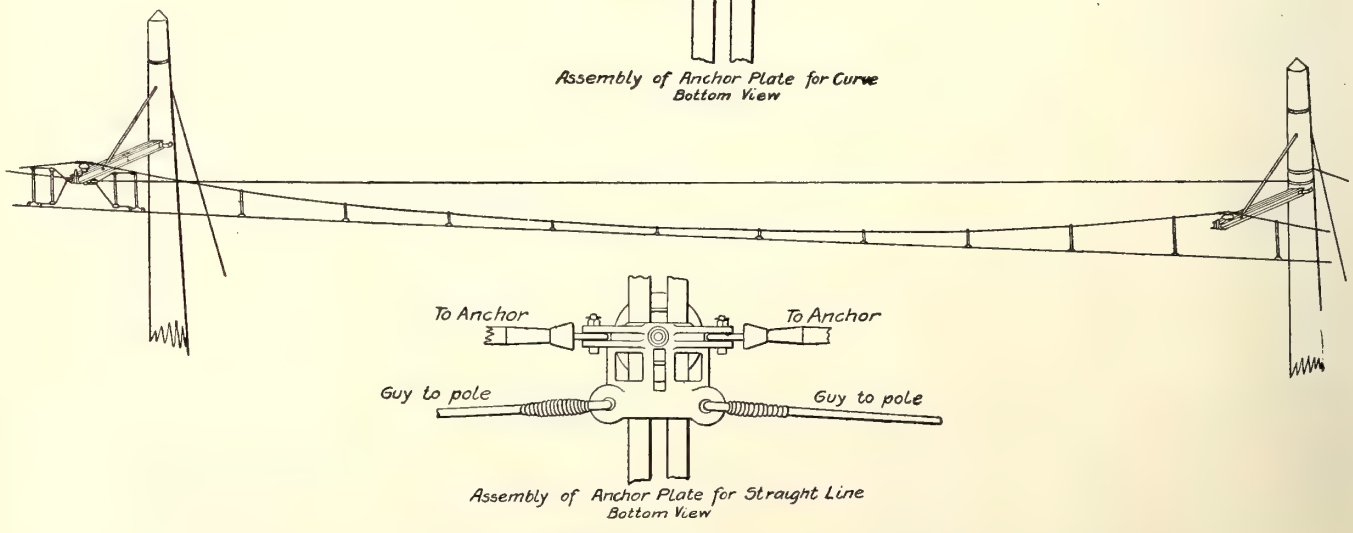
General Electric Company's Single Track Bracket Anchorage



General Electric Company's Passover from the Ordinary Bracket Suspension to the Catenary Bracket Suspension



H. W. Johns-Manville Company's Curve with Pull-off and Anchor



H. W. Johns-Manville Company's Straight Line Anchor

Catenary Test Line—Details of Anchorage and Other Adjustment Methods

Span No.	Pole No.	Span length in ft.	
62-65	123-131	148 to 154	5 regular form "Sure Grip" hangers, three being top hinge T-rod type, the other two top-and-bottom-hinged, strap type; span construction, with 9½-in. wood strain insulators between poles Nos. 123-124; bracket construction otherwise; feed tap on pole No. 125.
66	131-133	150	4 regular form "Sure Grip" hangers, three being top hinge T-rod type, the other top-and-bottom-hinged, strap type; bracket construction; two-way anchor at pole No. 133.
67	133-135	150	4 regular form "Sure Grip" hangers, three being top hinge T-rod type, the other top-and-bottom-hinged, strap type; bracket construction; messenger dead ends on pole No. 136.

Alignment, curve left, 2865-ft. radius, spans Nos. 51 to 61.

H. W. JOHNS-MANVILLE COMPANY.

Span No.	Pole No.	Span length in ft.	
68	135-137	150	10 rigid toggle-clamp rod type hangers; messenger dead-ends on pole No. 133.
69	137-139	152	10 flexible bottom-slide strap type hangers; steady brace and two-way anchor on pole No. 137; feed tap at pole No. 139.
70-72	139-145	150 to 152	11 flexible bottom-slide strap type hangers.
73	145-147	148	10 flexible bottom-slide strap type hangers.
74	147-149	74	6 flexible bottom-slide strap type hangers; one flexible pull-off; one-way anchor at pole No. 147.
75-82	149-165	73 to 77	6 flexible bottom-slide strap type hangers; two flexible pull-offs; feed tap at pole No. 159.
83-84	165-169	74 & 76	5 rigid toggle-clamp rod type hangers; one rigid pull-off; steady braces on poles Nos. 165, 167, 169.
85	169-171	77	4 rigid toggle-clamp rod type hangers; one rigid pull-off; two-way anchor and steady brace on pole No. 171.
86	171-173	74	5 rigid toggle-clamp rod type hangers; messenger dead-ends on pole No. 175.

Alignment, curve right, 1146-ft. radius, spans Nos. 74 to 86.

GENERAL ELECTRIC COMPANY.

Span No.	Pole No.	Span length in ft.	
87	173-175	152	3 flexible loop-top, strap type hangers; bracket construction; one-way anchor on pole No. 172.
88-89	175-179	151 & 152	3 flexible loop-top, strap type hangers; bracket construction.
90	179 & 184	82	3 flexible loop-top, strap type hangers; bracket construction, changing from west side to east side.
91	184 & 202	65	3 flexible loop-top, strap type hangers; bracket construction; two-way anchor at pole No. 202.
92	202 & 204	151	3 flexible loop-top, strap type hangers; feed tap on pole No. 204; bracket construction.
93	204-206	150	2 flexible loop-top, strap type hangers and two flexible sliding-top rocker-base rod type hangers, pull-off form; bracket construction.
94	206 & 212	166.5	4 flexible sliding-top, rocker-base rod type hangers, pull-off form; pole No. 206 has bracket; span between poles Nos. 209 and 212.
95-96	212-218	52 & 69.5	3 flexible sliding-top rocker-base rod type hangers, pull-off form; span construction.
97	218-220	65	2 flexible loop-top strap type hangers; span construction.
98-100	220-224	71 & 86	1 flexible loop-top strap type hanger and one flexible sliding-top rocker-base, rod type hanger, pull-off form; span construction.
101	224-226	80	2 flexible loop-top strap type hangers and one flexible sliding-top rocker-base rod type hanger, pull-off form; pull-down device at poles Nos. 223 and 224; bracket on pole No. 226.
102-104	226-230	100 & 116	3 flexible loop-top strap type hangers; one-way anchor at pole No. 230; bracket construction.

Alignment, curve left, 231-ft. radius, span No. 94; curve left, 1433-ft. radius, spans Nos. 96-100.

HEARING ON FULL VESTIBULES IN NEW YORK

The hearing by the Public Service Commission of the First District of New York to determine why an order should not be entered against the companies operating surface railway in Kings County and Queens County to require them to vestibule their cars completely was continued before Edward M. Bassett, of the commission, on Feb. 10, 1910. G. H. Backus acted as counsel for the commission. A. M. Williams represented the Brooklyn Rapid Transit Company in a similar capacity; J. J. Kuhn, the Coney Island & Brooklyn Railroad; Arthur G. Peacock, the New York & Queens County Railway, and the New York & Long Island Traction Company, and Joseph R. Mansion the complainant.

William C. Wiston, assistant electrical engineer of the commission, testified that during the storm on Jan. 1, 1910, he rode on the front platform of a car of the Brooklyn Rapid Transit Company equipped with one-third vestibule from the Borough Hall, Brooklyn, to the car house of the company near Bergen Beach, in the outlying section of Brooklyn. He was clothed for walking and wore a derby hat. The outside temperature was about 32 deg. and the temperature of the car about 49 deg. The run took about an hour. He felt no back draught, and it would be difficult to say what his feelings would have been had he been properly clothed. Conditions on the day he made his trip were not what could be considered average. He suffered no ill effects from the trip. The motorman of the car had the flaps of his cap turned down over his ears and a wide coat collar turned up about his throat. He evidently experienced no difficulty from the cold in operating the car, and his clothing did not appear to interfere with the performance of his duties.

Clifton W. Wilder, acting electrical engineer of the commission, who took part in the work of making an appraisal of the property of the Brooklyn Rapid Transit Company, said that, in his opinion, the cars of the company could not be equipped with full vestibules for the amount of money mentioned in an estimate furnished by W. H. Marsh & Company.

The specifications that were furnished with this bid did not conform to the standard practice of the Brooklyn Rapid Transit Company. The company would naturally follow its standard specifications in making this installation. That would increase the cost considerably. On the convertible cars it would be necessary to install trap doors on the platforms to fill in the space between the doors that would be put on and the edge of the platform. On the semi-convertible cars, of which there were more than 1000, the doors were set on the edge of the platform, and it would be necessary to fill in the space between the edge of the hood and the door. This would require extra material and extra labor over and above the estimate made. There were a number of other small items which he did not recall.

The specifications for painting called for work that would be suitable only for the inside. The Brooklyn Rapid Transit Company had standardized its entire equipment whereby it used practically the same article for the same service on all cars, and had adopted hardware made chiefly of brass or bronze. Wrought iron with an oxidized finish was called for according to the estimate furnished by Marsh & Company. This finish would wear off in time and expose the iron to the weather.

Mr. Wilder did not doubt that the estimate of $28 for the specifications submitted by Marsh & Company was accurate, but said that they were incomplete. He had examined estimates made by the Brooklyn Rapid Transit Company for materials and labor for a vestibule for its cars, such as would meet the requirements of the case, which placed the cost of materials at about $85 and the cost of labor at about $90 a car. He considered this estimate to be approximately correct. The cars of all the other companies were very similar in construction to the cars of the Brooklyn Rapid Transit Company. It would cost more to equip the 50 steel cars of the New York & Queens County Railway, however, than the wood cars.

The Brooklyn Rapid Transit had approximately 1050 semi-convertible cars and 450 convertible cars to be equipped with vestibules and the Coney Island & Brooklyn Railroad about 200 cars. Mr. Wilder would not advise that the companies depart from what had come to be their standard practice, especially as in this case it would entail the lowering of standards.

A motion made by Mr. Williams to dismiss the case was taken under advisement. The hearing was then closed.

Negotiations are in progress for the construction of an electric railway in Jutland, Denmark, from Aarhus to Randers. The estimated cost is $1,000,000.

OPERATING STATISTICS FOR STREET RAILWAY COMPANIES IN NEW YORK STATE

The table below gives a summary of the financial and operating statistics of the electric railway companies in New York State for the year ended Sept. 30, 1909. These figures are taken from the reports filed by the railway companies with the Public Service Commission of the Second District and will appear with the other detailed figures in the forthcoming reports of the commission:

Name of Company.	Total miles operated.	Street Railway Revenues.	Street Operating Expenses.	Operating ratio.	Car-seat miles, 6 mos. only.*	Total car-hours.	Total car-miles.	
United Traction Company, Albany	93.5	$2,003,178	$1,184,119	58.61	....	1,003,632	8,164,786	Pass.
Auburn & Syracuse Electric Railroad	56.8	387,707	233,030	60.1	....	157,907	1,521,968	
Auburn & Northern Electric Railroad Company	11	43,352	25,404	58.64	....	10,422	131,472	
(a) Babylon Railroad Company	7.5	1,390	1,260	90.6	(b) 32,400	....	1,080	
Eastern New York Railroad, Ballston Spa	15	31,058	23,087	74.34	....	3,872	59,110	
Binghamton Railway Company	46.98	331,777	195,518	58.84	*278,054,574	206,778	1,659,751	
International Railway Company, Buffalo	....	....	....	....	....	803,833	16,370,814	
Buffalo Southern Railway Company	23.6	63,662	55,662	87.43	....	42,893	416,925	
Buffalo & Depew Railway Company	13.59	14,489	21,382	147.5	....	....	193,124	
Buffalo & Lake Erie Traction Company	168	667,674	450,679	67.6	....	357,099	3,558,606	
Catskill Electric Railway Company	5.5	18,280	19.352	105.87	*1,539,915	....	121,732	
Cohoes Railway Company	2.6	77,810	53,707	69.02	....	53,523	400,153	
Corning & Painted Post Street Railway Company	5.9	49,753	34,711	69.53	*2,903,360	26,938	218,909	
Cortland County Traction Company	17	75,192	54,411	72.36	....	37,058	303,349	
Elmira Water, Light & Railroad Company	27.24	239,708	68,967	71.2	....	163,860	1,302,641	
Elmira & Seneca Lake Traction Company	16.41	64,037	48,011	74.9	....	22,311	316,201	
Fishkill Electric Railway Company	7.23	49,778	33,365	67.1	....	26,892	208,255	
(c) Geneva & Auburn Railway Company	17.75	94,631	50,132	52.98	....	43,882	422,706	
Glen Cove Railroad Company	3.45	20,585	14,807	71.93	....	18,240	98,501	
Hudson Valley Railway Company, Glens Falls	138.25	580,541	471,776	81.26	....	187,966	1,879,197	
(d) Fonda, Johnstown & Gloversville Railroad Company	117	773,849	378,033	48.24	....	....	1,653,945	
The Adirondacks Lakes Traction Company	5	6,949	7,112	102.34	(e) 366,274	4,767	31,166	
Lima-Honeoye Electric Light & Railroad Company	5.26	....	....	....	....	....	....	
Bennington & North Adams Street Railway Company	28.87	73,059	66,618	91.18	....	34,186	469,454	
The Hornellsville Electric Railway Company	5.06	21,029	18,296	87	*2,108,712	18,780	161,952	
The Hornellsville & Canisteo Railway Company	4.33	27,846	13,247	54.76	*1,678,000	10,414	82,512	
(f) Albany Southern Railroad Company	47.6	236,325	192,646	81.5	....	27,722	688,283	
Huntington Railroad Company	18.7	23,452	13,979	59.68	....	15,075	76,232	
Ithaca Street Railway Company	10.5	125,502	83,200	66.29	*5,512,437	66,876	387,722	
The Jamestown Street Railway Company	24.64	186,511	108,715	55.20	*13,038,833	154,815	794,668	Pass.
Chautauqua Traction Company	33.4	153,093	86,180	56.55	*12,965,348	57,649	506,458	Pass.
Warren & Jamestown Street Railway Company	22	84,417	42,067	49.83	40,774,509	22,828	296,802	
Keeseville, Ausable Chasm & Lake Champlain Railroad Company	5.64	....	....	....	....	....	....	
Kingston Consolidated Railroad Company	9.1	141,245	80,533	57.02	*9,139,147	68,864	573,083	
Marcellus & Otisco Lake Railway Company	....	32,173	25,389	78.9	....	....	....	
The Walkill Transit Company, Middletown	12.84	60,275	55,652	92.3	*29,984,508	33,313	305,387	
New York & North Shore Traction Company, Mineola	10	37,084	34,578	94.1	*4,926,048	18,970	201,001	
Newark & Marion Railway Company	9.15	14,357	13,708	95.4	....	....	....	
Orange County Traction Company	18.95	163,485	104,468	63.9	....	76,384	556,194	
New Paltz, Highland & Poughkeepsie Traction Company	9.27	27,885	17,813	63.8	....	....	....	
Westchester Electric Railroad Company, New York	50.3	388,497	406,811	104.7	....	267,888	2,169,517	
Niagara Gorge Railroad Company	25.43	163,193	87,740	53.76	....	37,076	305,023	
The Electric City Railway Company, Niagara Falls	3.87	18,825	13,593	72.20	....	11,137	93,146	
Northport Traction Company	2.74	10,755	9,304	86.56	....	....	42,627	
Ogdensburg Street Railway Company	63.71	37,993	24,207	63.71	*15,139,430	73,407	312,287	
Western New York & Pennsylvania Traction Company, Olean	98	346,842	145,294	42.12	....	145,068	1,503,534	
Oneida Railway Company	114.2	352,280	210,770	59.24	....	57,953	1,241,225	
(g) Otsego & Herkimer Railroad Company, Oneonta	76.62	185,508	179,163	96.61	*10,123,724	61,720	646,423	
Hudson River & Eastern Traction Company, Ossining	3	21,221	24,813	112.2	*2,914,993	....	138,583	
Oswego Traction Company	11.5	61,947	45,658	73.74	....	55,728	397,491	
Peekskill Lighting & Railroad Company	10.36	67,052	41,247	60.02	*5,252,908	44,583	340,745	
Putnam & Westchester Traction Company	4	8,484	7,474	88.09	*1,071,738	6,655	61,304	
Penn Yan, Keuka Park & Branchport Railway	9.32	30,002	17,255	57.5	....	8,518	85,708	Pass.
Plattsburg Traction Company	7.7	27,234	16,062	58.98	*1,903,934	13,822	134,993	
New York & Stamford Railway Company, Port Chester	23	250,853	169,780	67.45	....	95,342	879,232	
Port Jervis Electric Light, Power, Gas & Railroad Company	4.4	14,501	14,820	102.19	*1,122,562	17,278	98,269	
Poughkeepsie City & Wappingers Falls Electric Railway Company	17.05	135,755	100,323	73.95	*8,923,191	64,372	545,495	
(h) New York State Railways, Rochester	230.96	834,516	544,580	65.22	(h) 123,680,424	324,990	2,944,772	
(i) Rochester Railway Company	165.3	1,948,187	1,277,708	65.58	....	802,075	7,112,764	
(i) Rochester & Eastern Rapid Railway Company	53	202,534	142,773	89.734	....	....	556,475	
Rochester & Suburban Railway Company	23.4	58,308	38,250	65.60	*2,637,355	9,625	148,740	
(j) Rochester & Manitou Railroad Company	7.75	10,763	13,708	120.95	....	....	....	
Rochester, Syracuse & Eastern Railroad Company	115	382,037	199.106	52.12	....	67,243	1,333,662	
Buffalo, Lockport & Rochester Railway Company	60.3	167,047	144,946	86.78	205,375,894	31,286	582,288	
The Nassau County Railway Company, Sea Cliff	1.6	14,422	13,879	96.23	....	10,215	44,776	
Schenectady Railway Company	133.71	904,038	602,599	66.65	*63,668,850	338,822	3,223,769	
Syracuse Rapid Transit Railway Company	88.4	1,350,558	967,574	71.64	*97,714,888	5,454,256(?)	5,454,256	
Syracuse & Suburban Railroad Company	18.08	118,234	77,387	65.53	....	51,231	500,470	
Syracuse, Lake Shore & Northern Railroad Company	53.14	208,500	136,620	65.68	....	50,883	720,008	
Syracuse & South Bay Electric Railroad Company	21	39,105	35,098	89.75	....	12,463	166,810	
Troy & New England Railway Company	10	33,918	22,623	67.45	....	9,183	151,963	
Utica & Mohawk Valley Railway Company	127	1,149,890	710,410	61.78	*84,236,144	439,647	4,440,509	
Black River Traction Company, Watertown	10.47	73,071	73,095	100.00	*642,550,000(?)	....	365,000	
St. Lawrence International Electric Railroad & Land Company, Watertown	7.69	14,271	14,049	98.4	....	....	19,785	
Waverly, Sayre & Athens Traction Company	9.28	77,392	59,533	76.92	....	54,612	478,076	
Elmira, Corning & Waverly Railway Company	10	7,177	7,345	102.34	....	....	76,179	
Tarrytown, White Plains & Mamaroneck Railway Company	24	144,929	186,486	128.82	....	101,456	875,329	
Buffalo & Williamsville Electric Railway Company	11	38,703	27,293	70.51	....	....	....	

Seventy-eight companies on this list, but three with no report. (a) Operated during summer months only. (b) For one month only. (c) Successor to Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Co. (d) Includes 32 miles operated by steam. (e) For two months only. (f) Successor to Albany & Hudson Railroad Company. (g) Successor to Onconta & Mohawk Valley Railroad Company. (h) Operation from March 23 to June 30, 1909. (i) Operation from July 1, 1908, to March 23, 1909. (j) Operation from Aug. 20, 1908, to June 30, 1909.

A REVIEW OF THE STREET RAILWAY REHABILITATION IN CHICAGO

Speaking on the subject, "What Has Been Accomplished in the Rehabilitation Work of the Chicago Traction Companies," B. J. Arnold, chairman and chief engineer of the Board of Supervising Engineers, Chicago Traction, addressed the Electric Club of Chicago on Feb. 16. He reviewed the "settlement ordinances" passed by the City Council, Chicago, in February, 1907, which went into effect when accepted by the street railway companies. This date, in the case of the Chicago City Railway Company, was April 15, 1907. The ordinances were adopted as the result of a 10 years' struggle over street railway franchises and street railway service in Chicago. They provided for the organization of a board of supervising engineers composed of a representative from each of the companies, a representative of the city and Mr. Arnold as chairman of the board. The representative of the Chicago City Railway Company from the first was H. B. Fleming. The first representative of the city of Chicago was Charles V. Weston, later succeeded by George Weston, the present representative of the city. John Z. Murphy is the representative of the Chicago Railways Company, which did not formally accept its ordinance until Jan. 28, 1908.

At the present time, the work of the Chicago City Railway Company, which operates on the South Side, is almost completed and there is little doubt that the entire rehabilitation of this company will be accomplished within the three-year limit set by the ordinance, which, in the case of this company, will expire April 15, 1910. The work accomplished has been of a high grade and credit is due, said Mr. Arnold, to the engineering force of the company for carrying it on rapidly and efficiently. No doubt the Chicago Railways Company will complete its work also within the time limit set.

The work of rehabilitation has been an undertaking of magnitude, requiring the reconstruction of many miles of electric railway, the building of substations, car houses, etc. Financially considered, the ordinances provide that the operating expenses of the railway companies shall first be paid out of the gross earnings. From the remainder 5 per cent is deducted for interest on the investment. Of the net profits 55 per cent goes to the city and 45 per cent to the companies. Thus the companies and the city are jointly interested in the operation, success and profits of the street railways of Chicago.

Since the ordinances went into effect the companies have paid into the city treasury about $4,250,000 under the arrangement just mentioned. This money is available for any purpose to which the city sees fit to devote it, although it has been generally considered that it is to be used only for traction purposes. Having in charge the financial aspect of the rehabilitation, with its other duties, the Board of Supervising Engineers has supervision over the accounts of the rehabilitation work, as well as the engineering and construction. It files monthly certificates with the city comptroller showing the amount expended for betterments. Before the ordinances were adopted it was agreed that the valuation of the properties of the companies should be fixed at $50,000,000. Additions to this original investment are shown by the board's monthly certificates. One provision of the ordinances is that the city may purchase the properties at certain fixed times if it elects. The amount which must be paid is exactly determined at any time by adding the total expenditure shown by the monthly certificates to the original valuation. However, only the city has the right to purchase the properties at this valuation. If any third party desires to purchase the properties it is provided that 20 per cent shall be added to the actual investment determined in the manner mentioned. This is a wise provision in the ordinance, in Mr. Arnold's judgment, for it makes the companies feel secure in their investments.

Mr. Arnold gave some interesting figures showing the extent of the rehabilitation work. The mileage of track reconstructed so far is 302, and there are 305.5 miles of trolley wire and 465 miles of underground cable feeders. The trolley wires and the feeder cables represent 7,017,418 lb. of copper. For the feeders there have been constructed 888,139 ft. of conduit, representing 5,524,200 duct-feet. The number of manholes provided for these conduits is 2412. The total cost of this overhead and underground construction so far has been $4,468,767.

Some attention was paid by the speaker to the method adopted for the treatment of ties by impregnating the wood with chloride of zinc. This permits the use of cheaper timber and makes the first cost less. The ties are completely embedded in concrete. Three types of track are used. One consists of steel ties spaced 4 ft. apart. A second consists of treated wooden ties spaced 3 ft. apart, and a third of treated wooden ties spaced 2 ft. apart. In every case the ties are embedded in concrete, but in the third method they are laid on a foundation of crushed stone. This last type is used in the central business portion of the city and is constructed with the idea that it may be disturbed at the building of the passenger traffic subways. The construction is such that by removing the crushed-stone foundation the ties may be easily supported on temporary foundations while excavation is going on for the subways. The total cost of the rehabilitation of 302 miles of track has been about $15,000,000. Seventy-five per cent of this mileage is laid on treated ties.

In relation to buildings the rehabilitation has resulted in the construction of seven new substations, while two of the old cable-railway power houses have been remodeled into substations. Nine fireproof car houses have been built, as well as three paint and carpenter shops, one office building, one storage-battery building and four new storehouses. The total cost of these new buildings has been $4,620,000. An idea of the volume of building work performed may be had if one considers that the brick used would build a 13-in. wall 10 ft. high and 18 miles long. The new power-plant equipment consists of 78,400 kw in rotary converters and also 2240 kw in storage batteries. The total cost of this equipment has been $1,617,437. Electrical energy is purchased to a large extent.

Of new "pay-as-you-enter" cars 1350 have been purchased during the rehabilitation. Of these 50 are of the all-steel type. In addition, 828 modern cars have been remodeled to conform to the "pay-as-you-enter" standard car. The total number of these new or rebuilt cars in operation is 2178, and the cost of them to date has been $8,136,114. A standard fender which is believed to be the best yet evolved has been adopted and during 1909 the saving of four lives is directly ascribed to the use of this fender.

The total cost of the rehabilitation work to Dec. 1, 1909, was practically $37,000,000. To this should be added the certificates of investment cost during December and January, and also nearly $6,000,000 which has been expended for the smaller systems of the Calumet & South Chicago Railway Company and the Southern Street Railway Company. This brings the total investment to date up to about $95,000,000, and this amount will exceed $100,000,000 by the time the rehabilitation is completed. Thus the original valuation of $50,000,000 will have been doubled as the result of the extensive system of betterment and reconstruction carried out under the direction of the Board of Supervising Engineers. On the $100,000,000 the railway companies will receive 5 per cent on their actual investment as well as 45 per cent of the net profits and they appear to be satisfied with their returns under this arrangement.

Referring briefly to the tunnels under the Chicago River, Mr. Arnold spoke of the Washington Street and La Salle Street tunnels as under construction. In relation to the latter tunnel the shield method of construction is used on the land approaches in order not to disturb existing buildings. For the river section a double-section steel tube will be floated into the proper position across the river and then filled with water and sunk into the place excavated for it in the bed of the river. The tubes will then be pumped out and connected with the tunnels previously driven through the land approaches. In the case of the Washington Street tunnel a part of the old tunnel in the river section is to be utilized in an ingenious manner in the river section of the new tunnel. This portion is the new

roof of the old tunnel, consisting of a thickness of about 5 ft. of concrete reinforced by steel I-beams. The old footings under this roof will be cut out in places and still enough left to support it. In these cut-out portions the new side walls will be built down to the deeper level made necessary by the new construction and afterward the remaining portions of the old footings will be taken out in like manner. This accomplishment under a river bed is quite a complicated piece of engineering, and Mr. Arnold paid a compliment to George W. Jackson for originating it. The new Van Buren Street tunnel under the river is practically completed.

Mr. Arnold further said that the through-routing of the surface street railways in Chicago has been delayed largely by the necessity of building these three new river tunnels at a much lower level (in order to comply with the navigation requirements of the War Department) than the old tunnels. Furthermore, through-routing has been delayed by the necessity of rearranging some of the columns supporting the Loop elevated-railway structure in the central business district, so that the long new surface cars may go around curves which were not originally planned for their use. These obstructions will probably be removed, however, by a concerted action of all the surface and elevated railway interests, resulting from a movement now under way, so that it is probable that during the summer of this year the through-routing of the street railway lines of Chicago will be an accomplished fact. "After that," said Mr. Arnold in conclusion, "the problem of building the passenger traffic subways for Chicago will press for a settlement which can no longer be delayed."

ELECTRIC WELDING IN REPAIR SHOPS

The Philadelphia Rapid Transit Company after experimenting for a long time in a small way has perfected a number of interesting welding processes with an electric arc at its Kensington Avenue shops. Two welding outfits have been installed and the work of the forge shop is now confined almost entirely to upsetting and forming. All grades of wrought iron and steel are successfully welded with the electric arc and even malleable iron gear cases have been repaired with this process. Current at from 14 to 20 volts is used to form the arc. The carbon pencil is secured in a wooden handle and is connected to the positive lead of the water rheostat which regulates the voltage. The piece to be repaired is mounted on a bench and is connected to the negative side of the rheostat. By playing the point of the carbon pencil over the surface to be welded the metal is brought up quickly to a full welding heat, which is localized at the break. The weld is finished on an anvil by hammering until cold in the usual manner. A special flux is necessary to secure satisfactory welds with steel. The composition of this flux was determined by Harry Branson, superintendent of rolling stock and equipment of the Philadelphia Rapid Transit Company after many trials and experiments, and is secret.

Among the many uses to which electric welding is put in these shops may be mentioned butt welding of motor armature shafts and building up shafts which have worn down in the bearings. A worn shaft can be built up with metal welded on to a thickness of ¼ in. or ⅜ in. at a total cost for welding and machining to correct diameter of not to exceed $2. To tear down an armature and insert a new shaft would cost from $35 to $50. In building up a shaft small pieces of ½-in. round steel bars containing 0.20 per cent carbon are melted down on the shaft by the electric arc. The completed weld is not hammered, but it is claimed that the metal welded on in this manner is as homogeneous as the shaft itself and has quite as good wearing qualities. Another application is plugging worn and elongated holes in brake levers and rods which are afterward drilled out.

In a recent paper before the Engineers' Society of Western Pennsylvania, J. C. Roberts, assistant chief engineer of the Technologic Branch, Geological Survey, stated that 200,000,000 tons of coal are wasted annually by being thrown on the culm banks, or left in the mine in pillars and otherwise.

HEARING ON SERVICE IN THE NEW YORK SUBWAY

At the continuation of the hearing before William R. Willcox and John E. Eustis of the Public Service Commission of the First District of New York on Feb. 16, 1910, regarding service on the subway lines of the Interborough Rapid Transit Company, B. G. Lewis of the statistical department of the commission said that he had compiled from the reports of the company for 1905, 1906, 1907, 1908 and 1909 a statement of the number of cars in operation, the miles of track operated, and the revenue passengers. Mr. Lewis' figures follow:

CARS OWNED.

	1905.	1906.	1907.	1908.	1909.
Subway	796	794	794	837	823
Elevated	1552	1524	1503	1591	1591

MILES OF TRACK OPERATED.

	1906.	1907.	1908.	1909.
Subway	71.4	72.48	79.25	81.94
Elevated	118.05	118.05	118.05	118.05

REVENUE PASSENGERS CARRIED.

	1906.	1907.	1908.	1909.
Subway	137,919,632	166,363,611	200,439,776	238,430,146
Elevated	257,796,754	282,924,273	282,845,864	276,250,196

PERCENTAGE OF INCREASE ON SUBWAY ALONE FROM 1906 TO 1909.

Number of cars	3 to 4 per cent
Miles of track	14 per cent
Revenue passengers carried	73 per cent

James L. Quackenbush of counsel for the company said that the commission would be notified if any discrepancies were found in these figures.

Frank Hedley, vice-president and general manager of the company, said that it was not surprising that there had been no increase in the number of cars between 1907 and 1909, during which the traffic had increased from about 166,000,000 passengers to 238,000,000 passengers, because all the cars were being operated that could be used expeditiously. He presented the following memorandum showing the percentage of passenger increase and the percentage of increase in subway cars run from 1906 to 1909:

	Per cent.
1906 over 1905—Increase in passengers	28.88
1906 over 1905—Increase in cars run	17.65
1907 over 1906—Increase in passengers	21.88
1907 over 1906—Increase in cars run	15.63
1908 over 1907—Increase in passengers	21.05
1908 over 1907—Increase in cars run	29.01
1909 over 1908—Increase in passengers	16.19
1909 over 1908—Increase in cars run	.97

The hearing was then closed.

As a result of the hearings on this subject the commission on Feb. 18, 1910, adopted the following order:

"Ordered: 1. That the Interborough Rapid Transit Company provide service daily on all subway express and local tracks, by operating subway trains in each direction past every station so as to furnish during each half hour period, beginning at the even hour and half hour, either:

"(a) A number of seats at least equal to the number of passengers, or:

"(b) The maximum number of trains and cars that can be operated with the subway cars now and hereafter owned and equipped.

"2. That the interval of time between all subway trains operated both on express and on local tracks southbound past Ninety-sixth Street shall, daily except on Sundays and holidays, be as follows:

"(a) Not more than a two-minute interval between trains from 6.11 a. m. to 8.30 p. m.

"(b) Not more than a three-minute interval between trains from 8.30 p. m. to 12.39 a. m.

"Further Ordered, that this order shall take effect on Feb. 25, 1910, and remain in force until modified or revoked.

"Further Ordered, that within five days after service upon it of a copy of this order said Interborough Rapid Transit Company notify the Public Service Commission for the First District whether the terms of said order are accepted and will be obeyed."

The commission has adopted an order for a general investigation of the service on the elevated lines of the Interborough Rapid Transit Company, to be conducted by Chairman Willcox and J. E. Eustis of the commission. The first hearing was set for Feb. 24, 1910, at 2:30 p. m.

NEW FRANCHISE FOR CLEVELAND RAILWAY APPROVED

On Feb. 17 the people of Cleveland approved the Tayler form of franchise for the Cleveland Railway Company by a vote of 27,307 to 19,197, or a majority of 8,110. The small vote was the result of the very disagreeable weather that prevailed. The city was harassed with a blizzard so severe that traffic was demoralized. Under the circumstances, the friends of the grant feel that the vote was very complimentary to the ordinance and they are well satisfied. Had the day been pleasant, it is believed that the majority would have been very large. As it is, the number is larger than that given any other public measure in Cleveland for years.

Aside from the statements issued by Judge Tayler and former Mayor Johnson, nothing in the way of public campaigning regarding the grant was done. It is said that former Mayor Johnson's friends did some quiet work against the ordinance, but this evidently did not have much effect.

The cardinal points in the new grant are that there shall be a sliding fare so regulated that the profits shall be only sufficient to pay a dividend of 6 per cent to the stockholders and interest on the bonds; the initial fare for the first eight months shall be 3 cents, with a maximum fare of 4 cents cash or seven tickets for 25 cents and a penny for a transfer in either case; city council to have control over routing cars and conditions of service; a street railway commissioner to represent the city with a salary of $12,000 a year and expenses for assistance, all to be paid by the company, whose books shall be open to him at all times; charges for operating expenses limited and expenses for capital account to be approved by the city council; all lines to be equipped with pay-as-you-enter cars by a certain date; city given the right to purchase the property at the end of the grant and to purchase or name a purchaser at the end of eight years at $110 per share. The ordinance is for 25 years and if not extended for another 25 years at the end of every 10-year period, the company has a right to put in force the maximum rate of fare.

It is recognized that an experiment is to be tried in limiting the fare to such a low figure and placing the operation in complete control of the city council, as well as in putting a limitation upon the dividends to be paid upon stock. Judge Tayler realized that the elimination of the element of possible increase in dividends will to a certain extent tend toward loss of interest on the part of those in control, but he believes that there are other features which will counterbalance this, and that the result will be gratifying in every way. The stockholders, however, are guaranteed dividends of 6 per cent and, should the maximum fare not prove sufficient to give a good service, maintain the property in good shape and pay these dividends and the interest, it will be up to the city to take such action as will make this possible. It is believed that the people of Cleveland will not be satisfied with anything less than was furnished by the old company before the fight commenced. They have had to stand what the receiver has been able to furnish, but now that the city has achieved its purpose, the people will look to the city to carry out its contract with the company and at the same time furnish a service second to none in the country.

Judge Tayler and Receiver Bicknell had made arrangements so that little time would be required to put the new fare into effect if it was found that the grant had been approved. Accordingly, when the unofficial count showed that it had been carried by a decisive vote, the announcement was made that it would become effective on the morning of Feb. 19. It was understood beforehand that there should be no such demonstration as took place when the Municipal Traction Company acquired the system and presented the people with a "municipal day," with free rides.

The little metal disks went into general use on Feb. 19 and were sold five for 15 cents. They are put upon the little wire fixtures with which the Municipal Traction Company experimented at a cost of several thousand dollars. Fares were also collected in cash, but if even change was not proffered the conductors retained 5 cents. The old tickets were also accepted, but if the holders preferred, they could exchange them at the general offices for the 3-cent disks. It is understood that the company will use paper tickets when the formal change of control of the property takes place.

Judge Tayler has set March 1 as the date when the receivership will be ended. He believes that all the necessary formalities can be completed by that time. Funds will probably be placed in the hands of Secretary Henry J. Davies, as trustee, to pay the dividends to the stockholders of the old Cleveland Electric Railway and the holders of so-called guaranteed stock, as fixed by the court.

The new rate of fare applies on all lines within the city limits only and the people of the suburbs will be compelled to pay whatever their contracts with the old company provide. Collinwood and Corlett have been annexed to the city and the order putting the ordinance into operation includes them, although it was thought some time ago that a legal decision regarding the territory included in Collinwood would have to be secured, as it has been annexed since the ordinance was passed by the city council. East Cleveland has the same fare and the same conditions as prevail in the city, because of its contract with the old company to that effect. Lakewood people pay 5 cents and have the benefit of free transfers, as they have had in the past. Several other suburbs have the same conditions. In effect, the grant makes a zone system, so far as these villages are concerned.

As soon as the result of the vote was made known President Horace E. Andrews, then in New York, called a meeting of the board of directors for Feb. 21, in order to make preparations for receiving the propery on March 1 and also for financing the improvements that will have to be made. Under the requirements of the ordinance, it is estimated that about $3,000,000 will be required at once, although as much more will probably be necessary later. About $1,000,000 will be used for relaying tracks, $1,000,000 for power plant improvements, $600,000 for new cars and half that amount for converting cars now in use into pay-as-you-enter cars. Considerable talk is heard of purchasing power from the Cleveland Electric Illuminating Company, but if this is done the old power plants will be preserved and improved and the only power purchased will be the surplus needed above what the company's plants will produce. If the Illuminating company can furnish current at a desirable figure, it may be possible that such an arrangement will be made, especially for the outlying districts.

A problem is presented to the officers of the company in arranging for financing the improvements. President Andrews, it is stated, would prefer to sell stock for this purpose and it is possible that this may be done if the market price exceeds par value at an early date. If not, then a bond issue may be decided upon. In talking of the matter, Judge Tayler spoke of the 6 per cent dividends on stock and the probable 5 per cent interest on bonds, but seemed to be willing to leave the question of financing with stock or bonds with the officers of the company. Opinions in Cleveland differ as to the probable difficulty in financing the company on either plan with the initial fare at 3 cents.

The regular dividend of 6 per cent on the stock of the Cleveland Railway Company, to be paid in quarterly installments, will be begun on April 1. Unsecured claims against the company, amounting to about $40,000, will probably be paid by the receiver on order of the court, before the property is turned over to the company. A few other claims have not yet been passed upon and they will also be settled, in all probability.

On the Cleveland stock exchange the stock of the company has varied between 95 and 96 since the result of the vote was known. A little stock came into the market at the higher figure and had the effect of pushing down the price somewhat

John J. Stanley, vice-president of the Cleveland Railway Company, will again assume the duties of general manager of the system on March 1. Mr. Stanley, it is expected, will put into

effect the agreement made with the men to increase their wages.

It is said that the first new track building that will be done is the construction of a cross-town line on West Sixty-fifth Street. Another extension discussed is a short strip of tracks to connect the Superior Avenue line with the Euclid line in East Cleveland or the extension of the Superior line east to connect with the tracks at another point, so that the interurban cars will be able to use the Superior route.

The immediate announcement of the appointment of Gerhard M. Dahl as street railway commissioner by Mayor Baehr caused some surprise among the people. Mr. Dahl is well known as a young attorney and political speaker, but he had not been mentioned publicly in this connection before. It is rumored that Receiver Warren Bicknell will be the street railway expert in the office of the commissioner.

STRIKE IN PHILADELPHIA

The dismissal of 173 motormen and conductors of the Philadelphia (Pa.) Rapid Transit Company on Feb. 18, 1910, following their conviction of breaking the rules of the company, was made the excuse for a strike of the motormen and conductors of the company, called at 1 p. m. on Feb. 19, 1910. Of the 6700 trainmen employed by the company about 4000 heeded the order of the union and turned in their cars.

It was claimed by the union, in order to enlist the sympathy of the public, that the discharge of the men was in the nature of a lock-out. As a matter of fact the cases against some of the men discharged had been pending for some time, and the dismissal of so many men from the service at one time is accounted for by the accumulation of cases. Some 600 men were recommended for dismissal by the car house superintendents, but only 173 men were dismissed. The extreme action of the union is shown by the fact that the grievance committee of the men with which the company has dealt was to meet on the evening of Feb. 21, 1910, to consider matters affecting the welfare of the men and the company.

In explanation of the discharge of employees for breaking the rules of the company, a statement was issued by the company in part as follows:

"The assertion that the company locked out the men evidently represents an attempt to create a fictitious grievance, and is in line with the remark made frequently during the past month that the faction represented by Mr. Pratt, of the union, must bend all its energies to the creation of public sympathy. Hence, the claim that the company has ruthlessly discharged 600 or 700 employees without adequate cause.

"During the negotiations begun by the men on their own initiative, and without any suggestion from the company, for a new agreement, the company has scrupulously avoided any action that would in the slightest degree embitter the situation. For this reason few, if any, discharges have been made. The accumulation of cases of intoxication and neglect to register fares and miscellaneous breaches of discipline was disposed of on Feb. 18. This resulted in the discharge of 173 men. Twenty-nine of these were discharges for neglect to register fares; others for intoxication, others for breaches of discipline and for the good of the service. In the latter classification are men who have defied the company's rules and orders and stood in the way of efficiency and good service.

"These are the facts of the matter. The strike is in line with the action taken a month ago, when a strike vote was carried for the purpose of frightening the company into a new agreement to take the place of the contract which expires at the end of June, and with which the men have become dissatisfied. The company made every effort to arrive at an agreement, although it was under no obligation whatever to do so. It found, however, that the only thing that would satisfy the union element was a closed-shop agreement. The company was willing to go to any length short of surrendering the control of its property to the men who repeatedly succeed each other in the domination of the local union."

In June, 1909, the company entered into an agreement with its employees imposing conditions of service to be in force for a year, as published in the Electric Railway Journal of June 12, 1909, page 1087. According to this agreement the company was to treat with a committee from the men whose members were to be selected by the employees at the different barns. The first clause of the agreement between the company and the men covered this subject. It reads as follows:

"The company agrees, through its accredited representatives, to meet with the accredited representatives of its employees to adjust any differences or grievances which may arise."

This agreement was dated on June 5, 1909, and was signed for the party of the first part by the Philadelphia Rapid Transit Company and for the party of the second part by 19 car house representatives.

Some of the employees construed this agreement to mean that the company should not deal with any but representatives of the union which had been organized among the men, but which included in its membership less than a majority of the total number of trainmen. As a result the company found it difficult to maintain proper discipline among the men, especially those affiliated with the union, and was compelled from time to time to call the attention of the men to the necessity for exercising greater diligence in performing their duties.

Following a conference with a committee of the men on Feb. 17, 1910, to discuss a new agreement to replace the present one at its expiration C. O. Kruger, president of the company, issued a statement in which he said:

"The company must and will maintain the position that its employees shall be free to join or not to join any organization and may present their grievances to the company individually, or, if members of any organization of employees, by a committee or the representatives thereof, and there shall be no intimidation or discrimination against any employees so doing by any officers of the company or their subordinates."

The meeting on Feb. 17, 1910, to discuss a new agreement between the company and its employees lasted from 10:30 until 12:10. The men reiterated their demand for 25 cents an hour immediately, 26 cents an hour in 1911 and 27 cents an hour in 1912. On Jan. 1, 1910, the company announced a plan to provide insurance and pensions for its employees and fixed a new scale of wages effective on July 1, 1910, as follows:

"Motormen and conductors now in the employ of the company, and who remain continuously therein, will receive an increase of 1 cent an hour on July 1, 1910; another cent an hour on July 1, 1912, and another cent an hour on July 1, 1914, making a maximum rate at that date of 25 cents per hour.

"Motormen and conductors entering the service after Jan. 1, 1910, will receive the present rate of wages, namely, 22 cents an hour, until they have served the company continuously for two years, and if they remain in the service of the company they will then receive the increase of 1 cent an hour each two years thereafter, until the maximum of 25 cents an hour is reached.

"Motormen and conductors in the elevated service will likewise receive an increase of 1 cent an hour on July 1, 1910, and further increases of 1 cent an hour at the end of each two-year period, until the maximums of 28 cents an hour for motormen and 25 cents an hour for conductors are reached.

"New men entering the elevated service will be likewise increased after each two years of continuous service.

"Station and train men now in the elevated service will receive 19 cents an hour after July 1, 1910, with a further increase to 20 cents at the expiration of two years.

"New employees entering this branch of the service will receive 18½ cents an hour until they complete two years of service, when they will be paid 19 cents, and after two years' further service, 20 cents."

Mr. Kruger repeated on Feb. 17 that the wage scale approved by the directors of the company on Dec. 31, 1909, could not be changed except to concede a half-cent increase between the 23-cent rate effective on July 1, 1910, and the 24-cent rate to go into effect July 1, 1912. He stated, however, that he would

recommend to the directors that the time new men had to work at 22 cents before being entitled to increases be reduced from two years to one year. This was not satisfactory to the committee, the chairman of which stated that it was opposed to a sliding scale in any form, and wanted the same wages for a new man as for an old employee. It also demanded increases in proportion to the 25-26-27-cent scale for other employees that motormen and conductors received.

Incidental to the discussion of the proposed agreement, Mr. Kruger defined to the committee the company's position with regard to the presentation of grievances. He said that any employee had the right to present any grievance, but that the decision of the officials of the company must necessarily be final in all matters involving the discharge or discipline of employees. Mr. Kruger further stated that among the causes that would be considered sufficient reason for absolute discharge was the creation among the employees of a feeling of hatred, dissension and distrust, and that any man who engendered this feeling by word or act would be summarily discharged and not re-employed.

All of the men who did not turn in their cars on Saturday were continued on their runs and a limited service was given by the company with the men at its disposal. Almost immediately after the union men had abandoned their cars, however, violence was resorted to by the strikers and their sympathizers. It soon became necessary to abandon service entirely on some of the Kensington lines, including the Frankford line, and service had not been given on them up to Tuesday night. In many instances the company had the men necessary to man the cars ready in the car houses to take out the cars, but the police protection was inadequate and no attempt was made to operate cars over lines running from these car houses. Up to the evening of Feb. 22 the company discontinued service on all surface lines after 6 p. m., but maintained service on its elevated and subway line all day and until after 1 a. m. The subway and elevated lines were well protected by the police and the company's own employees, and in addition more than 450 Pinkerton detectives were detailed to duty on these lines.

On Feb. 20 the company had 700 surface cars in operation out of a total of more than 1100 called for in the regular schedule. On Feb. 21 it had 777 cars in operation. On Feb. 22 it had 600 cars in operation at 9 a. m. and increased the number steadily until about 3 o'clock in the afternoon, when cars had to be withdrawn from some lines on account of violence.

As Feb. 22 was enjoyed generally as a holiday and many offices and stores were closed, down-town Philadelphia took on the aspect of a city enjoying a celebration. The streets were thronged with people who watched the cars, and while they were for the most part orderly there was constantly present a very large element which made for inherent disorder. At the general office the company, at Eighth and Dauphin Streets, there was a special detail of mounted men augmented on Feb. 22 by a battalion of State Fencibles. Telephone communication kept these men informed of disorder and a portion of the mounted men was dispatched from the offices whenever it became apparent that the services of the men were needed to reinforce the regular police guard of two men to each car. The emergency crews were kept constantly in readiness, and whenever the services of a crew were needed two mounted men were dispatched to accompany each wagon.

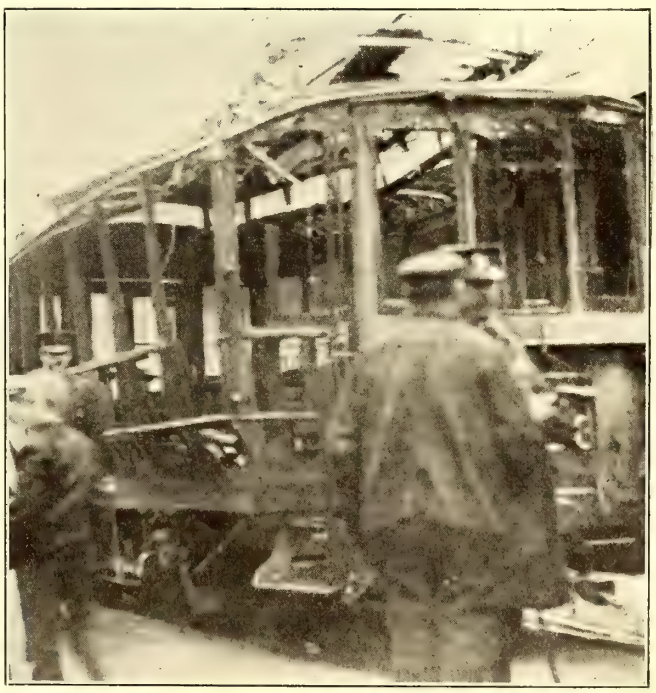
The company feels that most of the men are satisfied with the conditions of service which obtained before the strike, and it has not advertised for men. Feb. 22 was the regular pay day of the company, and all men who deserted their cars and applied for their pay were promptly paid provided they turned in their badges, thus formally terminating their term of service with the company. Very few men took their pay under the conditions imposed. This indicates that the men who are on strike realize the ability of the company to dispense with their services. It is generally agreed that the action of the men was ill-advised, and there is very little tendency on the part of the business interests to support the men. It has even become apparent to the casual user of the company's lines that the men have been negligent since the last strike and have failed in many instances even to extend to passengers courtesies that would be called for under ordinary circumstances.

On Feb. 21 C. O. Pratt, national organizer of the union, was arrested after a meeting of the strikers, charged with inciting riot, and was committed to jail and kept in confinement all night. It was alleged that his speech was of an incendiary character. When arraigned before Magistrate Beaton at the City Hall Police Court on Feb. 22 Mr. Pratt was released on $3,000 bail.

Following the disorder of Saturday and Sunday the company issued a statement in which it said:

"Last June the company stated that it had resisted the domination of the union because it believed that the public and the company would be better served by men who placed loyalty to their employers above any other allegiance. The public has had ample opportunity during the past seven months, and from the events of Saturday and Sunday, to judge whether or not the company was right then and now. We think it has been amply proved that neither peace nor good service can be expected from the forces directing the strike riots of to-day.

"Denial will, of course, be made that these riots are sanctioned by the union, but there can be no doubt that it has directed and expects to benefit by violence."



Strike in Philadelphia—Car Destroyed by Fire

George H. Earle, president of the Real Estate Trust Company and a representative of the city on the board of directors of the company, in an interview on Feb. 22, said:

"The sword has been wrested from the State and the State must get it back. Laws and authority are usurped, suspended by flying mobs. It is really pitiful. Under the circumstances it is no use talking of arbitration.

"You cannot arbitrate when the Government ordained by the people is to govern or that ordained by Pratt, of Detroit, is to govern. You cannot arbitrate anarchy. I warned Pratt that if he ordered a strike he would be sending many a poor fellow to his death, and look at the blood that has been shed.

"I believe in organized labor, but nothing discredits it so much as leadership which places the power of organization ahead of the happiness of men. The sentiment grows all the time that if the organization of street railway men is to mean constant disorganization of business and the transportation and comfort of 1,500,000 of people, the fight had better be fought to an end once for all."

OVERHEAD CONTACT FOR A CLEVELAND SWING BRIDGE

John W. Sheehan, superintendent of overhead construction of the Municipal Traction Company, Cleveland, Ohio, has made an interesting improvement in the overhead wiring connections on the Superior Viaduct in that city, which has done away with much of the trouble formerly given by this bridge, and has resulted in a material reduction of the maintenance cost. As this viaduct is opened and closed frequently through the season of lake navigation some form of connection was necessary to permit the flow of current the instant the bridge returned to its normal position. When the iron structure from which the trolley wires are carried was built, it was required to clear the rail 20 ft. On account of the settling of the west end of this viaduct some years ago, the iron structure was bent, and some of the poles had to be renewed. At another time, when the city widened the roadway, the structure had to be widened also. As a result of these changes the draw in swinging would be over 8 in. off center on one end and, with other irregularities, caused about one-third of the trolley wheels to jump when passing under the pans. Three blocks, 3 in. x 3 in., and 3-in. plank were employed for insulating the trolley runways when using the old clearance of 20 ft. The company also had much trouble in wet weather on account of the short-circuiting of the iron bolts which held this plank to the structure and from the breakage of adjoining wires. As the draw was close to the center of the city it was impossible for the conductor to collect all his fares by the time he reached the draw. With the pay-as-you-enter system in use he would have to get off the car to replace the trolley, thereby permitting people to board without paying fare. Mr. Sheehan therefore suggested that the company provide an improved runway of his design, to be built at the company's Lake View shops.



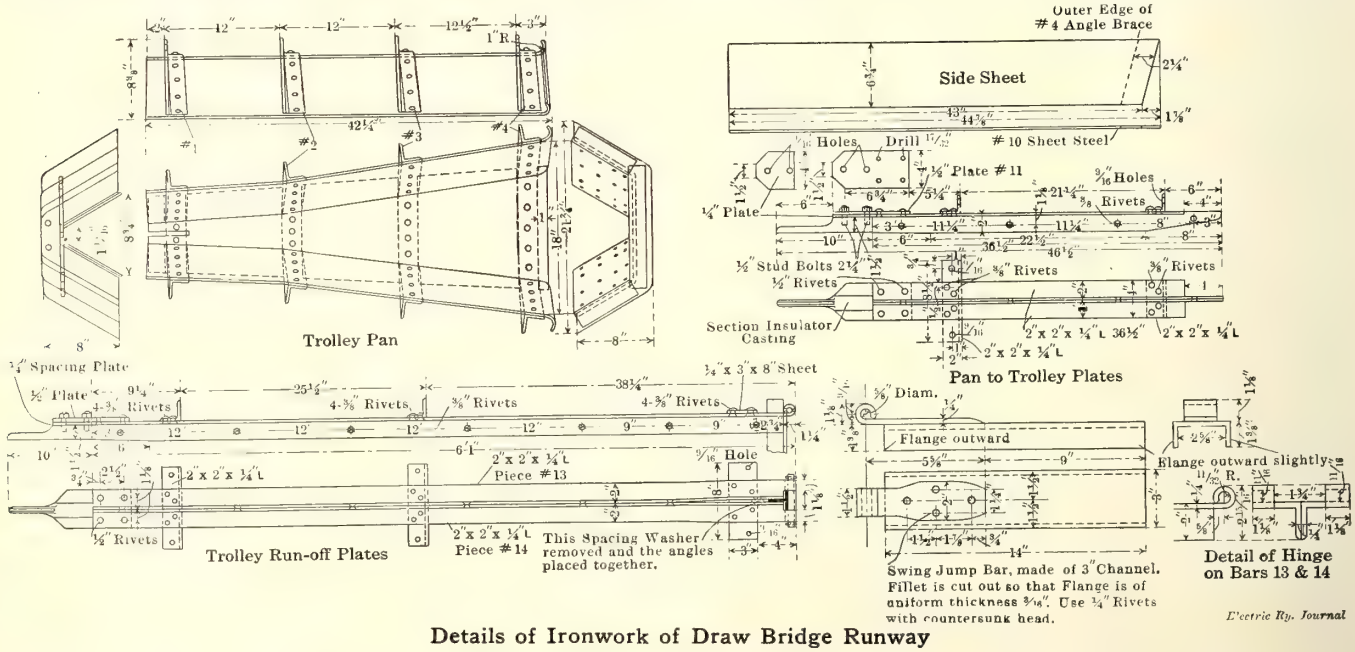
Draw Bridge Runway in Place

The new runway has lowered the trolley wire 15 in. without affecting the bridge truss, and allows better tension on the trolley pole. The frame from which the runway is carried consists of three 2-in. x 8-in. planks and three sets of 4-in. x 4-in. x 8-in. block spacers, all made of hard maple. These pieces were staggered in bolting to secure the best insulation possible. The flopper or swing jump bar is made of 3-in. channel iron weighing 4 lb. per foot and is 15 ft. long. The tongue of the hinge is riveted in the back of this bar, passing into the mortise of the hinge made by turning up the ends of the double 2-in. angle iron on the top used for the trolley runway. The bolt passing through this hinge has to be renewed with each new jump bar, the latter itself being replaced every three months on account of wear. The pan is 36 in. long, widening from the place where the double angle iron is attached to the receiving end, which is 12 in. on the top and flares at the sides to 18 in. across the bottom. The pan is 6 in. deep. The pans are made of case-hardened steel, and after 16 months' use show little wear, although about 3000 cars cross this viaduct daily. This is equivalent to 1500 cars to each track or 75 car per hour for a 20-hour day. The conductor no longer is obliged to hold the trolley rope when crossing the draw, as the wheel does not leave the wire.

PORTABLE TRANSFORMER FOR TESTING ARMATURES

At the Homewood shops of the Pittsburgh Railways Company a convenient mounting has been designed and built for an alternating-current magnet coil testing set, used to detect short-circuited armature coils. The curved pole-piece and coil are bolted to the top cross-piece of an ordinary two-wheeled warehouse truck. The iron shoe on the bottom of the truck is bent backward so that the frame of the truck will stand vertically when tipped up. Armatures under repair are mounted on wooden horses, which are of such a height that when the transformer truck is tipped up the center of the pole-piece is exactly opposite the center line of the armature shaft. The armature shop is wired for 60-cycle alternating-current incandescent drop lamps over each armature horse and by connecting the testing coil to one of the lamp sockets suitable current is instantly available.

Transformers of this kind are frequently mounted on a frame equipped with casters, but the attachment of the transformer to an ordinary warehouse truck makes it a very convenient testing outfit for transportation around the shop.



Details of Ironwork of Draw Bridge Runway

MEETING OF COMMITTEE ON EQUIPMENT

The committee on equipment of the American Street & Interurban Railway Engineering Association met at Pittsburgh, Pa., on Feb. 21 and 22. Plans were made for the work of the year as assigned by the executive committee, and a number of the subjects were discussed. There were present: John Lindall, chairman, superintendent of rolling stock and shops, Boston Elevated Railway Company, Boston, Mass.; M. V. Ayres, electrical engineer, Boston & Worcester Street Railway Company, South Framingham, Mass.; R. C. Taylor, superintendent of motive power, Indiana Union Traction Company, Anderson, Ind.; A. T. Clark, superintendent of shops, United Railways & Electric Company, Baltimore, Md.; J. L. Davis and M. B. Lambert, of the Westinghouse Electric & Manufacturing Company, and representatives of the technical press. A telegram from Terrance Scullin, Cleveland, Ohio, member of the committee, was read expressing regret that he could not be present.

GAGES FOR WHEEL WORK

The advisability of recommending gages for use in wheel mounting and inspection was first discussed. It was recalled that the gage for mounting wheels as described before the Denver meeting was not accepted as recommended practice because it was thought not suitable for universal use. That gage used the dimension between the backs of the wheels and if designed for steel wheels would not fit iron wheels which had the same tread and flange contour, but might not have the same flange thickness. It was agreed that a wheel mounting gage should be designed and recommended by the committee. Mr. Taylor thought that such a gage should use the gage line on the flanges as a basis, and not the backs of the flanges.

A discussion followed as to the advisability of recommending the marking of the center of each axle before finishing and using this center mark as a basis for all wheel mounting measurements. The committee agreed that such a recommendation would be advisable. That would be better practice than to measure from the center of the journals. In Boston, wheels were set according to the gage line and not the backs of the flanges. The allowance of 1/16 in. either way from correct gage was allowed. This practice was satisfactory.

Mr. Clark spoke of the need for a limit of wear gage and the committee agreed that it would be very desirable to design a gage which the inspectors could use to tell when to turn tires. This would reduce the variable element of personal judgment and would assure that the turning would be done at the time when the least metal would be wasted. It would be better to restore the contour frequently and thus gain wheel life.

One road had experienced derailment troubles because the wheel makers had thickened the wheel flanges to make them stronger. A proper gage to use in checking the contour of new wheel treads and flanges was thought desirable. A general discussion followed in which the tendency for wear of flanges and the best methods of restoring the flanges were considered.

The committee decided to consider the design of gages for checking the contour of new wheels, and limiting flange wear and a gage bar for mounting wheels.

TAPER OF PINIONS

The taper and design of pinions were discussed rather thoroughly. The taper used by the Westinghouse Company was 1.219 in. per foot and by the General Electric Company 1.25 in. per foot. Mr. Davis thought it would not be difficult to agree on a taper of 1.25 as standard for the pinions made by both companies if it really was advantageous to standardize the taper of pinions. The Westinghouse No. 312 and the GE-86 motors have interchangeable pinions now. Mr. Davis thought a standard taper would not be of great value unless other features, such as gears and pinions, were standardized. A standard taper would not make the pinion interchangeable, but it would probably facilitate the work of ordering pinions from different manufacturers. The two tapers now used by the manufacturing companies have practically no difference as to mechanical qualities. The armature shaft taper was not related to the size of the shaft and one standard taper would do for all capacities of motor.

The committee agreed to consider favorably the recommendation of a standard taper of 1.25 in. per foot for pinions.

MOUNTING PINIONS

Interesting practices of pinion mounting were then described. Indiana Union Traction shopmen pressed on pinions for 75-hp motors at 40 tons pressure by using a wheel press. They were taken off with a screw clamp or with wedges. At Boston about 90 per cent of the pinions were put on at the car houses, where it was necessary to put them on by driving. The Chicago Railways used a hydraulic press for removing pinions, pushing the shaft out as in wheel practice. The Baltimore United practice was to counterbore the pinion and fasten with a nut and lock washer.

Attention was called to the small part which keys played in holding pinions in place. If the fit of a pinion did not hold it securely, then the key would soon be destroyed. To emphasize this the Interborough Company had mounted a large number of pinions without keys more than a year ago. These ran satisfactorily in regular daily service. The practice of the Westinghouse Company in mounting pinions was to shrink them on. Formerly they were heated with a gas flame, but extreme care was necessary in this work to make certain that the pinions did not become heated above a temperature of 150 deg. C., otherwise dangerous stresses might occur. With specially hardened steels the process required even additional care or they would break in the keyways. Now the gas flame was no longer used, but the pinions were heated by immersion in boiling water. This did not anneal the steel as the careless use of the flame might do. It was a safe way for mounting large pinions. The shrinking fit was much better than a drive fit, because the arrangement of the grain of the metal was not disturbed.

GEAR AND PINION MATERIAL

An interesting discussion followed on the characteristics of pinions made of various kinds of steel. One member spoke of a tool steel pinion that had been so hard that it had stripped the teeth off a gear without any injury to the pinion teeth. It had been the experience of one committeeman that the combination of a hard pinion with a softer gear increased the life. The gears stayed in proper mesh longer, and because of the small wear of the hard pinion there was less abrasive metal to accelerate the wear.

A representative of the Westinghouse company called particular attention to the injurious effects which loose gears and bearings had upon the motor and armature coils. After a careful study interesting data had developed showing that an element which had much to do with the mechanical breaking down of armatures, brushes, gears and similar parts of the motor equipment was the loose axle bearing. Any play in the axle bearing permitted the gear and pinion to get out of mesh and thus severely jar the motor. The necessity for maintaining the gears accurately in mesh was most important. In many instances it would be advisable to scrap the gears and pinions sooner and thus save the motor equipment from the injury which severe vibration would bring about.

In developing characteristics of material for gears and pinions it was the practice of the Westinghouse company to make very severe endurance tests by driving a load with a 200-hp motor through gearing designed for motors of 50 or 60 hp only. In these tests it was plainly seen that if the gearing was not in accurate mesh the life of the teeth was very greatly shortened. Some experiments had shown that a great life will be had when both pinion and gear were made of treated or specially hard steel. The Westinghouse engineers had concluded that excellent results are obtainable by using treated steel of a high grade and ductile carbon steel. This was put through a heat treatment and the resulting pinion was neither too hard nor too brittle and was tough enough to give good wearing qualities. The experience of the Interborough Rapid Transit Company had shown that proper gear material was to

be obtained by treatment. The Westinghouse company was prepared to treat cast-steel gears. Old style gears, which had an elastic limit of from 20,000 to 25,000 lb., when treated had double that elastic limit.

The American Gas Appliance Company had case-hardened some pinions for small motors used on the Boston system.

Mr. Taylor suggested that gears might be made according to the process used in rolling steel wheels, that is they would be in one piece of homogeneous metal, as no operating man desired any part of his apparatus subdivided if he could get that part made of the same material in one piece. When rims were shrunk on there was an opportunity for fits which would distort the rim or stress it unduly. Mr. Davis stated that the Westinghouse company uses altogether for heavy equipments gears which are made from rolled tire steel.

One member called attention to the apparent inconsistency in the wear of gears on two and four-motor equipments. Although the two gears of a two-motor equipment handle practically the same load as the four on the other equipment, there was very little difference in the rate of wear. It was noted that there was more wear on the No. 2 and No. 4 motors. This probably was because the torque on these motors acted opposite to the blow made by irregularities in the track. The No. 3 motor gave the most trouble, so far as axle bearings were concerned.

One engineer suggested the advisability of standardizing the length of the axle bearing fit. With non-standard axle bearing lengths as now used it was not convenient to use motors of different makes but of similar capacities on the same axle. If the first motor used had an 8-in. axle bearing the shaft would be worn for that length, and if it were desired to install a larger motor on the same shaft it would be found necessary to smooth the shaft before the 10-in. bearing of the larger motor could be used.

The committee as a result of the foregoing discussion thought that it might be advisable to include in its report the following subjects: (1) Gear material, (2) better material, such as rolled instead of cast, (3) limit of wear of gears and pinions.

WHEELS AND TIRES

The question of wheel design was touched upon briefly at the first session of the committee. Mr. Lindall called attention to the necessity for careful judgment in choosing a wheel design suitable for the type of equipment under which it was to operate. On the Boston Elevated, with its large cars and wheels, there had been practically no loose tires in 10 years, while on the surface lines, with tires of smaller section, considerable trouble had been experienced. It was very desirable to have a proper limit of wear established for steel tires and wheels.

Mr. Taylor told of the practice of using steel tires on the large interurban cars of the Indiana Union Traction Company until they had worn down to a thickness of 1⅜ in., when they were transferred to a city car with a 20-ft. body and worn until they were but ¼ in. thick.

A peculiar wheel failure was mentioned during the discussion. On a road where severe braking was necessary, a wheel became very hot and when a pool of water was passed at the bottom of a grade the change in temperature cracked a large piece out of the tire and web. At first the reason for this fracture was not understood, but the explanation came when the same conditions were reproduced at the time of grinding another wheel. It broke in the same way because it had been overheated and then cooled with water.

It was the sense of the committee that profitable study could be made of the design of wheels with regard to the amount of metal used. One interurban road used wheels that weighed 725 lb., and these were too heavy. The cost of carrying the extra metal around was a dead loss.

REDUCING CAR WEIGHTS

The problem of reducing car weights brought forth an interesting discussion. It was thought very desirable to determine upon a unit of comparison for the more important parts of equipment. For example, should cars be compared on the passenger-seat basis or on the square foot of floor surface basis? Would it be advisable to rate trucks with a unit of tons of center plate load, and the electrical equipment according to horse-power? Mr. Ayres called particular attention to the necessity for better engineering design of car bodies. If a part broke it should not be assumed that the breakage occurred on account of lack of material in the part, but rather on account of wrong design or use of material.

Mr. Taylor felt that any units for comparing car bodies and trucks should include some function of the car speed. It would be desirable to find a unit better than the weight per seated passengers now so generally used. For that reason he suggested the unit of weight per square foot of car floor, including platforms, in relation to the speed. Stronger car bodies were needed for high speeds than those which would satisfactorily serve for low speed.

Following out this thought Mr. Lindall remarked that the service in cities where tracks were rough from special work and rail corrugations might possibly be as severe on a car body at slow speed as smoother track on an interurban at higher speeds. Mr. Ayres had noticed that an undue proportion of the axle and loose bolt trouble on his cars occurred while they were on the tracks of a large city company. This confirmed what Mr. Lindall had said. The members expressed various views on the conditions imposed by corrugated rails and agreed that roughness of track from this cause worked a severe hardship on car bodies.

One member said that there was such a variance in the designs of different car builders supplying equipment for like service that much work could profitably be given the problem of getting a unit of car-body comparison that would take all conditions into account; this would make the comparison of cars of different roads more accurate and useful. One member speaking of the effect of rough track related how one of his division foremen had told him that if all the cars were run on boulevards where the track was smooth, rather than over the special work in the center of the city, the equipment could be maintained with not one-third the work now required for the upkeep of the cars on the rougher lines. Mr. Taylor cited a peculiar condition brought out on the 18-mile division of the Indiana Union Traction Company, between Alexandria and Tipton. There were three railroad crossings in this section. The cars made a large mileage. It was found that the lighter type of car stood this severe service best and the body racked less than a heavier would. Mr. Ayres spoke of weight as a disadvantage unless the material were needed for strength. This was particularly true at high speeds. The blows were nearly in proportion to the square of the speed and also in proportion to the weight. So long as the blows could not be obviated it was very desirable to lessen their effect by judicious reduction in weight.

Mr. Davis called atention to the spring quill method of supporting electric locomotive motor armatures used on the freight locomotives and motor cars of the New Haven Railroad. This kind of support reduced the hammer blow very greatly, although it was an expensive design. The motors of this type were also heavier, but the pounding effect, nevertheless, was reduced considerably. Mr. Ayres spoke of an ideal design of truck which would have one spring-supported motor connected to both axles, thus permitting a reduction in maintenance, weight and some of the usual troubles.

Mr. Davis told of experiments which the Westinghouse Company was making with spring gears and asked for opinions of how a flexible gear would reduce maintenance troubles. The gear as designed had eight springs inside the rim which allowed it to absorb vibration without moving laterally on the axle. The reduction in vibration in the gear in turn reduced the injurious vibration in the motor and reduced the maximum stress in the gear teeth. The problem of lubricating the sliding surfaces of such a flexible gear might be difficult of solution. The company was not yet fully prepared to indorse this design, but the experiments were of considerable interest.

Several members placed emphasis on the desirability for re-

ducing tire weights and thus bringing about a reduction in track and motor maintenance cost. The single-phase high voltage railways were economical because from 20 to 25 per cent of the power was saved even though it was necessary to handle heavier cars. This saving, Mr. Davis said, more than balanced the additional cost of maintaining the single-phase equipment.

The allowable wear of axle and armature bearings was discussed. Many roads run their gears too long and a damage to the rest of the equipment results. This was false economy. F. R. Phillips, superintendent of equipment of the Pittsburg Railways Company, had used one-half the air gap dimension as the maximum limit of wear for armature bearings. He spoke of the false economy in trying to get too long a life out of motor bearings. Some roads did not take into account the injurious effects which loose bearings brought upon the rest of the equipment. He favored the use of bronze and said that it was cheaper than babbitt. When in charge of the equipment at Cleveland he had changed 55 per cent of the axle bearings from babbitt to bronze, and thereby reduced the bearing and gear case trouble 75 per cent. In using bronze extreme care was necessary to assure a uniformly pure mixture. The metal in each lot of 100 bearings was analyzed and thus the composition kept uniform. The mixture was in the proportion of 80:10:10, copper, tin and lead. No scrap was used and the base was pure lake copper. Scrap copper, such as magnet wire, contained phosphorus, iron and other impurities. The life of bearings of this mixture could be increased by adding ½ lb. of nickel to each 100 lb. of the mixture. The proportions as used were those which had been found so satisfactory in steam railroad service. Mr. Phillips did not think it economical for a railway company to operate its own brass foundry.

The bronze bearings were molded on a plate and after molding it was necessary only to bore and to face the collar, thus the bronze bearing required no more machine work than the babbitt bearing.

It had been the experience in Boston with babbitt bearings that the malleable shell required scraping after relining two or three times, because of the disfiguration and wear of the outside. The renewal of bronze bearings meant a full new shape with each bearing.

GEAR RATIOS

The subject of gear ratios was discussed in connection with the low voltage existing on the lines of many interurban roads. As much as 20 per cent reduction in power was frequently obtained where the line voltage was low by using a gear ratio which was less than that which would be suitable if the full voltage were had. The speeds obtainable would be the same because of the higher rate of acceleration, and the voltage would in turn be improved because of the reduction in power demand.

Referring again to car body design Mr. Phillips did not think that the element of speed would necessarily make much difference in the proper design of a car body. Rather, the acceleration and deceleration were the more important factors. Mr. Taylor spoke of the severe stresses set up in 50-ton cars which frequently were stopped in 600 ft. from a speed of 60 m.p.h. Car bodies which were of excellent design for use on lower speeds would soon give way under the stresses of high speed service.

Mr. Phillips described briefly the principles recognized in designing a new semi-steel car for street service in Pittsburgh. A ⅛-in. steel side plate extending up to the window rail with angles at top and bottom was the carrying member. Theoretically this plate could have been one-half that thickness if assurance might have been had that the material would always remain in its most effective shape. The design of the car framing was similar to that of a steel bridge. In estimating the stresses, the rates of deceleration and acceleration were considered in addition to the loads applied in service. The section modulus of each side plate was something over 110, while the stresses required a section modulus of approximately 20, including a factor of safety of five. The new Pittsburg Railways Company's car seats 57 passengers, is 45 ft. 6 in. long and weighs complete 46,400 lb. The weight of the body alone is 18,680 lb.

It was stated that the experience of the Pennsylvania Railroad Company, with its all-steel cars had shown that such equipment required 100 per cent more steam for heating than did wooden cars. In the Pittsburgh steel cars it had been found advisable to line the backs of the longitudinal seats as a precaution against uncomfortably low temperature.

ENTERTAINMENT FEATURES

While at Pittsburgh the members of the committee were entertained by representatives of the several large manufacturing plants of the Pittsburgh district. The works of the Westinghouse Electric & Manufacturing Company, the Westinghouse Air Brake Company and the Standard Steel Works were visited. The courtesies of a special new car, as earlier mentioned in the report, were extended by the Pittsburgh Railways Company, for a trip to the Westinghouse plant.

At the Westinghouse plant the committee inspected several new types of apparatus and processes of manufacture; this company now has on order more than 5,000 railway motors. Among these were a part of an order of 1,700 No. 319B motors for the Chicago Railways Company. This type of motor has field and inner pole coils wound with strap. The coils are mounted with flat springs underneath to provide against looseness. A new dust case for enclosing the car axle between the motor axle bearings was seen. The hand operated unit switch type of control attracted particular attention. This equipment, suitable for four 75-hp motors, weighs considerably less than the L-4 or even the K-34B control equipments. It includes a small drum controller on the platform and a group of eight unit switches, carried under the car; 500-volt current cut down by resistance is used for actuating the valves which operate the unit switches. By the addition of a line switch this very small control equipment is suitable for handling four 100-hp motors in heavy service. A new type of gear case made of sheet steel, fastened together by welding, was seen. The oxy-hydrogen flame is used to obtain a neat weld for joining the sheet steel and for adding reinforcements.

The committee inspected the motors and parts of the equipment of the large Pennsylvania locomotives now in course of erection in the Westinghouse shops. These locomotives have two 2000-hp motors each and weigh 166 tons complete. To provide against undue strains in the connecting rods which transmit the power from the large locomotive motors to the drivers a heavy clutch is built inside of the armature spider.

The New Haven freight locomotive equipment also was seen in course of construction. These single-phase motors will have frames and cases made up largely of structural steel, thus introducing a new design. A portable substation enclosed in a fire-proof steel car was seen in course of erection.

ELECTRIC LINES INCLUDED IN AMENDED RAILROAD RATE BILL

The bill which represents the ideas of the present administration at Washington for amendment of the interstate commerce act has been reintroduced in the House of Representatives by Congressman Townsend, of Michigan, who presented the original measure. The bill as introduced anew contains a number of important amendments drafted by Attorney-General Wickersham.

As a result of the hearings before the House Committee on Interstate Commerce, at which representatives of various electric railways complained that the bill discriminated in favor of steam lines by making no provision for joint rates and through routes between the two classes of properties, electric roads are included in the scope of the amended measure.

STANDARD FIRE HOSE HOUSES

In discussing fire preventive and fire-fighting methods and apparatus in connection with electric railway shops, car houses and other buildings, a prominent electric railway engineer recently expressed the opinion that if he could have enough hydrants, properly equipped with hose, axes, crowbars and other hand tools commonly used by firemen, the hydrants to be located on the property exactly where he wanted them, he would be willing to take his chances with any fire that might start, providing he could be confident that there would always be available at least six well-trained men for handling the hose and fire-tools.

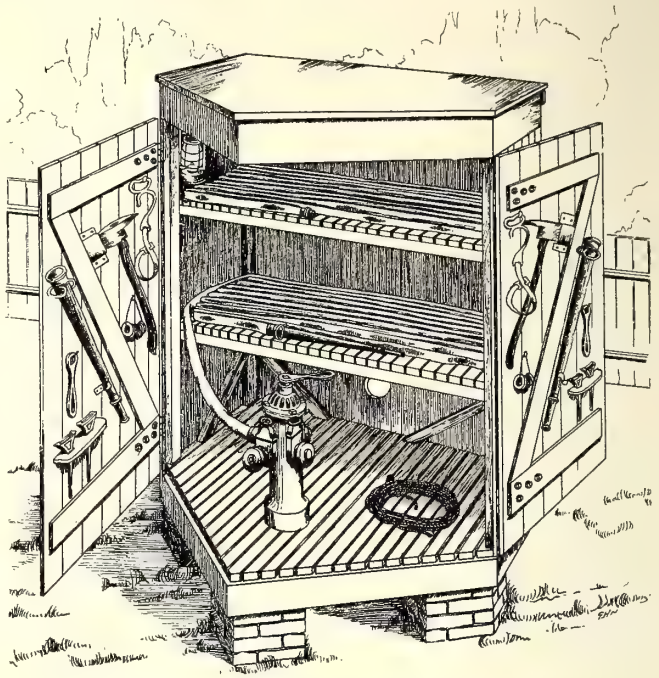
Possibly the foregoing statement should not be taken literally, but it goes to show that in the study of modern fire-fighting methods, which has been taken up actively during the past three years by electric railway engineers, the private fire-hydrant, properly placed with reference to the risks, and properly equipped, is now recognized as an essential factor in preventing the spread of fire in shop and car-house plants.

In many of the older electric railway buildings throughout the country, provision was usually made for one or two hydrants, located on the property, but their purpose was chiefly to give a source of water supply for the use of the regular fire department after it had arrived, or that hose could be attached to them by the men employed at the plant. The hydrant usually stood in the open and the hose, if any hose was provided, was kept in a coil or on a reel, detached from the hydrant and often, as was frequently proved by experience, in a place rendered inaccessible by accumulated rubbish, so that valuable time was lost in getting out the hose when the emergency which required its use arose.

The modern practice in this regard is to have enough private hydrants to cover the entire exposed area, and to protect each hydrant with a small housing in which is kept suitable lengths of hose, always attached to the hydrant, together with a full equipment of axes, bars, spanners, nozzles, lanterns and other hand tools and appliances, where they are always available for instant use.

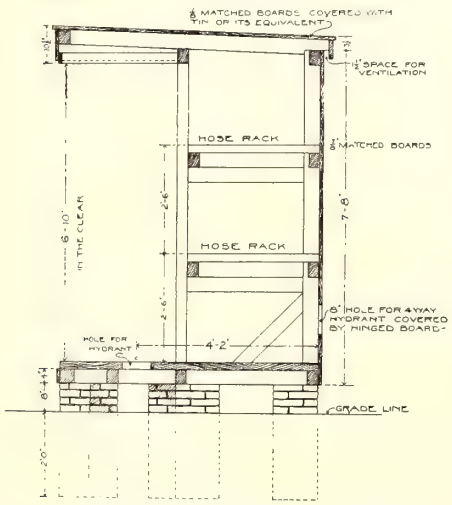
Recognizing the importance of the private hydrant and hydrant house, the Sprinklered Risk Committee of the Underwriters' Association of New York State some time ago prepared drawings for a standard hose or hydrant house, and suggested a list of equipment that should be included in each house. Certain of these drawings are reproduced in this connection. The committee did not specifically describe how the house should be built, but the following description of the houses built for this purpose by one of the prominent electric roads in New York State may be taken as good practice and in conformity with the recommendations of the New York State Underwriters and the National Board of Underwriters.

The house should be completely enclosed. The back and sides are rectangular, but the front, instead of being straight, is brought forward to a point as shown in the engravings. The house is so located with reference to the hydrant as to place the hydrant in the forward or triangular portion, leaving the rear or rectangular portion for shelves and racks upon which hose and other equipment can be stored. Two hinged doors at the front, as shown on the perspective view, give access to the house, and the inner sides of the doors provide room for hanging the smaller tools and appliances.

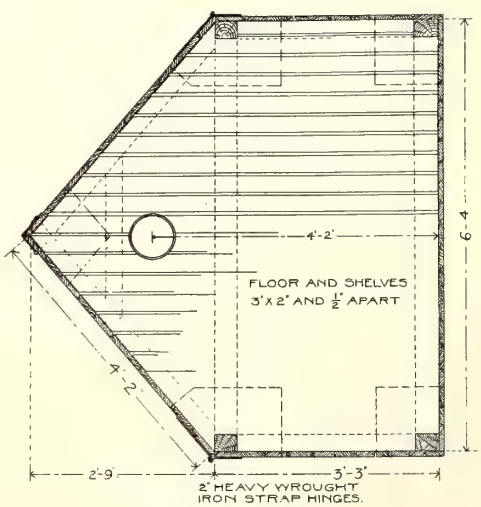


Hose House Completely Equipped

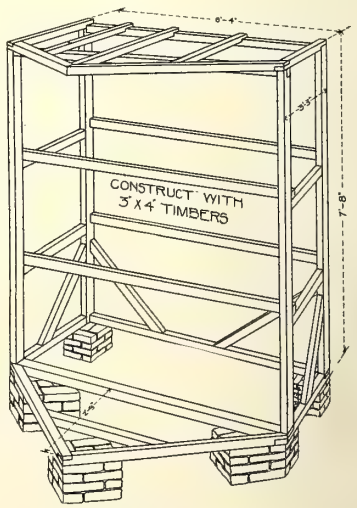
The dimensions recommended for a standard hose house are shown in the detail drawings. The house should rest on brick or concrete piers in order to give an open space of at least 8 in. under the floor. This open space underneath the house is an important feature as it gives circulation of air and assists in keeping the house and the contents dry, as well as tending to prevent freezing.



Side Elevation of Hose House



Plan of Hose House



Hose House Framework

The framework is constructed with 3-in. x 4-in. timbers. The side walls and doors are formed of matched tongue and grooved strips and the roof should be tight and waterproof. Matched boards, ⅞ in. or 1 in. thick make good material for the sides and roof ,and the roof can be covered with tin or tar and felt roofing material. A space of 1½ or 2 in. should be left open under the eaves for ventilation. If a three-way or four-way hydrant is used, 8-in. holes can be provided in the

side walls and in the back to facilitate the attachment of hose. These hose holes should be covered by hinged or sliding doors.

The floor is made by 3-in. by 2-in. slats, placed about ½ in. apart. Two racks or shelves at the back are recommended, as shown in the elevation, for holding the hose, which is laid in folds loosely upon the racks so that it will play out without twisting or kinking. The hose racks are made of 2-in. by 3-in. slats, about ½ in. apart, the slats running from rear to back.

In the house shown in the drawings there are two racks, each of which will accommodate 100 ft. of standard hose, and one of these lengths should always be coupled to the hydrant with play pipe attached.

For yard-hydrant use, Underwriters' standard, cotton, rubber-lined hose, in 100-ft. lengths is recommended. The actual size of this hose is 2⅝ in. in diameter, and the hose should be capable of standing a bursting pressure of 400 lb. per square inch when new. Hose should be subjected to actual test under fire-fighting conditions at frequent intervals. Hose and hydrant couplings and nozzles should be the same size and pattern and interchangeable with those of the public fire department, or the nearest factory or plant from which assistance may be obtained.

The Underwriters' Association of New York State recommends the following equipment for a standard hose house:

One-hundred ft. of standard Underwriters' hose, stored on bottom shelf and always coupled to hydrant ready for immediate use.

At least 100 ft. extra of Underwriters' hose, stored on upper shelf as shown in the view of the complete house with male end coupling to the front.

Two extra play pipes or nozzles, four spanners, two fire axes, two bars, two ladder straps, one nozzle holder, one heavy lantern.

One wrench should always be kept on the hydrant and a spare one provided for emergency. It is recommended, however, that in place of wrenches for turning on the hydrant, hands wheels permanently attached be used.

Coils of ½-in. hemp rope to suit the height of buildings should be hung in each house, and a liberal supply of rubber hose-washers kept on hand and hung in a conspicuous place.

Gate valves must be attached to each hydrant outlet, as shown, in order to control each hose stream independently.

The standard hose house recommended by the New York State Underwriters' Association is intended primarily for use in mill yards, but is adaptable for electric railway plants. For the latter service, the equipment can be augmented by several pairs of rubber gloves, wire-cutters and other appliances that will suggest themselves for use in fighting electrical fires. Some railway companies include in the hydrant-house equipment hand extinguishers and pails of sand and of water.

The location of hydrants and hose houses with reference to the various buildings is an important consideration. They should be placed in open spaces, easily accessible, and where they can be kept free from rubbish or any obstructions that would interfere with the use of the hose or appliances under emergency conditions. It is well to place the houses so that hose can be run through doors or windows into all of the buildings; although it should be understood that yard hydrants are not intended to take the place of interior standpipes. Serious delay may be occasioned by placing the hose and appliances at distant parts of the yard, and at the same time the hydrants should not be placed in alleys or so close to buildings that a serious conflagration might interfere with their use. The Underwriters recommend that hydrants and hose houses be placed not nearer than 20 ft. from any building if possible to avoid it.

The increased efficiency, economy, and the fact that the life of the hose is prolonged when stored on slatted shelves in well-ventilated houses, render a proper installation of standard hose houses and equipment desirable in the yards of every electric railway plant. As a matter of fact, in at least one large electric railway repair shop recently visited, standard hose houses and equipment were found not only in the yards but also on the second story of the building itself, the idea being that a hydrant outlet, covered by a standard house with all the auxiliary equipment, gave better facilities for fighting fire than the regulation standpipe. The doors to the hose houses should be kept closed but not locked. Frequent fire drills should be given to familiarize the employees with the location of the hydrants and hose houses, the use of the equipment and the areas that can be reached from each house.

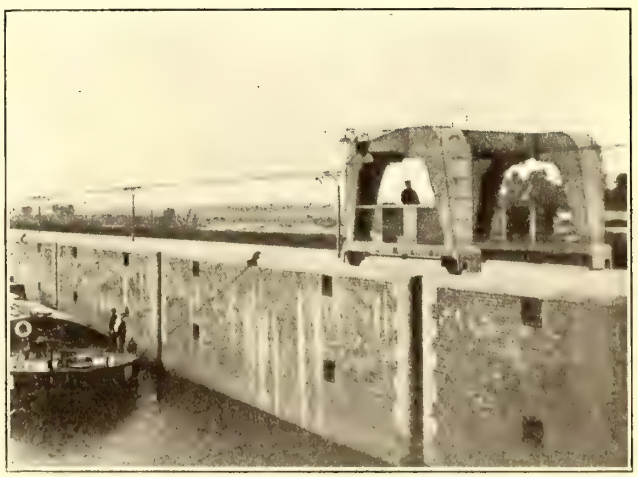
MEETING OF THE COMMITTEE ON POWER GENERATION

A meeting of the committee on power generation of the American Street & Interurban Railway Engineering Association was held at the headquarters of the association, 29 West Thirty-ninth Street, New York City, on the afternoon of Feb. 21, 1910. The chairman of the committee, W. S. Twining, chief engineer of the Philadelphia Rapid Transit Company, and E. D. Smith, superintendent of power stations of the United Railways Company of St. Louis were unable to be present but the following were in attendance: H. G. Stott, superintendent of motive power, Interborough Rapid Transit Company, New York, N. Y.; G. H. Kelsay, superintendent of power, Indiana Union Traction Company, Anderson, Ind.; J. D. Andrew, superintendent of power stations, Boston Elevated Railway Company, Boston, Mass.; and C. E. Roehl, electrical engineer, Brooklyn Rapid Transit Company, Brooklyn, N. Y.

A tentative program as suggested by the executive committee was considered and the following subjects were selected for special treatment in the report of the committee during the coming year: Steam meters, low pressure turbines, condensers, forced draft in connection with the capacity and efficiency of boilers, flue gas analysis, and economical methods of caring for peak load with special consideration of fixed charges.

NOVEL TYPE OF ELECTRIC LOCOMOTIVE

A novel type of electric locomotive has recently been built by the Allgemeine Elektricitäts Gesellschaft for canal haulage near Bremen. The locomotive runs on a quay which had to be kept clear for the passage of drays and for other purposes. To secure the necessary weight for adhesion it was decided to



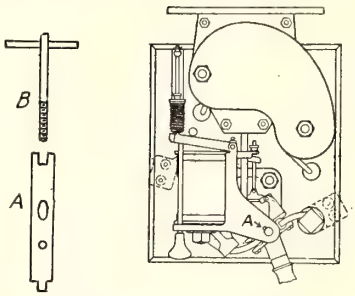
Novel Type of Electric Locomotive

build the locomotive in the form of two U's with a connecting girder. The width of each base is only 28 in., so that the driving motor had to be placed in the upper part of the structure. The current is taken from overhead wires, which also carry the current for lighting the quay. The motive power is supplied by one three phase motor, carried in the upper part of the locomotive, and geared to each of the four wheels.

TO REMOVE BRUSHES ON G. E. CIRCUIT BREAKER

BY G. M. COLEMAN

It has been my experience when repairing the brushes on the General Electric circuit breakers that the shaft *A* on top of the bearing is cut flush, as shown in illustration. It is therefore impossible to get hold of it when repairs are to be made. The shaft is generally tight from rust or other causes, and is taken out with difficulty. To remove the shaft the magnet coil must be taken off. As the nuts are on the back of the breaker, the entire breaker must be removed from the car. This causes considerable work and necessarily entails considerable waste of time.

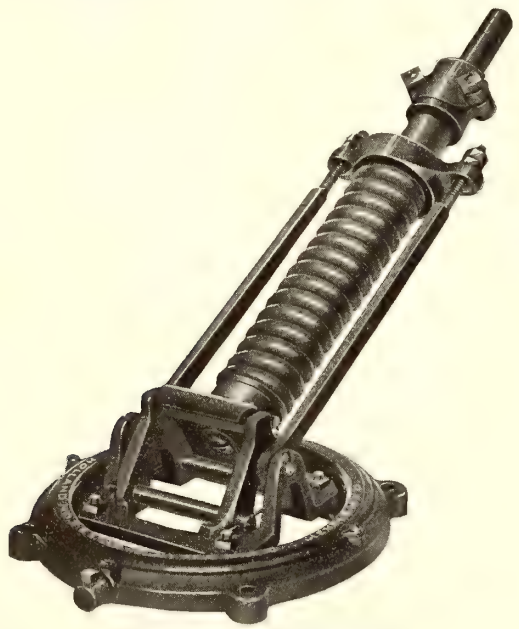


Device to Remove Shaft of Circuit Breaker

To overcome the difficulty, tap out the end of shaft *A* for a 5/16-in. screw. A small hand wrench can be made by cutting a thread on a 5/16-in. iron rod, as shown in *B*. Then drill a 3/16-in. hole about ⅜ in. from the top of the rod and insert a 3/16-in. bar about 3 in. long to make a good hand hold. This wrench is screwed into shaft *A*, and the shaft is easily pulled out. After all the shafts on the different breakers have been tapped out in this way it is a very easy matter to remove them at any time.

A REVERSIBLE BALL-BEARING TROLLEY BASE

A trolley base that is giving satisfaction, especially in suburban and interurban railway work is the No. 3 ball-bearing base made by the Holland Trolley Supply Company, Cleveland, Ohio. This base is 16 in. wide and is equipped with 42 1-in. balls running between two self-cleaning bearings, dust and water being permitted to work their way out through the bottom of the base. The sleeve is 24 in. long and reinforces the pole. The tension of the spring can be readily altered by adjusting the nuts on either side of the collar which retains the spring.



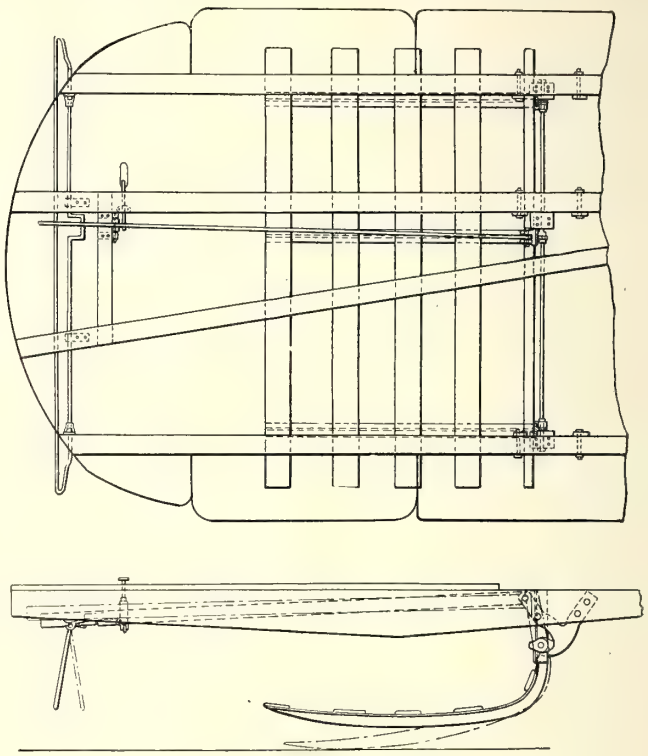
Ball-Bearing Trolley Base

The base is single acting and reversible and works equally well in either direction. The ordinary tension of the base against the wire is from 25 to 50 lb., but the construction of the base is such that the tension is very little when the pole is pulled half way down.

NEW AUTOMATIC WHEEL GUARD

The accompanying illustration shows a wheel guard for electric cars designed by Edward T. Hardin, general manager of the Hot Springs Street Railway. The rights of this wheel guard have been recently purchased by the Ackley Brake Company, New York, which is placing it on the market.

The wheel guard is normally carried at a height of 3 to 4 in. from the track. It can be dropped to the rails by an automatic tripping device actuated by a gate suspended from the front of the car by contact with a person or object on the track. It can also be operated through foot pedal by the motorman.



Automatic Wheel Guard

The frame of the wheel guard consists of T-irons of suitable strength to withstand the weight of any person or object it might pick up, without straining or bending any of its parts. The guard is pivotally suspended from the frame of the car body and is held raised with a long tripping bar which extends under the platfrom of the car with its forward end engaging the actuating mechanism of the wheel guard. The position of the guard and other parts of the mechanism when the car is in operation is shown by the solid lines in the side elevation. When in this position, the actuating bar is engaged by a notch to the roller stop, and the upper arm of the gate bears on the under side of the bar. The guard can be dropped automatically by the backward movement of the suspended gate thereby tripping the bar out of engagement with the roller stop, or it can be dropped by the pressure of the motorman's foot on a treadle which also raises the bar from its engagement.

The wheel guard is patented and has been in use for over a year on all the cars of the Hot Springs Street Railway where it has given satisfaction both as regards results and maintenance. The Ackley Brake Company is planning to manufacture this wheel guard on a large scale.

The British Board of Trade has published statistics of mileage and traffic of the tramways and light railways operating in the United Kingdom at the end of 1909. The total route mileage was 2526, representing a capital expenditure of £71,023,-239. Net receipts were £4,595,779 and 2,660,000,000 passengers were carried. All but 166 miles of line is worked by electricity. Of the 298 lines or systems, 176 are owned by municipalities and 122 to companies or individuals. The municipally owned lines comprise a total of 1680 miles.

News of Electric Railways

Policy of New York, New Haven & Hartford Railroad in Relation to Electrification and Controlled Lines

Charles S. Mellen, president of the New York, New Haven & Hartford Railroad, made the following references to the probable electrification of the company's lines out of Boston and to the attitude of the State of Massachusetts toward the company in a speech which he made before the New England Boot and Shoe Club, Boston, on Feb. 16, 1910:

"As the New York, New Haven & Hartford Railroad probably has a greater concentration of passenger business than any other railroad in the United States, naturally we expect we shall have to be a pioneer in the substitution of electricity for steam as motive power. In our judgment it will be a mistake, in the present stage of development, to force, by legislative enactment, the electrification of the lines about Boston. Through the natural process of evolution, electric traction will be installed in Boston, and the whole subject may well be left to the managers of the railroads as those more greatly interested even than the public which is to be benefited.

"The situation about Boston is one that is fraught with much greater difficulties than that about New York. From New York to Stamford, the New York, New Haven & Hartford Railroad has only one branch, and it was comparatively easy to electrify a straightaway line compared with electrifying a similar distance about Boston, where the lines branch immediately upon leaving the Union station. It will cost about four times as much to electrify the same distance from the Boston terminal to the south as was the case in New York and correspondingly as much to electrify the lines for the Boston & Maine Railroad to the north.

"There are probably fewer interruptions to the service over the electrified line between New York and Stamford than when the division was operated by steam, and, of course, the comfort of the passengers is promoted and the service has become very popular. It is asking too much to expect Boston to appreciate that it cannot furnish the business to warrant the expense of electrification, and I do not see how the railroads about Boston can be expected to substitute electricity for steam, without the toll collected being increased. A very large proportion of commutation or suburban service is unprofitable at present rates, and unless the substitution of electricity for steam is going to increase it tremendously, and beyond what has been the experience on the west end of the New York, New Haven & Hartford Railroad, I do not see where the business is coming from to warrant the expense.

"There is another complication, and that is the raising of the necessary capital required. We have no difficulty in raising all the money that is necessary for purposes outside of Massachusetts, but this will be the first time that a large amount of capital has been required by the company for purposes within Massachusetts, and opens endless questions regarding the position taken by the commonwealth upon past issues, and to authorize new capital while that already outstanding is under fire might be held to legalize the past transactions, and that may require careful consideration by the authorities. It would be a great mistake to force a situation by legislation upon a company admittedly so far in advance of all others in what it has already accomplished, and in what it is at the present time endeavoring to learn through costly experiments.

"I wish I could say definitely when the work of electrifying the lines out of Boston will commence. While the directors of the New York, New Haven & Hartford Railroad are willing to be advised on many subjects, it is a very large transaction. I believe it is coming within a very short time. I believe you will see works started within two years, and even earlier if there is sufficient encouragement for the construction of the tunnel. The tunnel I regard as the first step for all the improvements about Boston. The initial step to electrification is the tunnel, which must be operated by electricity. When that is completed, electrification at either side becomes necessary. You are losing no time. The New York, New Haven & Hartford Railroad is spending its money and trying the patience of other people who are, perhaps, more patient than the people about Boston. When the company starts at Boston it will know just what it wants to do before it takes the first step. You are gaining by the delay.

"If Massachusetts is content to execute her own laws within her own territory, she will have enough on her hands to occupy her time fully. It is no part of the business of this commonwealth to seek to extend by agreement with the New York, New Haven & Hartford Railroad, under threats of punishment, her jurisdiction over the actions of a public service corporation in neighboring States that have never been declared incompetent to arrange their own affairs, and which solicit neither advice nor assistance in such matters.

"The people of Massachusetts should not attempt to control the action of the New York, New Haven & Hartford Railroad in holding the stock of the Rhode Island Company of the State of Rhode Island and financing its necessities and activities in the State, or the Connecticut Company, the New England Company, the New York, Westchester & Boston, the New York, Ontario & Western or the Central New England in New York State.

"The endeavor of the commission in this respect is to secure an extension of the jurisdiction of the commonwealth of Massachusetts, based upon the ownership by the New York, New Haven & Hartford Railroad of a line into Springfield, less than 6 miles in length; to exercise that jurisdiction through bringing pressure to bear upon savings banks investments in this State to force us to retire from the class of business in other jurisdictions that those jurisdictions and the officers of the company have thought it wise and proper to develop, promote and profit by.

"The policy of the New York, New Haven & Hartford Railroad with reference to electric railways will be to let them severely alone in Massachusetts and so to handle them in other jurisdictions that perhaps the object lesson elsewhere will work a change in the sentiment and policy of the commonwealth of Massachusetts. I trust it is not beyond the limits of probability that Massachusetts may yet learn something from what is happening elsewhere."

Certificate of Exigency Denied the Boston, Lowell & Lawrence Railroad

The Massachusetts Railroad Commission has refused to grant a certificate of public convenience and necessity to the Boston, Lowell & Lawrence Electric Railroad, which desired to build a high-speed interurban railway to connect Boston, Lowell and Lawrence. The decision was reached after the presentation of exhaustive engineering testimony which was reviewed by the ELECTRIC RAILWAY JOURNAL of June 26, 1909, page 1172. The board decided the question by a majority vote. Chairman Hall, however, recorded his opinion in favor of the road. In the decision the commission says, in part:

"In the territory which would be served by the petitioners there are several steam railroads and street railways. The principal demand for the proposed railroad came from citizens of Lowell and Lawrence. A few citizens, however, of the cities and towns along the proposed line appeared in its favor; but most of the witnesses from Somerville, Medford, Winchester and Arlington opposed the granting of the certificate. The principal argument upon which this opposition was based was that adequate service was being rendered by the existing railroads and street railways, and that so far as these several communities were concerned the proposed electric railroad would entail large and needless expenditure of money and cause property damage along the proposed route. It was further contended in opposition that the proposed connection at Sullivan Square would add to the congestion upon the Boston Elevated Railway during the rush hours, both at the station

and in the train service through the Washington Street tunnel. The managements of the several railroads and street railways operating in the territory which would be served by the proposed railroad objected upon the ground that the building of such a railroad would exercise a very detrimental effect upon their lines.

"A primary test to be applied to applications of this character is whether the net results of the proposed undertaking promise public gain or public loss. The public convenience and necessity must be measured as a whole, giving due regard to the entire territory within which the proposed railroad is to be constructed. So measured, a majority of the board is of the opinion that public convenience and necessity do not require the construction of a railroad as proposed in the agreement of association for the formation of the Boston, Lowell & Lawrence Electric Railroad. The chairman, being of opinion that the public convenience and necessity require the construction of the proposed railroad, records his dissent from the conclusions of the majority of the board."

Cost of Improvements on the Salem Division of the Boston & Northern Street Railway

To counteract the testimony of residents that the company had neglected the physical condition of its property in Salem, the Boston & Northern Street Railway, Boston, Mass., has filed with the Massachusetts Railroad Commission the following statement of money expended for improvements on its Salem division between 1902 and 1910:

TRACK RECONSTRUCTED AND CONSTRUCTED		
Within the city limits, 64,270 ft.	$284,479	
Outside the city limits, 132,906 ft.	336,562	
		$621,041
POWER STATION ADDITIONS		
One 300-kw generator } One 500-hp engine }	$10,363	
One 350-hp boiler	8,527	
One 500-kw motor-generator	13,729	
Two 250-hp boilers and feed pumps	3,000	
One 1200-kw generating unit	119,527	
		155,146
CARS, ADDITIONS		
Nine 12-bench cars	$21,020	
Nine 30-ft. cross-seat box cars	52,078	
Fifteen 34-ft. easy access cars	117,727	
Three single-truck Wason shear plows } One double-truck shear plow }	13,806	
		204,631
Line improvements		81,381
Total		$1,062,199

Companies Which Paid Five Per Cent Dividends in Massachusetts

The Massachusetts Railroad Commission has transmitted to the Bank Commissioner of Massachusetts the names of the following street railways which have earned and properly paid without impairment of assets or capital dividends of not less than 5 per cent upon all their outstanding stock for the five years ending Sept. 30, 1909: Boston Elevated Railway; Boston & Revere Electric Railway, Boston; Citizens' Electric Railway, Newburyport; Dartmouth & Westport Street Railway, New Bedford; East Middlesex Street Railway; Fitchburg & Leominster Street Railway, Fitchburg; Holyoke Street Railway; Pittsfield Electric Street Railway; Springfield Street Railway; Union Street Railway, New Bedford; West End Street Railway, Boston; and Worcester Consolidated Street Railway.

Order Regarding Lighting of Subway

The following order was adopted by the Public Service Commission of the First District of New York on Feb. 15, 1910, regarding the lighting of cars and stations of the Interborough Rapid Transit Company:

"That on or before April 1, 1910, the Interborough Rapid Transit Company shall so illuminate by electricity its subway stations that passengers may read conveniently therein, such illumination to be not less than the present illumination over the east platform of the Brooklyn Bridge station; and it is further

"Ordered, That the Interborough Rapid Transit Company shall hereafter install and maintain in every subway passenger car operated by it, except those now or heretofore operated by it, a storage battery lighting appliance of sufficient capacity to operate four 12-cp lamps at their rated candle-power for at least three hours, such storage battery lamps to be instantly and automatically available whenever the other lamps in the car shall for any reason fail to furnish light."

Meeting of New England Street Railway Club.—The regular monthly meeting of the New England Street Railway Club was arranged to be held in the American House, Boston, Mass., on Feb. 24, 1910, at 8 p. m. Charles B. Edwards, chief engineer of the Fore River Ship Building Company, of Quincy, Mass., was to present an address on the subject, "Power Plant Installation of a Modern Battleship," and Milan V. Ayres, electrical and mechanical engineer of the Boston & Worcester Street Railway, who is a member of the Massachusetts Bar, was to address the club on the subject, "The Lawyer and the Engineer."

Chicago Loop Situation.—To decide upon some concerted action to relieve the congestion on the Union loop in Chicago, representatives of the four elevated railways in Chicago have agreed to form an elevated railway commission in which the city shall also be represented. It is proposed that the president and chief engineer of each of the companies shall be a member of the commission, while Bion J. Arnold, chairman and chief engineer of the Board of Supervising Engineers, Chicago Traction, and Alderman Milton J. Foreman, chairman of the local transportation committee of the City Council, will undoubtedly represent the city. It is probable that the representatives of the various companies on this committee will be as follows: Northwestern Elevated Railroad, M. B. Starring, president, and E. C. Noe, chief engineer; Chicago & Oak Park Elevated Railroad, Clarence A. Knight, president, and C. M. Mock, chief engineer; South Side Elevated Railroad, Charles V. Weston, president, and Garrett T. Seely, chief engineer; Metropolitan West Side Elevated Railway, B. I. Budd, president, and James Walker, chief engineer.

Storm in the Central West.—On Feb. 16, 17 and 18 the Central West was visited by a very severe snow storm, and the reports from Springfield, Cincinnati, Indianapolis, St. Louis, Cairo and other cities indicate that the fall of snow was between 10 and 15 in. Steam railroad traffic was seriously interfered with and the operation of the electrip railways was also hampered. On Feb. 17 eight cars of the Ohio Electric Railway were reported stalled between Columbus and Dayton, and service over that line between Springfield and Columbus had to be abandoned. On the line of the Ohio Electric Railway between Dayton and Springfield only four cars were operated on Feb. 17. At Indianapolis on Feb. 17 service was interrupted on the interurban lines, and the Indianapolis Traction & Terminal Company, operating the city lines, maintained service only with the greatest difficulty. Service in Cairo, Ill., was entirely abandoned for a short while. On Feb. 16 and 17, 16 in. of snow fell in St. Louis. The storm continued 36 hours. On the evening of Feb. 16 the United Railways had 35 sweepers in service, followed by 50 cars equipped with scrapers. In addition the company maintained a frequent all-night schedule on as many lines as possible so as to keep the road open. According to records of the local weather bureau at St. Louis, the storm was the worst which that city has experienced since 1884.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—In connection with his request to the legislative committee on railroads to aid the company to validate its securities in Massachusetts, T. E. Byrnes, vice-president of the New York, New Haven & Hartford Railroad, declared that in the next 10 years his company expects to spend $50,000,000 in the development of its transportation facilities in Massachusetts. He said that the attitude of the Massachusetts Legislature toward the New York, New Haven & Hartford Railroad has prevented the expenditure of $25,000,000 in improvements in the vicinity of Boston. The company is willing, he said, to build a tunnel connecting the North and South stations. He estimated the cost of electrifying the suburban lines of the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad at between $25,000,000 and $40,000,000.

Financial and Corporate

New York Stock and Money Market

February 22, 1910.

There has been a vast improvement in the condition of the stock market during the past week. Not only have prices regained much of the losses sustained earlier in the month, but the sentiment of the traders is much more hopeful. The anxiety that was the occasion of the recent decline has practically disappeared and there has been considerable buying by small outside investors. Traction shares are fairly active and have shared in the general recovery.

The money market continues to be satisfactory. Rates remain reasonable and the banks appear to be willing to meet all demands from legitimate traders. Quotations yesterday were: Call, 2 to 3 per cent; 90 days, 3½ to 3¾ per cent.

Other Markets

The shares of the Rapid Transit and Union Traction companies have been affected by the strike. On Feb. 21, on heavy sales, Rapid Transit declined to 24½ and closed at that figure, while Union Traction sold as low as 49.

In the Boston market, Massachusetts Electric has been less active than earlier in the month, although the prices have shown no disposition to decline. There has been some trading in Boston Elevated and quotations are higher.

In the Chicago market there has been little trading in traction shares. The issues of the Chicago Railways Company are almost entirely out of the market, Series 2 being the only shares traded in. Prices are unchanged.

In the Baltimore market there has been no trading in traction stocks. The bonds continue to be fairly active at former prices.

Quotations of various traction securities as compared with last week follow:

	Feb. 15.	Feb. 21.
American Railways Company	*46¾	a47
Aurora, Elgin & Chicago Railroad (common)	a57½	a57
Aurora, Elgin & Chicago Railroad (preferred)	a92	a93
Boston Elevated Railway	129¼	129½
Boston & Suburban Electric Companies	15	a16½
Boston & Suburban Electric Companies (preferred)	72	72
Boston & Worcester Electric Companies (common)	8	a11
Boston & Worcester Electric Companies (preferred)	a45	a44
Brooklyn Rapid Transit Company	72⅝	73¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	83¼	83
Capital Traction Company, Washington	a134	*134
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a108	a106½
Chicago Railways, ptcptg., ctf. 2	a29	a32
Chicago Railways, ptcptg., ctf. 3	a14	a15
Chicago Railways, ptcptg., ctf. 4s	a9	*9
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a105½
Detroit United Railway	*63	*62
General Electric Company	153⅜	154½
Georgia Railway & Electric Company (common)	107½	a108
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	20¾	22
Interborough-Metropolitan Company (preferred)	53½	55¾
Interborough-Metropolitan Company (4½s)	81¼	82⅞
Kansas City Railway & Light Company (common)	a30	a30
Kansas City Railway & Light Company (preferred)	a72¼	a68
Manhattan Railway	*136¾	*136¾
Massachusetts Electric Companies (common)	a18¼	a18¼
Massachusetts Electric Companies (preferred)	a84	83½
Metropolitan West Side, Chicago (common)	a17	a17
Metropolitan West Side Chicago (preferred)	a52	a55
Metropolitan Street Railway	*18	*16
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	79½	80¼
Northwestern Elevated Railroad (common)	a17½	a17½
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	*50½	a51½
Philadelphia Company, Pittsburg (preferred)	*43¾	a45
Philadelphia Rapid Transit Company	*26¾	a24⅝
Philadelphia Traction Company	*89	89
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a105	a104½
Seattle Electric Company (common)	a115	a116
Seattle Electric Company (preferred)	a106	a105
South Side Elevated Railroad (Chicago)	a53	a53
Third Avenue Railroad, New York	10	*10
Toledo Railways & Light Company	11¾	*11¾
Twin City Rapid Transit, Minneapolis (common)	112	113¾
Union Traction Company, Philadelphia	*51½	49½
United Rys & Electric Company, Baltimore	a13¾	a14
United Rys. Inv. Co. (common)	*33	37
United Rys. Inv. Co. (preferred)	67	68
Washington Ry. & Electric Company (common)	37	*37
Washington Ry. & Electric Company (preferred)	a87⅛	*87⅛
West End Street Railway, Boston (common)	a95	a95
West End Street Railway, Boston (preferred)	a109	a106
Westinghouse Elec. & Mfg. Company	68	70½
Westinghouse Elec. & Mfg. Company (1st pref.)	120	*120

a Asked. * Last Sale.

Report of Detroit United Railway

The report of the Detroit (Mich.) United Railways for the year ended Dec. 31, 1909, as presented at the recent annual meeting of the company, compares as follows with the report of the company for the year ended Dec. 31, 1908:

	1909.	1908.
Gross earnings	$8,047,554	$7,114,760
Operating expenses	5,042,724	4,559,123
Net earnings from operation	$3,004,830	$2,555,637
Income from other sources	144,833	64,956
Gross income less operating expenses	$3,149,663	$2,620,593
DEDUCTIONS.		
*Interest on funded and floating debt and taxes:		
Detroit United Railway	$1,325,568	$1,138,799
Rapid Railway System	159,578	135,050
Sandwich, Windsor & Amherstburg Railway	26,804	23,785
Detroit, Monroe & Toledo Short Line Railway	147,166	122,131
Detroit, Jackson & Chicago Railway	221,013	198,900
	$1,880,129	$1,618,665
Credited to depreciation reserve	400,000	300,000
Credited to contingent liability reserve	100,000	50,000
Total deductions	$2,380,129	$1,968,665
Surplus income	$769,534	$651,928

*1908 taxes included in operating expenses.

PASSENGER STATISTICS, 1909.

Revenue passengers	142,981,316
Transfer passengers	41,629,844
Employee passengers	5,770,881
Total passengers	190,382,041
Receipts revenue passenger	.0528
Receipts per passenger	.0396

MILEAGE STATISTICS, 1909.

Car mileage	32,699,206
Earnings car mile	$0.2461
Expenses car mile	.1542
Net earnings car mile	.0919

The condensed balance sheet as of Dec. 31, 1909, shows:

ASSETS.

Value of entire property	$38,717,468
Treasury securities	2,320,459
Accounts current	630,314
Prepaid taxes	42,000
Current assets, such as cash, accounts receivable and material and supplies	798,210
Discount on gold notes and bonds	376,393
Total	$42,884,844

LIABILITIES.

Capital stock	$12,500,000
Mortgage bonds and gold notes	24,903,000
Vouchers payable, bills payable, unredeemed tickets, etc.	818,645
Total reserve fund	1,418,660
Surplus account (less adjustment) and net income, 1909	3,244,539
Total	$42,884,844

In presenting the report J. C. Hutchins, president of the company, said:

"At the beginning of 1910 the company had outstanding $3,050,000 of its three-year gold notes issued to pay for betterments and extensions. During the year it sold $1,066,000 of its 4½ per cent consolidated mortgage gold bonds and applied the proceeds to pay off and retire $1,000,000 of these notes. This leaves outstanding of the company's three-year notes, issued for the same purposes, $2,050,000, as shown in the balance sheet, $2,000,000 of which are due and payable Feb. 15, 1910, and $50,000 May 1, 1910. Provision has been made to pay out of the company's resources $500,000 of this remaining amount Feb. 15, 1910, and to extend the balance for periods of six and 12 months.

"The company, as in previous years, made liberal expenditures during this year in the maintenance of its tracks, rolling stock and other properties. On Jan. 1, 1909, the company's depreciation reserve stood credited with $688,614. Large expenditures were incurred for extensive renewals of tracks and foundations, involving heavier construction to meet increased traffic conditions on various city lines, a part of the cost of which, to wit, $50,000, was charged against this depreciation reserve. There was added to the credit of the depreciation reserve during the year $400,000, leaving said fund with a present credit balance of $1,038,614. At the beginning of the year the company's surplus stood credited with $2,491,164. There has been credited to the contingent liability reserve the sum of $100,000 out of the earnings of the year 1909, making $300,000 in the reserve, and leaving a surplus of $3,244,539."

Consolidation of Surface Railways in Chicago

The details of the consolidation of the Chicago City Railway, the Calumet & South Chicago Railway, the Southern Street Railway and the Hammond, Whiting & East Chicago Railway, plans for which were noted in the Electric Railway Journal of Jan. 1, 1910, page 47, were effected on Feb. 21. The board of directors of the new Chicago City & Connecting Railways consists of James B. Forgan, John J. Mitchell, Samuel Insull, John A. Spoor, Edward Morris, Harrison B. Riley, E. K. Boisot and Ira M. Cobe. The shares and bonds of the four roads will be deposited with E. H. Gary, A. J. Earling and S. M. Felton as trustees, who have the power to issue securities. The total capitalization in stocks and bonds of the four companies entering into the merger follows:

Chicago City Railway	$40,500,000
Calumet & South Chicago Railway	10,750,000
Southern Street Railway	1,575,000
Hammond, Whiting & East Chicago Railway	510,000
Total	$53,335,000

For the new corporation there will be issued $22,000,000 in bonds. The capitalization of the new company thus remains about equivalent to the value of properties as appraised by the city. A. J. Earling, of the board of trustees, has been president of the Chicago, Milwaukee & St. Paul Railway since 1899 and is a director in a number of other large undertakings. S. M. Felton is president of the Chicago Great Western Railway, having previously served in the same capacity both the Mexican Central Railroad and the Chicago & Alton Railroad. E. H. Gary, chairman of the United States Steel Corporation, is a former Chicagoan, having been for 25 years a practising attorney in that city.

Earnings of Interborough Rapid Transit Company for Year

The Interborough Rapid Transit Company, New York, N. Y., has made public the following comparative statement of earnings for the years ended Dec. 31, 1909, and Dec. 31, 1908:

	1909.	1908.
Gross receipts	$27,963,377	$25,417,340
Operating expenses	10,759,738	10,869,546
Net earnings	$17,203,639	$14,577,793
Other income	*737,689	1,034,362
Total income	$17,941,328	$15,612,155
Interest, rents, etc.	$10,468,035	$10,208,531
Taxes	1,692,651	1,715,177
Total charges	$12,160,686	$11,923,708
Surplus	$5,780,641	$3,688,447
Dividends	3,150,000	3,150,000
Surplus	$2,630,641	$538,447

*The decrease in other income is largely due to the policy, inaugurated on July 1, 1909, of not crediting the interest upon the advances made for the construction of the New York & Long Island Railroad tunnel.

In 1909, 543,172,774 passengers were carried as compared with 494,846,348 in 1908.

Franchise Assessments in New York

In its annual report to the Legislature, the State Board of Tax Commissioners calls attention to difficulties in basing the special franchise tax on the net earnings of public service corporations, the method indicated by the Court of Appeals in its recent decisions involving the tax of the Jamaica Water Works Company. It says:

"The Special Franchise Tax law was a revenue measure intended for the benefit of the localities by increasing their revenues. If, however, the net earnings rule must be applied in disregard of general conditions, and if the rule must be applied from information contained in the records of these corporations, which is substantially all the information upon the subject of net earnings this board can obtain, it will largely wipe out the special franchise valuations in New York City in respect to street surface railroads, where these franchises are supposed to be and doubtless are of very substantial value."

Referring to the franchises held in Greater New York, the commission says in part:

"In New York City there is a well-regulated system and schedule of rates for the granting of these privileges, which, as a rule, represent a value very much higher than the valuations fixed by this board. In the case of street surface railways in that city there is a provision of the railroad law, existent for many years, which precludes the granting of such franchise, except upon condition of the payment of 3 per cent of the gross earnings for the first five years of its existence, and 5 per cent of such gross earnings thereafter, and corporations are apparently willing and anxious to accept these grants on that basis. Can it be said that these conditions—these sales prices—have no influence on the question of the value of these privileges, unless such value can be verified by the application of the net earnings rule?"

To do away with the confusion often caused by present methods the commission recommends that real property assessments be made against the property itself, and not against individuals. The board says that by this method the chances of property escaping its just share of tax burdens would be minimized.

The New York State Board of Tax Commissioners has completed its special franchise tax assessments for New York City. The total for 1910 is $468,887,100, as compared with $474,001,900 for 1909 and $492,492,970 for 1908. The final assessments of the principal street railways for 1909 and the tentative assessments for 1910 follow:

	Final. 1909.	Tentative. 1910.
Brooklyn Rapid Transit	$55,252,700	$53,886,500
Coney Island & Brooklyn Railroad	2,543,000	2,750,000
Hudson & Manhattan Railroad	8,000,000	11,770,000
Long Island Electric Railway	25,000	425,000
Manhattan Railway	78,500,000	78,686,300
New York & Queens County Railway	2,275,000	2,275,000
Pennsylvania Tunnel & Terminal	15,600,000	16,426,000
Richmond Light & Railroad Company	534,900	550,000
Interborough Rapid Transit	24,012,000	†12,000
Dry Dock, East Broadway & Battery Railroad	1,400,000	1,400,000
Forty-second Street, Manhattanville & St. Nicholas Avenue Railway	4,206,000	4,206,000
Third Avenue Railway	7,920,000	7,920,000
Union Railway	3,986,000	4,600,000
Westchester Electric Railroad	121,000	150,000
Bleecker Street & Fulton Ferry Railroad	730,000	730,000
Broadway & Seventh Avenue Railroad	7,955,000	7,955,000
Central Crosstown Railroad	660,000	660,000
Central Park, North & East River Railroad	2,750,000	2,750,000
Christopher & Tenth Street Railroad	1,172,000	1,172,000
Eighth Avenue Railroad	4,800,000	4,800,000
Forty-second Street & Grand Street Ferry Railroad	1,600,000	1,600,000
Metropolitan Street Railway	20,258,000	20,258,000
New York & Harlem Railroad (City Line)	9,343,000	9,343,000

Hammond, Whiting & East Chicago Railway, Hammond, Ind.—The Hammond, Whiting & East Chicago Railway has been incorporated with a capital stock of $1,000,000 by Robert S. Knox, Charles R. Moore, Samuel R. Jenkins, Frank G. Murray and Edgar H. Plank to succeed the Hammond, Whiting & East Chicago Electric Railway, Hammond, Ind.

Hudson Companies, New York, N. Y.—Harvey Fisk & Sons, New York, N. Y., offer for sale at 100 and accrued interest $11,000,000 of the 6 per cent secured convertible gold coupon notes of the Hudson Companies. The principal is payable on Feb. 1, 1913, and the interest is payable on Feb. 1 and Aug. 1. The Guaranty Trust Company, New York, N. Y., is trustee of the issue.

Lehigh Valley Transit Company, Allentown, Pa.—The stockholders of the Lehigh Valley Transit Company will vote on April 21, 1910, on a proposition to authorize an issue of $15,000,000 of bonds, to provide for refunding existing bonds, for extensions, improvements, etc.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe in the United States Circuit Court in a decision rendered on the application of the New York & Harlem Railroad, for an order directing the receivers of the Metropolitan Street Railway either to pay the back franchise taxes on the Madison Avenue, Eighth Avenue and Ninth Avenue lines of the company or else turn them over to the lessor companies considered a request from the receivers seeking instructions as to the issuance of receivers' certificates to pay the back franchise taxes, and as to their course with respect to the Federal corporation tax. The court directs the receivers to spend about $313,900 on the Madison Avenue line for repairs and $505,850 on the Eighth and

Ninth Avenue lines for like purposes. The decision says the State franchise tax in arrears is estimated at about $3,000,000 on all the lines now operated by the receivers of the Metropolitan Street Railway after making allowance for equalization according to the recent decisions of the State courts, The Court authorizes the receivers to negotiate with the proper authorities for the payment of all these taxes, including the $400,000 which the New York & Harlem Railroad has already advanced on account of the taxes on the Madison Avenue line to prevent a sale, and states that when a decision has been reached as to the exact amount they may come to him with an application for receivers' certificates to discharge this indebtedness. According to the court, if foreclosure and sale intervene before these negotiations are over, the receivers have at least kept off the disintegration of the property. As to the Federal corporation tax, Judge Lacombe says that inasmuch as it is based on net earnings and the Metropolitan Street Railway has no net earnings, the question as to its payment does not arise. In regard to the various lessor roads in the Metropolitan system which still enjoy net earnings, the court declares that the question is one that must be taken up by each road with its counsel. Argument was heard on Feb. 11, 1910, by Judge Coxe in the United States Circuit Court on the motion of Attorney-General O'Malley to remand to the State courts the suit brought for the forfeiture of some of the franchises of the Bleecker Street & Fulton Ferry Railroad and the Twenty-third Street Crosstown Railroad, for the reason that they had failed to operate a number of the branches of their railroads. Judge Coxe directed counsel to present briefs in the case.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Jenks have extended until March 1, 1910, the time for assenting to their proposition to buy from the stockholders of the New Orleans Railway & Light Company $4,000,000 of the common stock and $2,000,000 of the preferred stock of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, 1910, page 295.

Pittsburgh & Allegheny Valley Railway, Leechburg, Pa.—The Safe Deposit & Trust Company, Pittsburgh, Pa., trustee under the mortgage of the Pittsburgh & Allegheny Valley Railway dated July 15, 1904, will offer the property of the company at auction, free of all liens, at Kittanning on March 21, 1910, under a decree entered on Jan. 22, 1910, by the Court of Common Pleas of Armstrong County.

Pittsfield (Mass.) Street Railway.—The New England Investment & Security Company has taken an option on the stock of the Pittsfield Street Railway at a price said to be $275 a share, with a bonus of $75,000 to the Dolan interests, which have long controlled the majority of the stock of the company.

Public Service Investment Company, Boston, Mass.—Stone & Webster, Boston, Mass., offer for subscription at 98½ $300,000 of a new issue of 6 per cent cumulative preferred stock of the Public Service Investment Company, which was organized with authority to hold and deal in stocks, bonds and notes, or other securities and owns securities of companies under the management of Stone & Webster. The stock now offered for subscription is part of an authorized issue of $1,500,000 of preferred stock.

Twin City Rapid Transit Company, Minneapolis, Minn.—At the annual meeting of the stockholders of the Twin City Rapid Transit Company, held on Feb. 15, 1910, it was decided to increase the number of directors, and A. E. Ames and Henry M. Pellatt, Toronto, Ont., were elected as additional members of the board. The directors whose term of office had expired and the officers were all re-elected.

Youngstown & Ohio River Railroad, Youngstown, Ohio.—At the annual meeting of the Youngstown & Ohio River Railroad, the following officers were elected: Will Christy, president; George A. Stanley, vice-president; Charles S. Thrasher, secretary and treasurer; J. D. DeWees, general manager. The company's affairs have been in the hands of Will Christy, Warren Bicknell and George A. Stanley, as syndicate managers, but it is probable that a distribution of securities will be made shortly. The company has entered into a contract with the Warren Bicknell Company, Cleveland, Ohio, as operating manager.

Traffic and Transportation

Service in Rochester

The Public Service Commission of the Second District of New York, acting on suggestions and recommendations made by C. R. Barnes, electric railroad inspector of the commission, addressed a communication to the Mayor of Rochester and one to the New York State Railways, Rochester Lines, on Feb. 16, 1910, in reference to the complaint of the Mayor of Rochester regarding the service of the company, especially the congestion of cars on Main Street. In these communications the commission emphasized the statement that its efforts have so far been directed to the relief of congestion on Main Street during the evening rush hours and that no attempt has been made to devise any means of furnishing additional facilities on any of the lines in the city except that which will be reflected on the different lines by the more rapid and regular movement of cars through the business center of the city, but that the investigation of traffic conditions along the lines of the present and future requirements of the city will be continued. The communication to the company contained the following suggestions:

"The substitution of the far-side stop for the present near-side stop in all sections of the city.

"The rerouting of the interurban cars of the Rochester, Syracuse & Eastern Railroad and the Sodus Bay cars of the New York State Railways, removing them from Main Street between the Four Corners and Clinton Street. These cars, west bound, to be diverted from Main Street through Franklin, Andrews, State, Exchange and Court Streets, returning to Main Street at Clinton Street and crossing Main Street at the Four Corners.

"The putting in of crossovers on North St. Paul Street and on South Avenue near Main Street, connecting the double tracks in both of these streets, and the turning back of the cars on the North St. Paul Street and South Avenue line on either side of Main Street between 5 p.m. to 6:30.

"The employment of six additional inspectors on Main Street and side streets between Pindell Alley and Elm Street.

"A detailed set of rules for the government of motormen, conductors and inspectors intended to increase efficiency in operation by these employees which will result in reducing delays to cars to a minimum and add to free car movement.

"The placing of an emergency wagon equipped for trolley work and wrecking purposes on Water Street near Main Street during the evening rush hours."

The communication of the commission to the company also contained recommendations in detail for rules to govern the action of motormen, conductors, inspectors, inspectors at passenger stops and patrol inspectors, all designed with the end in view of expediting the movement of cars in the congested district. They are, for the most part, largely of local interest and relate to specific instructions for meeting conditions peculiar to some phase of the situation in Rochester. The recommendations of the commission to the city, however, indicate that the municipality can do a great deal more than in the past toward assisting the company in serving the community. These recommendations follow:

"It is respectfully suggested that the City of Rochester can aid materially in expediting the passage of street cars over street intersections and in the loading and unloading of passengers.

"It is respectfully recommended that the traffic officer stationed at the junction of St. Paul and Main Streets be instructed to give precedence to street car movement over the crossing in preference to vehicular traffic whenever possible. Difficulties arising at this street crossing occasion a very large percentage of the delays, and vehicular traffic should not be allowed, in the opinion of the commission, to delay the movements of street cars. Owing to the existence of a double track upon Main Street at this point, such delay may at times become inevitable for a brief period, but it is believed that the recognition of the superior claim of street car traffic over vehicular traffic by traffic officers will result in much relief.

"It is further respectfully recommended that the city cause the removal of all snow and slush from the street at loading points, in order that passengers may readily reach the cars and may be able to stand near the track ready to embark upon the cars immediately upon their stopping. Careful attention to this one point will save much delay during the winter season.

"It is expected by the commission that the foregoing recommendations to the street railroad company will be put in operation by that company on Feb. 21, 1910. This will give the company ample time to make the proper preparations and also to familiarize the public with the new requirements, which familiarity on their part is to some extent essential to the success of the new measures. Charles R. Barnes, the commission's inspector of street railroads, will give his personal attention during the week commencing Feb. 21, 1910, to the operation of these measures, and will also continue to collect data for further suggestions as to improvement and relief of unfavorable conditions now existing."

Hearing on Normal School and Business College Fare Bill

The committee on street railways of the Massachusetts Legislature gave a public hearing on Feb. 8, 1910. House bill 299, which provides that the rates of fare charged by street and elevated railways for the transportation of pupils of normal schools and business colleges between home and school, shall not exceed one-half the regular fare, tickets to be sold in lots of 10 each. The bill amends Sec. 72, Chap. 112, Revised Laws, which makes compulsory half fare for the pupils of public or private schools.

Bentley W. Warren, Boston, Mass., on behalf of the Massachusetts Street Railway Association, stated that the street railways object to being made compulsory assistants in charitable activities. Most of the companies mentioned by persons favoring the bill had never paid a dividend, with the exception of the Boston Elevated Railway, which was exempt by statute from making any special rate, and the Old Colony Street Railway, which had paid moderate dividends. It was unjust to require the stockholders of a company not paying dividends to meet the expenses of the grown people who attend such institutions. Moreover, most of the business colleges paid a reasonable return. There were no valuable franchises in the State except the rights of the Boston Elevated Railway in its elevated structure; and in general there was not a franchise in the State which could not be terminated without compensation. The companies could capitalize only their actual investment, and there were no franchise values which could be taken as a basis for reduced fares as required by the bill. There was just as much reason to make electric light companies supply current at half price to business colleges as to lay the burden of reduced fares upon the street railway.

Under the Revised Laws, Ch. 112, Sec. 72, street railways are required to transport pupils of the public schools to or from school at a rate of fare not exceeding one-half of the regular fare charged for the transportation of other passengers between the same points. In the case of Commonwealth vs. Interstate Consolidated Street Railway, 187 Mass., p. 436, the Supreme Judicial Court sustained the statute as applying to public school pupils, and this was again sustained by the United States Supreme Court in 207 U. S., p. 79, but on the technical ground that the Interstate Consolidated Street Railway had been incorporated after the statute had been passed. By the statutes of 1906, ch. 479, sec. 72, ch. 112, Revised Laws, was amended to include pupils of private schools. Under this amendment the pupils of parochial, tonsorial, business, normal and other institutions sought the reduced fare and hence arose the case of Commonwealth vs. Connecticut Valley Street Railway, 196 Mass., p. 309. The company refused to transport at this rate a student attending the Northampton Commercial College, and the Supreme Judicial Court held that the pupils of business and normal schools were not entitled to the benefit of the statute. About two years ago the Legislature amended the statute to include evening school pupils (Ch. 530, Acts 1908). The question of the constitutionality of this act was before the courts and it would be unwise to extend the statute in view of the intimation of the Supreme Court that it would not sustain an extension beyond the original intent of the law.

Long Island Companies Increase Wages

The New York & Queens County Railway, Long Island City, N. Y., of which W. O. Wood is president and general manager, and the New York & Long Island Traction Company and the Long Island Electric Railway, Long Island City, of which Mr. Wood is vice-president and general manager, increased the wages of their motormen and conductors on Feb. 1, 1910. The statement by the New York & Queens County Railway to its employees regarding the change follows:

"Taking effect Feb. 1, 1910, the rates of pay of the conductors and motormen are increased as follows:

"For the first and second years of service, 21 cents per hour instead of 20 cents per hour.

"For the third, fourth and fifth years of service, 22 cents per hour instead of 21 cents per hour.

"For the sixth and succeeding years of service, 23 cents per hour instead of 22 cents per hour.

"Employees will be advanced from the lower to the higher rates in the same manner as at present, upon completion of the periods of service above mentioned."

The statement of the New York & Long Island Traction Company to its employees regarding the change follows:

"Taking effect Feb. 1, 1910, the rates of pay of conductors and motormen are increased as follows:

"The flat rate of 20 cents per hour is abolished.

"For the first and second years of service, 21 cents per hour.

"For the third, fourth and fifth years of service, 22 cents per hour.

"For the sixth and succeeding years of service, 23 cents per hour.

"In the case of employees who have not been continuously in the service since their first employment by the company as conductors and motormen, their length of service will be based upon the date when they entered upon their last period of service."

The statement of the Long Island Electric Railway to its employees regarding the change follows:

"Taking effect Feb. 1, 1910, the rates of pay of conductors and motormen are increased as follows:

"The flat rate of 20 cents per hour is abolished.

"For the first and second years of service, 21 cents per hour.

"For the third, fourth and fifth years of service, 22 cents per hour.

"For the sixth and succeeding years of service, 23 cents per hour.

"In the case of employees who have not been continuously in the service since their first employment by the company as conductors and motormen, their length of service will be based upon the date when they entered upon their last period of service."

Finding of Massachusetts Commission in New Bedford Service Case

The finding of the Railroad Commission of Massachusetts in the case of the petition of the Selectmen of Fairhaven regarding service by the Union Street Railway, New Bedford, Mass., follows:

"After giving a hearing upon the petition of the Selectmen of Fairhaven relative to service on the Union Street Railway the board investigated the service rendered by the Union Street Railway between New Bedford and Fairhaven and inspected the rolling stock and the general condition of the Fairhaven line, and concludes that, with the exception of certain cars to which the attention of the company was called and upon which repairs have been or are now being made, the equipment is in good condition. It appeared that the company was not furnishing adequate service during the late afternoon. An extra car has been installed to relieve the congestion on the car scheduled to leave New Bedford at 6:08 p. m., and the board believes

that the use of this car, together with the suggested repairs, will relieve the situation.

"It should be added, however, that cars are at times overloaded or delayed from causes which cannot be remedied under present conditions, as the opening of the draw of the Fairhaven bridge, operated under direction of the Federal Government, and the grade crossing of the New York, New Haven & Hartford Railroad are factors that will at times disarrange the operating schedule."

Freight Service Between Providence and Attleboro.—The New England Investment & Security Company, Springfield, Mass., has established a freight service between Providence, R. I., and Attleboro, Mass.

Employees, Firemen and Policemen Requested to Surrender Seats.—The Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind., has requested members of the police force, firemen and employees of the company to surrender their seats to passengers paying cash fares on the lines of the company in Fort Wayne.

Accident Record in Atlanta.—The Georgia Railway & Electric Company, Atlanta, Ga., reports that for the year ended Dec. 31, 1909, the company transported 50,570,953 passengers, including cash fares, transfers and passes; that not a passenger was killed or seriously injured, and that only eight persons were killed in connection with the operation of the system.

Verdict Against Indiana Company for Issuing Pass.—The Evansville Suburban & Newburg Traction Company, Evansville, Ind., has been fined $500 by the Circuit County Court at Evansville in an action brought against the company by the Railroad Commission of Indiana for violating the anti-pass law of that State. The company gave free transportation to a shipper over its line who used the pass in going to and from a building which he was erecting along the line of the company. It is said that the case will not be appealed.

Schedule of New Line Between Warsaw and Peru.—The schedule adopted by the Winona Interurban Railway for its new line between Warsaw and Peru, which was placed in operation on Feb. 14, 1910, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 19, 1910, page 332, provides five passenger trains and one freight train each way per day with an average running time of about 2 hours and 40 minutes for the 42 miles. It is expected that track connections will be completed early in March with the lines of the Indiana Union Traction Company at Peru.

Louisville Railway Relief Association.—The report of the Louisville Relief Association for the year ended Dec. 31, 1909, has been made public. The total receipts for the year amounted to $4,614.95, of which $4,176.50 was collected as dues, $128.45 interest on reserve fund, $300 contributed by the Louisville Railway and $10 contributed from an outside source. A total of $4,770.60 was paid out during the year, of which $2,803.60 was paid to members for sick benefits, $1,625 for death claims, $192 for salaries, $150 for general expenses. The balance on hand on Jan. 1, 1910, was $4,512.85.

Traffic Agreement Pending Between Brooklyn Rapid Transit Company and Long Island Railroad.—An agreement is pending between the Brooklyn Rapid Transit Company and the Long Island Railroad whereby arrangements will be made for operating trains of the Brooklyn Rapid Transit Company from the Delancey Street terminal of the Williamsburg Bridge in New York over that structure and over the Broadway elevated line of the Brooklyn Rapid Transit Company to Euclid Avenue, in the East New York section of Brooklyn, where the trains will be run over an incline to a connection with the tracks of the Long Island Railroad at Euclid and Atlantic Avenues and thus continue over the Long Island Railroad from East New York to Jamaica. The incline connection between the elevated structure of the Brooklyn Rapid Transit Company and the Long Island Railroad is now utilized only in the summer, during which elevated trains of the Brooklyn Rapid Transit Company are operated over that system and the lines of the Long Island Railroad to points on Jamaica Bay and to Rockaway Beach.

Personal Mention

Mr. J. D. Dewees has been appointed general manager of the Youngstown & Ohio River Railroad, Leetonia, Ohio.

Mr. A. A. Crawford has been appointed superintendent of motive power of the Youngstown & Ohio River Railroad, with offices at Leetonia, Ohio.

Mr. William H. Wadsworth has resigned as master mechanic of the Boston & Worcester Street Railway, South Framingham, Mass., and Mr. E. S. McLean has been appointed to succeed him.

Mr. E. S. McLean, who has been connected with the Boston & Worcester Street Railway, South Framingham, Mass., for several years, has been appointed master mechanic of the company to succeed Mr. William H. Wadsworth, resigned.

Mr. Elmer S. Olmsted, who has been assistant electrical engineer of the Boston (Mass.) Elevated Railway since 1902 and who has been connected with the company for 10 years, has resigned from the company to become vice-president of the Cheatham Electric Switching Device Company, Inc., Louisville, Ky.

Mr. James D. Mortimer has been elected vice-president of the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company, Milwaukee, Wis., to succeed Mr. C. W. Wetmore, resigned, and has also been elected secretary of the companies to succeed Mr. Silas W. Burt, resigned.

Mr. Albert H. Stanley, general manager of the London Underground Electric Railways Company, London, Eng., has also been appointed managing director of the London United Tramways Company. This company owns and operates an extensive trolley system in the northwestern part of London and its stock is largely owned by the Underground Electric Railways Company, with which Mr. Stanley will remain associated as general manager. This appointment, then, comes as an extension and broadening of his duties. Mr. Stanley succeeds in his new position Sir Clifton Robinson, who has long been one of the most prominent figures, if not the most prominent, in tramway circles in England, but has concluded to retire from active management of the London United Tramways. The announcement was made on Feb. 2, 1910, at a dinner of the members of the Metropolitan Association of Electric Tramway Managers of London, of which Sir Clifton Robinson is president this year.

Mr. W. O. Woodard has been appointed traffic manager of the Chicago, Lake Shore & South Bend Railway, with headquarters at Michigan City, Ind. Mr. Woodard entered railway service with the Pennsylvania Railroad, and remained in the employ of that company until 1901, when he became connected with the Lake Erie & Western Railroad, which he served until 1905 in various capacities in the freight department. In December, 1905, Mr. Woodard became connected with the accounting department of the Terre Haute, Indianapolis & Eastern Traction Company. Subsequently he served in the passenger and freight departments of this company. He next accepted the position of division freight and passenger agent of the Ohio Electric Railway, at Dayton, Ohio. In 1908 he returned to the service of the Terre Haute, Indianapolis & Eastern Traction Company and remained with the company until March, 1909, when he was appointed traffic manager of the Indianapolis, Crawfordsville & Western Traction Company.

Mr. Gerhard M. Dahl has been appointed street railway commissioner of Cleveland by Mayor Baehr under the terms of the franchise to the Cleveland Railway approved at the election on Feb. 17, 1910. Mr. Dahl was born at Fort Howard, Wis., on June 8, 1876, where he attended the public schools and was graduated with honors. He then entered the University of Wisconsin, from which he was graduated in 1896. Later he completed the course in law at the University of Wisconsin and opened an office at Stevens Point, Wis., where he served two terms as prosecuting attorney, an office which he filled with satisfaction to his constituents. Through the influence of Senator La Follette of Wisconsin, Mr. Dahl became interested in politics. In the fall of 1906 Mr. Dahl established a connection with the law office of M. B. & H. H. Johnson, through Mr. T. H.

Hogsett of that firm. Mr. Dahl took a prominent part in the campaign of 1908, and was in constant demand thereafter as a public speaker. He was nominated for city solicitor of Cleveland last fall on the Republican ticket, but was defeated by Mr. Newton D. Baker, the only Democrat who was elected to office.

Mr. George Quackenbush, assistant general freight agent of the Chicago & Alton Railroad, has been appointed traffic manager of the Illinois Traction System, Peoria, Ill., to succeed Mr. H. H. Roseman, whose resignation takes effect on March 1, 1910. Previous to his connection with the Chicago & Alton Railroad Mr. Quackenbush was connected with the Iowa Central Railroad. Retiring temporarily from the Chicago & Alton Railroad Mr. Quackenbush accepted the position of manager of the Western Union Telegraph Company at Denver, Col., but later returned to the Chicago & Alton Railroad. He has acted in many capacities in the freight department of the Chicago & Alton Railroad, his last position being assistant general freight agent, with offices at Springfield, Ill. When the Chicago & Alton Railroad was reorganized recently with the other lines controlled by the Hawley interests, Mr. Quackenbush was transferred from Peoria, where for a number of years he had been division freight agent, to Springfield and given the title of assistant general freight agent. Mr. Quackenbush will have his office at Springfield, Ill.

Sir Clifton Robinson, as noted elsewhere in this department has retired as managing director of the London United Tramways, London, Eng., in favor of Mr. Albert Stanley, general manager of the London Underground Electric Railways. At a dinner of the Metropolitan Association of Electric Tramway Managers, of which Sir Clifton Robinson is president this year, he stated that he had been associated with tramway enterprises for 50 years, and felt that the time had come when he should lay aside some of the burdens of his life work. He congratulated the company as well as the association that the management of the London United Tramways would be in the hands of Mr. Albert Stanley. Sir Edgar Speyer, in behalf of Mr. Cator Scott, chairman of the London United Tramways, expressed the regret of the company at the retirement of Sir Clifton Robinson and its gratitude at the ability displayed by him in his management of the affairs of the company. It is understood that Sir Clifton Robinson will take a long trip in the East to investigate tramway matters for the firm of bankers of which Sir Edgar Speyer is a member.

Mr. C. F. Baker has been engaged by the Massachusetts Electric Companies, Boston, Mass., to examine the power plants and equipment on the Boston & Northern Street Railway and the Old Colony Street Railway, in consultation with Mr. C. F. Bancroft, superintendent of motive power and machinery of the companies, and make recommendations regarding changes in the system. Mr. Baker has been connected at different times with the Edward P. Allis Company, the Pillsbury Mills & Elevator Company and the West End Street Railway, now the Boston Elevated Railway. For a number of years he was superintendent of motive power and machinery of the West End Street Railway, in charge of all power plants, machinery and car shops, and the inspection, design and maintenance of the rolling stock of the company. The Charlestown, Dorchester and Harvard power stations of the Boston Elevated Railway were built under Mr. Baker's supervision and the "central" power plant of the company was changed over from belted to direct drive while he was with the company. Mr. Baker left the Boston Elevated Railway to become superintendent of power for the Brooklyn (N. Y.) Rapid Transit Company, and 20,000 kw of steam turbine equipment were installed under his direction in Brooklyn. For a year Mr. Baker was located at Baltimore, Md., in charge of field work for Mr. L. B. Stillwell, consulting engineer of the United Railways & Electric Company, Baltimore, Md., in building new power and substations and changing over, moving and installing machinery and reorganizing the power and transmission departments of that company. Mr. Baker was also connected with the Hudson & Manhattan Railroad as superintendent of equipment. Mr. Baker is a member of the American Society of Mechanical Engineers, past president of the New England Railroad Club and past president of the American Street & Interurban Railway Engineering Association.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Fort Smith & Interurban Railway, Fort Smith, Ark.**—Chartered in Arkansas to build a 25-mile electric railway between Greenwood, Bonanza and Fort Smith. Capital stock, $100,000. George Sevgel, Ft. Smith, president, and his associates are St. Louis and New York capitalists.

***Peoria Northern Railway, Peoria, Ill.**—Incorporated in Illinois in the interests of the McKinley syndicate to build an electric railway from Peoria along the Illinois River through Chillicothe, Sparland, Lacon and Henry to Bureau. Incorporators: H. E. Chubbuck, H. J. Vance, H. C. Dillon and W. J. Achelpohl, Peoria, and W. H. Carnahan, Champaign.

***Peoria Southern Railway, Peoria, Ill.**—Chartered in the interests of the McKinley syndicate, for the purpose of constructing an electric railway from Peoria to Pekin. Incorporators: H. E. Chubbuck, H. J. Vance, H. C. Dillon and W. J. Achelpohl, Peoria, and W. H. Carnahan, Champaign.

***Central Interurban Railway, Des Moines, Ia.**—Incorporated to build and operate interurban electric railways in Iowa. Capital stock, $10,000. Incorporators: J. B. Green, W. P. Clark, J. H. Phillips, W. M. Taylor and C. R. Keyes.

***Washington, Marlboro & Drum Point Railway, Power & Light Company, Annapolis, Md.**—A bill has been introduced in the Legislature to incorporate this company which proposes to construct an electric railway in Prince George and Calvert Counties, Maryland, starting at Drum Point. Connection will be made into Baltimore over the railway which has been projected between Drum Point and Baltimore by the Lauderbach syndicate, New York, and on which construction is to be started during the spring. Applicants for the charter are: C. A. M. Wells, William C. Carroll, Charles C. Mayer, Reese Carpenter, H. Magruder, F. C. Carmody, E. A. Fuller and G. F. Owens.

***Omaha, Western & Lincoln Railway, Lincoln, Neb.**—Incorporated in Nebraska to build a 219-mile electric railway from Omaha to Hastings, with a branch to Lincoln. Officers: Frank F. Schaaf, president and general manager; A. P. Tilley, treasurer, and J. B. Erwine, secretary. Headquarters, Lincoln.

Johnstown (Pa.) Traction Company.—Application for a charter was to be made on Feb. 18 by this company which was recently formed to take over the lines of the Johnstown Passenger Railway, Johnstown, acquired by the American Railways Company, Philadelphia.

***Montreal Central Terminal Railway, Montreal, Que.**—Application has been made by this company for a charter giving it the power to make agreements with the Montreal Terminal Railway, Boston & Maine Railroad and also to acquire the franchise of the Montreal Light, Heat & Power Company, the Central Heating Company, the Saraquay Electric & Water Company, and the Canadian Light & Power Company. It is said that the company expects to expend $500,000 within two years.

***Spokane Railway & Power Company, Spokane, Wash.**—Incorporated to build and operate electric railways in Washington. Capital stock, $2,000,000. Incorporators: H. L. Moody, D. M. Drumheller and Alfred Coolidge.

Wenatchee Valley Railway & Power Company, Wenatchee, Wash.—Incorporated in Washington to build an electric railway from Wenatchee via Cashmere and Peshastin to Leavenworth. Capital stock, $2,500. Incorporators: H. A. Chapin, Ralph Vermilya, A. J. Linville, John Godfrey and L. J. Nelson. [E. R. J., Feb. 12, '10.]

FRANCHISES

Atlanta, Ga.—The Council has granted the Georgia Railway & Electric Company one perpetual franchise and three 40-year franchises to build new lines through certain streets of Atlanta.

*La Grange, Ga.—The City Council has granted a 50-year franchise to C. M. Awtrey and G. E. Dallis, La Grange, to construct an electric railway in La Grange.

*Hamtramck, Mich.—Arthur O'Connor and Matthew Finn have applied to Council for a 30-year franchise to build an electric railway in Hamtramck.

Gilbert, Minn.—The Mesaba Traction Company has been granted a franchise to construct an electric railway in Gilbert. This is part of a plan to build an electric railway between Eveleth and Virginia. W. M. Prindle, Duluth, and W. D. Chapman, Chicago, are interested. [E. R. J., Feb. 5, '10.]

Lincoln, Neb.—The Lincoln (Neb.) Traction Company has applied to the City Council for a franchise granting it the right to build four extensions to its lines through certain streets of Lincoln. The company agrees to begin construction by Aug. 1.

Columbus, Ohio.—Application has been made to the County Commissioners by the Ohio & Southern Traction Company for a franchise to build a 2-mile extension of its electric railway from Hartman Farm to Shadeville.

Stroudsburg, Pa.—The Stroudsburg & Water Gap Street Railway has been granted a perpetual franchise by the Council to build a 2-mile extension of its electric railway along the highway extending through the Delaware Water Gap. A further extension of 3½ miles will connect this company's line with the lines of the Portland & Bangor Traction Company at Portland. Engineers are now at work on the proposed extension. The franchise stipulates that work must be completed by July 1, 1911. A. A. Holbrook, Wilkes-Barre, general manager.

*San Marcos, Tex.—C. L. Hopkins, San Marcos, representing a syndicate of capitalists, has applied to the City Council for a franchise to construct an electric railway in San Marcos.

Provo, Utah.—The Board of County Commissioners has granted to Jesse Knight a 50-year franchise for an interurban electric railway from the south to the north boundaries of Utah County. [E. R. J., Feb. 5, '10.]

TRACK AND ROADWAY

Calgary (Alta.) Electric Railway.—T. H. McCauley, superintendent, advises that this company expects to build 9 miles of new track in Calgary.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company is reported to have made an agreement with the Canadian Pacific Railway whereby it will construct 10 miles of new line in South Vancouver and Point Grey municipalities, provided the Canadian Pacific Railway will lease to it the Vancouver & Lulu Island Railway for a term of years.

United Railroads, San Francisco, Cal.—This company, through Ford, Bacon & Davis, New York, N. Y., will purchase poles, cross-arms and copper for use on its city lines.

Vallejo & Northern Railway, Vallejo, Cal.—This company has entered into agreement with the Northern Electric Railway, Chico, and the Central California Traction Company, San Francisco, whereby it is to pay its share of the cost of tracks to be used jointly by the three electric railways. T. T. C. Gregory, Suisun, president. [E. R. J., Oct. 23, '09.]

Pueblo & Suburban Traction & Lighting Company, Pueblo, Col.—This company, it is stated, will build a 4-mile extension from Pueblo to the City Park. F. J. Vail, purchasing agent.

Steamboat Springs, Col.—Joseph Monette, Lawrence, Mass., who was recently reported to be interested in a plan to build an electric railway to connect Steamboat Springs with the Three Forks mining district of Colorado and Wyoming, writes that the project will be taken up in the spring, when a preliminary organization will be effected. [E. R. J., Feb. 12, '10.]

Shore Line Electric Railway, New Haven, Conn.—This company announces that its proposed 40-mile railway between Essex and Stony Creek will be complete this spring. Nearly all of the roadway has been finished, except a stretch in Guilford. Work remains to be done on several small bridges owing to the delayed arrival of materials. The poles have been set and the wires strung for long distances. The power house on Connecticut River at Saybrook has been completed. Cars will be run into New Haven over the tracks of the Connecticut Company.

City Suburban Railway, Brunswick, Ga.—This company expects to extend its line at once in the southern section of the city to connect the Albany and Newcastle Street lines. T. D. Aiken, general manager.

Kankakee (Ill.) Electric Railway.—This company advises that it expects to relay 5 miles of track with 70-lb. rails. B. M. Rollins, Kankakee, purchasing agent.

Fort Wayne & Springfield Railway, Decatur, Ind.—This company advises that it expects to place contracts during the next 60 days for the construction of 12 miles of track, using 70-lb. rails, 10,000 oak ties and 600 40-ft. 7-in. top cedar poles. The company will also erect a 20-ft. steel bridge. W. H. Fledderjohann, general manager.

South Bend & Logansport Traction Company, South Bend, Ind.—This company advises that its proposed 24-mile electric railway is under construction. It will connect South Bend, Lakeville, Plymouth, Rochester, Lake Maxinkuchee, Logansport and Bogansport. Power will be obtained from Indiana & Michigan Electric Company. Capital stock, $400,000. Officers: Thos. P. Moredock, 11 American Trust Building, South Bend, president; Henry F. Coleman, Logansport, vice-president; Virginius Nicar, 11 American Trust Building, South Bend, secretary; Alexis Coquillard, South Bend, treasurer; J. M. McCampbell, South Bend, general manager. [E. R. J., Dec. 25, '09.]

Des Moines, Winterset & Creston Electric Railway, Des Moines, Ia.—At the annual meeting of this company recently held in Creston the following officers were elected. R. Brown, Creston, president; Jerry Wilson, Adair County, first vice-president; M. Harris, Madison County, second vice-president; A. A. Yynn, secretary, and W. W. Walker, treasurer. The plans of the company include the construction of an electric railway from Des Moines to Winterset and Creston. [E. R. J., July 17, '09.]

Motor Grand Traction Company, Belleville, Kan.—This company announces that construction will begin in the spring on its 150-mile gasoline motor railway which is to extend from Belleville to Concordia, Minneapolis, Salina, Canton, Newton and Wichita. Capital stock, $1,000,000. The Securities Selling Company, Montreal, Que., Can., has been awarded the contract for selling the stock. Repair shops will be at Belleville, Kan. Officers: E. S. Alnutt, Belleville, president and general manager; E. N. Van Hosen, vice-president; C. F. Davis, secretary, and W. S. Ball, treasurer. [E. R. J., Feb. 12, '10.]

Rockland, So. Thomaston & St. George Railway, Rockland, Maine.—This company advises that it expects to build 4 miles of new track. John T. Berry, purchasing agent.

*Springfield, Mo.—F. C. Yentsch, Mount Vernon, Mo., is reported to be interested in a plan to organize a company for the building of a 60-mile interurban railway from Springfield to Haseltine, Nichols, Halltown, Paris Springs, Mount Vernon, Hoberg, Stotts City and Carthage.

*Lewiston, Mont.—S. W. Gebo is said to have made a proposition to some of the leading financial interests of Lewiston in which he proposes to prepare for the construction of two electric railways, one from Lewiston to Kendall and the other from Lewiston to Philbrook via Moore.

*Osceola Construction Company, Lincoln, Neb.—This company has been organized for the purpose of building the Omaha, Western & Lincoln Railroad Company's projected line from Omaha to Hastings, and a branch to Lincoln. The total length of the system will be 219 miles. Headquarters, 140 South Thirteenth Street. Officers: Frank E. Schaaf, president and manager; Charles Butler, vice-president; A. J. Schaaf, secretary; A. P. Tilley, treasurer.

*Tecumseh, Neb.—Press reports state that T. P. Kennard, Lincoln, is interested in a plan to construct an interurban electric railway from Lincoln to Auburn, via Cheney.

Lakewood, N. J.—Charles R. Le Compte, who is interested in a plan to construct a 9-mile electric railway between Lakewood and Point Pleasant, is said to have announced that work will be started as soon as the weather permits. [E. R. J., March 27, '09.]

Public Service Railway, Newark, N. J.—This company has ordered 1800 tons of girder rails from the Pennsylvania Steel Company.

***Albuquerque, N. Mex.**—The people of Albuquerque have accepted the proposition made by J. H. Barrett, Pittsburgh, Pa., to build an electric street railway on the east side of Albuquerque.

New York State Railways, Rochester (N. Y.) Lines.—The Public Service Commission of the Second District has issued an order to this company to construct a grade crossing over the New York Central & Hudson River Railroad tracks in Lyell Avenue to connect with the Buffalo, Lockport & Rochester Electric Railway, Rochester. By this decision the latter company is given a clear running track into Rochester.

New York & North Shore Traction Company, Roslyn, N. Y.—This company advises that it will begin work early in the spring on double-tracking its railway from Flushing to Bayside. All necessary material has been ordered. Geo. B. Thomas, Roslyn, general manager.

***Altus, Okla.**—Harry Bradford, El Reno, is said to be planning to construct an electric railway in Altus provided the city will furnish the power, the city to receive one-half the proceeds of the railway in return for the power furnished and the franchise.

Easton & Washington Traction Company, Easton, Pa.—This company has awarded the contract for building an extension from Port Murray to Lake Hopatcong via Hackettstown, N. J., to the M. P. McGrath Contracting Company, 409-410 Trust Building, Easton, Pa. W. O. Hay, Easton, purchasing agent.

Irwin-Herminie Traction Company, Irwin, Pa.—This company has started work on the concrete piers for its 350-ft. bridge at Hahntown. Materials for track-laying and overhead work are on the ground and the bridge will be completed about March 1. The company expects to have its line from Hahntown to Irwin in operation on May 1. Cars are now running between the former place to Herminie.

West Penn Railways, Pittsburgh, Pa.—This company has made extensive plans for connecting lines and extensions. From Scott Haven, its present terminus in Allegheny County, a branch will be built to West Newton and Hunker, where connection will be made with the Greensburg-Connellsville division. This will be 16 miles in length. Another extension will be built from Greensburg to Latrobe, a distance of 10 miles. Engineers are running lines for a line from West Newton to Donora, on the Monongahela River. At the former place crossing will be made over the new bridge spanning the Youghiogheny River, a franchise having been secured from the Westmoreland County Commissioners. This division will run through Monessen and Webster. The line from Irwin to Trafford City will be rebuilt.

Bradford County Traction Company, Towanda, Pa.—This company advises that it will begin work about April 1 on its projected 16-mile railway between Towanda, Wester, Milan, Greenslanding, Athens, Sayre and Waverly. The location of the power plant has not been definitely decided upon. Capital stock, $50,000. Officers: George R. Hill, president; John C. Ingham, secretary, and W. W. Jennings, treasurer. [E. R. J., Feb. 12, '10.]

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—The organization of this company, which proposes to build an electric railway from Belton to Greenville and Spartanburg, has been perfected by the election of the following officers: W. J. Thackston, president and treasurer; J. R. Vandiver, vice-president; T. F. Hill, secretary, and E. A. Smith, chairman executive committee. The capital was fixed at $600,000. The purchase of the Anderson Traction Company's property was consummated. [E. R. J., Jan. 15, '10.]

***San Marcos, Tex.**—B. G. Neighbors, San Marcos, and Joseph Jennings, Martindale, are said to have revived the project of building an interurban electric railway from San Marcos to Luling.

Uvalde & Leona Valley Interurban Railway, Uvalde, Tex.—This company has recently made surveys and partially secured rights of way and capital for its proposed 25-mile electric railway from Uvalde to Batesville. M. M. McFarland, vice-president and general manager. [E. R. J., Dec. 25, '09.]

Spokane & Inland Empire Railway, Spokane, Wash.—This railway has awarded to the American Bridge Company a contract for 238 tons of girder bridges for elevated crossings at Spokane.

Puget Sound Electric Railway, Tacoma, Wash.—This company announces that $106,187 will be spent for improvements to its lines this spring. A second track will be built at Black River and Argo and a siding at Riverton. George O. Snider, purchasing agent.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—This company expects to build during the summer a 20-mile extension of its electric railway to connect Mount Claire, Lost Creek and Janelew. S. L. Watson, president.

SHOPS AND BUILDINGS

Omaha & Council Bluffs Street Railway, Omaha, Neb.—It is stated that plans are being prepared by this company for an addition to its car shops in Omaha. The addition will be used for entirely new work and the present shops will be used for repair work. [E. R. J., July 17, '09.]

Lehigh Traction Company, Hazelton, Pa.—This company expects to build a new car house at Thirteenth Street and Gordon Street, Allentown. It is also planned to erect a paint shop 80 ft. x 100 ft. adjoining the office building in Allentown to be two stories high.

Shamokin & Mount Carmel Transit Company, Shamokin, Pa.—This company intends to build as soon as the weather permits an additional car house 200 ft. x 48 ft. It will be a steel structure with corrugated iron roof and sides. Monroe H. Kulp, Shamokin, general manager.

Puget Sound Electric Railway, Tacoma, Wash.—This company is said to be considering plans for the erection of a car house on Bay Street, Tacoma; also passenger stations at Puyallup, Black River and Renton.

POWER HOUSES AND SUBSTATIONS

Sheffield (Ala.) Company.—This company has recently purchased from the Westinghouse Electric & Manufacturing Company a 300-kw rotary converter and a 40-kw exciter. W. R. Hall, Sheffield, general manager.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company expects to enlarge its power house at Batavia this spring. A two-story sandstone addition will be built at the northern end of the plant and a 2500-kw generator will be installed. W. P. Harvey, purchasing agent.

Mason City & Clear Lake Railway, Mason City, Ia.—This company has recently purchased the following apparatus: one 1500-kw, 2300-volt, 60-cycle, three-phase turbo-generator and 500-kw rotary converter from the General Electric Company; two 500-hp Sterling boilers from Babcock & Wilcox Company and condensing apparatus from Henry R. Worthington. The rotary converter will be installed at Emery. In addition, the company will build a 5-mile, three-phase, 13,200-volt transmission line from Mason City to Emery. [E. R. J., Dec. 4, '09.]

Frederick (Md.) Railroad.—This company advises that during the next three weeks it expects to purchase an engine and generator of 300 to 400 kw capacity to replace a 14-in. x 26-in. x 36-in. Wright steam engine, and a Westinghouse 200-kw, 500-volt, shunt-wound, six-pole, d.c. generator. W. S. Taylor, general manager.

New York & North Shore Traction Company, Roslyn, N. Y.—This company states that its power house which is under construction on Little Neck Bay, L. I., between Bayside and Douglaston, will be in operation about May 1. The company has ordered for its power house two 1000-kw Westinghouse horizontal turbines, Westinghouse Machine Company stockers, Babcock & Wilson boilers and Worthington condensers. All contracts for accessories have been placed.

Stroudsburg & Water Gap Street Railway, Stroudsburg, Pa.—This company states it expects to build during the next month a new power station, of 500 kw capacity, at Stroudsburg and will operate its own plant in the future instead of purchasing power from the Monroe County Water Power Company. A. A. Holbrook, Wilkes-Barre, general manager. [E. R. J., Nov. 27, '09.]

Manufactures & Supplies

ROLLING STOCK

Phoenix (Ariz.) Railway had four cars destroyed when its car house burned recently.

Macon Railway & Light Company, Macon, Ga., is in the market for six pay-as-you-enter cars.

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., it is rumored, will soon buy some new rolling stock.

Conestoga Traction Company, Harrisburg, Pa., has contracted with The J. G. Brill Company for one 10-bench open car.

Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., is making inquiries regarding two or three cars.

Connecticut Company, New Haven, Conn., had two cars destroyed and three others partially destroyed in a fire at its car house in Middletown, Conn.

Boston & Northern Street Railway, Boston, Mass., has ordered six pairs of heavy trucks, type C-60, for freight cars from the Standard Motor Truck Company.

Havana (Cuba) Central Railroad has purchased 10 semi-convertible cars from The J. G. Brill Company to be mounted on Brill No. 27 GE-1 trucks.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., has placed an order with The J. G. Brill Company for two 29-ft. combination passenger and smoking cars.

Virginia Railway & Power Company, Richmond, Va., has ordered five pairs of type C-50 trucks from the Standard Motor Truck Company for use on its Richmond & Petersburg division.

Stone & Webster Engineering Corporation, Boston, Mass., it is reported, will soon order a parlor car and a motor car for its Puget Sound property and about 12 cars for Fort Worth.

Ohio Valley Electric Railway, Huntington, W. Va., has ordered three double-truck cars from the Jewett Car Company, Newark, Ohio. The cars are to be 39 ft. over all, equipped with GE-80 four-motor equipments and GE air brakes.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, has ordered 10 15-bench open cars from The J. G. Brill Company through Crossman & Sielcken, 96 Wall Street, New York. The cars will be mounted on Brill No. 39-E trucks.

Columbus, Delaware & Marion Railway, Columbus, Ohio, reported in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1909, as being authorized by the court to order five new cars, has purchased this number from the Jewett Car Company, Newark, Ohio.

Lexington & Interurban Railway, Lexington, Ky., mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 12, 1910, as having lost a number of cars by fire, has ordered six 20-ft. 8-in. semi-convertible and two 46-ft. combination interurban cars and six Brill No. 27-MCB trucks from The J. G. Brill Company.

Rockland, South Thomaston & St. George Railway, Rockland, Maine, mentioned in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1909, as contemplating the purchase of one construction and two freight cars, will also order one snow plow, two flat cars, one tower car and perhaps an additional construction car.

Baltimore & Washington Transit Company, Washington, D. C., will receive within the next month from the John Stephenson Company two side-entrance cars adapted for pay-as-you-enter service. The cars will be mounted on special Brill 21-E trucks and will be equipped for operation with gasoline by the May Development Company, New York, N. Y.

TRADE NOTES

Burton W. Mudge & Company, Chicago, Ill., announce the appointment of Otto P. Hennig as sales manager in charge of sales, advertising and purchasing.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., are calling attention to the "Anderson Trolley Ear," the product of "over 20 years' study of service requirements."

Railway Specialty & Supply Company, Chicago, Ill., has appointed Fred A. Preston general sales agent. The company manufactures the P. & M. rail anchor and other railway devices.

Jones & Laughlin Steel Company, Pittsburgh, Pa., has appointed Charles A. Fisher, formerly assistant auditor and assistant treasurer, treasurer of the company to succeed J. B. Laughlin, resigned.

McKeen Motor Car Company, Omaha, Neb., has received an order from the Oregon Railroad & Navigation Company for a 70-ft. steel motor car and from the Oregon & California Railroad for a 70-ft. steel motor car.

L. J. Wing Manufacturing Company, New York, N. Y., has opened an office in Chicago at 1785 Old Colony Building, where a stock of blowers will be carried. The office is in charge of J. J. Arnsfield, the Western manager of the company.

National Engineering & Construction Company, Dover, Del., has been incorporated in Delaware by William S. McGuire, New York City; J. D. Fackenthal, Brooklyn, N. Y., and James W. Williams, Watson, Pa., with a capital of $500,000.

Harrison Engineering Company, New York, N. Y., manufacturer of the Harrison aertube heater, has opened a branch office at the Real Estate Trust Building, corner Broad and Chestnut streets, Philadelphia, Pa., in charge of J. J. McKee as manager.

Wonham, Magor & Sanger, New York, N. Y., announce the resignation of Basil Magor, who will become president of the Wonham-Magor Car & Manufacturing Company. Wonham, Magor & Sanger propose to change their name to Wonham, Sanger & Bates.

Cleveland Frog & Crossing Company, Cleveland, Ohio, announces that L. G. Parker, for many years connected with the engineering department of the Lake Shore & Michigan Southern Railway, and also with the Chicago Terminal Transfer Railroad, has joined its sales department.

Protectus Company, Philadelphia, Pa., has been purchased from the receivers by W. C. De Armond. The manufacturers of high-grade paints for the protection of metal and wood, insulating paints and marine compositions will be conducted under the name of the Protectus Paint Company.

Pantasote Company, 11 Broadway, New York, N. Y., announces that the new Agosote Mill Board Company will open its plant at Trenton, N. J., about April 1, 1910. The company will then furnish boards of American manufacture to the trade. The capacity of the new plant will be 10,000,000 sq. ft. per year.

Holland Trolley Supply Company, Cleveland, Ohio, announces that it has acquired the sole manufacturing and selling rights of the Ludlow track drilling machine, a large number of which are in use on many railways. It is stated that this is the only drill made which will drill and ream railroad tracks by electricity.

Green, Hook & Company, Hudson Terminal Buildings, New York, N. Y., has been organized to manufacture and sell chemicals for boiler treatment. The main laboratory and works will be at Jersey City, and a branch laboratory at Baltimore, Md. Sales offices will be opened in Boston, Philadelphia, Baltimore, Norfolk and Havana, Cuba. Jacob W. Hook and Stanley K. Green are interested.

M. P. McGrath Contracting Company, Easton, Pa., has been incorporated in New Jersey for $125,000 to carry on railroad construction and proposes to make a specialty of electric railway work. The officers of the company are: M. P. McGrath, president; J. F. Mooney, secretary and treasurer. Mr. McGrath has to his credit the construction of a considerable number of electric railways in various parts of the country.

General Concrete Construction Company, Chicago, Ill., has appointed E. M. Lara contracting engineer. Since he was graduated from Cornell University Mr. Lara has been engaged in steam and electric railway work, in the sale of

engineering supplies, and at one time was associate editor of the *Street Railway Review*. The General Concrete Construction Company undertakes the construction of tapering concrete chimneys for all services.

King-Lawson Car Company, Middletown, Pa., at the annual meeting of the stockholders on Feb. 9, 1910, elected the following directors: Thomas Lawson, G. O. Draper, Edward Bailey, Harold C. Hansen, Paul A. Kunkel, Arthur King and Howard W. Bible. The directors organized by electing the following officers: Thomas Lawson, president and general manager; H. W. Bible, vice-president; H. C. Hansen, treasurer, and P. A. Kunkel, secretary.

Merchants Steel & Supply Company, Chicago, Ill., has been organized with a capital stock of $100,000, and will buy and sell scrap iron and steel, new and relaying rails, cars, locomotives and railway supplies and equipment. The company's offices are in the Marquette Building, and a yard will be provided to handle its materials. W. K. Kenly is president and treasurer of the company; W. T. Twomely, vice-president and general manager, and L. W. Parker, secretary.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., reports that the Boston & Northern Street Railway and Old Colony Street Railway are among the largest users of its well-known pinion pullers. In February, 1909, these companies ordered two pinion pullers and they proved so satisfactory that a month later the companies placed an order with the Columbia Machine Works & Malleable Iron Company for 26 more, making a total of 28 pinion pullers for one customer.

Crocker-Wheeler Company, Ampere, N. J., held a convention during the week commencing Feb. 14, 1910, of the district and branch office managers at the company's main offices and works at Ampere, N. J. Confidence is expressed as to the business possibilities for electric motors, generators and transformers during 1910 by this company, and as this company has retained its entire organization during the dull business season, it feels prepared to meet all demands for the classes of machinery which it manufactures.

American Ship Windlass Company, Providence, R. I., manufacturer of the Taylor stoker, has recently sold to the Detroit Edison Company four 13-retort Taylor stokers to be used with two 2300-hp Stirling boilers. The company says: "This great output from a single boiler is secured by double firing with a stoker at each end, each boiler having a furnace 26 ft. x 15 ft. The Taylor stoker was selected because of its great overload capacity. So far as known by the manufacturers, these are the largest stokers in the world."

Gulick-Henderson Company, Pittsburgh, Chicago and New York, inspecting engineers, metallurgists and chemists, announce that J. W. Henderson has resigned as treasurer to become manager of the Verona works of the Standard Steel Car Company, formerly known as General Castings Company. The metallurgical and foundry department of the Gulick-Henderson Company, which was directly under Mr. Henderson, will in the future be taken care of by W. G. Ireland, who is well equipped by many years' experience to take up the work.

Lord Electric Company, New York, N. Y., announces that this year it has sold more of its various products than in any six months of any previous year since it has been in business. Large orders have been received for Earll trolley catchers and retrievers, controlators, lightning arresters and other specialties. The company considers such results proof of the satisfaction secured in operation with the devices which it handles. The company has received an order for the complete equipment of the cars of a representative electric railway of the United States with Earll catchers. This is in addition to several hundred catchers ordered since Jan. 1, 1910.

H. W. Johns-Manville Company, New York, N. Y., announces that the Chicago and Baltimore branches will be moved about March 1, 1910, to new locations with more room. The Chicago branch, now on Randolph Street, will occupy the four-story and basement building at 27-29 Michigan Avenue. With 32,500 sq. ft. of floor space, offices, store and stock rooms will be amply provided for all under one roof. The Baltimore office, store and warehouse will be located at 30 Light Street, where the company will have considerably more room than before. A large stock of J-M products will be kept in both branches and the company will be in much better position than ever to give all orders prompt attention.

Western Electric Company, Chicago, Ill., has made known its returns for the first two months of its fiscal year. Taking into consideration the ratio which these first two months bear to the fiscal year as a whole, it is estimated that the year 1909-1910 will show a gross business of approximately $61,000,000. With this estimate realized, the current year will rank as second best in the company's history, being exceeded only by gross earnings of $69,000,000 in 1906. The sales for January, 1910, showed an increase of 46 per cent over January, 1909. Much expansion and extension work is promised for the current year, and with the money raised by the issue of $5,000,000, two years 4½ per cent collateral trust notes secured by $6,250,000 of first mortgage 5 per cent bonds the company is in a position to meet the demands upon it without borrowing at higher interest rates. Authorization for extensions to the Hawthorn plant calling for the expenditures of about $500,000 have already been made, and it is likely that the year's extensions and improvements will total much larger. The company reports the adoption of telephones for dispatching trains on several railroads. Among those which have installed the system in the South are the Georgia Railroad, for 245 miles, the Chesapeake & Ohio, on its Cincinnati division, the Norfolk & Western Railroad Company, on a large portion of its line, the Seaboard Air Line, for two of its divisions, and the Atlantic Coast Line, on one division. Elsewhere in the country similar interest in the use of the telephone for this service prevails. For instance, the Boston & Maine Railroad has installed telephone equipment for train dispatch on three of its divisions, one 70 miles in length, one 95 miles in length and one 51 miles in length.

ADVERTISING LITERATURE

Arthur S. Partridge, New Bank of Commerce Building, St. Louis, Mo., has issued under date of Feb. 19, 1910, List 32 of electrical machinery, cars and equipment which he is offering for sale.

American Carbon & Battery Company, East St. Louis, Ill., has issued a card on which it recommends that flat spots and rough commutators be done away with by the use of American carbon brushes.

Wickes Brothers, Saginaw, Mich., have issued their February "Monthly Stock List of Power Equipment." The company will also send on request its lists on metal-working machinery, electrical equipment, contractors', mining and quarry equipment and woodworking and sawmill machinery.

Jeffrey Manufacturing Company, Columbus, Ohio, in its twenty-page illustrated Booklet No. 36, says: "Our facilities for manufacturing high-grade steel and cast-iron spiral conveyors are unsurpassed. We employ every modern appliance in shop equipment and every known economy in shop practice in an effort to produce the very best spiral conveyors possible at a minimum cost. We carry large stocks and can ship promptly any of the Helicord or Sectional flight steel spiral conveyors listed as stock sizes. Any special styles or sizes practicable to structure will be made up and shipped on the shortest possible notice."

Barrett Manufacturing Company, New York, N. Y., announces in a four-page folder that it has just introduced a new reinforced waterproofing felt called "Tartex." It is constructed of the best-quality tarred felt and cotton drilling in such a way as to make an unusually pliable sheet, the tensile strength and waterproofing properties of which, says the company, are absolutely unapproachable by any other similar material. The roofing specifications of the Pennsylvania station, now building in New York City, call for coal-tar pitch and tar felt "equal to that manufactured by the Barrett Manufacturing Company." A handsome photograph, 13 in. x 8 in., of the station is "tipped in" on the folder.

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Through Routes and Joint Rates.

Two representatives from Iowa electric railways made the principal protest at Washington against the clause in the railroad rate bill that was designed to withhold from the Interstate Commerce Commission power to prescribe through routes and joint rates between steam and electric carriers. Properties in all sections of the country, however, are vitally interested in the outcome and we believe that the omission in the amended bill of the clause to which objection was raised will be approved by most roads which are especially concerned in legislation upon this subject. The facts in the case may be summarized briefly in the statement that while, under the existing law, the interstate commission has authority to direct the installation of through routes and joint rates between carriers of the two classes, it was proposed by amendment to take away the power of this commission to prescribe the establishment of through traffic routes between steam roads and electric passenger railways. The freight traffic that will be developed by many interurban electric railways if they establish through routes with steam roads will have an effect upon the revenue that will be much smaller in importance than the benefit to the public in many localities that are now without adequate transportation facilities.

Developments in the South

So much has been written about the "New South" during recent years that electric railway men doubtless will be interested to learn to what extent their brethren in the Southern States are keeping pace with the developments in electric transportation which are going on in other parts of the country. A study of the traction conditions in the South Atlantic States was recently made by a representative of this paper and it is gratifying to report that in its electric railway systems every Southern city visited is showing the same enterprise and progress which it is customary to associate with the improved development of the agricultural and manufacturing resources of that section of the country. This condition is not based upon any forced or "boom" growth of the different cities, but is due entirely to the better exploitation of the splendid resources of the South. For a generation after the Civil War these resources lay almost dormant. Now capital is pouring into this territory from all sides and under this impetus, the people are showing an activity hardly suspected by the rest of the country. A visitor to Atlanta, for instance, seeing its bustling population, its busy manufactories and its network of railroads could easily imagine himself in a miniature Chicago. The upward industrial movement naturally has had a most favorable influence on the electric railways. Hitherto most of these roads have been controlled almost wholly by local capital and the properties, although well maintained, have been managed along the most conservative lines with regard to extensions which would require large bond issues. Outside capi-

talists, however, are appreciative of the fact that the electric railways in a rapidly-growing country can be made attractive investments. Hence they are now putting their money into the properties for such purposes as the extension of the lines and the construction and equipment of modern power stations, car-houses and shops. It is not likely that the near future will bring any radical changes in standards of car line and track as these divisions of railway work appear to be all that could be desired for the conditions obtaining in each case.

The Philadelphia Strike

The underlying cause, in fact the only reason for the strike and scenes of disorder which have disgraced Philadelphia during the past 10 days, is a demand for the recognition of the union. All other reasons or excuses which have been put forward by the strikers and their sympathizers have been advanced to cloud the main issue. Up to this time, the company has consistently refused to grant this recognition or to treat with its employees, except on the basis that union and non-union men should have equal rights and treatment. This position it not only has a legal and moral right to take, but it should be supported in this attitude by all right-thinking people. It is for the citizens of Philadelphia to determine whether the tremendous cost to which they and the company have been and are being subjected is warranted by the effort to make the company discriminate against its non-union employees.

The history of the differences which led up to the present strike is brief. On June 5, 1909, the company signed an agreement with its employees in regard to wages and other matters to continue in force up to June 30, 1910. The text of this agreement was published in the Electric Railway Journal for June 12, 1909, and contained four sections. The first provided that the company, through its accredited representatives, would meet with the accredited representatives of the employees, to adjust any differences or grievances which might arise. The second provided the way in which the employees should obtain uniforms. In the third, the company agreed that when an employee was suspended or discharged, and after an investigation it should be found that he had been unjustly suspended or discharged, he should be reinstated to his former position and paid for the time lost. It also provided "that the wage schedule shall be 22 cents per hour for the surface men and the same proportionate increase for the elevated men from June 5, 1909, to June 30, 1910," provided that the report of the audit of the city controller for 1908 sustained the company's statement that its receipts did not warrant any further increase beyond 22 cents. In such cases, the wage schedule should be immediately adjusted. The fourth section stated that the agreement should be binding on both parties up to and including June 30 of the present year.

This agreement was made with the employees as a whole. At the same time the company issued a statement denying any obligation to deal exclusively with the union, then comprising not more than one-sixth of the company's employees. It said it was prepared at the time the agreement was signed, and it had always consented, to receive complaints and communications from all kinds of its employees and to adjust these complaints to the best of its ability, but that there were few, if any, concessions in the agreement then just made which could not have been obtained peacefully by the employees.

As will be seen, the agreement was to continue until June 30 of the present year, and negotiations were under way for the wage schedule which was to go into effect on July 1, 1910. In the meantime, the discharge of a number of men for various breaches of discipline some two weeks ago was made an excuse by the union for the present strike, which they call a "lock-out." At the same time, the members of the union were forbidden by their leaders to return to work, until the company should agree to pay 25 cents an hour, although the agreement provided that the present rate of wages should continue until June 30, 1910.

Thus the two issues are, the right of the employees to deal directly with the company, whether they belong to a union or not, and the question whether in the future mob rule and violence are to be recognized in Philadelphia as the favored and most efficacious means for securing advances in wages and other concessions from employers.

That the leaders of the union realize they are losing ground is shown by their insistent demands for arbitration, but we do not see that there is any question to arbitrate. The rate of wages to be paid after June 30 is still to be settled, but the present is no time to take up that question. In fact, the experience of the company with the agreement of last June demonstrates the futility of contracts of a character which hold one side, but not the other. Until some method shall be devised by which a penalty may be attached and can be enforced against employees or the members of a union as a body for violations of trade agreements, we cannot look upon them seriously or regard them as practicable methods to be used in the settlement of a controversy between capital and labor.

The public in Philadelphia can settle the struggle in a few days, if it wishes, but not through arbitration. If peace should be secured in this way, it would be an armistice only and the embers of the present struggle would burst forth again into flames within a short time. But if the citizens of Philadelphia adopt the advice of the Mayor, who seems to have kept his head during the struggle, and insist on a termination of the presents acts of disorder, the situation will right itself, as it is now fast doing.

Direct Current on the Washington, Baltimore & Annapolis

Another chapter was added last month to the history of electric railway distribution systems when the Washington, Baltimore & Annapolis Electric Railway Company changed from single phase to 1200-volt direct current. It is a curious coincidence that this road on which the single-phase system has now been displaced was the first in the country in which the use of that system was seriously considered, although a change of ownership occurred before the system was finally installed. We hardly believe that the action of the company will be considered as a reflection upon the single-phase system *per se*, but simply that it was not adaptable to the particular set of conditions existing on this road. One of the foremost of these adverse circumstances was the necessity of using a 600-volt single-trolley system in Baltimore and a 600-volt double-trolley and an underground conduit system in Washington. A second objection was that the Washington conduit tracks were unsuitable for the long, heavy cars which were necessary with the complicated electrical apparatus required when single-phase motors were used with each of the varieties of direct current distribution mentioned. A striking feature of the conversion was the absence of interruption to the service by the change.

Double Claim for Damages

The Kentucky Court of Appeals was recently called upon to decide an interesting case, John Raymond's Administrator vs. Louisville Railway Company, in which the court decided that the settlement of a claim for damages made in good faith and without fraud precludes the recovery of a judgment for the death, at a subsequent time, of the person injured. The case has just been reported in 123 Southwestern, 281, and is of such general interest as to merit consideration.

A little over a month after Raymond was injured by a car, he compromised with the company by accepting $20 in full settlement of all claims which he had against it because of the accident. He died about six months afterward. Nearly a year later his administrator sued the company for the loss of his life, alleging that his death was the result of the injury he had sustained. As a bar to the action the company pleaded, among other things, the written settlement which it had made with the decedent.

At common law a civil action could not be maintained to recover damages for the death of a human being. In 1846 the English Parliament passed what is known as Lord Campbell's Act, the purpose of which was to do away with the common law principle just stated, and similar acts have been generally passed by the States of the Union, but the recovery thus permitted is purely statutory and the statutes have generally been strictly construed. The Kentucky constitution provides, following Lord Campbell's act, that when death shall result from an injury inflicted by a wrongful act, damages may be recovered, and subsequent statutes specify through whom the suit may be brought.

The holding of the Kentucky court, briefly stated, is that the constitution and statute did not create a new cause of action, as claimed by the plaintiff, distinct from that which accrued to the decedent, and that a personal representative cannot sue in damages for death and also for physical pain and mental suffering. A recovery for one bars an action for the other. The reason for this rule is that only a single wrong is committed, and while the law gives the injured person or his representative two remedies for that wrong, either of which can be used, there cannot be two recoveries by them for the one injury.

The debates in the constitutional convention and the intention of the legislature in passing the subsequent acts, upon which plaintiff relied, are considered by the court in an opinion too long to be reviewed in detail, but cases which sustain the court's contention are cited from the law reports of England, Vermont, Indiana, Rhode Island, New York and Georgia.

We are inclined to agree with the Kentucky court that the authorities are consistent and uniform. The rule has been thus stated by a well-known text book:

"The right of action in the personal representatives, it has been held, depends not only upon the character of the act from which death ensued, but also upon the condition of the decedent's claim at the time of his death. If the claim was in such a shape that he could not then have enforced it had death not ensued, the statute gives the executors no right of action, and creates no liability whatever on the part of the person inflicting the injury. Therefore, where in an action by the personal representative of a person to recover damages for his death, caused by the wrongful act of the defendants, it was shown that the defendants settled with the deceased in his lifetime, and paid him the amount of his claim on account of injury, it was held that this would bar the plaintiff's action. Such a release is invalid if secured by unfair means."

Of course, under certain conditions, two causes of action may arise for a single injury. For example, if a child is hurt and the parent settles, this does not bar an action by the representative of the child because two actions lie for the injury, one by the parent, which he settled, for loss of services, and the other by the child for pain and suffering. The same would generally be true if a married woman had been hurt.

The subject is an interesting one, and should be clearly understood by claim departments of railway companies and their adjusters in making settlements.

Hudson & Manhattan Power Station

Electric power is now being generated on so vast a scale in and about New York City that the inauguration of a new power station, even of monumental size, hardly arouses the interest it deserves as an engineering achievement. When electric railway train service is so uniformly smooth from the beginning as that operated by the Hudson & Manhattan Railroad even the engineering fraternity may be profitably reminded of the perfection of detail with which the power generating system has been worked out. A brief description of it in this issue by Hugh Hazleton, one of its designers, is therefore worthy of notice.

The power station is advantageously located, both with respect to its load and coal and water supply. It would appear that bedrock at the power house is near enough to the surface to obviate piling and at the same time to introduce some rather unusual construction for the intake and discharge tunnels. As in many other instances, some of the most difficult and fundamentally important construction work about a large power station is out of sight beneath the surface. It almost looks as if the pneumatic shield tunnel experts, who made possible the construction of the railroad itself, preferred that style of intake construction from force of habit, but it is also to be supposed that the subaqueous method was estimated to cost less than cofferdam construction under existing conditions.

The combination of the use of the vertical type of turbine with all boilers on a single deck enables the construction of a building of more uniform height than has sometimes been possible where very large power has been concentrated within a restricted area. The design of the building is worked out to make the boiler room nearly square instead of oblong, which may offer some operating advantages in cutting any battery in or out of service, with a simpler steam piping layout than is possible with the long-line style of boiler arrangement. The boiler units are increased to the unusual size of 900 hp, apparently by increasing the width rather than the height, and necessitating the division of each boiler furnace into two units. It does not appear that the floor space per boiler horse-power is appreciably less than in former installations, but some floor space is gained by raising the stack structures entirely above the boilers and economizers. The balanced draft system is used for greater fuel economy with firing and further to insure that the smallest possible number of heat units shall escape, the boiler settings are reinforced with magnesia covering and tightly sealed by being encased in steel plating. Even the furnace and ash pit doors are fitted with asbestos gaskets. The still unfilled want of an automatic stoker suitable for small anthracite coal is emphasized by the use of flat grates.

A good feature resulting from the shape of the boiler room is the subdivision of the coal-bunker system into compartments which would seem to aid in the distribution of the dead load on the supporting columns and also minimize the losses and inconvenience of bunker fires in case spontaneous combustion is possible with the fuel used. The situation of the power house for the receipt of coal by rail is much more advantageous than with most of the large stations about New York harbor, and it is presumably for this reason that the coal-handling system seems somewhat more complicated than is usual where coal is brought by water.

In the adoption of heavier and especially designed valves, flanges and fittings for the main steam piping, it is evident that the experience of large stations during the past 5 years in the use of superheated steam with turbines, has been profitably followed. So much has been learned in that time about the effect of superheat on piping and valves that its influence on the details of this plant would doubtless make an interesting story in itself.

The absence of electric driven auxiliaries, excepting one exciter, is noticeable, as is also the economy of space consequent upon combining the air and circulating pumps for each main condenser into a single machine of the vertical type.

Among the electrical features worthy of special note is the system of busbar and feeder group arrangement, by which a high degree of flexibility is assured in working out combinations between generators and feeders, though at the expense of a considerable number of extra switches, there being 13 besides those necessary for the generators and feeders alone, according to the diagram. Another remarkable thing about the electrical installation is the compactness with which the busbar structures and switch gear are disposed in the basement, excepting only the operator's benchboard which is in the usual elevated gallery and the rotary converter substation direct-current switchboard, which is on the main floor. The arrangement of so much of the switching apparatus in the basement requires less gallery space above the main floor and affords better lighting and ventilation than would otherwise be possible, besides saving considerable construction expense. It also speaks well for the confidence of the engineers in the reliability of the 11,000-volt switches selected.

The comparatively short distance to which the outgoing direct-current is transmitted and the vital necessity of quick control in case of emergency have caused the addition of some special distant control apparatus not commonly met in railway substations for sections of the third rail in the Hudson tunnel.

Although this is the third of the large power stations in the New York district which have been designed under the engineering guidance of Mr. Stillwell and his associates, it is the first of the three to be uniformly equipped with steam turbines, the others having been designed before turbines had come into common use in large sizes. While there is little in the description to indicate that there have been any further distinct advances during the past few years in the design or economy of the main items of generating apparatus as supplied by manufacturers, there is every evidence of intelligent effort on the part of an experienced engineering staff to work out from available means the best combinations for securing the economical generation of power.

Purchase of Power for Electric Traction

As a rule electric railways in this country generate their own power, but in a few conspicuous instances they have found it wise to purchase power from large producers who are able to furnish it on favorable terms. The figures quoted for power thus supplied have usually been low and it is therefore with considerable surprise that one picks up a recent report of the prices charged tramways for current in England. There are sixty-five towns in Great Britain having combined lighting and tramway generating stations under municipal ownership and the average price charged up against the tramway amounts to about 2.7 cents per kw-hour. In addition there are seventeen separate traction stations owned and operated by the local authorities and generating each over two million units per annum. These separate stations furnish current at an average price of 1.5 cents per unit, a figure that would stagger most electric railways in this country if proposed as an equitable figure for purchase of power.

These prices charged the tramways in Great Britain are notoriously high, higher even than the power rates of many of the same stations to their large power consumers, a fact due, in some cases at least, to a practice of embodying in the franchise for a privately owned road, or making an agreement with the tramways committee of a municipally owned road that it should take energy from the municipal power station at a high stated price. This phase of the topic may not be of particular interest to American railway companies, but it opens up the entire subject of equitable rates for electric service, which is of vital concern to many railway corporations in this country. And right here is the point at which we propose to propagate a heresy.

From a considerable experience in watching the operation of electric railway power stations we are pretty thoroughly convinced that the nature of the load and the cost of supplying it are things rather generally misunderstood by those who are not in the immediate work of electric railway engineering. Whenever an electric railway and a central station begin figuring on the cost of power there is a great hue and cry raised about the irregular load on the railway system. Now as regards small systems operating few cars on heavy grades the loads are undeniably irregular. On the other hand, a large tramway system operated under moderately favorable conditions gives a load factor as steady and almost as high as that found in general power service, save for cases like cotton mills which run as a whole or not at all, and at exceptionally steady output.

As a matter of fact, some electric railway generating stations, in spite of the alleged irregularity of the loads, do actually turn out energy at as low price per unit as any electric stations used for any other purpose, barring such instances as a few stations that own their own coal mines and are therefore enabled to get extraordinarily low fuel costs. The general load factor of a fairly good sized electric railway plant is far from bad. The loads from day to day are rather exceptionally uniform and the generating costs should be and often are low. True, a railway load has a high peak at times, but railways operating their own plants actually do get down to very low figures despite this peak. As we have said, the enormous prices we have quoted as current in England would seem in large measure to be due to methods of charging, excellently adapted to punish traction service. The rate itself

is not only often high but the charge is also frequently based on the now rather discredited maximum demand system. There is no denying the fact that one of the factors in the cost of supplying electrical energy is the maximum demand, but it is only one of the factors in the fixed charges, and in very many, perhaps most, cases not the controlling factor even in tramway load.

Methods of electrical charging are as a rule based on the good old commercial principle of charging what the traffic will bear, under whatsoever disguise the price may appear, and this is what it should be as a fair commercial proposition. That is, the supply company should obtain such a reasonable figure as the general conditions indicate, bearing in mind, of course, that as a public service corporation neither a supply station nor the electric railway it serves is at liberty to grasp for extraordinary profits. The general principle that the total cost of electrical energy may be divided into a fixed sum proportional to the general investment and a production cost dependent on operating expenses, is sound, if indeed one admits that the price charged should be in any direct way dependent upon actual costs rather than upon the basis of reasonable dividends.

It is a mistake, however, as a matter of fact, to suppose that the first element is correctly measured by the maximum demand of the consumer taken under arbitrary conditions. Such a proposition merely assumes the maximum demand to be the only variable in the quantity sought, and all the other factors to be taken as constant by general average. Obviously such matters as the relation of the time of maximum demand to the load of the station, the length of the maximum demand, the frequency with which the load rises over a given amount, and the distance from the station at which the load has to be delivered through costly cables, are all factors certainly commensurate in importance with the absolute amount of highest reading of the ammeter obtained in a certain month or quarter. The running costs pure and simple are much more easily put on a fair basis than the stand-by charges.

When it comes to a matter of trading regarding the prices to be paid for power by a tramway system, it seems to us that the matter should stand on the ordinary basis of buying and selling. The practical question for the tramway company is whether it can buy power cheaper than it can make it. If it can, it is sound business to do so, and we are inclined to think that with the enormous central supply stations now becoming common it will oftener and oftener pay electric railways to purchase their power.

On the other hand, the supply station desiring to sell power must assure itself of a reasonable profit. It is at liberty to figure this out on any basis of stand-by charges and operating charges that it sees fit, but the prospective customer is not really interested in that phase of the matter. If the question of stand-by charge has to be raised at all in figuring out the proposed purchase of power, it seems to us that instead of basing it upon any single factor assumed as variable and averaging the others, a more sensible procedure would be to ask baldly, "How much actual extra investment in apparatus, accessories and lines are you going to install when you take on our tramway load?" If heavy expense of this kind is entailed it is a perfectly proper and legitimate source of a stand-by item in the price. If, on the other hand, such investment is chiefly theoretical, as we believe will frequently be found to be the case, then it has no place in the calculations. It is a very nice thing for a central station to take on a large consumer and figure out against him a large *pro rata* stand-by charge based on his maximum demand, if at the same time the load is actually assumed with the existing apparatus and without the slightest intention of increasing the concrete investment, save perhaps in cables for handling the new load. What really happens under such circumstances is that the station gets the benefit of an increased load factor and charges up a stand-by charge which it does not really incur. The only way in which a railway load is likely to be a heavy drain upon a supply station is by increasing the general peak, and a stand-by charge, reckoned on such increase, while preserving, so to speak, the factor of safety in the equipment, can be figured out with some fairness to both parties. Such increase will at least lead to a lower figure for stand-by costs than an assumed or measured maximum demand uncorrelated to the actual output conditions of the station.

Possible Coal Strike

If signs which have held true in the past are to be accepted at this time a strike of the coal miners in the Central States will probably occur on April 1. At least conditions in Indiana have taken such a turn that a settlement of the differences between the coal miners and the operators is spoken of as being very unlikely. The daily papers of Indiana, Illinois and Ohio predict that the Indiana mines will shut down on April 1, and that those of the other two States and perhaps Western Pennsylvania will follow shortly. The operators are said to be preparing for a protracted stoppage of the supply. They are accepting restricted orders for delivery after this month. It is also true that large users of coal, so far as possible, are storing large amounts of coal. One steam railroad is storing 200 tons a day at one point on its lines in Indiana.

Several electric railroads already are experiencing difficulty in obtaining any excess coal over that ordinarily received, because wholesale dealers will ship only in amounts sufficient to fulfill their contracts. The managers of some electric railroads have had the foresight to put by coal sufficient to run their plants for several weeks. One road some months ago made plans for storing a large amount of coal in an artificial pocket formed by the 14-ft. embankment at a junction of three interurban branches. It was planned to line the embankments and cover the bottom between with concrete. This would permit the coal to be stored under water at a moderate cost. An electrically operated grab bucket mounted on a flat car offers an economical means for reloading the coal.

It is not difficult to find a method of storing coal if the coal is obtainable. Of course, this is the time of the year when rumors that a coal strike is impending are common. It is impossible to tell whether these rumors have any greater foundation this year than last or the year before. Nevertheless, the management of many electric railway and lighting companies think that they are doing wisely to lay in an excess of fuel over the normal requirements. Coal is essential to the operating road and a note of warning has been sounded by several railway men. The situation will certainly merit careful watching.

POWER STATION OF THE HUDSON & MANHATTAN RAILROAD

BY HUGH HAZELTON, ELECTRICAL ENGINEER, HUDSON & MANHATTAN RAILROAD COMPANY

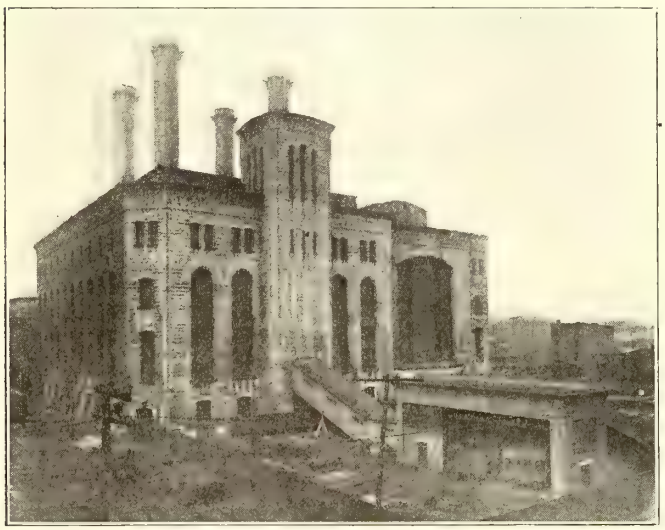
The power station which supplies electric energy for the operation of the Hudson & Manhattan Railroad is located in Jersey City, on the block bounded by Washington, First, Green and Bay Streets. This location is advantageous for the delivery of coal, as it is accessible to all the railroads entering Jersey City. This makes possible the shipment of coal directly from the mines to the power-house siding without break of bulk. Water for condensing purposes is obtained from the Hudson River through an intake tunnel about 1800 ft. long.

The power house is near the center of the Hudson Tunnel system, and is adjacent to the tunnels under Washington Street, thus minimizing the length of power cables.

The power is transmitted from this station, by means of three-phase, 25-cycle, alternating current, at 11,000 volts, to three substations, two in New York City and one in the power station building, as follows:

Substation No. 1.—Christopher and Greenwich Streets.

Substation No. 2.—Washington and First Streets (in the power-house building).



Hudson & Manhattan Railroad Power Station—Eastern and Southern Front

Substation No. 3.—Hudson Terminal Building, Cortlandt and Church Streets.

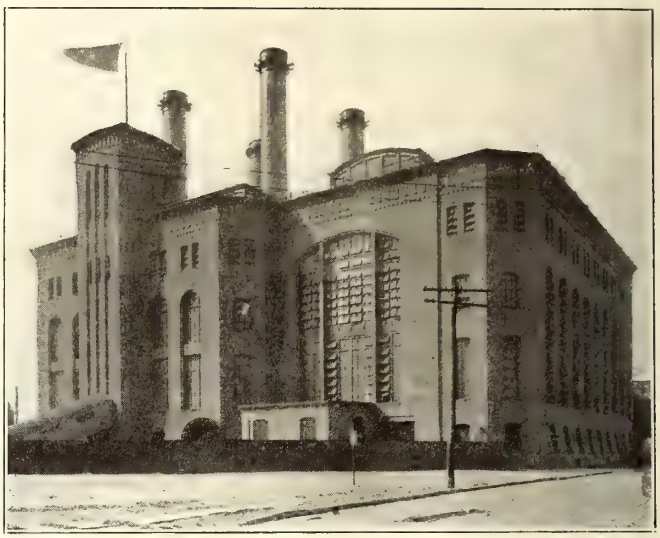
THE BUILDING

The eastern and southern fronts of the building are shown in the exterior view in which can be seen the tower which contains the equipment for handling coal and ashes.

The building has an average width of 210 ft., and is 195 ft. long. Provision has been made for an extension to a distance of 70 ft. to the westward for possible future requirements. The present installation consists of two 3000 and two 6000-kw turbo-alternators at normal rating, making a total generating capacity of 18,000 kw. One additional 6000-kw turbo-alternator and its necessary complement of boilers can be installed in the present building. Should the building be extended, two 6000-kw generating units could be added, making an ultimate generating capacity of 36,000 kw.

The foundations are of concrete carried down to bed rock. The floors, except where iron floor plates are used, are of reinforced concrete. All doors and interior window frames are kalomeined, while the exterior window sash, frames and doors are of iron or copper. The windows are glazed with wire glass as a protection against fire. The flat portions of the roof are of reinforced concrete, covered with terra-cotta blocks. The monitor roofs are covered with waterproofing of tar and gravel.

Four brick-lined, steel chimneys have been erected. They are supported on steel columns to allow maximum room for the boilers, and make it possible to place all boilers on one floor. The chimneys have an internal diameter of 11 ft. The tops are 180 ft. above the curb line and 98 ft. above the

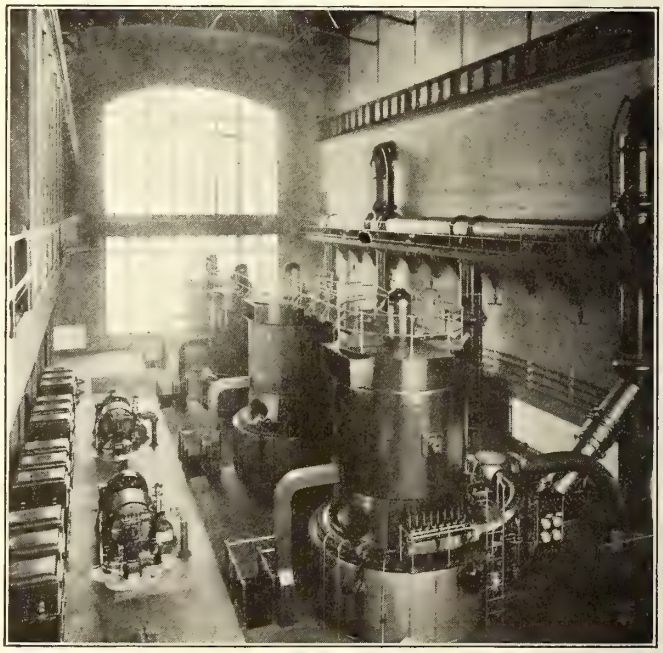


Hudson & Manhattan Railroad Power Station—Eastern and Northern Front

cornices. The two flue openings in the base of each chimney are placed diametrically opposite each other.

GENERATING ROOM

Two views of the generating room are given. One is taken looking toward the boiler room and shows the atmospheric exhaust piping. The other is from the opposite side of the generating room and shows the operating gallery, under which are the converters and transformers belonging to substation No. 2. The generating room is well lighted by means of large window surfaces on three sides as well as by a skylight superstructure. As nearly all of the windows are fitted with pivoted sash, the ventilation is very satisfactory. The generating room is provided with an electric crane, having a 61-ft. span and equipped with one 50-ton and one 10-ton hoist.



Hudson & Manhattan Railroad Power Station—Generator Room, Looking Toward Boiler Room

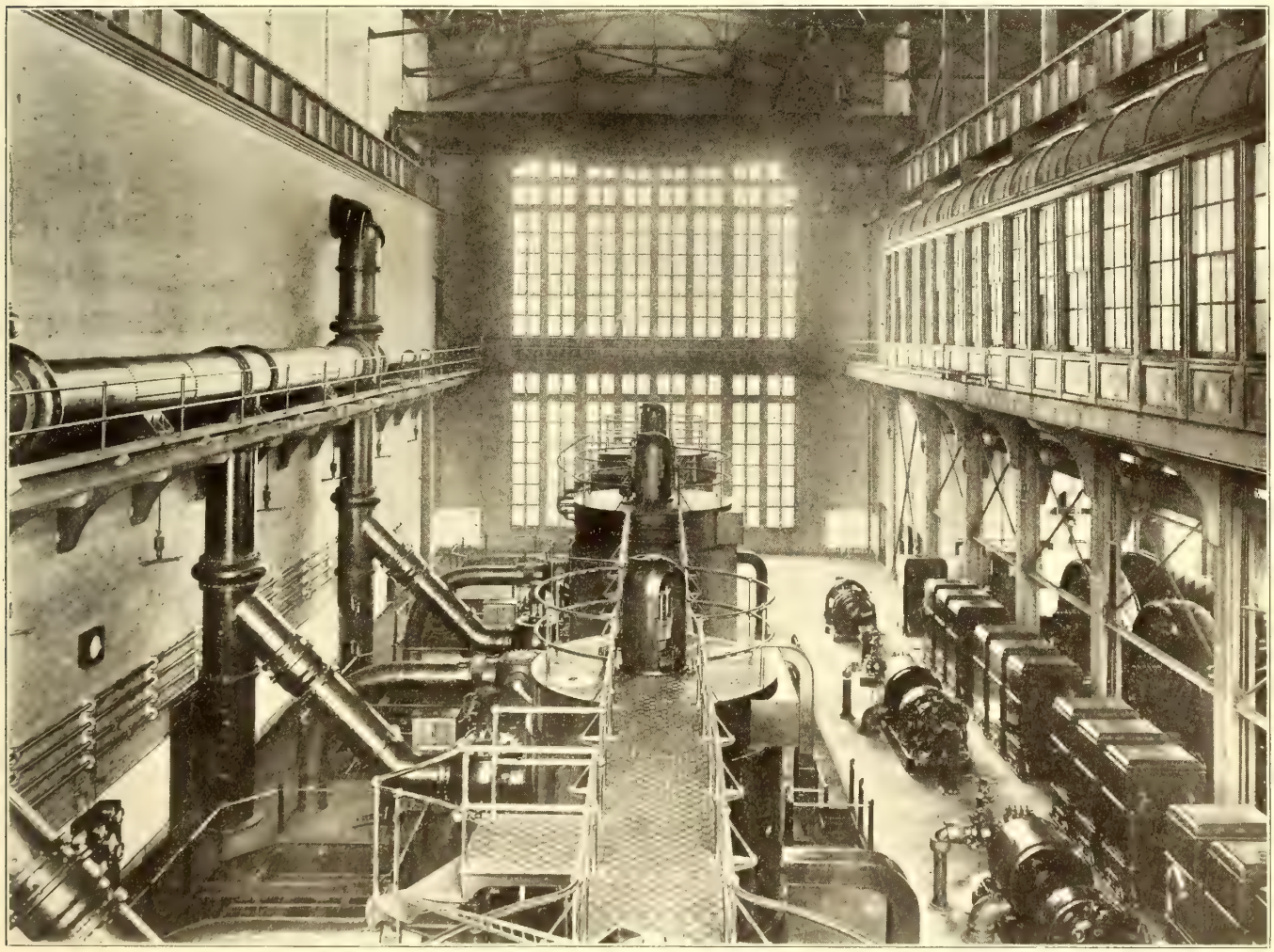
TURBO-ALTERNATORS

The turbo-alternators are designed to operate at 175-lb. steam pressure with about 100 deg. Fahr. superheat. The turbines are

of the vertical shaft five-stage General Electric Curtis type, and are equipped with centrifugal safety stops.

Lubricating oil is distributed under pressure to the various journals, and is then filtered and returned to oil reservoir tanks. Four steam-driven, high-pressure pumps are provided for the step bearings, each pump having a capacity of 20 gal. of oil per minute at a pressure of 1100 lb. per square inch. These pumps were furnished by Dean Brothers, and possess the unusual feature of having high-pressure cylinders and steam chests of about double the customary weight. An accumulator maintains a constant pressure on the step bearings.

The alternators are designed to deliver three-phase, 25-cycle alternating current at 11,000 volts. They have a revolving field and stationary external armature. Exciting current at a potential of 250 volts is furnished by two 150-kw horizontal Curtis turbo-generator sets and one 150-kw motor-generator.



Hudson & Manhattan Railroad Power Station—Generator Room, Looking Toward Switchboard Gallery

CONDENSERS AND CIRCULATING PUMPS

There are five surface condensers which were furnished by H. R. Worthington. Three of these contain 10,000 ft. of cooling surface each. The other two contain 20,000 ft. of cooling surface each. As will be seen from the plan, the middle small condenser is connected to the two 3000-kw turbines and the arrangement is such that either one of these turbines can be operated on either of two condensers. The gate valves between the 3000-kw turbines and the condensers are operated by steam. Each condenser is equipped with a centrifugal pump driven by a Kerr turbine, for returning the water of condensation to the hot well and storage tanks.

There are four combined circulating and air pumps, each unit consisting of one vertical steam engine, directly connected to one centrifugal circulating pump and one single-stage, dry-air pump proportioned to operate one 6000-kw condenser or two 3000-kw condensers.

INTAKE AND DISCHARGE TUNNELS

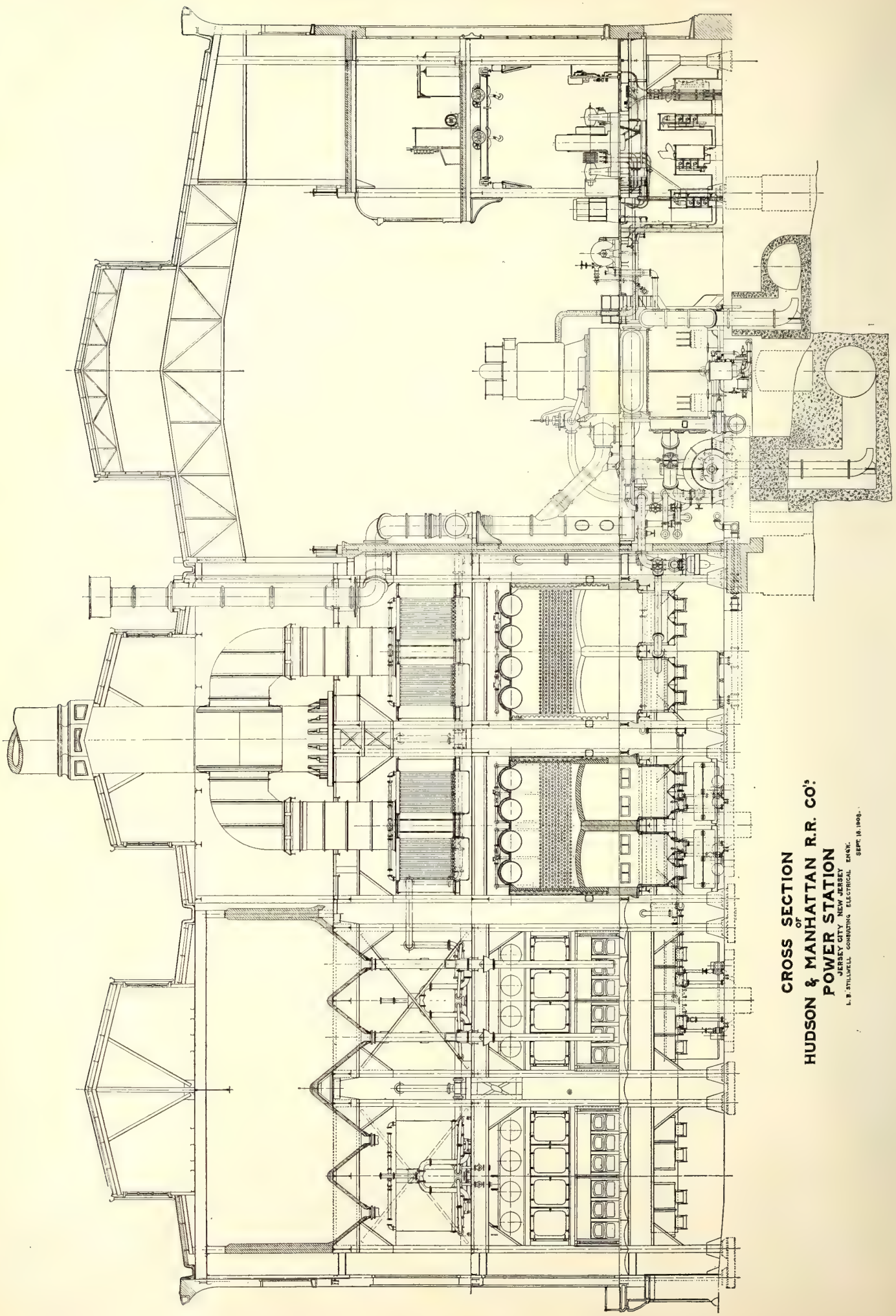
Condensing water is taken in at the end of Pier H, in Jersey City, at a point about 600 ft. beyond the bulkhead line. The water is discharged from the power house into the river at the bulkhead. Between the power house and the bulkhead the tunnels are mostly constructed in rock, where they are lined with concrete provided with an internal facing of vitrified brick. The brick of the discharge tunnel are laid in a slag cement to resist the deteriorating effect of the warm salt water. At the termination of the rock, the tunnels were constructed in the river bed in the manner employed for the construction of the main railway tunnels under the river. A small shield was used for making the excavation, and the cast-iron tunnel plates were lined with concrete.

BOILER ROOM

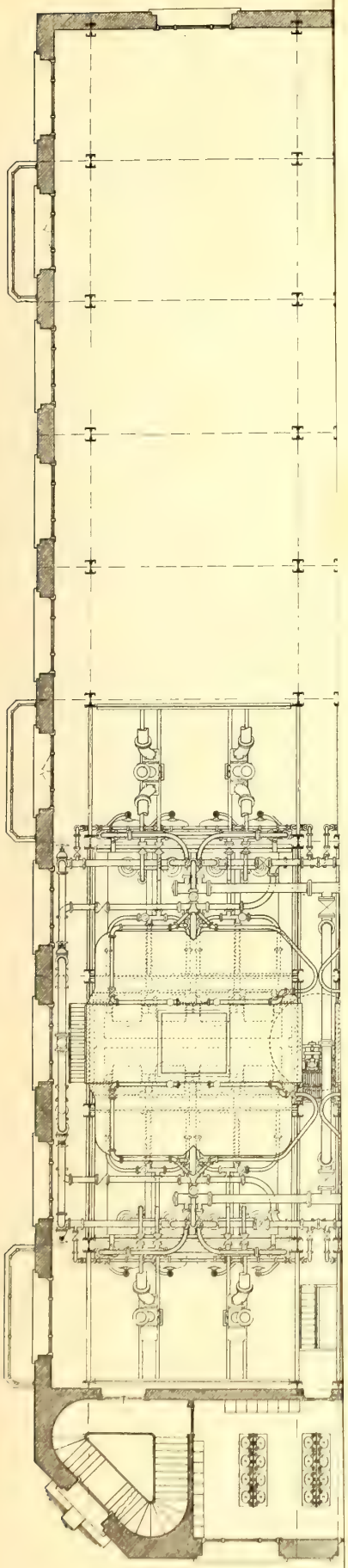
The present building is designed for 16 boilers of 900 boiler hp each. The ratio existing between the boilers and the generating capacity in the station is four 900-hp boilers for 6000 kw of generators. Each boiler is therefore capable of generating steam for 1500-kw capacity of turbines when the boilers are operated under normal conditions of draft and firing. As one of the 6000-kw generating units is a reserve unit, the boilers have been provided for the generation at normal rating of only 12,000 kw, that is, the station contains now eight boilers or half its capacity.

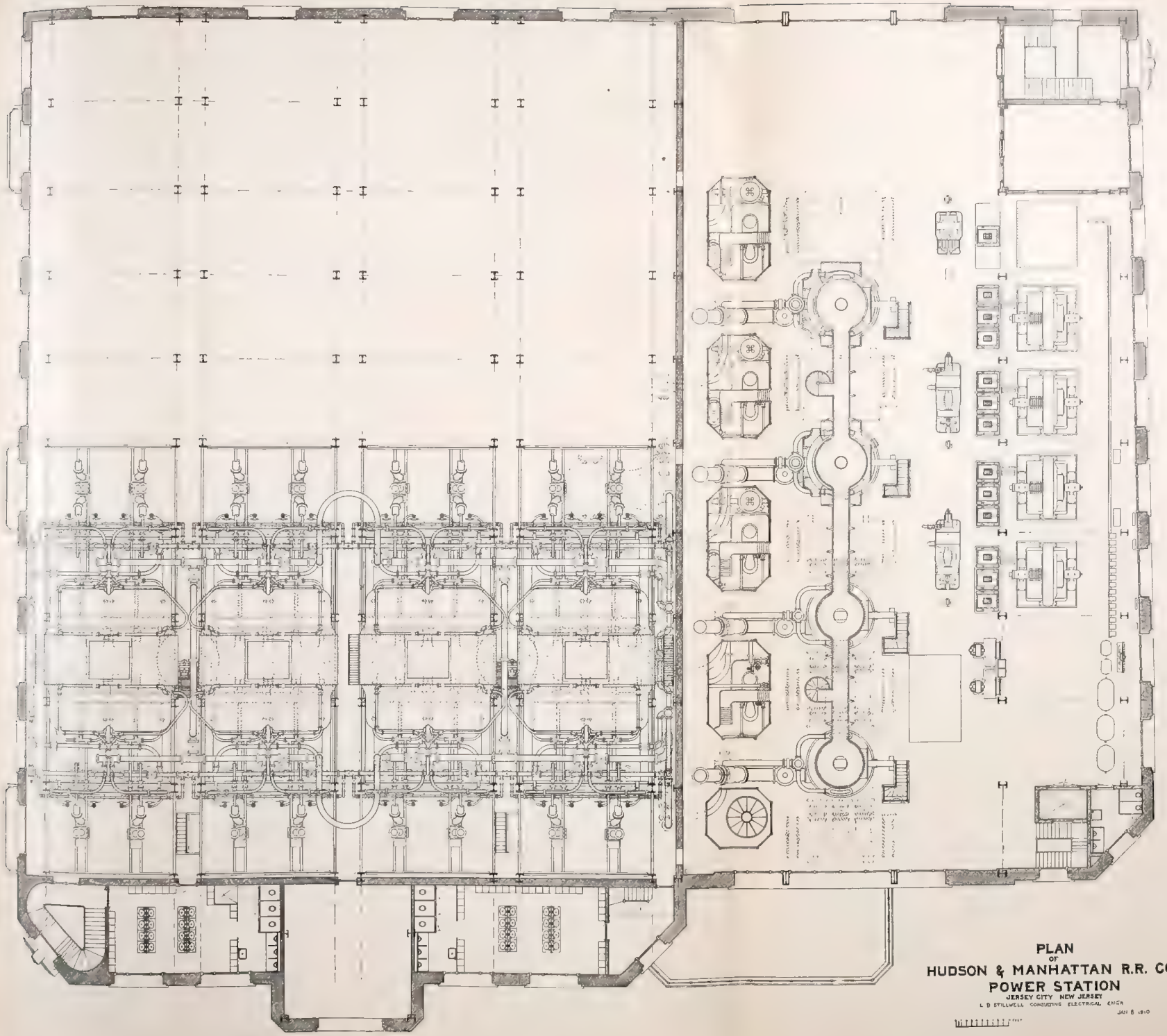
The boilers, which were furnished by the Babcock & Wilcox Company, are arranged back to back in rows of four boilers each, the aisles being at right angles to the generating room. This arrangement shortens and simplifies the steam-pipe lines. Each boiler has 9000 sq. ft. of heating surface and four drums, and is equipped for super-heaters.

There are two McClave-Brooks hand-fired grates under each boiler. Each grate has an area 9 ft. 6 in. wide by 10 ft. deep.



CROSS SECTION
OF
HUDSON & MANHATTAN R.R. CO'S
POWER STATION
JERSEY CITY NEW JERSEY
L. B. STILLWELL CONSULTING ELECTRICAL ENGR.
SEPT. 10. 1908.





PLAN
OF
HUDSON & MANHATTAN R.R. CO.'S
POWER STATION
JERSEY CITY NEW JERSEY
L B STILLWELL CONSULTING ELECTRICAL ENGR
JAN 8 1910

divided into six dumping sections for convenience in cleaning fires.

BOILER SETTING AND EQUIPMENT

A feature of the boiler construction consists in the use of steel-encased brickwork. This brickwork is 12 in. thick, except at the furnaces, when the thickness has been increased to 25 in. Between the brickwork and the steel casing there is a 2-in. layer of 85 per cent. magnesia. All the door and cleaning openings, leading into the boiler setting, are supplied with asbestos-packed doors and frames of special design. Care has also been taken to make the large front cleaning doors air-tight, as well as the entire boiler setting.

The boilers are operated on the balanced draft system. The air duct used is designed so that four 10-ft. fans supply air to the eight boilers. All fans discharge into a common ring air-duct system connected to the ash pits.

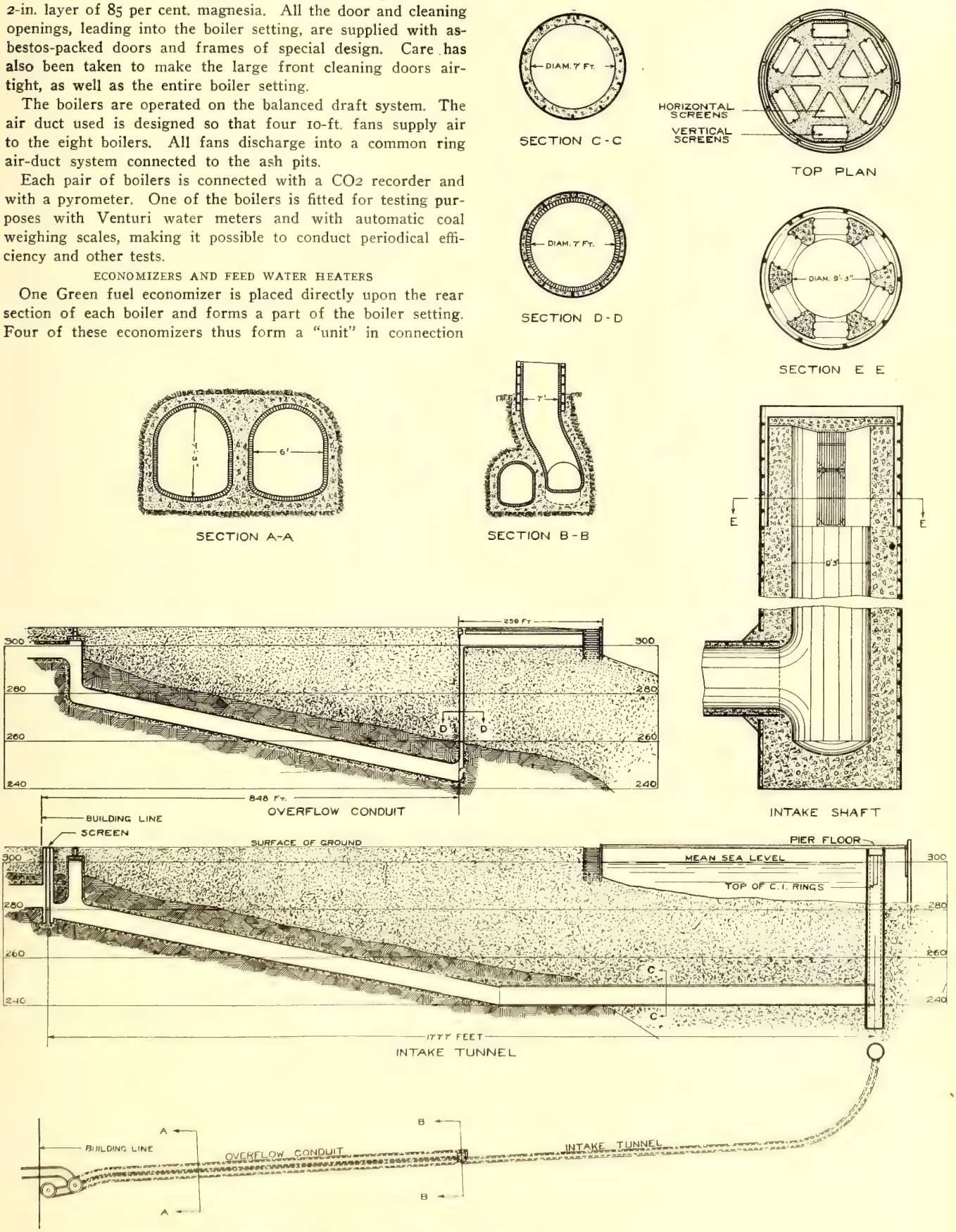
Each pair of boilers is connected with a CO_2 recorder and with a pyrometer. One of the boilers is fitted for testing purposes with Venturi water meters and with automatic coal weighing scales, making it possible to conduct periodical efficiency and other tests.

ECONOMIZERS AND FEED WATER HEATERS

One Green fuel economizer is placed directly upon the rear section of each boiler and forms a part of the boiler setting. Four of these economizers thus form a "unit" in connection with four boilers, two smoke uptakes and one chimney. The uptakes are constructed of 3/16-in. plate steel stiffened by angle irons, the latter being supported by the steel columns and the boiler setting.

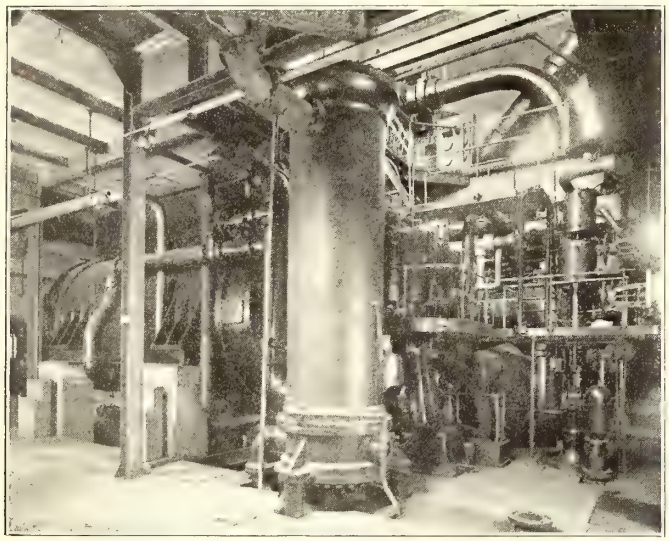
COAL AND ASH HANDLING MACHINERY

The coal and ash handling system is shown in plan and sec-



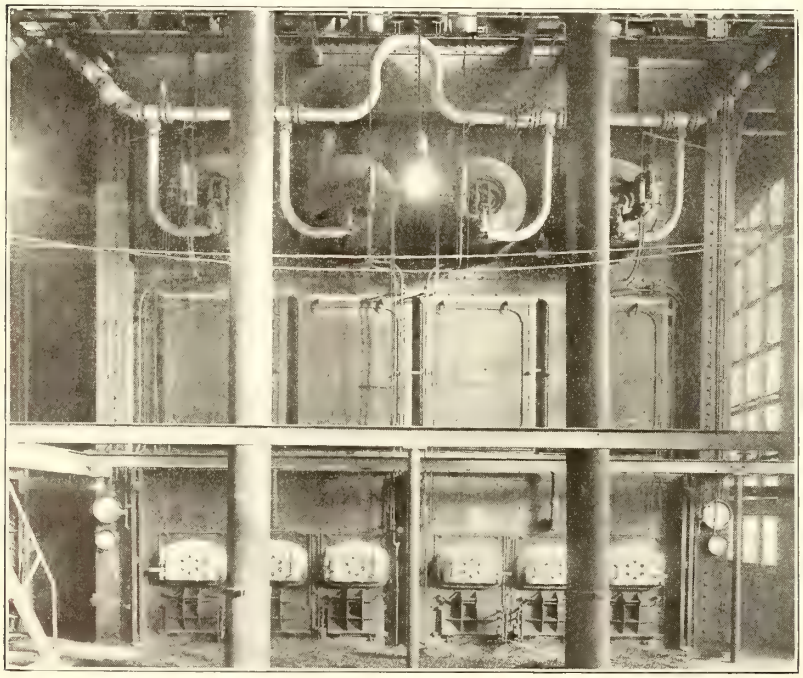
Hudson & Manhattan Railroad Power Station—Intake Tunnel and Overflow Conduit

tion. Coal is delivered in cars to the coal unloading house in the power house yard, and is conveyed from the track hoppers, under the track in the unloading house by two 30-in. Robins belt conveyors to the receiving hopper in the building. From the receiving hopper the coal is discharged either through a crusher or directly through a chute to the weighing hoppers. After being weighed, it is dumped into skip hoists, by which it is



Hudson & Manhattan Railroad Power Station—Condenser, Circulating Pumps, Vacuum Pump, Feed Water Heater

lifted to the distributing belt conveyors over the coal bunkers and is automatically unloaded. The coal bunkers that are now in service have a total capacity of about 4000 tons. From the bunkers the coal descends through cast-iron downtakes to the middle of the firing aisles. At present No. 3 buckwheat anthracite is being used for fuel.



Hudson & Manhattan Railroad Power Station—Boiler Fronts.

Two brick-lined steel ash hoppers, with cast-iron gates, are provided under each boiler. By means of steel ash cars and tracks, the ashes are conveyed to one of the skip hoists and elevated to chutes through which the ashes are delivered either directly into a car on the track outside the building or to a large ash storage bin. The ash storage bin is designed so that the ashes can be discharged into railroad cars.

FEED WATER

The feed water is obtained from two independent 8-in. city mains. There are four main storage tanks equipped with float valves to maintain proper depth of water. As the water of condensation from the surface condensers is returned to the storage tanks, only sufficient water is drawn from the city mains to replace the loss from evaporation or leakage. Feed-water heaters are used with the piping so arranged that the feed water may also be by-passed around either the heaters or economizers or both. The boiler feed pumps and feed-water heaters were furnished by H. R. Worthington.

MAIN STEAM PIPING

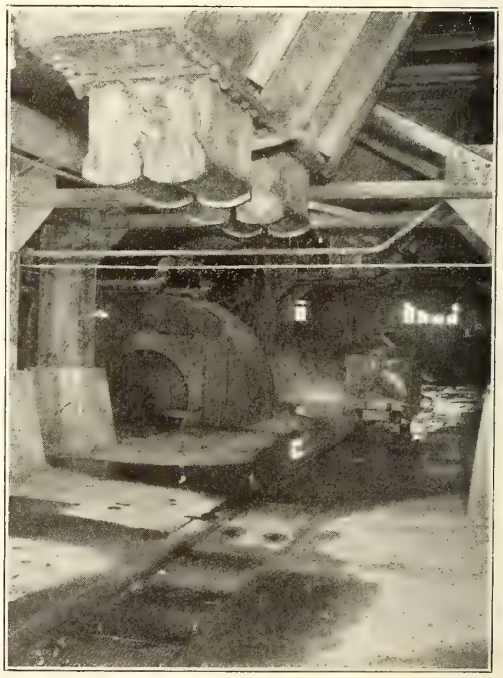
The main steam lines from the boilers are carried directly across the boiler room to the partition wall, whence they drop to two main steam headers in the basement. From the basement headers, the steam is taken through separators and goose necks to the throttles of the turbines. Condensation from the high pressure steam lines is returned to the boilers by the Holly drip system.

The proportions of the flanges, fittings and valves are heavier than the A. S. M. E. standard, and much heavier than is the general practice. All the high-pressure steam valves, which were furnished by the Fairbanks Company, were constructed from new and special patterns by the Pratt & Cady Company. All the high-pressure drip valves from ½ in. to 2½ in. were made from new patterns for valves about double the weight of those commonly used.

At eight different points in the steam mains provision has been made for the installation of a similar number of pneumatically operated 14-in. rotating cut-off valves controlled from distant points. These valves are also of new design, and are to be furnished by the Pittsburg Valve Manufacturing Company. The pipe and fittings were furnished by the M. W. Kellogg Company.

ELECTRICAL CONNECTIONS

The high potential wiring system is shown in one of the diagrams. It will be observed that the group busbars may be connected together to form an auxiliary bus and that great flexibility is thus obtained. The group and bus-bar connecting switching are non-automatic. The feeder and alternator switches are provided with overload time-limit relays. All high potential connections are made by means of oil switches. As shown in the cross-section, the oil switches and busbars are located in the basement, thus securing the shortest possible length of high potential cables.



Ash Dump and Ash Car

A reference to the diagram of electrical connections shows that a grounded neutral is used for protecting the cable system. A 16-ohm rheostat is employed in connection with the lighting cables and an 8-ohm rheostat with the power cables. The

system of connections is such that the neutral point of either of the 3000-kw alternators, when carrying the lighting load, can be connected to the 16-ohm resistance, and that of any one of the 3000-kw or 6000-kw alternators to the 8-ohm resistance, but at no time can more than one machine be connected to one rheostat.

BENCH BOARD

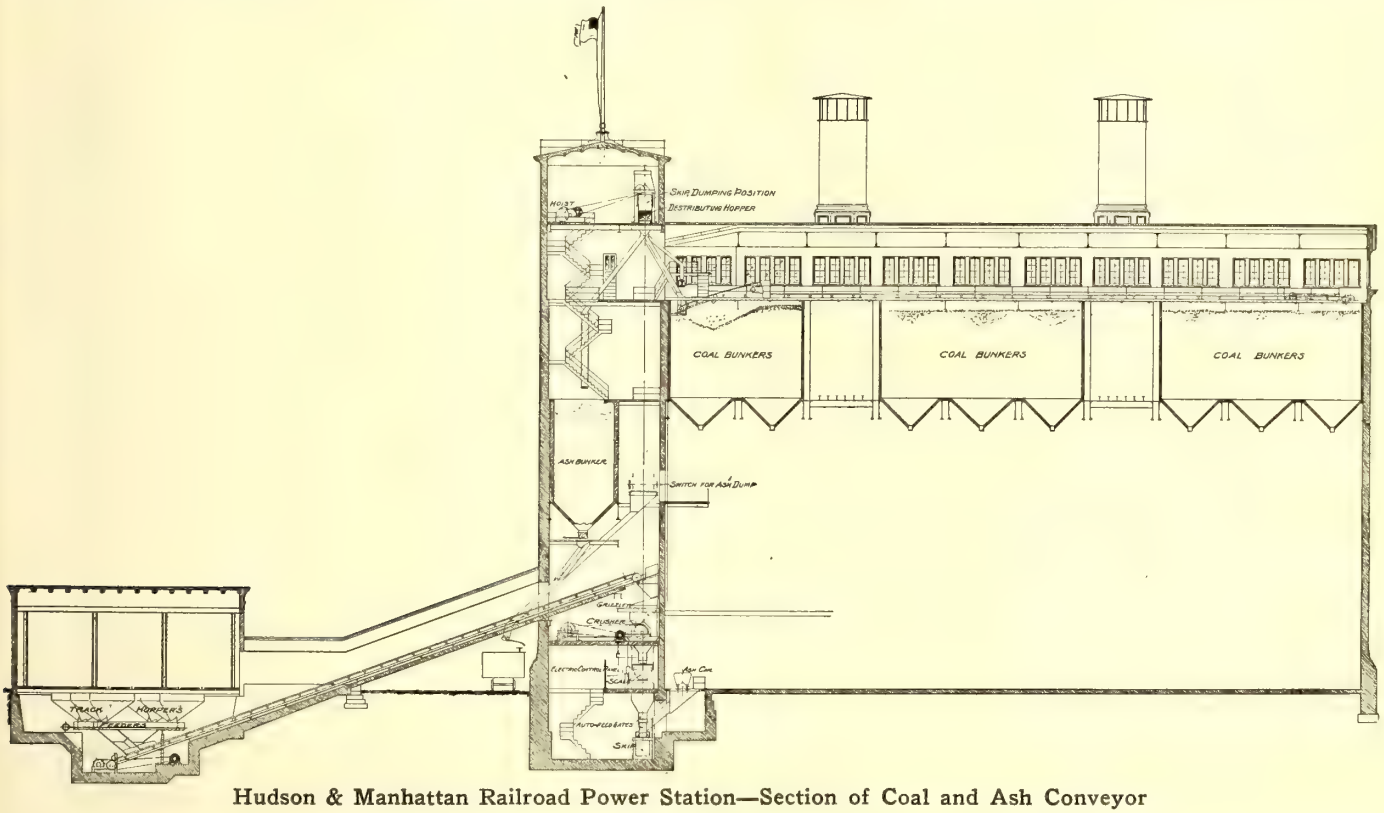
One view illustrates the control bench board with indicating and recording instruments for alternators and feeders. The high potential layout is shown diagrammatically on the bench-board by means of miniature busbars. The various switching operations are shown by means of colored lights and mechanical indicators. Bull-switches are used on this board to minimize the danger from the accidental operation of the switches by the operator.

Above the bench board are the indicating instruments for the alternators and feeders. Each panel represents an alternator and a feeder group. The arrangement is such that extensions can be made by adding successive panels with minimum interference to the present board. The two instruments on the upper lefthand corner are ammeters connected to neutral ground. To the right of the bench board are the exciter and power house lighting switchboards.

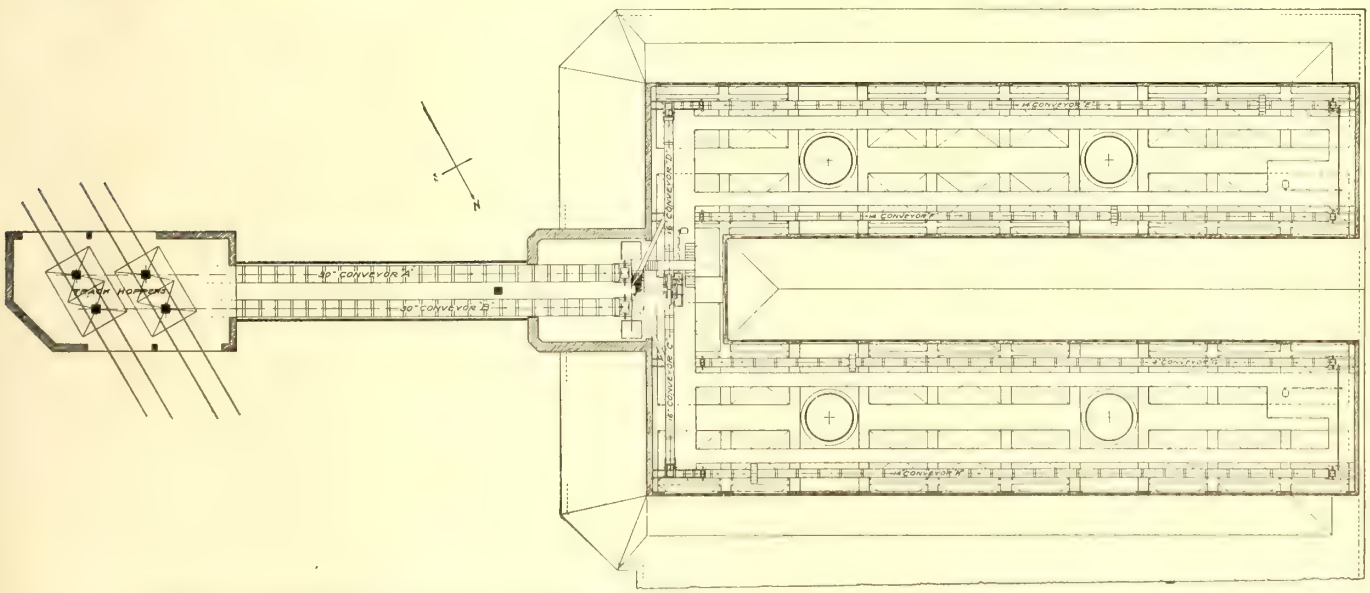
ANNUNCIATOR SYSTEM

An annunciator system has been installed to furnish means of communication between the turbines and the operating gallery. A large annunciator is placed at one end of the generating room, in full view from any part of the room. This instrument carries a set of code numbers indicating the nature of the call, i. e., whether to turbine No. 1, 2, 3, or 4, to telephone, etc. Coincidently with the illumination of a number a loud whistle is sounded. These calls may be sent in either direction between generating floor and operating gallery, and they remain active until the answering signal is given.

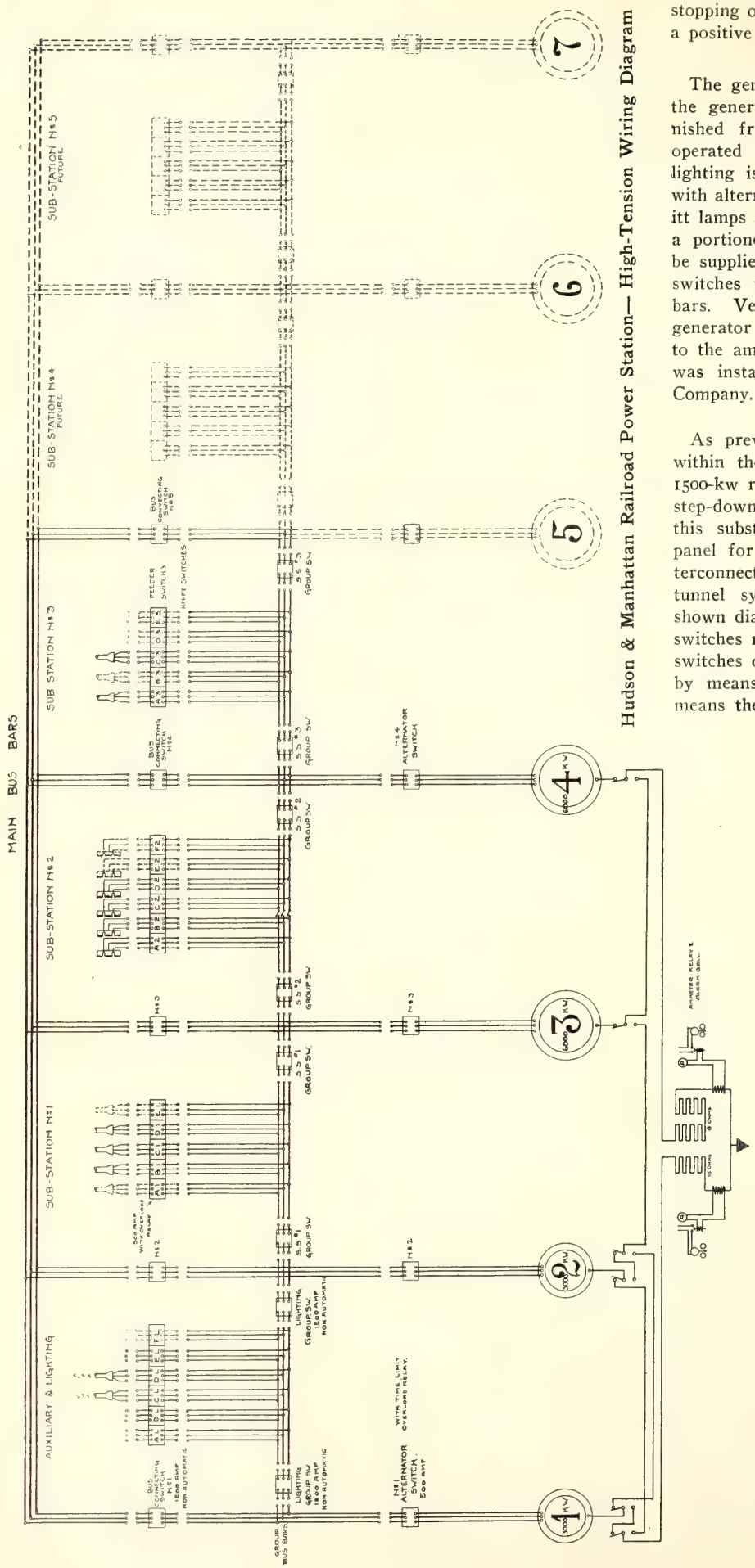
Adjoining each turbine, and connected to the annunciator system, is another set of signals covering the various opera-



Hudson & Manhattan Railroad Power Station—Section of Coal and Ash Conveyor



Hudson & Manhattan Railroad Power Station—Plan of Coal and Ash Conveyor and Coal Pockets



tions required in connection with the starting and stopping of the machines. Each of these also requires a positive signal by way of answer.

LIGHTING

The general illumination of boiler room aisles, of the generator room, galleries and basement is furnished from Cooper Hewitt mercury vapor lamps, operated on direct current circuits, while localized lighting is by incandescent lamps normally supplied with alternating current. A few of the Cooper Hewitt lamps are supplied from the exciter bus bars, and a portiond of the incandescent lighting system can be supplied in emergency by means of double throw switches with direct current from the exciter bus bars. Very little artificial light is required in the generator room and galleries during day time owing to the ample window space. The lighting equipment was installed by the Watson-Flagg Engineering Company.

SUBSTATION NO. 2.

As previously stated, substation No. 2 is located within the power-house building. It contains four 1500-kw rotary converters with 12 550-kw, 11,000-volt step-down transformers. An interesting feature of this substation is that the switchboard contains a panel for operating remote control switches for interconnecting various contact rail sections in the tunnel system. The contact rail-feeder layout is shown diagrammatically on the panel, and the section switches may be opened or closed by means of full-switches on this panel, the operation being registered by means of green and red bull's eyes. By this means the operator in the substation has entire control over the contact rail sections and by means of the remote control circuit breakers can throw the current either on or off the various sections or change the connections when a fault develops or an accident occurs in the tunnels.

Emergency alarm boxes have been installed at close intervals throughout the tunnels, by means of which, in cases of emergency, the power can be cut off from the contact rail. At the same time, through a separate circuit, the location of the trouble is immediately reported by means of automatic recording devices, which indicate the number of the box from which the alarm has been given. When the power is cut off the rail, the fact is also immediately reported by means of gongs. Alarm gongs and automatic recording devices are located in the substations and the various offices as required, and the panel board for controlling these emergency alarm circuits is also shown in the interior view of the substation. The emergency alarm boxes and panels were furnished by the Gamewell Fire Alams Company.

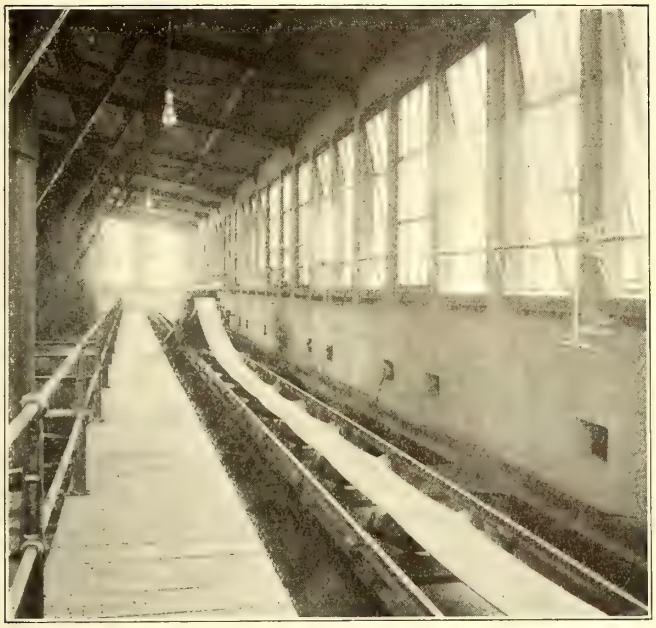
TELEPHONE SYSTEM

A private telephone system connects the power house with the substations, offices and passenger stations throughout the tunnels. In addition to this an intercommunicating telephone system connects various parts of the power-house building.

SUBSTATIONS NOS. 1 AND 3

Substation No. 1, located at the corner of Christopher Street and Greenwich

Street, New York City, is equipped with five 1500-kw rotary converters, with the transformers for reducing the 11,000-volt current to 430 volts on the alternating side of the converters.



Hudson & Manhattan Railroad Power Station—Distributing Conveyor and Coal Pockets

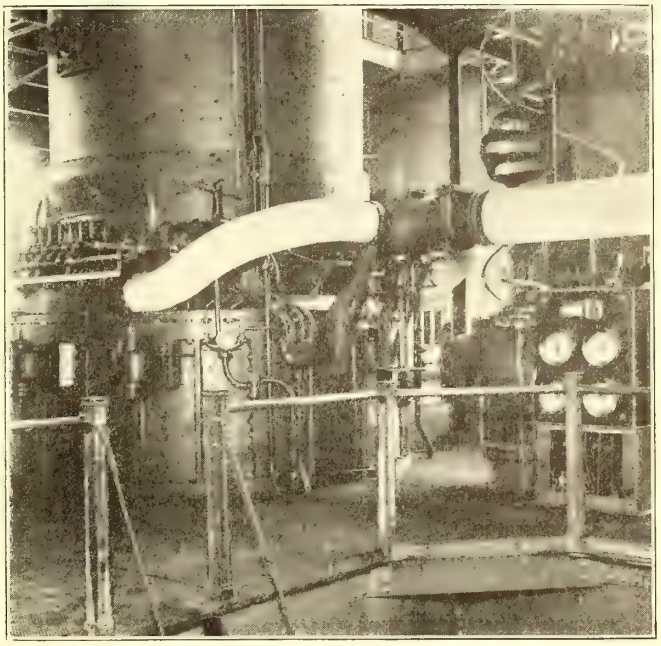
Provision is made in the substation building for the installation of storage batteries on the two upper floors in case their use should later be considered advisable.

Substation No. 3 is located in the basement of the Terminal Building about 90 ft. below the street surface. It comprises



Hudson & Manhattan Railroad Power Station —Remote Control Panel

two 1500-kw converters, which are used for supplying the energy for the railway load, and three 750-kw converters, which supply 250-volt current for operating lights and motors in the Terminal Building. In addition to this provision for current supply to the Terminal Building, there are steam-driven generators, which are used principally in the winter time when their exhaust steam is utilized for heating the building. When

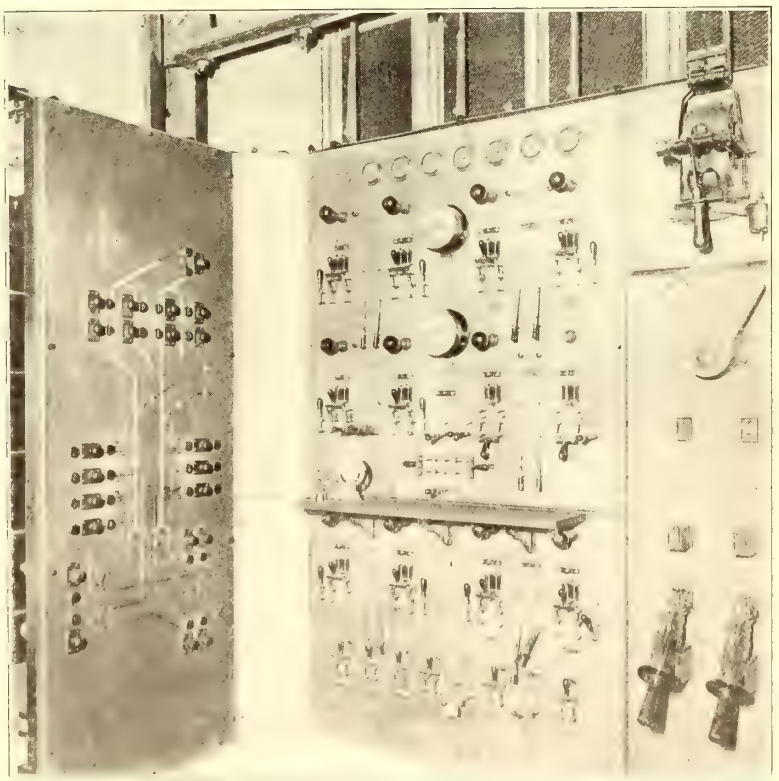


Hudson & Manhattan Railroad Power Station—Indicators for Signal System and Base of Turbines

no heat is required in the building, the three 750-kw converters supply all of the power necessary.

ENGINEERING

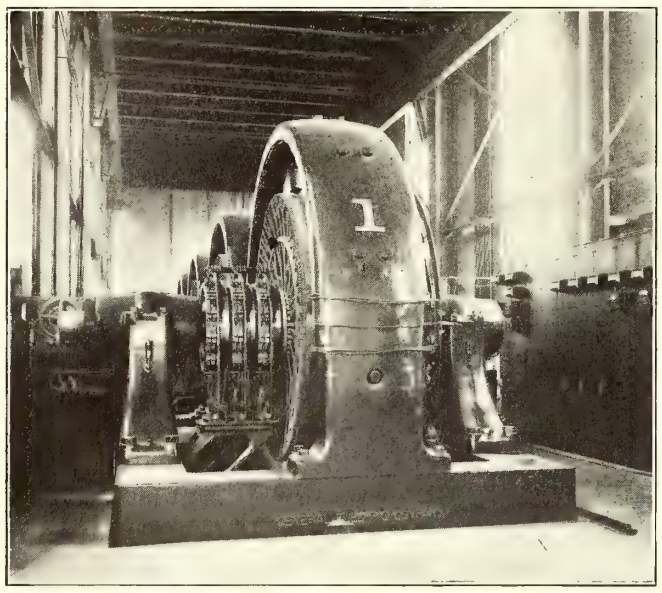
The power-house superstructure, exclusive of the steel work, was designed and erected under the supervision of the architects, Messrs. Robins & Oakman. The condensing water tunnels were designed and constructed by the Hudson Companies under the direction of Messrs. Jacobs & Davies. The foundation work, structural steel, steam, mechanical and electrical



Hudson & Manhattan Railroad Power Station—Control Board, Showing Feeder Diagram

equipment were designed, constructed and installed under the direction of L. B. Stillwell and his associates, John Van Vleck and Hugh Hazelton.

The station was first put in operation on May 8, 1909, and is now producing power for the operation of 140 cars on



Hudson & Manhattan Railroad Power Station—View in Substation

the Hudson & Manhattan Railroad tunnel system, together with tunnel and station lighting, ventilating fans, etc., and a portion of the power load for the Hudson Terminal Buildings. The average daily net station output is at present about 130,000 kw-hours, and the maximum hourly output is about 12,000 kw. These figures include the amount of energy supplied to the air-compressor plant.

Upon the installation of the final 6000-kw generating unit the plant will occupy an area which will be at the rate of 1.7 sq. ft. per kilowatt of normal generating capacity and, it is believed, embodies in its design and construction the very latest and best engineering practices that apply to the generation of electric energy at the lowest possible cost consistent with the attainment of maximum reliability of service.

MEETING OF CENTRAL ELECTRIC TRAFFIC ASSOCIATION

The Central Electric Traffic Association met at the Hotel Algonquin, Dayton, Ohio, on Feb. 19, and discussed the advisability of adopting various measures. After some discussion it was dicided to re-issue the baggage tariff, making several minor changes which will enable the agents and public to understand the working of the tariff better. The tariff covering the 1000-mile interchangeable mileage ticket will also be reissued with a few small changes.

After a careful investigation by the members of the association it was decided not to re-issue joint passenger tariff No. 3 for the present, but to allow it to stand for some time. A. L. Neereamer, the chairman, was instructed to secure data concerning the issue of a joint weight sheet, covering weights of standard commodities.

The subject of a milk and cream tariff was discussed and it was decided to postpone action until the next meeting, which will be held at the office of the chairman, Indianapolis, on March 11 and 12.

The Hollandsche Yzeren Spoorwegmaatschappij, which financed the Rotterdam-Haag single-phase line, has obtained a concession for equipping for electric operation the horse railway system in Leyden, and also the steam railway connecting Leyden, Nordwijk and Kotwijk. Direct current at 1000 volts will be used.

CHANGE TO 1200 VOLTS ON THE WASHINGTON, BALTIMORE & ANNAPOLIS RAILWAY

On the morning of Feb. 15 the Washington, Baltimore & Annapolis Electric Railway changed its system of operation from 6600 volts single-phase a. c. to 1200 volts d.c. The change was made with absolutely no interference with the regular operation of the road or the maintenance of its schedule.

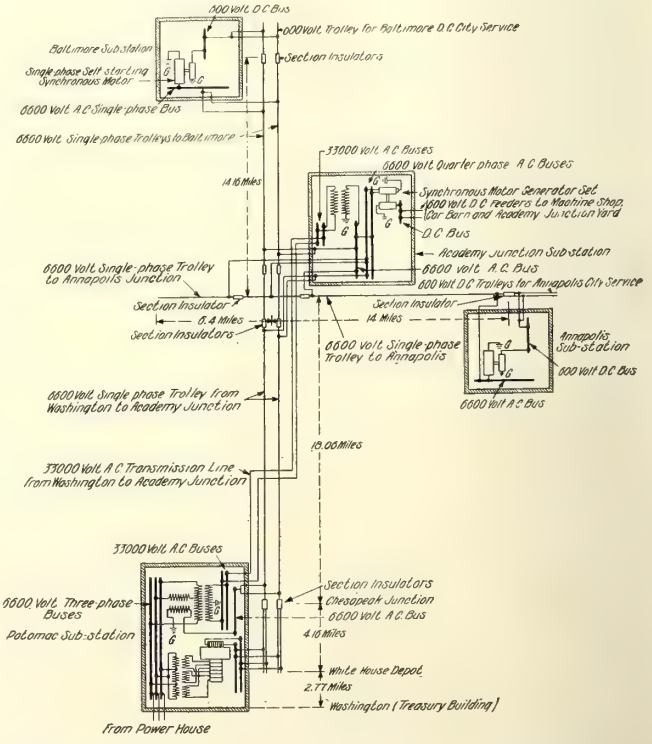
The decision of the railway company, some eight months ago,



Change to 1200 Volts—Map of Washington, Baltimore & Annapolis Railway

to make this change attracted general interest, because it was one of the largest and most important interurban single-phase installations in the country.

The company's 60-ton cars, equipped for operation on the single-phase system, could not enter Washington, because, owing to the limited strength of the yokes which support the



Change to 1200 Volts on W., B. & A.—General Distribution Diagram when Operating Single Phase

city tracks, the maximum weight of the cars was restricted to 40 tons. As the railway company desired to run to the heart of Washington it was confronted there with the problem of securing a car of this weight equipped with motors of sufficient size to provide the high speed and particularly high-class service

required by the character of its patronage. A careful investigation of the engineering features involved showed that it was impossible to meet these requirements with the existing single-phase equipment. The company then made an investigation into the relative merits of the two d.c. systems, and found that a large saving in first cost and operating expenses would result from the adoption of the 1200-volt system in preference to the 600-volt. A contract was, therefore, made with the General Electric Company in accordance with which the latter company was to provide and install the necessary equipments for both cars and substations, with the understanding that the railway company's regular service should not be interfered with in any way.

The change was actually made without any accidents. At 1:15 a. m. on the morning of Feb. 15 the last a.c. car was taken

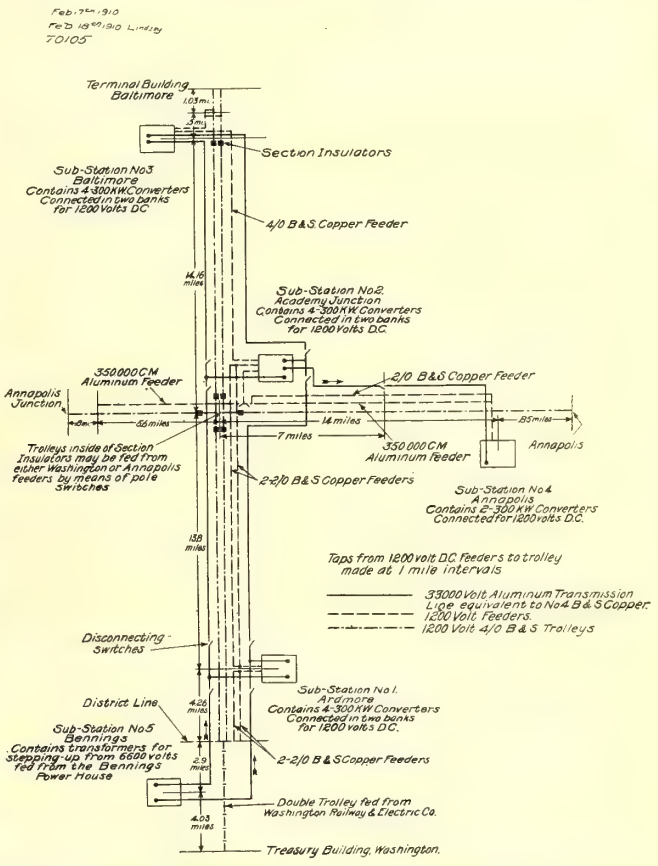


Change to 1200 Volts on W., B. & A.—Exterior View of the Temporary Substation at Naval Academy Junction, Showing Line Entrance

off, and at 5:20 a. m. the first d. c. car was started. The records made under the new system substantiate the expectations formed of it. During the first day of operation the cars ran over 4500 car-miles and not a trip of the regular schedule was lost. Moreover, a saving of over 25 per cent in power is indicated by the wattmeter records of the first few days. The apparatus, which included many new designs, was constructed, delivered and installed in the short period of eight months.

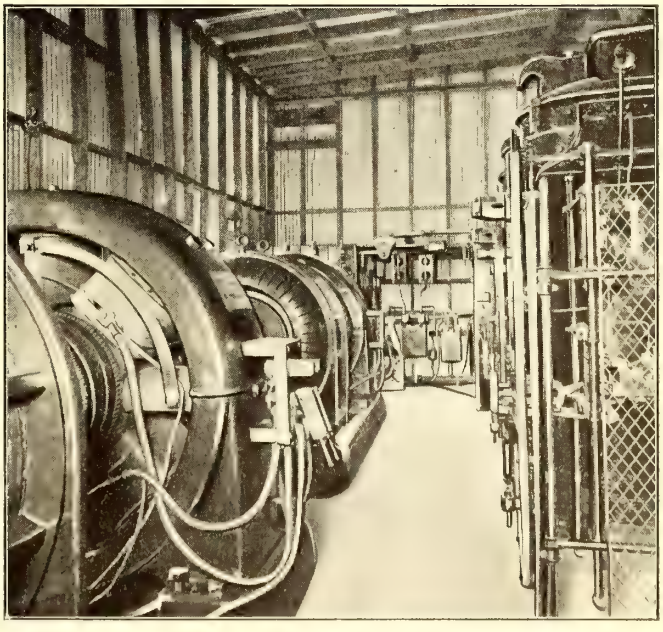
For the operation of the railway with single-phase apparatus power was purchased from the Potomac Power Company, in Washington, and delivered to the Washington, Baltimore & Annapolis Electric Railway Company substation at Bennings, where it was received through two underground cables at a potential of 6600 volts and a frequency of 25 cycles. It was there changed into two phase by means of T-connected transformers, giving 6600 volts on one phase and 33,000 volts on the other. The 6600-volt phase furnished power direct to the trolley for operation of the road from District Line to Naval Academy Junction. For the operation of the three sections of the line from Naval Academy Junction to Baltimore, to Annapolis and to Annapolis Junction, power was transmitted single phase, at a potential of 33,000 volts to the substation at Naval Academy Junction, where it was stepped down to 6600 volts and fed to the trolley lines. At Naval Academy Junction 6600-volt, two-phase synchronous motor-generator sets in duplicate supplied 600-volt d.c. for the car houses and yard. At Baltimore and Annapolis the 600-volt d. c. local trolleys were supplied with power by means of single-phase motor-generator sets, the 6600-volt motors taking power from the high-tension a.c. trolley. The a.c. trolley line was of the single-catenary type with the side-bracket arrangement of suspending the trolley.

As it was necessary, in changing over the system, to move the motor-generator sets, the transformers and controlling panels out of the substations without interfering with the operation of the road, one of the motor-generator sets and its controlling panel at Baltimore was moved into a temporary structure made



Change to 1200 Volts on W., B. & A.—General Distribution Diagram when Operating with 1200 Volts D. C.

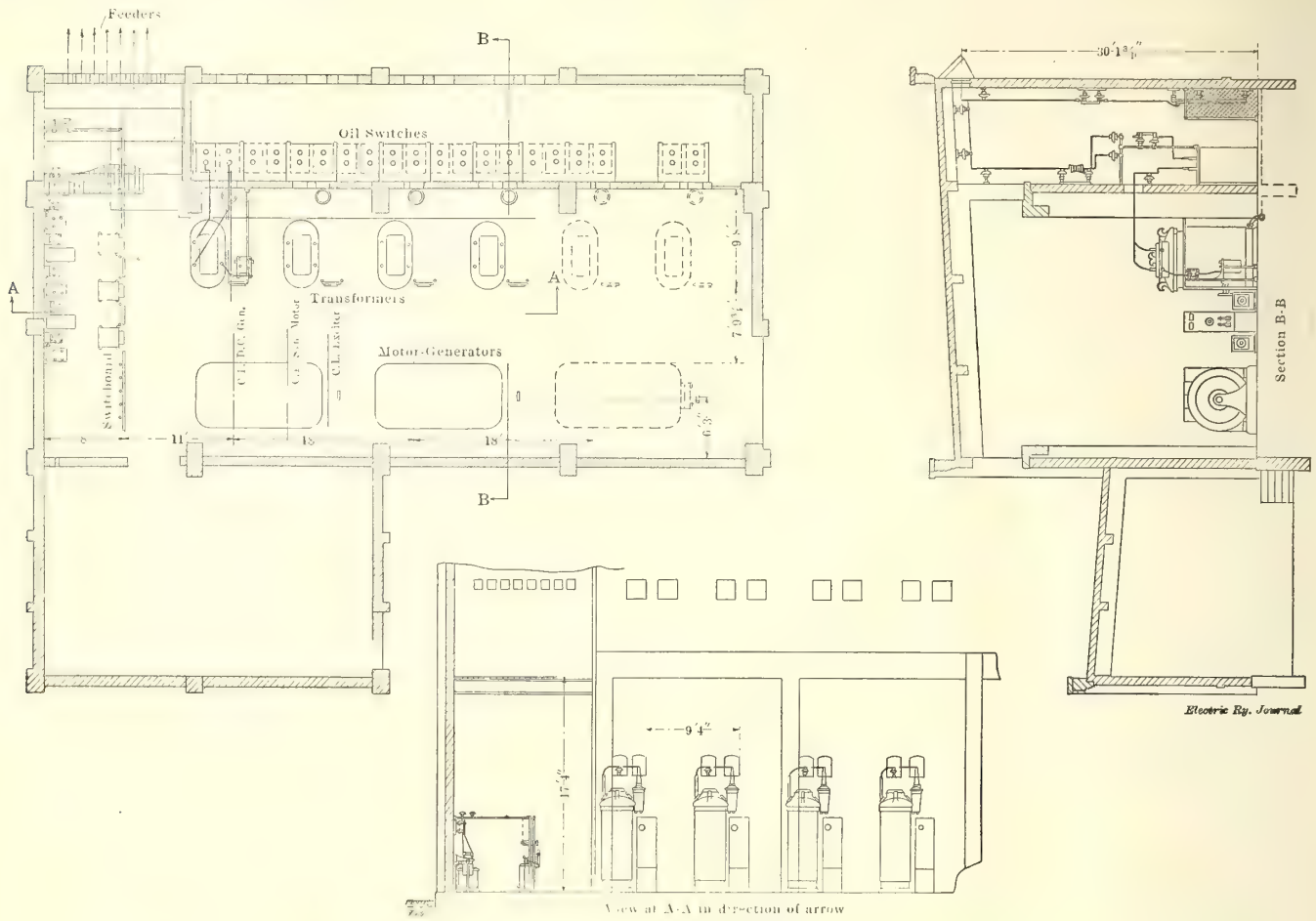
of galvanized iron. In accomplishing this it was, of course desirable to have the set out of service the shortest possible time. So after preparations were completed, in the early morning, the



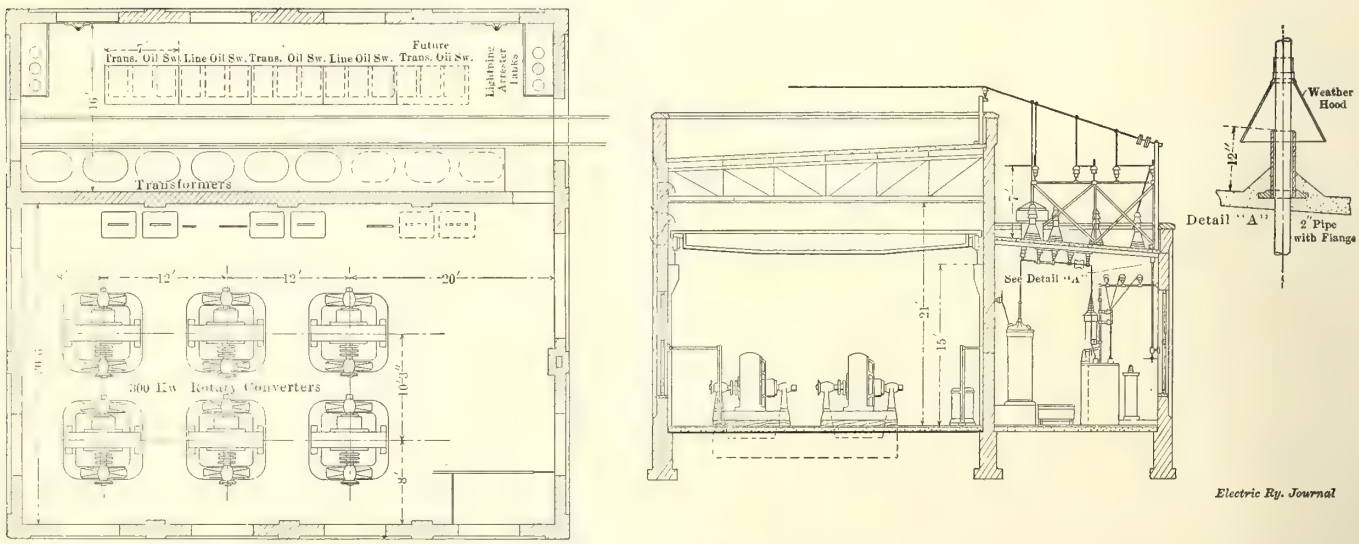
Change to 1200 Volts on W., B. & A.—Interior View of the Temporary Substation at the Naval Academy Junction, Showing Installation of the Motor-Generator Sets, Transformers and Controller Panels

set was jacked up by means of four 20-ton jacks, rollers were placed underneath, and it was pulled into position in the temporary substation by means of a block and tackle. The switch-

board panel and other necessary apparatus were also transferred and installed. At midday the installation was complete and the set was then started up and operated in multiple with the set in the substation for two days as an assurance that the temporary installation would afford reliable service. Then the second set so that the cars might be tested out and the car crews broken in. This plan was followed because the company wished to be sure that the car crews would handle the cars under the new system with as great dispatch as under the old, and would have no difficulty in maintaining the schedule.



Change to 1200 Volts on W., B. & A.—Arrangement of Academy Junction Substation when Operating A. C.



Change to 1200 Volts on W., B. & A.—33,000-volt A. C., 1200-volt D. C. Converter Substation with 300-kw Converters

in the substation was shut down and moved to the temporary building. Such changes as were necessary in order to prepare the substation for the new apparatus were then rushed to completion and the apparatus was installed.

In the meantime the same plan of work had been followed with regard to the other substations. The three transformers at Bennings had been rewound, and a 1200-volt generating system was installed and put into operation on an experimental track

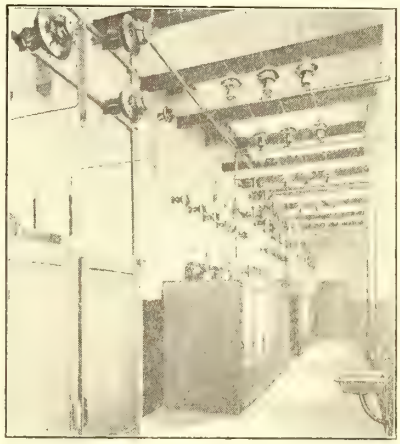
In the a.c. system the trolleys for the two tracks were insulated from one another, while in the d.c. system they are tied together. The jumpers for this purpose and also those between the 1200-volt feeders and trolleys were all connected in during the period required for shutting down the a.c. system and starting up with 1200 volts.

For operation at 1200 volts, d.c. power is purchased from the Potomac Power Company and is received, as before, at the

Bennings substation, where it is stepped-up and transmitted three phase to the substations at Ardmore, Naval Academy Junction, Annapolis and Baltimore at a potential of 33,000 volts and a frequency of 25 cycles. The transformer primaries are Y-connected and the neutral point is grounded. The transmission line is in duplicate, the conductors being aluminum wire.



Change to 1200 Volts on W., B. & A.—Interior of Baltimore Substation, Showing the Rotary Converters Arranged in Pairs for Supplying Current at 1200 Volts

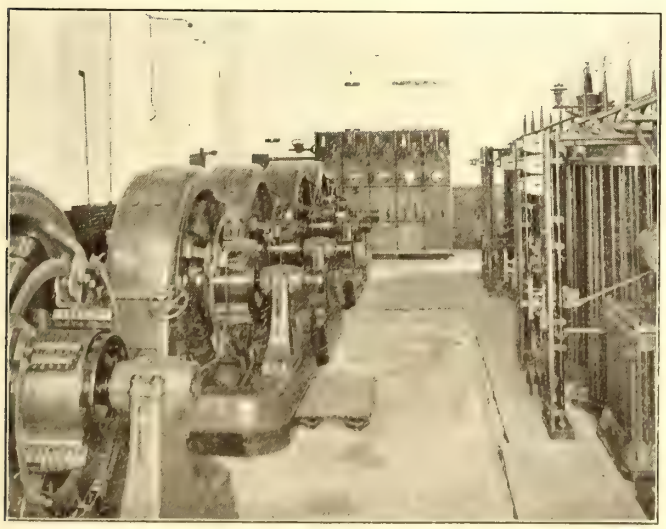


Interior of Naval Academy Sub-Station, Showing High-Tension Busses and Oil Switches

The switchboard equipment at the Bennings substation controls two transformer panels and two 33,000-volt, three-phase outgoing lines.

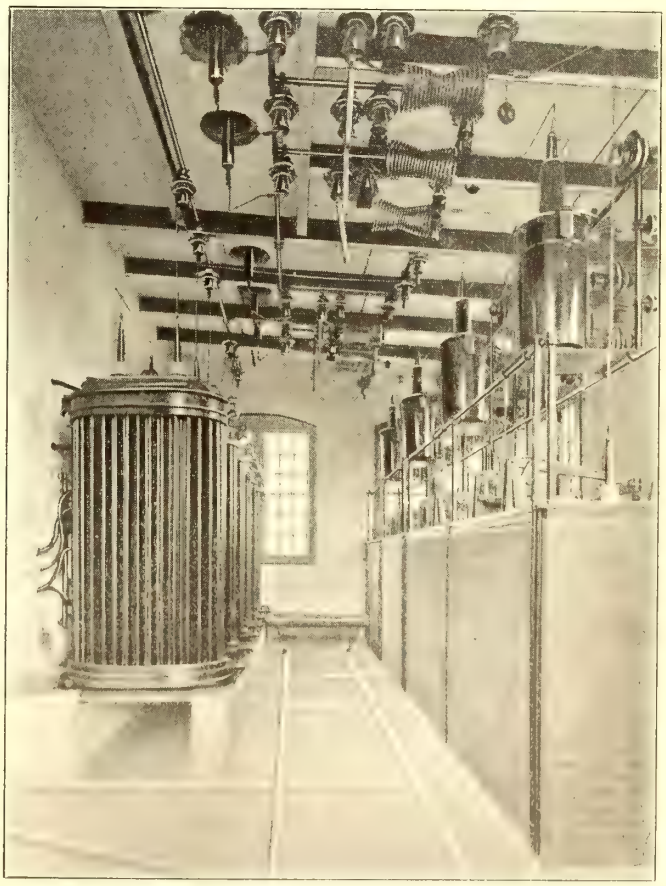
With the exception of Annapolis, the substation equipments consist of duplicate sets of rotary converters, each set consisting of two 300-kw machines operating in series to supply current at a potential of 1200 volts. The Naval Academy Junction substation also has a spare converter. There is at Annapolis but one set of converters, which supply current at a potential of 1200 volts for the operation of the cars in that city. The converters operate in every way similarly to standard 600-volt machines, and are started from half voltage a.c. taps on the transformer secondaries in the usual manner.

The switchboards of the Ardmore, Naval Academy Junction and Baltimore substations have two 33,000-volt incoming line panels, two 33,000-volt rotary converter and transformer panels, and two 1200-volt d.c. feeder panels, making it possible to supply power to the three sections of the trolley line from this substation. The Ardmore and Baltimore substations have two 1200-volt feeder panels each; the Annapolis substation has one panel of each kind. In addition the Naval Academy Junction substation has one 33,000-volt outgoing line panel for the line running to Annapolis. The Naval Academy Junction substation has one 600-volt d.c. feeder panel controlling power for the operation of the motors which drive the repair-shop tools. For the protection of the substation apparatus 33,000-volt aluminum lightning arresters are being installed in the substations. Each transmission line is protected by an overhead ground wire.



Change to 1200 Volts on W., B. & A.—Interior of Naval Academy Junction Substation, Showing Rotary Converters, Transformers and Controlling Panels

The rolling stock consists of 30 passenger cars and three service cars. Each passenger car is equipped with four GE 205-75-hp 600-1200-volt commutating-pole railway motors, and each service car with four GE 207-140-hp, 600-1200-volt motors, also of the commutating-pole type. The cars are equipped with automatic-relay type M control and have control couplers for



Change to 1200 Volts on W., B. & A.—Interior of Baltimore Substation, Showing Incoming Lines and High-Tension Apparatus

operation in trains if desired. A potential of 600 volts for controlling and lighting the cars is obtained by means of a dynamotor, as on other 1200-volt equipments. This is used only on the 1200-volt section. On the 600-volt section the control lighting circuits are supplied directly on the trolley.

The cars are equipped with Westinghouse automatic "AMM" schedule air brakes with graduated release. The air compressors are GE CP-29, and are operated by 1200-volt motors.

In the city of Baltimore the cars receive 1200-volt power for operation to the point from which they run over the tracks of and obtain 600-volt power from the United Railways Company to the Washington, Baltimore & Annapolis terminal station.

At Annapolis the 1200 d.c. trolley extends through the city, and the cars receive power from this source for operation within the city limits.

At the Washington end of the system the cars are operated from the 1200-volt d.c. system as far as the District Line, and from there they run over the tracks of the Washington Railway & Electric Company, using the power of this company.



Change to 1200 Volts on W., B. & A.—New Standard 40-ton Car

These tracks are equipped with the 600-volt, double-overhead trolley from District Line to Fifteenth and H streets, N. F., and with the 600-volt conduit system from there to the Treasury Building at Fifteenth Street and New York Avenue, N. W.

It will thus be seen that the cars are required to operate with 1200-volt single trolley and ground return; with 600-volt double overhead trolley metallic circuit, and on the 600-volt underground conduit system. The ground connection for single trolley operation is obtained by means of a connection through the negative trolleys and their holding-down hooks in such a manner that when either negative trolley is raised for operation on the double overhead trolley section the ground circuit is broken. The change from double-trolley overhead to conduit is made by a d.p.d.t. transfer switch, which may be operated either by compressed air controlled from the motorman's cab or by hand.

The Cleveland Construction Company was the consulting engineers on the work and supervised the changes in the transmission system, overhead work and changes in the substation buildings required to adapt them to the new apparatus. All the electrical apparatus was furnished and installed by the General Electric Company, Schenectady, N. Y.

THE BERLIN PENSION SYSTEM

The employees' pension system of the Grosse Berliner Strassenbahn, Berlin, Germany, was organized on July 1, 1900, to take care of superannuated employees or those who became unfit for service after 10 years' membership, and to pay to widows 30 per cent of the wages earned by their husbands at the time of death. The organization accepts as members all employees of the railway whose earnings do not exceed $500 a year and who are not less than 18 years or more than 40 years of age. In exceptional cases applicants over 40 years of age are taken by the board of trustees.

All employees of the transportation department must join the pension association as soon as they accept their positions, but shop and way men are under no obligation of this kind. However, when the latter have been employed for four years and are still under 40 years of age they must either join the organization or else give up all claim to such privilege in the future. When the organization was begun the charter members were given service records equal to one-half (but not exceeding 10 years) of the time they had worked for the parent company or the Western Suburban Railway. No credit is given for service nor are any dues collected during long absences for military purposes, for recreation or temporary work elsewhere.

If a member of the pension fund is discharged by the management, all payments personally made by him are returned. If he leaves the company's service voluntarily, return payments are made as follows: After one year's membership, one-half of all personal payments; after three years' membership, three-fourths of such payments; after six years' membership, all personal payments. Heirs of those who become superannuated or die before 10 years' membership receive all dues paid by the members in question.

The pension fund dues contributed directly by a member amount to 4 per cent of his annual income plus 75 per cent of a monthly increase in wages when received the first time. Should a member suffer a reduction in wages, he may continue the same payments and receive the same pension benefits as if he had continued to earn the original wages. In addition to the dues contributed by the members, the Grosse Berliner Strassenbahn gives an amount equal to the total of all dues plus three-fourths of monthly wage increases when made for the first time. The allied Berlin-Charlottenburg Railway also pays an additional sum of $2,250.

Qualified members are placed on the pension list as superannuated after a favorable medical decision on the application of the employee or management. No medical examination is made in cases where the retiring member is 65 years of age, or when the mutual aid society (Verein) states that a certain individual has suffered a reduction of at least 66 2/3 per cent in earning capacity.

If the annual pension is based on 10 years' membership it amounts to one-fourth of the last yearly salary earned by the applicant up to the limiting wage of $1,125. To this amount one-sixtieth is added for every additional completed year of service, but the maximum pension must not exceed forty-five-sixtieths of the pensioner's latest earnings. All pensions are paid monthly at the treasury of the society, or are sent to the beneficiaries at their risk.

The fund is managed by a board of trustees selected four and four by the management and the men for terms of three years each. The chairman of the board is selected by the company. Meetings of the members are held annually. The original fund was started with a contribution of $200,000 from the company, and by Dec. 31, 1900, or six months after the organization, the fund amounted to approximately $264,000 for 4880 members. At the end of 1908 the pension fund had grown to approximately $1,740,000 and the membership to 6850. Members began to be retired after July 1, 1905. Of the 162 so retired 20 died within the next three years, and one who went abroad accepted three years' payments as a receipt in full. There are also 38 widows on the pension list. The average age of the pensioners is 56.08 years, and of the widows 48.58 years.

At Drammen, Norway, a city of 25,000 inhabitants, two lines of trackless trolleys have recently been placed in operation. One is 3 km long and the other 3½ km. Grades as steep as 10 per cent are surmounted by the cars which have a speed of 14 m.p.h. Current at 500 volts is transmitted through a pair of overhead wires supported from brackets on wooden poles. The cars, of which there are four, weigh 3000 kg each and will seat 20 passengers.

IMPROVEMENTS IN EUROPEAN CATENARY WORK

The Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany, has developed several improvements in catenary construction to eliminate the troubles hitherto experienced from wide changes in temperature. In the earlier forms of catenary suspension, as made for the Spindlersfeld Railway, the tendency of the trolley wire to depart from the horizontal plane was overcome partially by hand-operated regulators. This tension adjustment, however, had to be confined entirely to the conductor so long as the catenary was anchored firmly to its supports. In this case there was a tendency for the hangers to assume an oblique position, but the variation from the perpendicular was so little that it could scarcely be detected, even at the most unfavorable places. In a later design made for the Hamburg City & Suburban Railway, the entire catenary acted simply as the carrier of a new conductor, or third wire, which was attached with sliding clips to the horizontal hanger-connected wire. As this power wire was supplied with tension means and could slide along the clips, the hangers naturally remained perpendicular. It will be understood that neither the Hamburg nor Spindlersfeld installations provided for the tension regulation of the catenary. The absence of such adjustment in the hanging of the catenary between successive poles changes the sag to such a degree that the current collectors are obliged to make upward and sidewise movements, which may increase to a dangerous extent in high-speed operation. To avoid this fault, the Allgemeine Company has provided a design which keeps the trolley wire at the same height in all temperatures through the simultaneous, automatic regulation of both the catenary and conductor wires.

A general view of the new construction as arranged for spans of 210 ft. to 250 ft. is shown in Fig. 1. The conductor wire is connected to the catenary by hanger wires spaced about 19 ft. 6 in. apart. The wire shown above the catenary runs from span to span without any intermediate hangers and is used to equalize the changes in the height of the trolley as caused by variations in temperature. The trolley is wire of hand-drawn copper, while all remaining wires are of silicon bronze. Thus the entire construction has similar coefficients of expansion throughout. It can be used as a feeder, and, moreover, is influenced little by chemical changes in the atmosphere. The suspension of this construction at a supporting point is shown in Fig. 2. The equalizer and catenary wires pass through clips a short distance on each side of the span, the former going over and the latter under the span. In this construction the equalizer and trolley wires are of practically the same length, but not necessarily parallel. Double insulation against grounding through the equalizer wire is obtained by using opposite pairs of insulators of the wheel type shown in Fig. 3. The construction of these insulators is such that even if one should

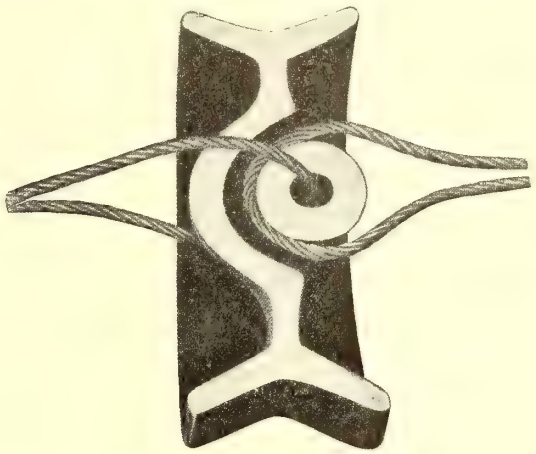


Fig. 3—European Catenary Construction—Cross Section of Insulator

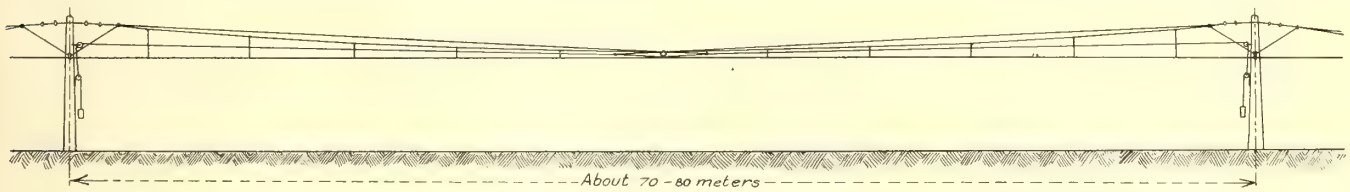


Fig. 1—European Catenary Construction—Tension Regulation by Weights in Every Tenth Span

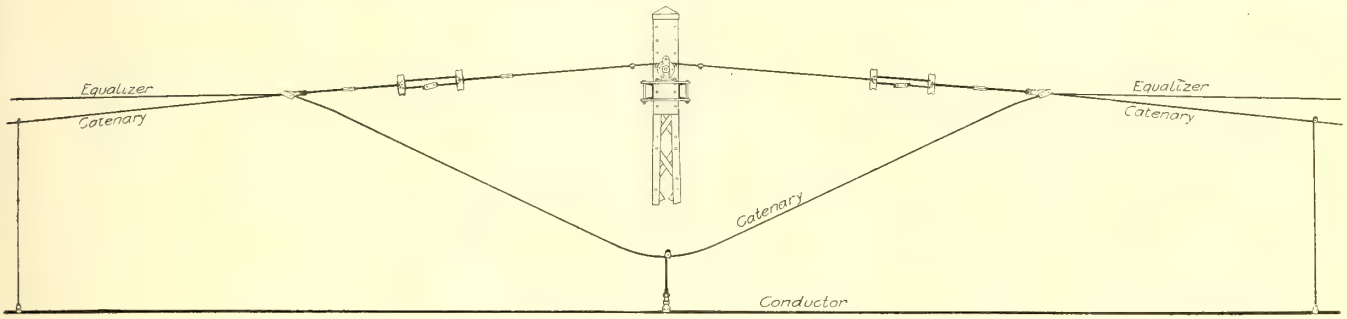


Fig. 2—European Catenary Construction—Interconnected Suspension of All Wires

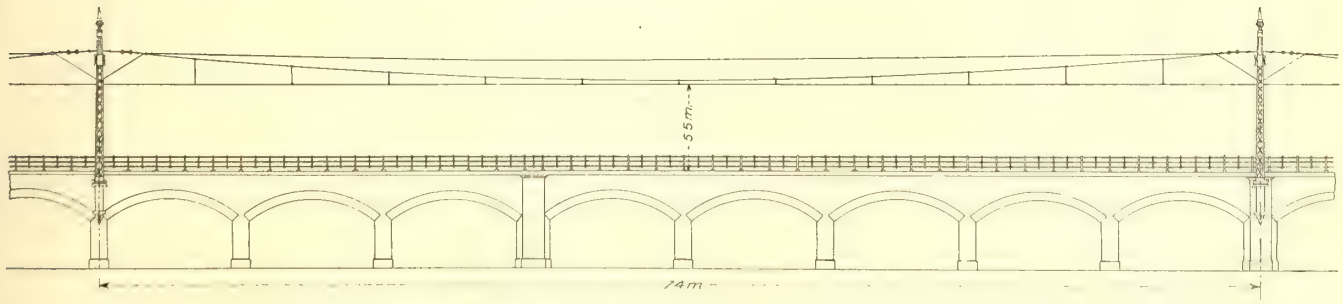


Fig. 5—European Catenary Construction—Side Elevation of 228-ft. Span

break, the interlooping of the equalizer wires would prevent the catenary suspension from falling. The use of four insulators allows each to receive the same voltage. Where three insulators are used it is customary to have two in parallel and in series with the third. The result is that the third insulator must carry twice the voltage of the others. Consequently if this

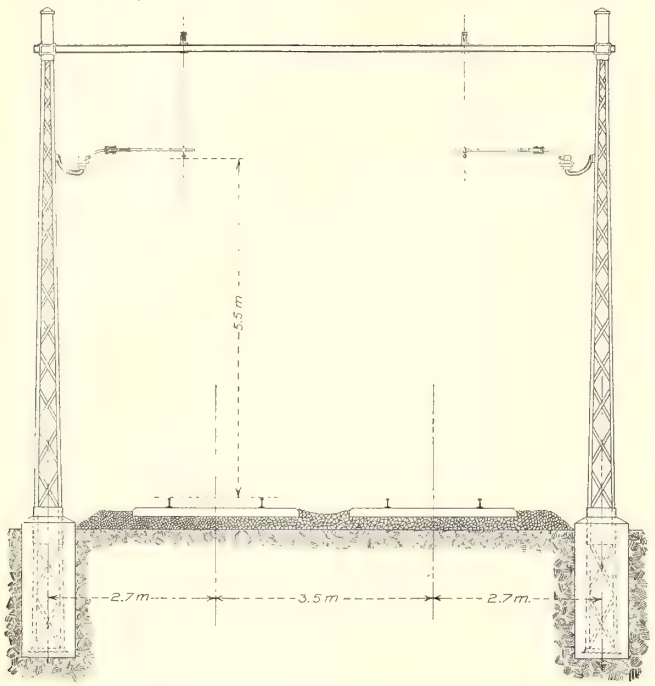


Fig. 4—European Catenary Construction—Two-Track Approach Proposed for Berlin City & Suburban Railway

third insulator should break it is quite possible that the others would be short-circuited on account of the sudden increase in voltage.

The line is zigzagged to such an extent that every contact area of the bow collector is brought into service between the ends of each span. As illustrated in Fig. 4, light supporting brackets are employed at sharp curves to keep the conductor in line, but elsewhere span wires are sufficient. These brackets are also doubly insulated. The trolley wire and the turning point of the brackets are in the same plane to prevent any overturning movement, but the brackets themselves are bent upward so as to protect them from possible blows of the bow collectors.

The automatic tension devices for regulating the height of the trolley wire without distorting the catenary suspension are installed at intervals of 2500 ft. to 4000 ft. The arrangement as applied for double track is shown in Fig. 5. The conductor, catenary and equalizer wires from opposite directions are brought to the middle point between two spans, where they form a cross-over. Each group of wires is fastened to a steel cable and carried over rollers at the span columns, which are

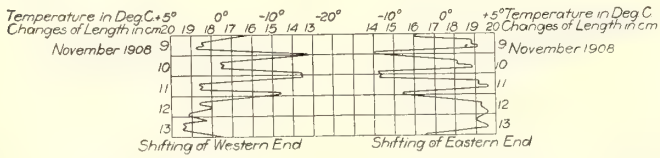


Fig. 6—European Catenary Construction—Effect of Tension Regulating Device on the Oranienburg Test Line

provided with the necessary tension springs or weights. When the temperature drops, the conductor and equalizer wires quickly contract on account of their taut position, the weights are raised and the hanger points of the catenary approach each other. The sag of the catenary remains unchanged, so that a lifting of the conductor wire is held to be impossible. An increase in temperature simply produces a reversed equalization.

The reliability of this automatic tension device in practice is shown in Fig. 6, which gives the variations in the length of the new catenary suspension built for the Oranienburg experimental line of the Prussian State Railway. This suspension is built along a 938 m (3080 ft.) horseshoe curve of the continuous ellipse which constitutes the test track. The tension indicator needles showed that each end of the horseshoe curve was influenced almost equally by the automatic tension regulation.

INSPECTION OF ELECTRIC RAILWAYS BY NEW YORK COMMISSION

The pamphlet report of the New York Public Service Commission, Second District, for the calendar year 1909 contains an account of the work of the division of railroad engineering and inspection. An abstract of the discussion regarding the inspections of street railroads, including various recommendations on questions of operation, follows:

"The reports of inspections of city street railroads show the different kinds of rail, its cross-section, weight, length of track, substructure of same, when track was laid, what repairs have been made if any, and present condition of track divided into four classes: first class, good, fair and poor. The reports also contain detailed description of each piece of track special work, its location, date of construction, date of renewals and repairs, and present condition. Recommendations are submitted for reconstruction or repairs of track and special work where necessary. The reports are indexed by streets, and furnish a complete history of track and special work.

"The inspection of interurban electric roads has been continued to an extent consistent with other matters requiring the attention of the electric railroad inspector. These inspections have been made along the lines previously employed.

"*Results of Inspections:* In addition to the actual improvements made in compliance with suggestions or recommendations by the commission, the fact that such roads are inspected results in better maintenance of properties and more efficient service to the public, for the reason that the conditions of each road are set forth in the report, and the knowledge that these reports are made public acts as an incentive for companies to have their properties in as good condition as possible when inspected.

"During the business depression of 1907-08, electric railroads were affected seriously. The decrease in receipts during that period necessitated the curtailment of service and operating expenses. Maintenance expenditures for track and equipment were reduced to the lowest possible point consistent with safety of operation. This resulted in a condition of track and equipment which required unusually large expenditures to restore to normal conditions. The past year has been a more prosperous one for the companies, all of them showing increased gross earnings and nearly all have been liberal in expenditures for track and equipment improvement.

"*Interurban Roads:* The interurban roads inspected this year, with very few exceptions, are reported as having been materially improved, large sections of track having been ballasted and a sufficient number of tie renewals having been made. Nearly all of the roads are employing a sufficient track force to properly maintain track and roadbed. Several of the interurban railroads in this district are reported as models of construction and maintenance and comparing favorably with the majority of the steam roads in this dictrict. Among these are the Rochester, Syracuse & Eastern; the Syracuse, Lake Shore & Northern; Syracuse & South Bay; Utica & Mohawk Valley; Fonda, Johnstown & Gloverville; Buffalo, Lockport & Rochester, and Western New York & Pennsylvania. Some of this class of railroads are reported as not in first-class condition, and while not at present dangerous for operation, require a considerable expenditure of money to make necessary improvements on them.

"*Car Heating:* A marked improvement has been made in the manner of heating cars during the winter season. A number of the companies have adopted as a standard the hot

water heater and as fast as practicable are replacing the electric heater with it. During the winter of 1808-09 very few complaints of insufficient heating of cars were received by this commission, which is unusual, as previously this was one of the most serious and frequent causes of complaint on city railroads.

"Pay-as-you-enter Cars: A new type of car has been put into operation on several of the city roads, namely, the pay-as-you-enter car, and other companies are contemplating additions to rolling stock of this class of car. The consensus of opinion of the managers of roads who are operating these cars is that it has been of material benefit in handling the fluctuating travel on city systems and has reduced a class of accidents which are of frequent occurrence: injury to passengers boarding and alighting from cars. The introduction of this class of car caused some inconvenience and confusion to the public, which is being reduced as the people become accustomed to their operation.

"Changes in Methods of Operation, Routing Cars, and Restriction in Use of Transfers: During the past year two of the companies operating large city systems have made radical changes in methods of operation and in the use of the transfer. It is alleged that there is considerable abuse of the transfer privilege in the different cities in this State. In the two cases, Buffalo and Rochester, serious congestion of cars occurs during the rush hours. To prevent the alleged misuse of the transfer, these company establish arbitrary transfer points. With the object of relieving congestion, the 'near-side' stop was adopted. An almost unanimous public opinion against the changes has caused the companies to modify their rules in reference to both the transfer and the 'near-side' stop.

"Accidents: During the year 65 accidents have been investigated. Very few collisions have occurred on suburban railroads, but an unusually large number of such accidents have occured on city railroads. Investigation of these accidents, in most cases, has proven that they were caused by motormen with very little experience.

"Rules: Four-fifths of the accidents occurring on interurban railroads in this district result from causes other than defects in track, roadbed, and equipment, and a large number of accidents on these roads are the results of defects in rules governing operations on them or violations of such rules by employees. The subject of proper rules for the operation of interurban railroads is one to which the commission has given serious consideration, and one on which the Street Railway Association of the State of New York took action in the adoption of a set of rules. The American Street & Interurban Railway Association at its convention this year also adopted a set of rules which it is expected will be adopted by the various State associations. Without approving or criticizing these rules, the adoption of a uniform set of rules to be used on all interurban railroads in this country would be of benefit to the companies and tend to reduce the number of accidents occurring on such roads.

"Block Signals: The use of block signals on electric roads is a very important element in operation. A number of the interurban roads are equipped with signals. They are also used on nearly all of the city roads, protecting sections of single track where view is limited. There are several kinds of signals used, both automatically and manually operated. There is also in use a system of semaphores and signals operated only from the despatcher's office. This system should be used only for stopping cars to give crews instructions or train orders. The manual system is in more general use than any of the others. Nearly all the single track interurban roads are equipped with it. In addition to the above system, the Auburn & Northern road between Auburn and Port Bryon, and the Syracuse, Lake Shore & Northern road between Syracuse and Long Branch, are equipped with semaphores and oil light signals, with lap block sections automatically operated by track circuits. This system is the most expensive to install and maintain and is unquestionably more reliable in operation than any at present in use on interurban roads in this district. With the exception of the track circuit system, there are serious defects in all of the above mentioned systems, and collisions have occurred on roads equipped with them. While neither approving nor condemning at present any of the systems in use, the commission believes they should be used on interurban roads only for spacing cars moving in the same direction, or supplementing a proper method of train dispatching on single track.

"Grade Crossings of Highways: The construction of improved highways and the large increase in the number of automobiles have increased the danger in operation of high-speed interurban cars over highway crossings at grade. Additional precautions should be taken by companies to prevent accidents at these points. Some of the companies have equipped all of the important highway grade crossings with a cluster of lights which are burned during hours of darkness. Several are experimenting in the use of bells at these points. At some of the more dangerous the commission has directed that all cars come to a full stop. This is the safest method of operation, but to adopt it at each crossing would restrict the running time so as to interfere seriously with the convenience of passengers. Special attention has been given to the maintenance of the roadways across electric tracks. The majority of the roads have adopted a standard cattle-guard and wing-fence, and the greater portion of the crossings are equipped in this manner.

"Rail-braces and Tie-plates: The increased weight of cars and the speed at which they are run on interurban railroads necessitates careful maintenance of track, especially on curves. Serious accidents which have occurred in the past on steam railroads have resulted in the adoption of tie-plates on curvature. Nearly all of the companies operating interurban roads are using some rail-braces on curves. One of the interurban roads in this district has adopted the use of tie-plates instead of rail-braces for that purpose. Steam railroad experience has proven that the tie-plate is preferable to the rail-brace."

The report of the division of statistics and accounts says in reference to the forms of annual reports:

"The forms for street and interurban railroad corporations were prepared on the same general plan as those for steam railroad corporations, although the details necessarily differed very considerably. The first year's use of these new and extended forms was necessarily attended with a variety of difficulties that will be avoided in the following years. The requirements of a new form of report are certain to receive a variety of interpretations, and to reduce these to uniformity is a matter involving both time and patience. Where the report is a mere skeleton, the variety of interpretations may not be apparent on the face of the reports, but where it goes into considerable detail there are likely to be inconsistencies in it which are disclosed by a careful test. The correction of these will show how the erroneous interpretations arose, and what steps are advisable for their prevention in future reports. Such correction has necessarily thus far, because of the absence of a body of traveling auditors or examiners in the staff of the division, been attempted through correspondence. It thus happens that a vast mass of correspondence has been necessary in the correction of the annual reports rendered by the corporations for the year 1908. Because of the thoroughness with which this work has been done it is expected that much less will be necessary in connection with the reports for 1909. Indeed, the representatives of one considerable group or system of corporations are already making a careful scrutiny of the reports rendered in behalf of those corporations and filing corrections of the errors discovered, preferring to anticipate the results of the test of the reports to be made by this division."

Petrol-driven street cars are being put in service in Karachi, India, with a view to speedier service without the cost of equipping the system with electricity. The cars, seating 46 people, are driven by a Lucas valveless engine of 25 hp, and are capable of making about 10 m.p.h.

THROUGH ROUTES BETWEEN ELECTRIC AND STEAM ROADS

During the hearings before the Committee on Interstate & Foreign Commerce of the House of Representatives, in relation to the railroad rate bill, testimony was given on behalf of electric railways which desired through routes with steam roads by Lewis S. Cass, president of the Waterloo, Cedar Falls & Northern Railway, William G. Dows, president and general manager of the Cedar Rapids & Iowa City Railway & Light Company and W. J. Ferris of Lacrosse, Wis., who is interested in a projected interurban road. The committee was asked to eliminate the clause which provided that the Interstate Commerce Commission shall not establish any through route, classification or rate between street, suburban or interurban electric passenger railways and railroads of a different character. This clause was finally amended and appears in the bill as reintroduced by Congressman Townsend, of Michigan, as follows:

"The commission shall not, however, establish any through route, classification, or rate between street, suburban or interurban electric passenger railways not engaged in the general business of transporting freight in addition to their passenger and express business, and railroads of a different character."

Bentley W. Warren, of Boston, filed a brief discussing various features of the bill. After the public hearings on the bill, which lasted from Jan. 18 to Feb. 21, the committee began the consideration of the measure in executive session.

TESTIMONY OF LEWIS S. CASS

Mr. Cass testified that he was thoroughly in sympathy with the interstate commerce law as it stood and with the proposed amendment, giving the commission the right to establish through routes and joint fares and joint classifications. Without this right, a great many communities would suffer for the want of equal and fair freight rates. He knew of no interurban railroad in the State of Iowa that did not do what might be termed a commercial railroad business, and a great many interurban roads throughout the country did such a business. Yet in every sense, so far as the passenger business of these lines was concerned, they were interurban electric passenger railways. It seemed to Mr. Cass that they were forms of railways which the committee proposed to exclude from the right of the enforcement of joint rates and through routes with steam connecting carriers. With few exceptions, most of the electric interurban railroads which had joint rates and through routes with steam carriers would be deprived of these rights as soon as they lost the power to enforce the rates. This loss would deprive a number of communities of a chance at markets equal to that of communities located in adjacent and corresponding stations upon trunk lines of railroads.

Responding to inquiries by a member of the committee, Mr. Cass said that the interurban roads of Iowa transacted the same character of general freight business as any steam railroad in the State excepting that they were not so long and did not reach the great markets like Chicago. The steam roads extending to and from Iowa were built for the longest haul and to make Chicago the market place. They carried products from Chicago to Iowa and reloaded the cars with grain and live stock for transportation to Chicago. The people of Iowa had invested their money in roads running across the State at right angles and communities had been established on these short lines. In order that the communities might thrive, they had to send their products to Chicago and to receive products from Chicago, and to buy and sell in competition with the communities located upon the trunk lines of railroad they must have substantially the same rates.

Mr. Cass said that his company had considered itself subject to the interstate commerce law for several years past and its accounts had recently been examined by auditors for the Interstate commission.

The subject of consolidation of properties was brought up by Congressman Charles G. Washburn of Massachusetts, who asked whether Mr. Cass thought that steam and electric lines should be kept separate as competing factors. Mr. Cass said that he thought the two classes should be kept separate as a matter of public policy. He thought it was for the best interests of the public. When the subject of through passenger rates was suggested, Mr. Cass said what he was advocating principally was the matter of through freight rates. He did not consider the question of passenger rates an important one. Referring to the clause in the bill under discussion, Congressman William C. Adamson, of Georgia, asked whether, if roads of a different character had the same gage and equipment that could be interchanged, they were not nearly enough of the same character to make an arrangement for through routes feasible under the bill as it stood.

Mr Cass said that of 150 cars owned by the company 75 had been built under Master Car Builders' specifications and 45 were freight cars, interchangeable with steam lines. The company had six steam locomotives and of its trackage, 50 miles of track were operated as a commercial railroad.

Chairman Mann pointed out that the average was a little less than a freight car a mile and asked Mr. Cass whether that was a fair proportion if steam railroads were to be compelled to interchange business.

Mr. Cass thought it a greater proportion than the average small steam railroad owned. He had just retired as vice-president of the Chicago Great Western Railway and had met that situation in connection with the interurban lines of the small steam railroads. He knew from experience that the average electric railroad which was attempting to do a commercial railroad business was better equipped in nearly every respect to serve the public than the average small steam railroad.

Congressman William Richardson of Alabama asked whether the elimination of the clause would not give the great railroad systems a power over the electric lines. Mr. Cass said that to let the clause stand would give the railroad systems the power. If the clause should be struck out, a community, whenever an electric line was in a position to serve it commercially, might make an application for the service, and if the connecting steam roads refused to grant a rate, an appeal could be made.

Congressman Richardson asked whether Mr. Cass thought the commission should have power to create through routes between steam and electric roads. Mr. Cass thought the question of routing a car or of the character of the car did not enter into the subject. He said that there was no reason why a shipment should not be transferred from steam railroad cars to electric railway cars any more than why a shipment should not be transferred from steam railroad cars to the barges of a water line. As vice-president of the Chicago Great Western road he had been ostracized from good railroad society because he would not refuse rates with connecting railroads that were operated by electricity.

Congressman Richardson asked whether it was the idea of Mr. Cass that the same control should be exercised by the Interstate commission over interurban railroads as over steam railroads. Mr. Cass responded in the affirmative. Mr. Richardson asked whether this would not place power in the hands of the great railroad systems to absorb and destroy the short electric lines. Mr. Cass said that if an electric railroad had sufficient earning power to meet its fixed charges and maintain itself in a healthy condition, the only way the steam roads could break it down was by buying its stock and absorbing it. If steam railroads should be given the right to refuse to permit electric roads to enjoy through routes and joint rates and to haul the products to a connection with steam lines, the latter would have power to reduce the earning capacity of electric properties and to destroy their communities commercially.

Congressman Richardson said that it seemed to him that if the electric railway properties were to be governed, they ought to be directed on an entirely different system from the steam railroads.

Mr. Cass said that as he understood it, it was not the intention that the commission should go throughout the coun-

try seeking places to make joint rates and through routes without complaint. But it was the intention, as under the law at the present time, that the commission should have the right to investigate the complaints and to prescribe joint rates and through routes where the carriers were entitled to have them. He wanted the matter left where it stood. All of the interurban roads in Iowa had been built originally for the purpose of transacting commercial railroad business in addition to the passenger business. The steam locomotives owned by the company were used largely in construction work and in clearing snow. They were used to handle freight at times when business was very heavy if the electric equipment was not adequate.

Some questions regarding the meaning of the phraseology of the clause to which objection had been made were discussed and Mr. Cass said that if the United States Supreme Court should hold as the Iowa Court had, that the Waterloo, Cedar Falls & Northern Railway was an interurban railroad, the company would be shut off from 40 per cent of its revenue. Mr. Cass thought that consolidation in competitive transportation should be prohibited wherever it was met and under whatever circumstances. During his connection with the Chicago Great Western road, he made it a practice to encourage the construction of electric lines and established through routes and joint rates willingly with such properties because he discovered that the advantages which the electric roads gave to the communities added very much more to the trunk line business than they took away. Outside of the Chicago Great Western, it had never been the practice on the part of the trunk lines to encourage the construction of electric railways.

TESTIMONY OF WILLIAM G. DOWS

William G. Dows, president and general manager of the Cedar Rapids & Iowa City Railway, said it seemed to him that the clause of the bill under discussion, unless eliminated would cause the withdrawal of through routes on interurban railroads. The Cedar Rapids & Iowa City Railway owned its freight terminals in Cedar Rapids and Iowa City and was built on private right-of-way. It was capable of handling freight in carload lots and it served towns which were not reached by any other railroad. When the road was constructed, an effort was made to have the steam railroads establish joint rates and through routes but they refused to do so. The Interstate Commerce Commission after a hearing ordered the Chicago & Northwestern Railway to establish joint rates and through routes with the electric line, holding that the latter was able to take care of all kinds of freight.

Congressman William H. Stafford of Wisconsin asked whether Mr. Dows considered the line an electric passenger railway, as stated in the bill. Mr. Dows replied that the passenger revenue of the average interurban road was greater than the freight revenue.

Congressman Stafford said that the character of the service, not the revenue, determined the character of the railway. Mr. Dows said that the reason why the passenger revenue of his line was greater than the freight revenue was the character of the service given. With an hourly service, the company stopped its cars anywhere to get passengers. The consequence was that the passenger service that was given for 20 hours a day made the revenue from that branch of the business greater than the freight revenue notwithstanding that the freight revenue was as large as that of the average small railroad in Iowa.

Mr. Dows added that the company had standard equipment and had physical connection in Cedar Rapids with the Chicago, Milwaukee & St. Paul and the Chicago & Northwestern roads, while at Iowa City connection was made with the Chicago, Rock Island & Pacific Railway. Congressman Richardson asked whether the company was equipped with sufficient freight cars to meet the demands of traffic. Mr. Dows said that the company had some freight equipment but it had never found difficulty in securing from other roads any additional equipment that it desired.

Chairman Mann asked if there would be any objection to a provision that if the equipment was interchanged the electric road should provide its proportion of the equipment. Mr. Dows thought there would be no objection to that. Chairman Mann asked whether the interurban railroads were financially able to purchase the necessary equipment. Mr. Dows said that any of the roads could buy on the car trust plan.

Mr. Dows added that 27½ miles of his line were operated for freight purposes. The company had 20-odd standard freight cars but no locomotives. Its franchise did not limit the kind of power to be used. On one occasion, the company did not have sufficient electric equipment to handle passenger traffic, so it rented from one of the large trunk lines a complete steam train with a locomotive and operated that.

Answering a question as to the differences in construction between steam and interurban railroads, Mr. Dows said the public had understood that the interurban roads could be built for less than the steam properties. It cost more per mile of track for an interurban line than a steam railroad.

Congressman Richardson asked why Mr. Dows thought that the inclusion of the paragraph in the original bill would give the steam railroads great power to destroy interurban properties. Mr. Dows said he knew from what the steam trunk lines had done in the past. They refused to make any joint rate with his company. In some of the communities, people wanted to ship their stock and they had to pay his company the local rate either to Iowa City or Cedar Rapids and then the local rate from one of these points to Chicago instead of having a through rate made from the point of shipment. The decision of the Interstate Commerce Commission required the installation of joint rates and through routes and not only saved the interurban railroad but gave the communities which it served the benefit of the through rate.

STATEMENT OF W. J. FERRIS

W. J. Ferris of La Crosse, Wis., expressed his sympathy with the statements of Mr. Cass and Mr. Dows. He was interested in a franchise which had been secured recently providing for the construction of an interurban line connecting La Crosse, Wis., and Winona, Minn. This line would reach some points that had no railroad facilities at the present time and he believed that it should be possible to secure joint rates and through routes so that goods could be transported to La Crosse and from there on to Chicago by steam railroad with the advantage of through routes and joint rates. The passage of the bill containing the clause to which objection was made would probably stop the construction of this proposed line because reliance had been placed upon the revenue from the interchange of freight with the steam railroads.

STATEMENT OF MARTIN A. KNAPP

Martin A. Knapp, chairman of the Interstate Commission, appeared before the committee on Feb. 18 and made an extended statement in relation to the effect of the bill as drafted upon steam railroad matters. Congressman Charles E. Townsend, of Michigan, asked whether Mr. Knapp had considered the proposition to except electric roads in the clause prohibiting a railroad from purchasing the stock of a competing line. Mr. Knapp had not considered this proposition. He knew that there had been traffic relations between certain steam roads and electric lines. He thought it would not be wise to deny the commission the right to establish through routes and joint rates between electric and steam properties. Mr. Knapp thought the kind of motive power was not important. If a railroad was engaged in interstate commerce under the first section of the act, it did not matter whether its motive power was steam or electricity.

Mr. Knapp apeared before the committee again on Feb. 19 and made a further statement in relation to various points, including the question of through routes between steam and electric lines. He said that, assuming that under present conditions there would rarely be public need of compelling through rates between steam and electric lines where the latter were wholly or mainly engaged in passenger business, there might be cases where that ought to be done in the public interest and with the rapid development of electric transportation it was altogether probable that in the near future cases would arise where joint rates and through routes should be established between

steam and electric lines such as would not be possible under the limitations in the original bill.

BRIEF OF BENTLEY W. WARREN

Bentley W. Warren, counsel for the Boston & Northern Street Railway and the Old Colony Street Railway, submitted a brief in which he made the following arguments:

"Street railways should not be included among the transportation agencies subject to the act of Congress to regulate commerce, approved Feb. 4, 1887, as amended.

"If there is sufficient reason to include street railways within the act to regulate commerce, they should not be denied any of the benefits of that legislation.

"If street railways are to be included or continued under the jurisdiction of the Interstate Commerce Commission and the several acts of Congress to regulate commerce, it is submitted that they should be excepted from the provision of section 13, as they already are from the provisions of section 12, in the bill under consideration."

Mr. Warren said in part:

"Not only is the kind of business done upon street railways so different from that done upon railroads as to make the application of interstate commerce regulations to the former unnecessary, but the physical differences between the two classes of carriers render impossible such a relation between them as can ever raise street railways to sufficient importance to justify the application to them of federal control. It is not practical to operate over the ordinary street railway standard railroad cars.

"The distinction between the so-called interurban electric railways, which are really railroads operated by electricity, and the ordinary street railway is almost as marked as that between the street railway system in New York City and the New York Central Railroad or the Pennsylvania Railroad.

"Bearing in mind that the primary object for the federal regulation of interstate commerce was to eliminate abuses and introduce uniformity in the transportation of merchandise, there is surely little reason to load down the Interstate Commerce Commission with the oversight of the Massachusetts street railways. The figures show that all these companies in Massachusetts derive less than 1 per cent of their entire earnings in the transportation both of mails and merchandise. Their receipts from that source were actually less than half what they were from miscellaneous items of tolls, from advertising in the cars, etc. It is confidently submitted that the negligible amount of freight business done by the street railways in Massachusetts is undoubtedly true of similar street railways elsewhere; that is, street railways in other parts of the country constructed as are those in Massachusetts, chiefly in the highways.

"In Massachusetts, for example, there are only about 15 points where a street railway either crosses the boundaries between Massachusetts and any one of the five neighboring States or connects at the boundary lines with street railways operating in the neighboring States.

"I have said nothing about the probable conflict between the State laws and regulations and federal laws and regulations. That such a conflict exists and will result in unavoidable confusion and dissatisfaction in many of the States is undeniable. This is peculiarly true of States like Massachusetts, which supervise their street railways very strictly and subject them not only to minute control by State officials, but also in many respects, noticeably in the matter of engaging in the transportation of merchandise, to the control and supervision of city and town officials."

Mr. Warren added that although the freight business done upon street railways is, it is believed, negligible, always keeping in mind the distinction between street railways which are operated on highways and interurban railways, which are railroads operated by electricity, these street railways and such persons as may ship merchandise over them should not be denied the benefits intended to be conferred by the section relating to through routes. He said that if any good reason existed for the exception as to electric passenger railways in the original bill, it must be that the business done upon these railways was so different from that done upon railroads of a different character as to make the law applicable to the latter inapplicable to the former. Mr. Warren continued:

"If, however, such railways are to be included within the act, and Congress is thereby to adjudge that the interests of the traveling and shipping public require them to be included, Congress should see to it that that public is enabled to utilize to the fullest extent such facilities as are, or may be, under federal regulations, furnished by the street railways. If the street railways and their business are to be wrested from their primary purpose of the local transportation of passengers, and, to a very limited extent, of merchandise, and brought under federal control, that control should be made effective. If there is any public demand for that federal control of street railways, and the demand is to be adequately met by legislation, the power to exercise the control should be placed in the hands of federal authorities, and not made dependent upon the voluntary act of the 'railroads of a different character.'

"The public policy of Massachusetts, as must be well known to the Massachusetts members of the committee on interstate and foreign commerce, has long favored, first by special acts and now for more than 12 years by general acts, the merger and consolidation of street railways. This policy has resulted to the general satisfaction of the public and in greatly improved service and lessened charges for transportation. Experience has shown that it is far better to have one operating company in a city like Boston, or Worcester, or Springfield, than several struggling and competing companies. The consolidation of the small companies has been uniformly encouraged in Massachusetts, subject to the supervision of the railroad commissioners, who are required to pass upon each proposed merger.

"The prohibition in section 13 of the proposed act against the issue of stock and bonds will be similarly objectionable, unless the corporations operating street railways, as that term is defined in the Massachusetts laws, are excepted from its provisions. When the commission recalls the fact that there are somewhere between 1236 and 2206 street, suburban and interurban railway corporations in the United States, they may be able to determine which of these alternatives the Interstate Commerce Commission will adopt—either to make the supervision of the proposed issue purely perfunctory, or subject the corporation and public desiring the expenditure of the proposed capital to an indefinite delay. Certainly no one would expect that nine human beings, charged with the supervision and regulation of the interstate commerce conducted upon 232,000 miles of steam railroads, would have much time or energy to pass upon the necessity or reasonableness of proposed stock and bond issues by this great number of street railways."

ELECTRIC CARRIERS

At a meeting of the committee on Feb. 1, J. C. Lincoln, of St. Louis, president of the National Industrial Traffic League, made an extended statement in reference to the steam railroad situation. He said there was no desire on the part of shippers that the commission should establish joint rates with the average interurban passenger railway, but there were a number of interurban properties in Iowa, operated by electricity, that were purely common carriers, transporting both passengers and freight. Mr. Lincoln referred to the Illinois Traction System and its joint rates with various steam properties. He thought it would be proper to except electric railways in the establishment of joint rates carrying passenger traffic, but not for freight rates.

Congressman Charles E. Townsend, of Michigan, said that his understanding was that the exception applied to a different class of properties, but the suggestion of Mr. Lincoln had created doubt in his mind as to whether this provision would not prohibit the establishment by the commission of through rates for freight between the steam road whether electrified or otherwise and the ordinary street, urban or interurban railway.

Congressman John T. Esch, of Wisconsin, said it seemed to him that the insertion of the words in that section must have resulted from a failure to apprehend the enormous extent of the electric railway industry in the United States.

THE PHILADELPHIA STRIKE

Following the disorder in Philadelphia on Feb. 22 and Feb. 23 the Governor of Pennsylvania called out four companies of the State Mounted Constabulary, numbering 157 men, exclusive of officers, to assist the regular uniformed police of Philadelphia in quelling riots. These men soon enforced order and the company immediately demonstrated its ability to operate more cars and to return to something like its normal schedule. On Tuesday, March 1, 50 per cent of the lines were being operated on regular schedule and service was being maintained on all lines, whereas the company had previously been compelled to abandon service altogether on some lines so lawless did the strikers and their sympathizers become in Kensington and other outlying districts. Besides the 2200 men who did not heed the order of the union for a strike, the company has employed quite a number of men who have met the qualifications necessary for service and 250 men have applied for reinstatement. Whereas only 722 cars were operated on Feb. 20, following the strike order issued at noon on Feb. 19, 925 cars were in service on March 1. The record by days of the number of cars operated follows: Feb. 20, 722; Feb. 21, 777; Feb. 22, 663; Feb. 23, 714; Feb. 24, 744; Feb. 25, 821; Feb. 26, 840; Feb. 27, 968; Feb. 28, 970; March 1, 925. On Feb. 28 the company had 3960 men available to run cars.

On Feb. 25 the directors of the Philadelphia Rapid Transit Company authorized the following reply rejecting the suggestion of a committee of ministers that the strike be settled by submitting the questions at issue to a board of arbitrators:

"Your communication of Feb. 24 has had the careful consideration of our board. We appreciate the spirit which has led you to intervene in the present controversy, and regret the condition existing in our city. If we thought it could be remedied by accepting your good offices we would be prompt to do so. But our knowledge of the situation convinces us that any such adjustment as you recommend would not give lasting peace or result in good service to the public.

"There are but two real questions at the bottom of this strike:

"First. The right of our employees to deal directly with us, without the intervention of an organization officered and controlled by outside men; and

"Second. The right of this company to have the same freedom in hiring and discharging men that the men have in staying with or leaving the company.

"These rights are fundamental and inalienable, and do not submit themselves to any form of arbitration. To surrender them to any outside interest would be to abrogate the management of the corporation, which duty the law imposes upon us as directors.

"An adjustment of all other questions, such as wages, schedules, conditions of labor, etc., was being satisfactorily proceeded with by direct negotiation between our employees and our executive officers when the present strike was precipitated without an hour's warning.

"As soon as normal conditions are restored, should there be any questions needing adjustment they will be taken up directly with our men, and we entertain no doubt of our ability to reach a satisfactory understanding."

A meeting of representatives of 122 local unions, whose members number, perhaps, 100,000 employees, was held in the hall of the Central Labor Union on Feb. 27, and it was voted to order a general strike to begin on March 5 as a sympathetic movement to force a settlement of the street railway strike, and resolutions were adopted urging Councils to request Mayor Reyburn, William H. Carpenter and George H. Earle, Jr., city representatives on the board of directors of the company, to endeavor to bring about arbitration of the differences between the company and its former employees and to end the strike.

As stated in the Electric Railway Journal of Feb. 26, the company has maintained uninterrupted service on its elevated and subway lines. Following the arrival of the State police the company began to operate cars at night on Feb. 25 and has steadily increased its night service since then. On Feb. 24 the company issued the following statement to its employees:

"Any motorman or conductor in the employ of this company who has been, or may be, injured as the result of any violence attendant upon the present strike, and who has notified the company within 24 hours after being injured, will be cared for by the company as long as he remains incapacitated."

On the same day the company inserted the following advertisement in the newspapers:

"Two thousand positions as motormen and conductors are open in Philadelphia to men of good character. We do not want strike-breakers. Only men who intend to remain permanently in the service are desired. Wages, 22 cents per hour, with a guarantee of early increase. Work day averages 10 hours. Apply Philadelphia Rapid Transit Company, Eighth Street and Susquehanna Avenue, Philadelphia, Pa."

On Feb. 24 George H. Earle, Jr., one of the representatives of the city on the board of directors of the company, declared that arbitration of the differences between the company and its former employees was out of the question on account of the domination of the members of the union. Mr. Earle said:

"I advised Mr. Pratt not to lead the carmen into this mistake, quite as much on their own account as that of the public and the company. I knew that the feeling of the officers was that it was impossible to permit the demoralization of the men to continue; and that they knew that the service would be impaired just as long as the employees were being taught that the company that paid them could be fought and quarreled with at will. I knew and so said that nothing but disorder could stop the cars, but that no community would long permit an interference with its right to unobstructed transportation."

Severe punishment has been dealt by the courts to those who have been convicted of acts of violence in connection with the strike. Judge Davis, in Quarter Sessions, Part No. 1, on Feb. 23 sentenced one man to six years' imprisonment and two others to two years' imprisonment. These were among the first cases taken up. In passing sentence Judge Davis said:

"It may as well be understood now that the questions in dispute between the Philadelphia Rapid Transit Company and its employees cannot be adjusted by the unauthorized interference of outside parties, nor by irresponsible acts of lawlessness, inciting to riot, destruction of property and bodily injury to citizens. If the carmen encourage or approve such conduct they are enemies of the law, the peace and the safety of the community. The law is supreme and will be enforced, and every citizen should aid in its observance."

On March 1 Mr. Kruger explained that there had been no change in the opinion of the directors about the inadvisability of arbitration since the refusal of similar proffers made by the united clergy of the city. The statement issued by the company on March 1 follows:

"At the conclusion of an informal conference of directors of the Philadelphia Rapid Transit Company, Mr. Kruger stated that the company has not changed and will not in any way change its attitude with respect to arbitration already outlined in its reply to the Ministers' Association."

On March 1 Mr. Earle also issued a statement explaining his attitude. He said in part:

"The real difficulty in this matter is not to get peace, but permanent peace. Philadelphia cannot stand any further makeshifts. The company, when I was not a member of the board, made an effort for peace some months since; and the city has been in a turmoil ever since. That must not be repeated. In whatever way settlement is reached, it must be a permanent settlement, and nothing is permanent that is not fair.

"The greatest difficulty is that while the company is a permanent body, the union is a shifting one; and nothing done with it amounts to much if the men change their minds. The problem is a difficult one; but there should be enough ability to work it out in Philadelphia. Personally I shall favor whatever I think will bring us permanent rest and quiet, and that as I have found it is neither weakness nor truculence, but simply good sense and justice."

QUARTERLY MEETING OF THE NEW YORK ASSOCIATION

The eleventh quarterly meeting of the Street Railway Association of the State of New York was held in Rochester on Tuesday, March 1, and Wednesday, March 2. Three sessions were held, consisting of an informal dinner at the Seneca Hotel on Tuesday night and business conferences on Wednesday morning and afternoon at the Rochester Club.

BLOCK SIGNALING

The Wednesday morning session was opened by a paper on "Block Signaling on Electric Railways," prepared by Charles R. Barnes, Inspector of Electric Railways, Public Service Commission, Second District. This paper, which is published elsewhere in this number, was read by J. H. Pardee, secretary of the association.

The discussion of Mr. Barnes' paper was opened by Frank Rhea, signal expert of the General Electric Company, who thought that the system proposed by Mr. Barnes would require many years of inventive thought. There was not a single practical system to-day which would fill his specifications. The subject of signals was being investigated on a comprehensive scale by the board of control of the Interstate Commerce Commission. This study has been going on for three years, but as yet no definite recommendations have been made. However, he considered the conservatism of the board in this respect as a healthful condition. One serious point about the signal question is how far we can go without hampering the running of the railway. With the present earnings, admissible expenditures and maintenance standards, no railway in the United States could afford to install and maintain an ideal system of the type proposed. It was going to be largely a question of being able to spend a good deal of money, but where would this money come from? Mr. Barnes had touched on one important point in stating that electric railway signal problems should not be studied in the light of steam railroad experience. It was not safe to assume that the electric signaling problems can be solved even along similar lines. The existence of a return propulsion current was one thing which had retarded electric railway signal development, because of the patent situation on track currents. At present none of the leading signal companies knows what its rights are. The alternating-current track circuit appeared to be the one which must prevail in direct-current train operation. Up to the present time none of the alternating-current track circuits has proved perfect, and particularly in avoiding inductance through unbalanced bonding. In conclusion, Mr. Rhea said that if automatic train stops should be demanded on the steam railroads, the latter would be unable to continue doing business in accordance with their present income, expenditures and operating methods. The Board of Control of the Interstate Commerce Commission appears to think that a continuous indication to the engine would be desirable, but one of the great difficulties about continuous indication is the permanent maintenance of contact between the engine and the rails. Up to the present such signal systems have been put in only where the conditions were peculiarly favorable. While Mr. Barnes was right in saying that the automatic trips could easily be broken, that fact did not bar their use under the right requirements. The New York subway, on account of its stupendous traffic, has been obliged to change its signal system three or four times, particularly to gain a few seconds in train movement at certain points. Thus one improvement in speed control over a distance of 2000 ft. cost $78,000 to gain 13 seconds per unit. So far as the great majority of roads were concerned, it seemed better to devote the limited expenditure to home signals alone over a large piece of track rather than to use a more elaborate equipment with both home and distant signals on a short section.

C. P. Nachod said that Mr. Barnes had used the word "signal" in a very high sense, for, according to its etymology, this term means simply to give an indication. If Mr. Barnes' recommendations could be carried out, it would mean an enormously expensive system. It requires far less money to make apparatus which would fail, say, once in 100,000 times, instead of once in 1,000,000 times. Mr. Barnes apparently would discourage the use of any but perfect signals. As Mr. Rhea had said, the railroads had only a limited amount to spend for signal protection. A signal which failed only once in 100,000 movements was surely a great protection. The electric railways could use intermittent contact systems if more reliance is placed on human co-operation. In these systems the motorman can easily determine whether the signals have failed, whereas the steam engineer does not look behind him to see whether or not he has protected himself. He assumes that the signal system is perfect, whereas the motorman does not.

Mr. Barnes said that he greatly appreciated the remarks of Messrs. Rhea and Nachod. He wanted it understood, however, that he did not wish to discourage the introduction of the present signal systems, as distinctly stated at the end of his paper.

E. J. Dunne, superintendent of distribution, Public Service Railway of New Jersey, said that one type of signal had been used on his lines for the past three years with very good results where the speeds under the contacts do not exceed 10 m. p. h. to 11 m. p. h., but the same signal was giving very bad results on higher speed lines. Thus the linemen spend more time on 6 miles of protected track than on 125 miles of ordinary line. On the other hand, there is very little signal maintenance cost on the line where the cars pass the contacts at 10 m. p. h. His company is now making competitive tests of six signal systems. Among these installations are two recording signals, one of which has given very good results, and one in which the signal circuit is closed through the car wheels, a section of running rail and a storage battery. The cost per block of the installed systems varied from $300 to $750.

M. C. Brush, general manager of the Buffalo & Lake Erie Traction Company, said that when he was in charge of another property three or four years ago he was told that no reliance could be placed on any counting signal. The counting mechanisms proved perfectly reliable, but it was necessary to change the overhead contacts to others made on the dash-pot principle to insure their operation at high speeds. Eventually the company installed two different signal systems on its various lines, but used the same overhead contact for both.

Mr. Dunne said that he was using telephones in connection with the signal systems, so that a man could not enter a block without calling the despatcher. Mr. Brush added that he would never operate signals without a complete telephone system. A man should not be allowed to enter a block without orders.

Mr. Rhea brought up the question of "signal aspect," namely, the use of moving apparatus in addition to lights. Electric railways could easily afford to have a position signal all the time. As the electric railways can always illuminate their signals at little expense, he thought they would go to the position signal ultimately before the steam railroads. Mr. Rhea divided the signals suitable for electric railways into three classes, as follows: Overhead contact, track circuits and automatic control. The contact system is within the reach of many companies, but it is not possible to build good installations for the price most railways are willing to pay. Track circuit signals analogous to those of the steam railroads and without automatic train control constitute an intermediate step more expensive than the overhead contact. It is much more extensive and in some ways is more flexible from the standpoint of safety. As for automatic train control, he was surprised to see how prone some electric railways are to consider it. Possibly the steam railroads might come to use automatic trips through their earlier adoption by electric subways, elevated lines and heavy interurban service. Speaking about clear failures, Mr. Rhea said they could be practically disregarded, particularly in connection with track circuits. During his experience with the Pennsylvania Railroad, at the Philadelphia terminal there had been just two clear failures in 14,000,000 signal indications over a period of 2½ years. One of these failures was never explained, and the other was due to the carelessness of a workman in leaving a wrench inside a moving cylinder.

Mr. Brush said he would absolutely insist upon visible, physical, moving signals aside from the lights. The semaphore should assume the danger position by gravity. He had found it necessary, however, to discard steam semaphores and use an enclosed type which did not interfere with trees on the road, etc. Mr. Dunne agreed with Mr. Brush about the use of semaphores, and added that lamps alone were not reliable, especially as they might burn out at the most unexpected times. Besides, it is very difficult for the motorman to distinguish the lamp colors when he enters a block while facing the sun. A three-wire signal system used by his company sets the distant signal before the home signal.

COMPENSATION FOR HANDLING MAIL.

E. S. Fassett, general manager, United Traction Company, Albany, presented a progress report of the committee on remuneration for handling United States mail, in the absence of J. K. Choate, chairman. Mr. Fassett said that this question had been taken up by a similar committee of the American Street and Interurban Railway Association. That committee learned that while the electric railways were generally dissatisfied with the compensation received for handling United States mail, there was a great diversity of opinion about what was wanted. Hence, before bringing the matter before Congress it was determined to get answers from all companies to four questions. The replies are not intended primarily for statistical purposes, but rather to get the consensus of opinion so that the electric railway representatives can answer intelligently any questions which may come up in a Congressional inquiry. Mr. Fassett thought it might be of assistance to other companies to learn how the United Traction Company had answered the questions of the American Association's committee. The four questions and answers follow, together with interpolated explanations made by Mr. Fassett at the meeting:

Question 1.—Please give a brief description of the mail service given on your road.

Answer 1-*A*.—We carry mail on our regular passenger cars between the following points daily except Sunday: Albany-Watervliet, 8 trips, 14 pouches, 6.08 miles; Watervliet-Troy, 8 trips, 10 pouches, 1.4 miles; Troy-North Troy, 11 trips, 22 pouches, 3.2 miles; Troy-Waterford, 1 trip, 1 pouch, 4.4 miles.

This mail is delivered to the motorman on our cars and is taken from the motorman at destination by post-office employees. The company's employees do not handle the pouches and are not responsible for anything more than the carrying of the mail on the cars. (We induced the postal people to handle the mail themselves, as the carrying to and from the cars involved both labor cost and responsibility. Now, for example, the post-office men place mail on a car in Albany and telephone the Troy post-office when the pouches are due so that they can call for them.)

Answer 1-*b*.—We also run one special mail car from Albany to Troy, a distance of 7.42 miles. It leaves Albany at 2 a. m. daily, averages 34 sacks or pouches and carries mail one way only. This mail is also delivered to and taken from the car by post-office employees.

Question 2.—What is the compensation for this service paid your company?

Answer 2.—That part of the service given in answer No. 1-a does pay; the service under answer No. 1-b, at the rate of 16 cents per mile, does not pay. (The original compensation was 3 cents per car-mile, whereas the operating expenses were 14 cents per car-mile. The 16-cent rate was obtained after the company gave notice that it would give up the service in 30 days if the compensation were not raised. The speaker believed that there was no reason why a mail car should n t bring the same revenue as a car in regular service.)

Question 3.—What in your opinion is the best method of compensation for the service performed?

Answer 3.—For the service we perform a mileage basis on both classes is satisfactory.

Question 4.—What is the amount you think you should receive?

Answer 4.—The portion of the service under answer 1-a we believe is proper provided the service does not call for more than 150 lb. of mail or practically the equivalent of one passenger; 3 cents a mile being a fair rate for such service. The service called for under answer 1-b, in my opinion, should be paid for at the rate of 25 cents per car-mile, covering the entire mileage of the car from the carhouse, out, to the carhouse, in. This is based on the average passenger mileage receipts of cars on the line on which the service is performed. (In conclusion the speaker said it was fallacious for railway managers to assume that the carrying of United States mail would insure government help in case of labor troubles. On the contrary, experience had shown that the railway would be held responsible for all delays. It was therefore expedient to insert a clause providing for non-responsibility in the contingencies of riot, strike, fire, flood, etc.)

In reply to a question by W. H. Collins, general superintendent of the Fonda, Johnstown & Gloversville Railroad, Mr. Fassett said that while they should have been glad to secure an increase from 3 cents to 25 cents per car-mile, they took all they could get at the time in securing 16 cents per car-mile. In Boston, the compensation had been increased by using a larger car, as the payments were based on cubic capacity.

Mr. Collins said that the second assistant postmaster-general had told him that no changes in compensation could be made except in accordance with the department's regulations. He was told that the cubic foot rate applies only where special mail cars are used. When his company refused to carry mail for 3 cents a mile, the post office instituted a pony express, which costs considerably more than the electric service.

E. J. Cook, general manager, New York State Railways, Rochester lines, said that in 1908 his company had two single-truck cars, which carried mail and made collections from street boxes over prescribed routes. Compensation was on the cubic contents basis, so that the ratio per mile could not be increased without enlarging the cars at considerable expense. These cars interfered with the rush-hour service on account of the box collections, and in the end the company was obliged to discontinue this service. The company also withdrew the special mail carrier rates, which amounted to about 3 cents on the basis of on-duty travel only, but this privilege had been abused, as the men would carry uniforms and pouches in going to and from their homes or to amusement resorts, like baseball parks. His company is now carrying only a few pouches on interurban cars and, as in Albany, the work outside the car is done by postal employees.

In reply to a question by J. C. Calisch, vice-president of the Buffalo & Lake Erie Traction Company, Mr. Fassett said that from his experience with the Short Line Steam Railroad Association, that body was not likely to co-operate effectively with the electric railways in obtaining better mail remuneration. As for transporting letter carriers, the only concession his company makes is to print a special carrier's ticket, but no transfers are given.

Mr. Cook said that he had cut off the letter carriers' tickets after finding that a veritable transfer exchange had been built up in the postoffice.

E. F. Peck, general manager of the Schenectady Railway Company, warned against the installation of mail boxes on interurban cars. He had found them a nuisance, as often people would stop the car simply to mail a postcard.

Albert Eastman, passenger and express agent of the Utica & Mohawk Valley Railway, said that at the request of C. Loomis Allen, general manager, he had prepared some data to show the comparative revenues from mail and express under similar conditions. It was found that the revenue from mail was about 72 per cent of the rate for regular express matter. Recently the postoffice had notified his company that its compensation would be increased owing to an increase in the number of bags handled.

President Peck announced that as the result of a meeting of the American Street & Interurban Railway Association in New

York on January 27, the presidents of the various State associations were made members of the public relations committee of the American Association. Hereafter at the annual conventions of the national body the State representatives will be enabled to discuss officially matters of common interest.

CHARTERED AND SPECIAL CARS

B. E. Wilson, general passenger agent, New York State Railways, Rochester, then presented a report on chartered and special cars. This report is published on page 413 of this issue.

Mr. Fassett, Albany, in opening the discussion, asked whether there was any good reason why the chartered car rate should be less than the regular rate. He thought that if the companies carried people at less than the regular rates, it would make an argument for lower rates. If any one wanted special service it should be worth more than the regular service.

Mr. Eastman, Syracuse, said it was a matter of judgment with the railway whether the chartered car business was desirable. He thought that many persons could be persuaded to charter a car when they would not travel at the regular rates in the regular cars. Mr. Cook, Rochester, said it was easier to run a chartered car on special service than to operate extra cars in the regular service. The former enabled the company to plan in advance to take care of the extra business. John H. Cain, Buffalo, Lockport & Rochester Railway, thought it was often necessary to give inducements to secure special parties.

Mr. Wilson asked what should be considered a round trip in chartered car service. If a party engaged a car for a dance, leaving early in the evening and returning the next morning, should the transportation be considered a round trip or two one-way trips. Mr. Fassett said that no road with which he was connected would grant a round-trip rate for such a service.

Mr. Wilson said it was an advantage to provide that cars could be chartered only at the convenience of the company. This had made it possible to restrict special service to times when it could be conveniently handled.

Mr. Cook asked how it would be logical to establish an extra charge for transportation between certain places. Mr. Fassett said that a distinction could be drawn between special cars and extra service. When there is a circus, for instance, extra cars were provided for the traffic, but these cars were not for the exclusive use of any individuals or parties. J. C. Calisch, Buffalo & Lake Erie Traction Company, said that that company had a party rate in addition to a chartered-car rate. The former rate was used where a special car was not desired.

The association then adjourned for lunch, which was served at the rooms of the Rochester Club, where the meeting was held.

AFTERNOON SESSION

When the meeting reconvened at 2 p. m., Mr. Griffin, Mr. Callaghan and Mr. Collins read their papers. These papers were discussed together and are published elsewhere in this issue.

DISCUSSION ON TRANSFERS

Mr. Duffy, Syracuse, said that the Syracuse Rapid Transit Company had recently adopted a new transfer containing some of the same features as those used in Rochester. In Syracuse, only the day of the month was printed on the face of the transfer, so that the amount of waste was less. He thought that too little attention had been paid by railways to the subject of checking transfers. Mr. Collins had drawn attention to a very important matter in his discussion on this subject. In cities where transfers are used it had been the general practice for conductors to accept almost anything in the way of a transfer. This was especially the case in large cities where the transfer traffic had been increasing year by year. In Syracuse and adjoining cities meetings held recently to instruct conductors in the proper use of transfers had resulted in a very material reduction in the proportion of transfer traffic. The Syracuse Rapid Transit Company followed the practice of paying men their regular wages for attendance at meetings of this character and he considered the money was well expended.

The questions for discussion to be presented by Mr. Duffy (a) "Selection of Platform Employees"; (b) "Fare Collection and Registration"; (c) "Interdepartment Relations," were then taken up.

ENGAGEMENT OF PLATFORM EMPLOYEES AND RUSH-HOUR TRAFFIC

Mr. Duffy referred to the difficulty experienced by most companies in getting just the right kind of employees. He outlined the conditions under which most companies employ new men, and mentioned the physical examinations, the weeks spent in learning the duties, the payment for a uniform, the employment for rush-hour service, and the gradual advancement to other runs. Interurban lines did not experience the same difficulties as city properties, due to the absence of tripper runs, which is a feature of city operation. At Syracuse 105 cars were operated regualrly in the day-time service recently with 35 or 40 extra cars during the rush hour, and 475 platform men were employed. Of the total number of new men hired during 1909 more than 50 per cent had left during the year. If a man continued with the company more than a year he was likely to remain in the service indefinitely. He thought that all companies had had a similar experience.

Mr. Fassett, Albany, brought up the subject of whether there was not some method of distributing the rush-hour traffic. The hours of work of almost all skilled employees were now eight hours per day. In Troy, 4500 girls were employed in collar factories and their day ended at the same hour each night. No railway could in a few minutes take care of the rush of traffic which such a condition imposed. The company could not afford to employ men for the full day in order to take care of the traffic which would be offered in so short a period. It seemed to Mr. Fassett that the only solution of the problem would be the release of people from factories of this character at different hours by dividing the force of employees of large factories into shifts. The problem of rush-hour travel would have to be met by action outside of that of the railways. It had been suggested that the Public Service Commission should order large cars to replace small cars, but Mr. Fassett said that small cars could be unloaded in 30 seconds, while the large cars could not be unloaded in two minutes. Even the railways of Greater New York, with their excellent facilities, had been unable to solve the problem of rush-hour traffic.

Mr. Cook, Rochester, said that the plan of having manufacturers release their employees at different hours had been considered in Cleveland, but that the employers could not be persuaded to make a change of more than one or two minutes for the release of part of their men. Mr. Duffy, Syracuse, said the condition was one of importance to all city companies.

Mr. Fassett, Albany, said that the Public Service Commission had tried to help the situation in Albany by limiting the number of people on a car, but that the effort had been a failure. The public insisted upon the right to board cars whenever it desired. Mr. Barnes, of the Public Service Commission, thought that each case would have to be handled by itself, and that no general treatment of the problem of rush-hour traffic could be formulated.

Mr. Callaghan, Rochester, said that in the discussions before the employees of the Rochester lines he had tried to impress the men with the fact that their positions were just as good as those of bank clerks. They earned just as much when they worked seven days a week as many tradesmen. It was necessary to instill in the minds of platform men the idea that their positions were honorable. If the companies could get the men to realize that their positions were important, fewer men would resign from the service.

Mr. Duffy, Syracuse, said one company had guaranteed the extra men a certain minimum wage per week. The real trouble was with the men who remained in employment for less than one year. Mr. Rockwell, Syracuse, said that for the last two weeks he had been able to keep his extra men at work shovelling snow. Mr. Duffy referred to the New York State law prescribing a maximum 10 hours' work inside of 12 consecutive hours. Mr. Eastman, Syracuse, mentioned a statement compiled by him some time ago of the records of men who stayed in the service and those who left. He also found that if

the company could keep a man a year, the chances were that he would remain in the employ of the company indefinitely.

FARE COLLECTION AND REGISTRATION

Mr. Duffy brought up the next subject, "Fare Collection and Registration." Mr. Fassett, Mr. Callaghan and Mr. Peck participated in the discussion.

INTERDEPARTMENT RELATIONS

Mr. Duffy next took up the subject "Interdepartment Relations." It was the practice for the transportation department to criticise the engineering or the maintenance of way or some other department on certain lines. Managers should try to inculcate a spirit of loyalty to the company rather than too much independence on the part of each department. To this end, meetings held often to discuss the work of the company are of great benefit, particularly in the case of accidents.

NEXT MEETING

Consideration of the topics which were to have been presented by Charles A. Smith, superintendent of the United Traction Company, Albany, N. Y., was postponed until the next meeting.

The president then announced that the annual meeting of the association would be held on June 27 and 28 at Cooperstown.

DINNER OF THE NEW YORK ASSOCIATION

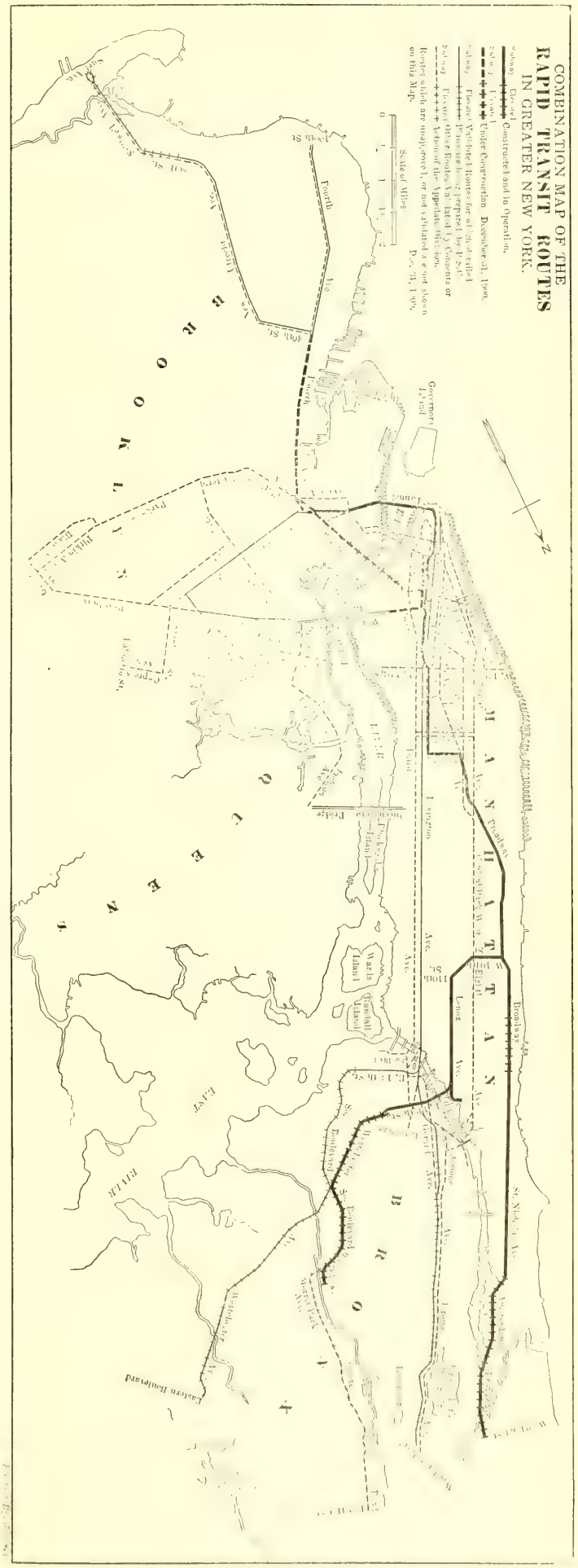
The dinner in connection with the eleventh quarterly meeting of the Street Railway Association of the State of New York was held on Tuesday evening, March 1, at the Hotel Seneca. The attendance was about 75 and would have been larger if quite a number of members had not been prevented from coming on account of the heavy floods in Central New York. The dinner was a most pleasant affair enlivened by good speeches and hearty singing. Short addresses were delivered by Don Beach, legal representative of the Rochester railway and lighting interests; Charles R. Barnes, inspector of electric railroads, Public Service Commission, second district; J. W. Hinkley, Jr., president and general manager of the Poughkeepsie City and Wappingers Falls Electric Railway Co.; "Bob" Searles, president of the Rochester Railway & Lighting Company. The delegates were welcomed by George Dietrich, president of the Rochester Chamber of Commerce, who spoke of the good relations between the Rochester railway system and the city.

RAPID TRANSIT ROUTES IN NEW YORK CITY

The New York Public Service Commission, First District, has reprinted in pamphlet form an appendix of its annual report for 1909, giving a summary of the facts concerning the legal steps taken upon rapid transit routes up to Dec. 31, 1909.

The historical part of the pamphlet deals with the present subway and while the principal developments described are of a legal nature, a few operating statistics are given. These include the following, showing the number of fare passengers per car mile: 1905, 3.84; 1906, 4.31; 1907, 4.47; 1908, 4.55; 1909, 5.15. With the exception of the results for 1905, which relate to the period from Oct. 27, 1904, to June 30, 1905, the figures relate to the fiscal year ended June 30.

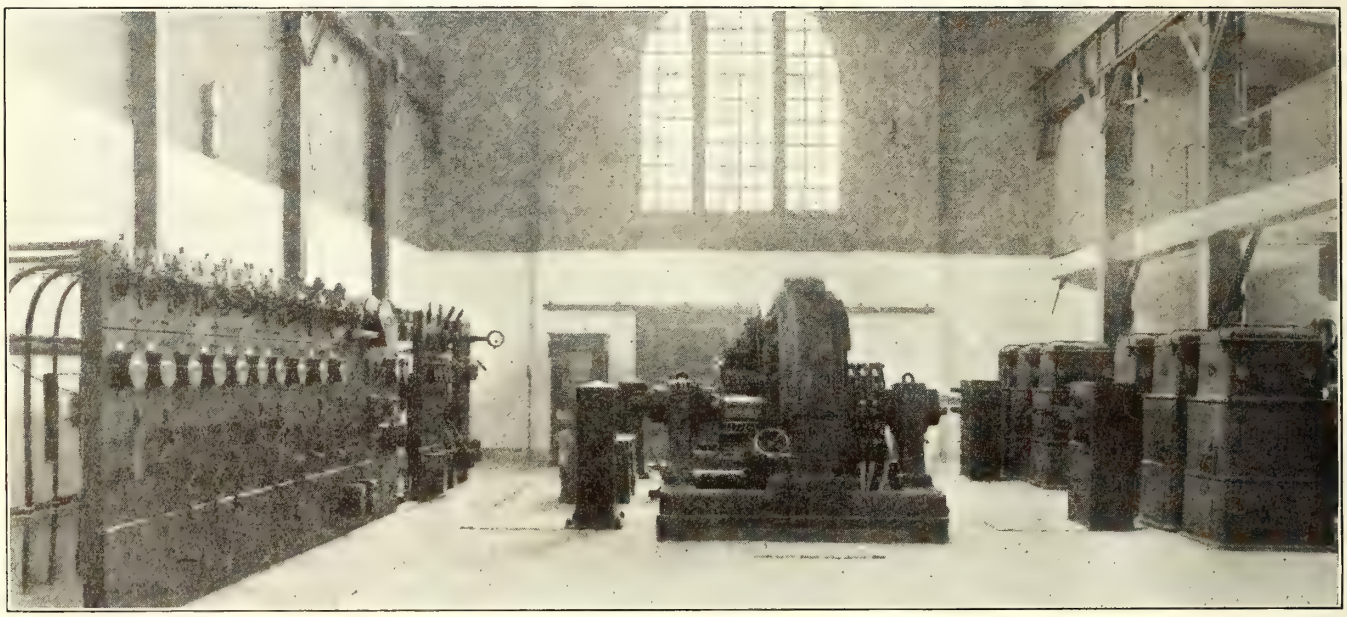
The accompanying map, prepared from one compiled by the commission, shows the existing routes and those under construction and validated for construction. It does not show the lines of the Manhattan Elevated Railway.



The Babahoyo & Guaranda Electric Railway, Baltimore, Md., has been chartered in Maryland for the purpose of building a 40-mile electric railway in Ecuador, South America, and engage in a general development business in that country. Ecuador has guaranteed the principal and interest on 6 per cent bonds running 33 years on the amount of the authorized capital stock, interest to be payable in New York, London or Paris.

NEW SUBSTATION EQUIPMENT OF THE BOSTON ELEVATED RAILWAY COMPANY

The Boston Elevated Railway Company has recently placed a 2000-kw initial capacity substation in operation near the Egleston Square station of the Forest Hills elevated extension to assist in the power supply of the elevated and surface lines of the district lying south of Dudley Street. The inauguration of this service is of special interest on account of the departure which it represents from the company's well-known practice of direct-current power generation and distribution. For many years the electric transportation lines in Boston and its vicinity have been supplied with power from direct-current generating stations located at convenient points on the system, without the use of alternating current except for temporary service. The Egleston Square substation marks the first permanent use of alternating current methods on the Boston system, and while the present source of energy supply for this installation is of a somewhat special character, the design and construction of the building and its equipment are calculated to meet the company's future needs without any handicaps from the prospective development of an alternating current generating and distributing system.



Egleston Square Substation at Boston—Interior

The substation is now supplied with energy from a steam-driven turbo-alternator located at the company's Dorchester power station. This unit is the only alternating-current generating machinery in the company's system, and was formerly used for direct-current service as a turbo-generator wound for 600 volts and delivering current directly to the trolley and feeder system in the vicinity of the power plant. Recently this machine was rebuilt for alternating current service, delivering 25-cycle energy at 13,200 volts for transmission to Egleston Square through an underground cable line of No. 1 copper, assembled in a three-phase paper-insulated, lead-covered sheath and traversing a distance of about three miles. The turbine is a two-stage Curtis-General Electric outfit with a normal speed of 750 r.p.m. and has a maximum capacity of about 3500 kw. The company recently purchased a large tract of land in South Boston, at the water front, with the expectation of ultimately building a great central generating station at this point and converting the system into one of alternating current production and transmission, with distribution from substations either supplementing or superseding the less economical means of existing stations. While the details of this probable development have not yet been made public, the general location and arrangement of the Egleston Square installation accords with anticipated power requirements, and a large amount of extension capacity has been provided in the building, with provision for an ultimate equipment if necessary of four 2000-kw. rotary converters with transforming and other auxiliary apparatus.

BUILDING

The building is located at the intersection of Washington and Bray streets, Boston, in a residential district traversed by the Forest Hills elevated and surface lines, and is a brick, concrete, and steel structure of an ornamental design, both tapestry and common brick being used. The substation was built large enough for its ultimate capacity in machinery, and is about 93 ft. long by 50 ft. wide, with a sloping roof rising to a maximum height of 44 ft. above the surface of the street. Copper trimmings are provided, as in the company's latest elevated station designs, and special attention was given to securing window ornamentation.

ROTARY CONVERTERS

At present the substation contains two Westinghouse rotary converters of 1000-kw. rating, each machine being of the six-phase, 25-cycle, self-starting type, with a direct current delivery at 600 volts, flat compounded.

The usual anti-hunting devices are provided. On their alternating current sides these machines receive energy at about 400 volts. For each rotary is installed a bank of three 375 kva. air-blast Westinghouse transformers, with a 13,200/400 voltage ratio. Starting switches are provided with connections for half, two-thirds and full voltage from the secondary transformer taps. The guaranteed efficiencies of the rotaries are:

Half Load	Three-quarters Load	Full Load
95 per cent.	96 per cent.	96½ per cent.

Air for transformer cooling is supplied by three 24-in. squirrel cage fans, which are each direct driven by a 7½ hp., 400-volt Western Electric induction motor. The fans were supplied by the Massachusetts Fan Company, of Watertown, Mass., and embody a recent design having considerable capacity in a limited area, with interblades extending almost to the center of each fan structure. This construction gives the entering air a slowly whirling motion and a comparatively rapid radial motion toward its shallow peripheral blades, which results in the motion of a relatively large amount of air for the power expended.

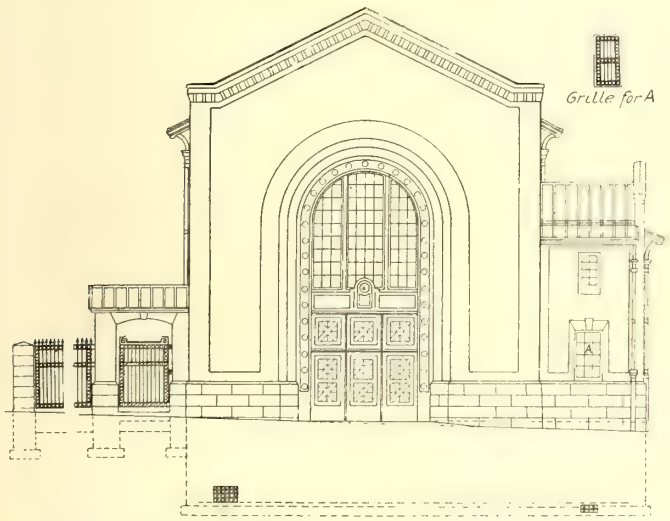
ARRANGEMENT OF MACHINERY

The substation interior is divided into a main operating room, a sectionalized basement, a bay for high tension oil switch and auxiliary wiring, and a bus bar compartment gallery located 12 ft. above the main floor. In general the course of the electrical energy through the building is from the north to the south side, with little or no doubling back. The operating room has

a span of 37 ft. and is served by a 21-ton Whiting hand-operated crane throughout its entire length. The interior walls are faced with white enamelled tile for a height of about 12 ft. above the floor, the balance of the wall being of pressed brick. The crane is carried on a runway supported on I-beams, the latter being carried on steel columns. The bus bar compartments are carried on a concrete gallery and all machinery foundations are of concrete.

ELECTRICAL CONNECTIONS

The line from Dorchester power station enters the basement of the building, terminating in a cable pot head, from which the leads rise to the switch and bus-bar compartments on the north side of the building. Knife selector switches for disconnecting service are provided in each phase between the pot head and the bus bars, so that the entire substation may be positively cut off from the supply line when desired. After passing the selector switches, which are located in fire-proof compartments, the phases rise to 13,200-volt, three-pole oil circuit breaker equipments, of solenoid operated type, with automatic actuation and overload inverse time limit relay attachments. Another selector switch is included in each phase beyond the oil switch, giving a knife switch installation on each side of the latter and rendering repairs absolutely safe. After passing through the second set of knife switches the line connects with the bus bars. From the latter, which are horizontal, each in a separate compartment with soapstone barriers and concrete bases, leads pass downward through disconnecting knife switches to the automatic oil switches to the primary sides of the transformer banks for each rotary. From the transformer secondaries the leads are carried under the floor past the starting switch stands to the a.c. rings of the rotaries, and the d.c. output of the rotaries is then carried under the floor to the mai nswitchboard, which is located near the south wall of the operating room. Wired glass doors are provided for oil switch compartments.



Egleston Square Substation at Boston—Side Elevation

SWITCHBOARD

The switchboard contains all the latest standard indicating and recording equipment, and is built in 17 panels, ten of which are used for direct current feeder distribution service, and the remainder for the rotary and station equipment. Each of the feeder panels is equipped with a circuit-breaker of the carbon type, single pole positive switch and Weston ammeter. Two of the panels are used for supplying power to the elevated lines near the substation, and the rest of the active feeder panels are operated in connection with the surface line service. Each circuit-breaker is wired to an electric gong located on the board, with automatic alarm in case of an opening. A small plug board included in the equipment permits the operator to keep any breaker open if desired, without ringing the bell. The station panels contain recording wattmeters for the total direct current output of the rotaries, the substation power and lighting output, and a curve-drawing d.c. voltmeter is installed, together with a totalizing d.c. ammeter between the rotaries and the distributing busses. The latter has a capacity of 10,000 amperes at 600 volts. Polyphase recording wattmeters are also included for the a.c. sides of the rotaries. The oil switches are operated by a 55-cell battery, supplied by the Electric Storage Battery Company, of Philadelphia. The battery is located in a small chamber on the level of the bus bar gallery, and is charged twice a week through a rectifier installation of General Electric manufacture. The negative and equalizer switches of each rotary are mounted on a common pedestal and each machine is provided with a field break-up switch for use in starting with the proper polarization. The station lighting service is controlled from a separate slate panel mounted on the wall behind the switchboard, the different parts of the building being well-subdivided. Relays are included in the switchboard equipment for facilitating the control of the oil switches, and power factor indicators and a.c. ammeters are included in the instrument layout. The d.c. feeders pass out of the operating room to the basement and thence to the surface and elevated lines by underground conduits. All the frames of the a.c. equipment are grounded to a common ground bus located in the basement. Part of the basement is used as an air space for the supply of the transformer cooling service. The substation is lighted by ten Cooper-Hewitt mercury vapor lamps installed 25 ft. above the floor and operated in a single series circuit from the 600-volt d.c. bus bar.

MISCELLANEOUS.

The elevated feeders are each of 2,000,000 circ. mils, and two 3,000,000 circ. mil cables are brought into the substation from the rail and ground returns of the outside elevated and surface service. At present the substation is operated mainly on the morning and evening peaks, which occur between 7 and 9.30 a. m. and from 3 to 7.30 p. m., in general. Ground was broken for the construction of the substation in September, 1909, and on Dec. 30 the machinery was placed in operation. When the company begins the operation of eight-car trains on its elevated lines the new substation will be operated on longer shifts. One man per shift handles the work at present.

FRENCHMAN'S ISLAND BEING IMPROVED AS A PLEASURE RESORT

A contract has been let by the Oneida Lake Terminal Company, Syracuse, N. Y., a part of the Beebe electric railway system, to the American Steel & Wire Company, New York, N. Y., for the delivery and laying of 5700 lineal feet of three-conductor armored submarine cable from a point at South Bay to Frenchman's Island in Oneida Lake, to convey power for lighting that island. The company is spending a large sum in the development of Frenchman's Island as a high-class family recreation park, and as a part of this scheme more than 10,000 16 c.p. incandescent lights are to be strung there. The cable is for three-phase, 25 cycle current, and 300 kw. will be delivered continuously at a power factor of 90, 6600 volts, with an ohmic drop of not more than 2½ per cent, and a rise in temperature of not more than 20 deg. Cent. Current is to be obtained from the service of the Niagara, Lockport & Ontario Power Company at North Syracuse at 33,000 volts and there stepped down to 6600 volts. Transformers will be put in at Frenchman's Island to reduce the current to 110 volts.

Oneida Lake is one of four large inland bodies of water reached by various roads in the Beebe system. It is only 12 miles from Syracuse and is on the Syracuse & South Bay Electric Railroad. The Beebe system operates a frequent steamer service on Oneida Lake during the summer season. Year-around traffic on that line will be materially increased by the purchase of a site at South Bay for a large club house for the Onondaga Angler's Association, which has 1500 members. This club house is to be erected in the early spring and will cost about $50,000.

CONSTITUTIONALITY OF THE CORPORATION TAX LAW

A case in which the application of the corporation tax law to the municipally-owned subway of New York will be tested has been appealed to the United States Supreme Court. This case is in addition to several other cases pending to test the constitutionality of the law of which the only other one involving a public service corporation, however, is that affecting the Coney Island & Brooklyn Railroad. A report of the action in the latter case was published in the Electric Railway Journal of Feb. 12, 1910, page 277.

On Feb. 16 there was filed with the United States Supreme Court an appeal from a decision of the United States Circuit Court for the Southern District of New York in the case of Arthur Lyman and Arthur T. Lyman as trustees of the last will and testament of George Baty Blake, deceased, appellants vs. Interborough Rapid Transit Company et al. Arguments will be heard by the Supreme Court on this case, as well as on the other cases, during the week beginning March 14.

The bill of complaint in the Interborough case, in which Evan Shelby, of New York, is solicitor for the complainants, sets forth that Arthur Lyman and Arthur T. Lyman, of Waltham, Mass., citizens of Massachusetts, are the owners as trustees of 150 shares of capital stock of the Interborough Rapid Transit Company of New York. The bill shows that the company was organized under a special act of the Legislature of New York. In this act, specific provision was made for the incorporation of companies to take over and exercise the rights and privileges connected with the leasing, operation and maintenance of any rapid transit railway, which might be constructed by a municipality under the provisions of the act. The bill describes the extent of the railroad operations of the company, comprising the municipality owned subway, the leased Manhattan Elevated Railway, the New York & Queens County Railway, a majority of whose capital stock is owned, and the New York City Interborough Railway, a majority of whose stock is also owned.

While some of the provisions of the bill follow closely those advanced in the case affecting the Coney Island & Brooklyn Railroad, several bring out the points in which the case is different from any others that have been taken before the Supreme Court. For instance, one section of the act under which the company was incorporated provided that the person, firm or corporation operating any road of the character described in the act "shall be exempt from taxation in respect to his, their or its interest under said contract and in respect to the rolling stock and all other equipment of said road," but this exemption shall not extend to real property. The company pays interest upon the city bonds issued for building the subway.

A valid agreement is said to exist between the State of New York, the city of New York and the Interborough Rapid Transit Company, exempting the company from any and all taxation in respect to its interest in the rapid transit railroads in the city of New York. This exemption from taxation has recently been upheld by the Court of Appeals of the State of New York in the proceeding instituted by the company to review a special franchise tax assessed against it by reason of its interest in the rapid transit railroad.

One paragraph in the bill states: "Your orators further aver that the said tax imposed upon the defendant Interborough Rapid Transit Company by the provisions of said act of Congress, to the extent that it is measured by the income derived from the operation by the said company of the rapid transit railroad in the city of New York, as aforesaid, is a tax imposed upon the franchise of said company to hold and operate a municipal property created and existing for the purpose of carrying on a municipal enterprise; that it is a tax upon the income derived by the said Interborough Rapid Transit Company from said property; that as such it is a tax upon an incident to said property, and is a tax upon municipal property, and is therefore not a tax that can be lawfully imposed by the Congress of the United States under the constitution of the United States."

The court is therefore asked to decree that the provisions of the act concerning the tax be declared unconstitutional, null and void, and that the company be restrained from voluntarily complying therewith.

NEAR-STOP OPERATION *

BY W. R. W. GRIFFIN, GENERAL SUPERINTENDENT, NEW YORK STATE RAILWAYS, ROCHESTER

In the general operation of a street railroad the question of location of passenger stops matters little, provided there be but one stop at an intersection and a practically uninterrupted movement up to the point of stop.

This being the case, the near stop or far stop is purely a question of sentiment and local education, together with physical conditions at the stop for proper boarding and alighting, and it does not enter for or against ease of operation as far as proper transportation is concerned.

But this condition is met seldom, especially in our larger cities at prominent intersections where all classes of traffic are heavy and in diverse directions.

In such cases the municipal authorities, for the safety of pedestrians as well as all other traffic, make ordinances and rules governing the movement across such intersections, the principal rule of which is, and should be, the halting or stoppage of all traffic before crossing, and that the movement be made under the direction of a municipal traffic officer.

Where street car traffic is heavy, necessitating a large number of cars in short space of time, the time of movement over a given stretch of track very often determines the regularity of service to a large portion of the outlying district. And whenever it so happens that this stretch of track is common to a large portion of the lines operated, it becomes necessary to eliminate all possible dead time or unnecessary stops.

The method of operation in Rochester previous to Nov. 16, 1909, was to make the near or safety stop, move by the direction of the city traffic officer, and then to make the far or loading stop.

This necessitated making seven stops in a little over 1000 ft. on Main Street, between State and St. Paul, and the number of cars required to operate the schedules had then reached the limit of free movement. The holidays came, requiring still more cars. The company had to work out some plan of relief, and eventually adopted the near stop.

Before the adoption of this plan, checkings were made during the rush hour of the average delay at the first or safety stop, and of the average time required to load and unload all passengers handled at the several intersections.

The check of average delay of the near or safety stop at the corner of Main and St. Paul (corner) the slowest showed 35.2 seconds, and of the far or loading stop 24.7 seconds during the 15 minutes' peak of the rush hour at night.

This check showed that the near or safety stop afforded ample time to do all the loading and unloading at this corner and, that being the case, the car service could be benefited by using the 24.7 seconds' loading time in car movement.

The company also figured that some of the near stop delay was due to blockade of the loading stop and that the elimination of the latter stop would lessen the near stop delay in actual operation. This proved to be the case as the first night's operation showed a 20 per cent quicker and freer movement, and this was maintained until the schedules were closed up to a required movement of 25 seconds headway during the 15 minutes' peak of the rush hour. This movement proved to be too rapid for the traffic direction, which never got faster than 28 seconds headway, working under the existing traffic rules and regulations.

As stated, successful operation depends more on the uninterrupted movement from and to the point of stop, than upon any other element after once the car has completed loading and un-

* Abstract of paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

loading. Checkings on Rochester's heaviest corners show this loading and unloading time to be an average of about 13.5 seconds per stop or 2.2 seconds per passenger handled during the rush hour at night.

The successful operation of the near stop, as well as the far stop, requires the very best possible co-operation of the city's traffic officers and no doubt, on heavy traffic streets, the near stop operation is by far the safest and will cause less serious accidents and personal damage.

METHODS OF CHECKING TICKETS AND OTHER PASSENGER REVENUE*

BY J. C. COLLINS, SECRETARY AND AUDITOR, NEW YORK STATE RAILWAYS, ROCHESTER

My subject is, in other words, the expeditious audit of conductors' returns and prompt report of the results to the operating men, in order that they may have the figures of the different lines as early the next day as possible, and be able to correct or regulate the traffic according to the figures shown. This is especially true where the change of a schedule may show too many miles run or car-hours made; or where an extra train may be needed on an interurban run.

This sounds very easy, but unless the system is simple, the records correct and the work done daily, the results cannot be shown promptly, and two or three days' losses are made before correction is possible. If these reports are prepared the next day and studied carefully by the transportation department, only one day elapses before a change of schedule can be made.

With the advent of the Public Service Commission it became more important than ever before to enter into the most minute detail. With an accurate record of the conductors' returns, properly classified, there is no question that may be asked by the commission that cannot be promptly answered.

In preparing returns promptly the next day, we have found the receiver system a very valuable and satisfactory method. It not only facilitates the prompt issue of what we call our "daily report," but at the same time saves disagreement between the conductor and the auditing office as to what was turned in. This system may be a little more expensive than others, but in our experience it has justified any difference there may be between the cost of employing a number of girls to do the work, and of two men to do it at night.

Suppose we start with our method where the work originates —with the car record. This record is placed in the car by the night watchman. It contains space for car number, date, time, commencing and closing numbers of the car registers (which in our case are 5- and 3-cent registers), and the line and the badge number of each conductor operating the car. When the car pulls in at night a man known as the register taker enters the car as soon as possible, removes this record, compares it with the register, O.K.'s the card, and sends it to the auditor's office. This is checked against the trip sheets for register readings, and then compared with the car record for the previous day to see that there is no discrepancy between the commencing and closing numbers.

The next step is the conductor's trip report, which is the basis for compiling the earnings, passenger and transfer statistics. Our trip sheet shows the station number, the car number; also, under head of registered fares, tickets, 5-cent, 3-cent and transfers, total passengers and total cash for each trip; also the commencing and closing number of transfers issued, the train number, motorman's and conductor's badge numbers and names, the total time worked, date, run number and line.

On the back of the trip sheet is the register record, giving the car number, beginning and closing numbers of each register and the difference; also the total of each register. Where the line may have a suburban end, the registered cash fares, tickets and total passengers, also total cash, are shown.

The trip sheet, after being totaled by the conductor, is turned in by him to the receiver, together with his cash, tickets, collected transfers and unused pads of transfers. The receiver compares the differences as shown by the register record on the back of the trip sheet with the conductor's returns, and multiplies the 5- and 3-cent cash fares to see that they correspond with the cash. He then puts his initials on the sheet in indelible pencil.

The receiver has a sheet which is called "audit of conductors' collections" for each line in the city. This sheet shows the names of the conductors, and the various items of cash fares, tickets and transfers. On this sheet the receiver lists the different conductors' trip sheets, totals it and forwards to the auditor's office together with the tickets and trip sheets, the money being sent to the cashier.

The auditor's office verifies the trip sheets with the receiver's record, counting the tickets and examining them to see that they are properly canceled and good only on the line on which they were used.

The summary of the receiver's sheets for each line is then made on a separate blank, which gives the detail of revenue tickets, revenue passengers, free tickets, non-revenue transfers, cash fares and total passengers. This sheet gives—on the reverse side—a recapitulation of earnings, showing the cash receipts and ticket values and the total earnings of each line. This sheet is checked and verified, and signed by the clerks who do the checking and verifying. This summary of receiver's sheets is also used for the various passenger statistics, and is posted daily in our statistical record. From these sheets the daily earnings report is also compiled.

Our method of treating ticket sales is to credit them to earnings when the tickets are collected, not when they are sold. If the ticket sales are credited directly to earnings, then the record of passengers carried for that day is not correct. On an interurban road, in comparing one day with another, you will be comparing one day's sales against another day's passengers carried.

We had considerable trouble, some time ago, from the loss of transfer envelopes. Our method provided that at the end of each trip the conductor should put the transfers collected in an envelope, seal it, and deposit it in a box at one end of the car. This envelope was taken out by the man who took the register statement when the car pulled in at night. We found a number of discrepancies between the conductors' records and the envelopes turned in to the office. Sometimes this was due to the conductors, and sometimes to the man who collected the transfers.

To correct this and avoid the many disputes that occurred, the conductor is now required to turn in his collected transfers at night, at the same time that he accounts for his money. To save any discrepancy between the number of transfers turned in and the number the conductor's record called for, we adopted a gummed band, on the inside of which we had printed, at the head, "transfers collected" and the various trips. These trips were numbered from "No. 1" up, and opposite each trip number were the words "in" and "out." At the end of the trip the conductor places his transfers in the envelope and enters on the envelope certain data, together with the number of transfers in the envelope; and the number as marked on the envelope is also marked on this band under the head of "in" or "out," according to the trip number. At the end of the day the band is placed around the envelopes and the ends are sealed. The outside of the band shows the date, conductor's name, badge number, line, car number, number of envelopes and the name of the person receiving the envelopes. The receiver to whom these are turned in counts the number of envelopes and checks them off against the number reported on the band, without disturbing the seal.

The package is then sent to the auditing office, and the clerk again verifies the number of envelopes. By this method there can be no question of lost envelopes, eliminating any dispute between the conductor and the auditing office.

The clerk in the auditing room opens the envelopes and com-

* Abstract of paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

pares the number of transfers contained therein with the number the conductor shows on his trip sheet and on his band, and in case of a shortage the head checker verifies the clerk's count before sending out a shortage statement.

Since the adoption of this method we have had practically no trouble with shortage of transfers collected, and the men are pleased with the system. I would recommend this very highly to any road whose method of turning in transfers is similar to our previous method.

All the members of this association may not be aware that we have lately inaugurated a new transfer system in the City of Rochester. It would be very patent to them, however, if they were residents of the Flower City or connected with the corporation that had the temerity to put into effect a transfer system that would prohibit the public from taking two rides for one fare or from getting a shave or transacting some business around the corner by exceeding the time limit. This state of affairs is common, I have no doubt, with most roads, and it is due to the fact that transfers have not been audited as to time and line, and that the conductor receiving them, knowing that he is not being checked regularly, grows careless and accepts anything in the shape of transfers that it presented to him, whether the time limit or even the day has expired. The fact is, we received some transfers from Syracuse, which were the same color as the Rochester transfers, and they were accepted by our conductors without any question. I merely state this to show how lax the conductors can become if the transfers are not properly audited.

Our new system has required us to put on a few more girls, but we are now checking the transfers as to color (a new color being used every 15 minutes of the hour), as to transfer point and number called for in each envelope. The conductor is charged with any shortage, and a report is made to the transportation department on what may seem to be lack of knowledge in handling transfers.

EDUCATIONAL METHODS USED IN PLACING NEW SYSTEM OF TRANSFERS IN OPERATION*

BY W. C. CALLAGHAN, SUPERINTENDENT OF TRANSPORTATION, NEW YORK STATE RAILWAYS, ROCHESTER.

While the title of this paper would indicate methods covering any railroad system, the writer assumes he was expected to describe the new transfer system lately put into effect in Rochester. It will be along these lines that the subject will be treated. The new transfers of the New York State Railways Rochester lines were introduced on Dec. 1, 1909, and superseded a method of transfers that were governed by no positive rules or regulations. Transfers were accepted when presented at almost any point and at almost any time. However, for a year previous to the date mentioned, an attempt was made to enforce the time limit to within an hour at least. The new method required the presentation of the transfer within the time limit punched and at the junction indicated on the back of the slip. No discretion whatever was left to the conductor as to the enforcement of these rules, as rigid compliance to them was required. The new transfers had the day of the week and month printed on them and were issued in four colors to indicate that they would be void in 15 minutes, 30 minutes, 45 minutes or one hour after the hour punched. The idea of the different colors was original with our general manager, and had never been used anywhere else before. The same punch mark used to show the line destination indicated the junction on the back of transfer. Exceptions to the enforcement of this rule were made in three case only:

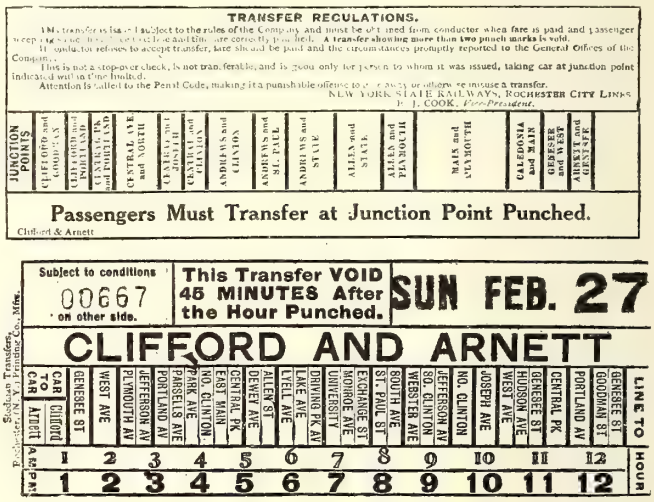
First. When the car in charge of the receiving conductor was late.

Second. Where passengers made a positive declaration that they had used the transfer properly and in connection with such a declaration were willing to write their name and address on the back of transfer.

Third. In the case of suburban lines with a longer headway than the time limit of the transfer.

For the education of the public, placards were posted on the car windows to advertise the change in the transfer system. These cards were carried for a week previous to the date of the change and were supplemented by news articles and a full-page advertisement in the newspapers. These news articles and advertisements not only were printed in the English dailies, but in all the foreign papers published in Rochester. Rochester has a large number of Italian residents. The latter voluntarily held meetings to instruct each other and without requesting the railway company to be represented. In these articles and advertisements the use and object of the transfer were clearly defined and explained. That these advertisements bore good fruit is proven by the few complaints received after the installation of the new transfers. In fact, there were absolutely no complaints in which Italians or other foreigners were concerned. On the first day the transfers were issued there were 25 telephone calls for information in regard to them; on the second day there were 60 calls and on the third day 50 calls.

On Dec. 13, 1909, the privilege of these transfers was extended in so far that where cars ran over comon tracks in the same general direction, the choice was given passengers of presenting their transfers at either the first or last junction point.



Front and Back of Rochester Transfer Ticket

The original rule was for the last junction point only. Transfers would also be accepted at the first stop on either side of the junction point.

Meetings were held daily for a week for the instruction of employees, there being four sessions at different hours to accommodate all employees. Motormen and conductors were required to attend these meetings, which were supposed to last about one hour and they were paid at platform rates for the time given up to this purpose. The men could attend as many of these meetings as they saw fit and were paid for all meetings attended. Some employees were present at as many as five of these meetings. Sample transfers were distributed at these conferences and each point was gone over thoroughly by using blackboard illustrations. Particular attention was paid to the proper punching of the time limit.

Probably the point which was given the most attention in these talks was that while the conductors must be firm in the rigid, literal enforcement of these rules, they must be gentlemanly under all circumstances and at no time lose their temper. The results show that the instructions along these lines were very successful for, notwithstanding the unlimited criticism to which the new transfer system was subjected for a while, not a complaint was received about the ungentlemanly conduct of any conductor in the enforcement of the rules covering them.

While these meetings were supposed to last one hour, they

* Paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

often lasted as long as two hours through the asking of questions by employees. The management knew from the experience of previous meetings that many times employees would not ask questions because they feared to display ignorance. By assuring them that the officials had omitted to refer to features which needed explanation and were only reminded of them by employees asking questions, a great number were induced to make inquiries. In this way certain things which were apparently clear were found to involve some points which needed explanation. The instructors were astonished at some of the questions that were asked concerning features about transfers which had not occured to the officials even after long study.

To assist conductors where an improperly punched transfer was presented, the conductor, after taking the number and color of such transfer, presented a card to the passenger reading as follows:

TO OUR PATRONS
THIS CONDUCTOR IS
GOVERNED BY RULES he is NOT AUTHORIZED TO CHANGE
In case of dispute KINDLY PAY FARE and send complaint with this card to the General Superintendent of Transportation for adjustment, 267 State Street. Both 'phones 887.
NEW YORK STATE RAILWAYS,
Rochester Lines.
This Conductor's No. is ———.

When given to the passenger this card had the badge number properly filled out in the space left for that purpose.

The day the new transfer was put into effect, cards headed "Don't Blame the Conductor" were posted on the windows of all cars. These cards informed the public that the conductors were working under rules which they could not change and requested passengers with complaints of any kind to present their grievance to the office. This slogan "Don't Blame the Conductor" was undoubtedly one of the happiest thoughts that could have occurred, as it became general all over the town and no doubt relieved the conductors from many disputes and troubles.

REPORT OF THE COMMITTEE OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK ON RELATIONS WITH THE AMERICAN ASSOCIATION

The report of the committee appointed by the Street Railway Association of the State of New York to represent the association at a conference with the executive committee of the American Street & Interurban Railway Association and representatives of other State associations, presented its report at the meeting of the New York association March 2 at Rochester. The report was signed by the committee, consisting of E. F. Peck, C. Loomis Allen, J. W. Hinkley, Jr., and J. H. Pardee, and was as follows:

"A conference was held on Jan. 27, 1910, of representatives of various State organizations and the committee on public relations of the American Street & Interurban Railway Association. As a result of this conference recommendations were made to the executive committee that the presidents of the various State associations be appointed as members of the committee on public relations. By means of membership on this committee, matters of mutual interest to the State associations and the American association can be discussed and proper action taken.

"The recommendation made by the joint committee was favorably acted upon by the executive committee of the American Street & Interurban Railway Association, and on Feb. 16, 1910, President Jas. F. Shaw of the American Street & Interurban Railway Association confirmed the appointment of presidents of the various State organizations as members of the committee on public relations."

A report of this meeting was published in the ELECTRIC RAILWAY JOURNAL for March 5, 1910.

CHARTERED OR SPECIAL CARS*

BY B. E. WILSON, GENERAL PASSENGER AGENT, NEW YORK STATE RAILWAYS.

It is generally admitted that the best business for a railway company to secure is the regular, every-day travel, but I doubt if there is a company represented at this meeting that is not confronted with the proposition of furnishing chartered or special car service to care for the movement of picnics, pleasure parties, funerals, or service at hours not covered by the regular schedule. The question is, what is the proper basis upon which to cater to this special service. Should the rates and conditions be such that this particular class of business would grow and in the end make demands for additional equipment and an increased list of extra motormen and conductors? It is certain that local conditions should govern the policy of each company. Nevertheless, the basis upon which special service is to be furnished can and should be of a stimulating rather than a depressing nature. It should also be remembered that the effects upon the regular service and patrons of the road should be given proper consideration.

Funeral or picnic parties, with a distinctly different purpose in view, do not want to be transported by the regular, every-day service, and why should they? Picknickers, upon pleasure bent, do not care to ride on the same cars that are used by the regular riders. Imagine children, on their way to a Sunday School picnic, riding in the same car in which prisoners, fastened with iron shackles to a police officer, are being taken to a jail or a police court; or on a car in which some poor unfortunate, with blood trickling over his face, is being conveyed to a hospital. Both of these occurrences are common upon lines operating in districts without ambulance service. Again, should the members of a funeral party necessarily allow their grieved feelings to affect other passengers.

The special car service is a subject which, in my opinion, has never been given the proper attention. Are the rates and conditions under which cars are chartered, consistent? Are the rates higher than would be demanded under regular service? If so, why are they? Is it the desire of the company to carry the picnic, the funeral and the hospital in one car? Have not the passengers using the regular service some rights?

The rates and conditions governing special car service should not only be based upon earnings of the cars themselves, but upon the influence of these cars upon the general service. Make the special car rates such that they will stimulate and not retard the promotion of picnics and outings. What better means is there of getting earnings out of idle equipment, and what better opportunity of protecting regular travel against unusual loads? Perhaps your equipment is always busy. If so, you had better purchase more, for you must be giving poor service at some time or other.

Cars should be chartered only when they can be spared from the regular service. I find that several companies have this in mind, for their conditions governing chartering of cars state that cars will be chartered only when they can conveniently be supplied by the company. Personally, I cannot see where it would be possible for any company to build up a special car business that would support equipment to be used for that purpose alone, unless it were funeral car service. Place the rates on the funeral cars where they will not be prohibitive to a small funeral or for persons of moderate circumstances, for it will be from this class that the patronage will come. It is a common occurrence for a man of means to engage a car for the sake of exclusiveness, but remember he, too, has a limit.

The proof that too little attenton has been paid to special car service is contained in the following abstracts from tariffs issued by companies, as regards chartering and arranging for special cars. Note the differing conditions under which this service is offered. On referring to about 35 tariffs, I found that no two were alike.

* Paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

Toledo & Western Railway Company.—This company arranges for special or chartered service on the party ticket plan. One-way party tickets, for 10 or more passengers, traveling together, are sold between all points, at 1½ cents per mile, or fraction thereof, adding where necessary to make rate end in 0 or 5. No party rate is made at a rate less than 10 cents per passenger. Round-trip party tickets are sold by this company as follows:

10- 49 (inclusive) traveling together at 1⅓ fare for round trip.
50- 99 (inclusive) traveling together at 1¼ fare for round trip.
100-149 (inclusive) traveling together at 1 fare for round trip.
150-200 or more traveling together at 4/5 single fare for round trip.
No excursion ticket is sold at less than 25 cents.

Public Service Railway Company.—Cars are chartered on the basis of $3 per hour, or 5 cents per minute, covering actual operation, round-trip time for one-way trip. If a lay-over is made at the destination or the car has to return for the party, a charge is made for an additional round-trip time. This company quotes a minimum of $6 for any service. A chart, in blue print form, showing the running time between all points, is used in making chartered car charges. Orders for cars are made in triplicate, one copy going to the party engaging the car, one copy to the auditor and the remaining copy to the supervisor of the car house. A deposit of $3 is demanded in each arrangement, the conductors collect the balance due and in turn give a receipt. The conductor then turns in the money at the car house.

Schenectady Railway Company.—Chartered car orders are made out in duplicate. The original copy is sent to the car barn. After movement, the trip sheets, money and order are sent to the superintendent, who in turn forwards them to the cashier, together with duplicate order attached. In the city of Schenectady a straight 5-cent fare is charged, with minimum charges as per following table:

Type of Car.	Seating Capacity.	One-Way.	Round-Trip.
Small, closed	26	$4.00	$6.00
Medium, closed	40-42	5.00	7.00
Large, closed	54-56	5.00	8.00
Small, open	45	5.00	7.00
Large, open	65	6.00	9.00
Chair car	24	7.50	10.00

When trip is not continuous and car is subject to order of party, an extra charge of 50 cents per hour is made for lay-over time. Between midnight and 6 a. m., a minimum charge of $10 is made. Advertising cars or trolley trips within the 5-cent fare limit of the city of Schenectady are chartered for the first hour at $6, with an extra charge of $1.50 for each additional quarter of an hour or fraction thereof. With regard to the suburban service, tariff sheets give definite rates between stations or stops on the basis of seating accommodations and distances. For a car seating from 52 to 56 passengers, the charge for one-way between Schenectady and Watervliet is $15. If regular fares were charged for the full complement of passengers, the total revenue for the car would be $11.20. Likewise, the round-trip chartered rate is $25 for the same service, against $19.60, if regular fares were collected.

Detroit United Railway.—This company charters city line cars on the basis of $3 per hour, this time covering the leaving and returning times at the car houses. For funeral cars a charge of $15 is made for service to and from cemeteries within the city limits, or $20 to and from cemeteries within 7 or 8 miles of the center of city. The following conditions govern the chartered service: Number of passengers limited to 60; no advertising streamers to be carried on cars; an extra charge of $5 per hour for service between the hours of 1 a. m. and 5 a. m. For round-trip service, where rates of $15 and $16 are charged, a charge of $1 per hour is made for all time over four hours. For service where a rate of $25 or more is charged, a reduction of $5 per car is allowed on each car ordered, in addition to the first car. Comparing the Detroit system of chartered car service against regular fares we find that the chartered car rate, one-way Detroit to Toledo, is $33, while on the regular fare plan the revenue from 60 passengers would be $48. Likewise, the round-trip chartered plan would be $55, whereas the regular fare plan would give $90.

Indianapolis & Cincinnati Traction Company.—This company's tariff states the following conditions as regards special or chartered cars: "Special cars are furnished on reasonable notice, where practicable. Agents will quote rates, but all final arrangements must be made with traffic manager, or general agent. Special cars are subject to a minimum of 40 passengers per car. If a car is chartered for a round trip, the rate per passenger would be 5 cents, plus the full first-class fare. If chartered for single trip, the charge will be, per passenger, the first-class fare at a minimum cost of 40 cents. Between midnight and 5 a. m., an additional charge of 5 cents per half hour, per passenger, is made, the charge to be added to the minimum charge per passenger when the rate per passenger is less than the minimum."

Terre Haute, Indianapolis & Eastern Traction Company.—Special tickets are made out for an entire party at a rate of 1 cent per mile per passenger (round-trip mileage), a minimum of 60 passengers per car on the Northwestern Division, and 55 passengers on other divisions, with a minimum charge for the service at all times of $25 per car. All additional passengers are charged at the same rate of 1 cent per mile, the fare to end in 0 or 5. Cars used one way only are charged 75 per cent of the round-trip mileage. Agents contract for special cars only when approved by superintendent. A comparison of this company's chartered rates against its regular fares shows the following: Chartered car, Indianapolis to Youngstown, one way, $66; regular fares, $77; round-trip chartered, $88; regular fares, $148.50.

Erie Railroad Company.—Chartered or special cars are arranged for on the per capita basis. In other words, regular fares are charged and the car in each case is to earn not less than $1 per mile, with a minimum charge of $25.

New York State Railways—Rochester Lines.—City service cars are chartered at the convenience of the company on application to the general passenger agent, at the following rates, between any two points in the city of Rochester: One way, $4, and round trip, $7. The chartered car service is limited to transportation only and does not include the use of the car during lay-overs or the time between the outbound and the return trip; and it does not include transfer privileges.

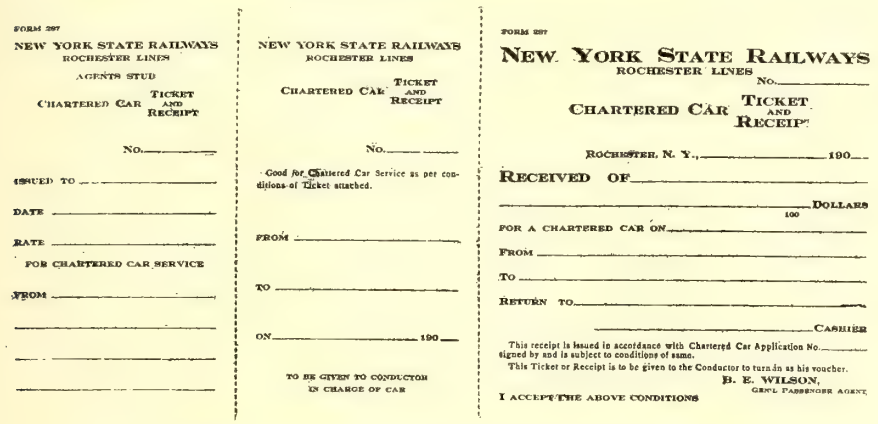
The Rochester Company's interurban chartered car service is at all times subject to the convenience of the company and arrangements can be made only by application through the office of the general passenger agent. Chartered car rates, covering points between any two stations, are computed on the basis of 75 cents per mile, using round-trip mileage between the points of service. When this total mileage contains a fraction less than one-half, the fraction is dropped; when the fraction is greater than one-half the charge is made for a whole mile. A minimum charge of $20 is made for any service. Interurban chartered car service is limited to the time the car is in operation from start to destination, and does not include lay-over or time between outbound and return trips. The number of persons to be carried in any one chartered car is limited to 50. Each additional passenger carried is charged regular fare.

In arranging for chartered car service, each applicant must sign a chartered car application form covering all details of the service required. The application also contains a clause releasing the company from any claim that might be made for failure to furnish service, in consequence of strike, lockout, want of power, or any other unavoidable contingency. The application also stipulates that no liquors shall be taken on the car and that fireworks shall not be used; that yelling or disorderly conduct shall not be indulged in, nor vocal or instrumental music of any character be given while on the car.

As soon as the application is signed by the person engaging the service, a chartered car ticket, consisting of two coupons, is given the applicant. This ticket not only serves as a receipt for money paid on account of the service, but also shows the exact routing. The coupons are surrendered to the conductor, one for the outgoing trip and one for the return trip. The conductor on receiving same fills out a form on the back, to show the mileage made, time out and time in, as well as the number of passengers carried. The tickets are then turned

in to the receiver the same as any other car earnings. While the chartered car application and tickets are made out in the office of the general passenger agent, both bear the signature of the cashier, to whom the money is actually paid for service.

The transportation department receives its instructions concerning service in the form of a chartered car order, which is made in duplicate. This order is issued to the division superintendent with advice as to the number of cars, type, routing, party for whom service is engaged and person in charge. The chartered car order also shows the number of the chartered car application, which is held in the office of the general passenger agent, and the number or numbers of chartered car tickets which are to be surrendered for the service.

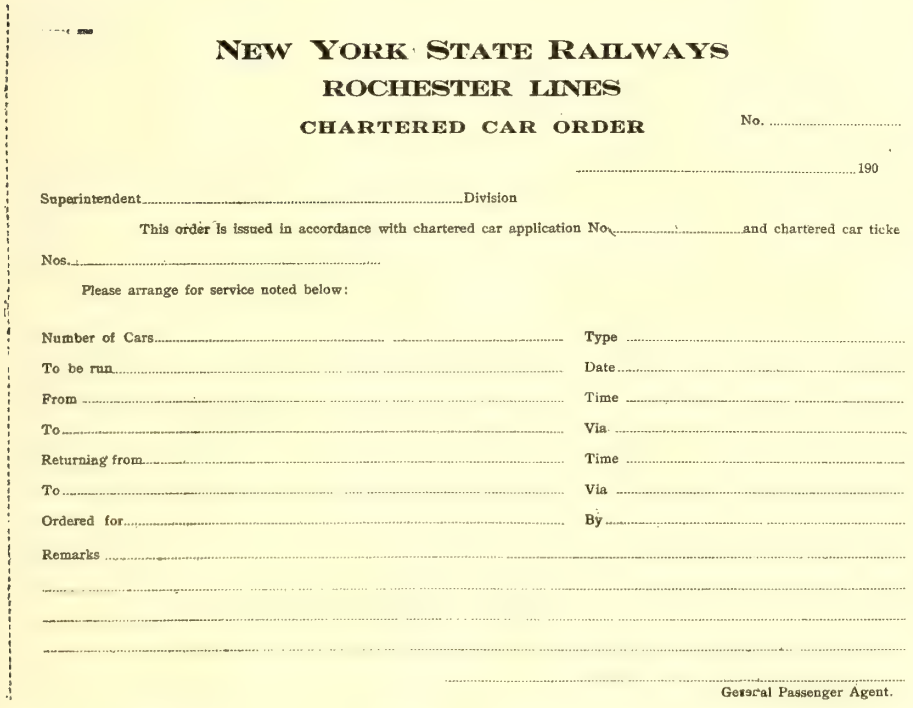


FORM 297
NEW YORK STATE RAILWAYS
ROCHESTER LINES
AGENTS STUB
CHARTERED CAR TICKET AND RECEIPT
No.
ISSUED TO
DATE
RATE
FOR CHARTERED CAR SERVICE
FROM

NEW YORK STATE RAILWAYS
ROCHESTER LINES
CHARTERED CAR TICKET AND RECEIPT
No.
Good for Chartered Car Service as per conditions of Ticket attached.
FROM
TO
ON 190
TO BE GIVEN TO CONDUCTOR IN CHARGE OF CAR

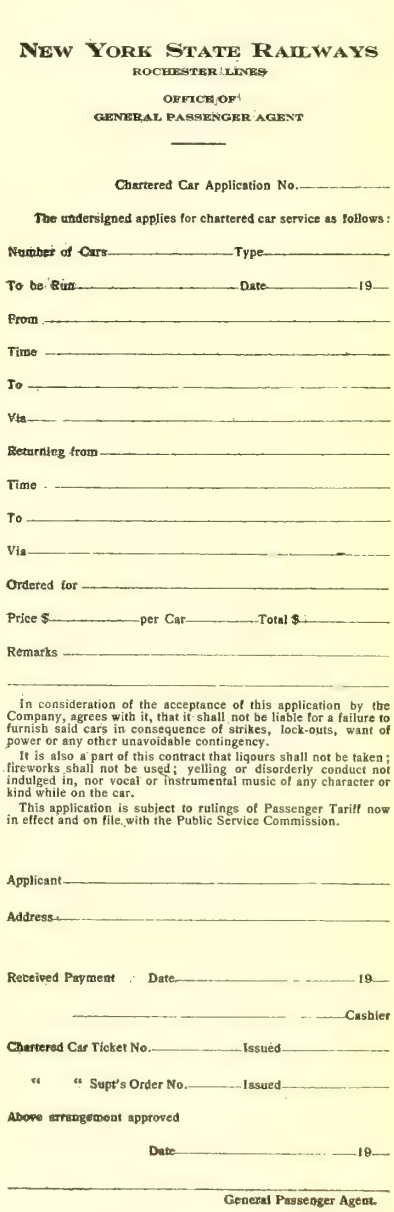
FORM 297
NEW YORK STATE RAILWAYS
ROCHESTER LINES
No.
CHARTERED CAR TICKET AND RECEIPT
ROCHESTER, N. Y., 190
RECEIVED OF
DOLLARS
100
FOR A CHARTERED CAR ON
FROM
TO
RETURN TO
CASHIER
This receipt is issued in accordance with Chartered Car Application No. signed by and is subject to conditions of same.
This Ticket or Receipt is to be given to the Conductor to turn in as his voucher.
B. E. WILSON,
GENL PASSENGER AGENT
I ACCEPT THE ABOVE CONDITIONS

Form of Receipt for Chartered Car, Rochester



NEW YORK STATE RAILWAYS
ROCHESTER LINES
CHARTERED CAR ORDER
No.
190
Superintendent Division
This order is issued in accordance with chartered car application No. and chartered car ticke
Nos.
Please arrange for service noted below:
Number of Cars Type
To be run Date
From Time
To Via
Returning from Time
To Via
Ordered for By
Remarks
General Passenger Agent.

Form of Chartered Car Order Issued to Superintendent by General Passenger Agent. (Duplicate Stays in the General Passenger Agent's Book)



NEW YORK STATE RAILWAYS
ROCHESTER LINES
OFFICE OF
GENERAL PASSENGER AGENT
Chartered Car Application No.
The undersigned applies for chartered car service as follows:
Number of Cars Type
To be Run Date 19
From
Time
To
Via
Returning from
Time
To
Via
Ordered for
Price $ per Car Total $
Remarks
In consideration of the acceptance of this application by the Company, agrees with it, that it shall not be liable for a failure to furnish said cars in consequence of strikes, lock-outs, want of power or any other unavoidable contingency.
It is also a part of this contract that liquors shall not be taken; fireworks shall not be used; yelling or disorderly conduct not indulged in, nor vocal or instrumental music of any character or kind while on the car.
This application is subject to rulings of Passenger Tariff now in effect and on file with the Public Service Commission.
Applicant
Address
Received Payment Date 19
Cashier
Chartered Car Ticket No. Issued
" " Supt's Order No. Issued
Above arrangement approved
Date 19
General Passenger Agent.

Application for Chartered Car, Rochester

This entire arrangement calls for payment for the service in advance. At the end of each month a complete report of the chartered car service is made in the office of the general passenger agent, by drawing off the details from the applications. This report is sent to the auditing department, thereby making a complete check in all departments interested.

GENERAL

An analysis of the rates and conditions given would, I think, show as far as city operation is concerned, that the practice of the Public Service Railway of New Jersey, with slight modifications, comes the nearest to answering all purposes. This company makes a charge of $3 per hour, or 5 cents per minute, for actual operating time, with a minimum charge of $6. This arrangement is preferable to that of making a flat charge for one-way and round-trip service between any two points, in that the person engaging the service can, if desired, designate the route and pay for the service accordingly.

Conditions that should be added are that the service should be paid for in advance; that the person engaging the service should receive a chartered car ticket, which would be surrendered to the conductor, who would turn the same in to the receiver or cashier, with a notation on the back of the ticket as to the number of passengers carried, etc. The number of passengers to be carried should also be stipulated and a minimum charge given for the one-way service. If the plan of the Public Service Railway were to be adopted by any company, the chart showing the operating time between all points should not be forgotten.

The writer appreciates the fact that to find a proper or satisfactory standard for interurban service is a different problem. The rate per passenger or car-mile would, of course, have to be subject to the physical conditions of the line. In other words, if the car houses are located such that a considerable amount of dead mileage is necessary, the rates must be based accordingly. A definite rate per mile would seem to be a proper basis for interurban service. It should be such that the actual miles operated to furnish the service will be covered by

a rate per mile at least equal to the average earnings per car-mile of cars in regular service. The charges should be paid for in advance and a ticket issued to the person engaging the service for transmission to the conductor in charge of the car.

While the rate per mile basis is recommended for interurban service, the chartered car conditions or rulings in the tariffs might be on the per capita basis, charging regular fares, with the condition that the car in each case is to earn a certain rate per mile, with a stipulated minimum charge, say, $25, for any service. This arrangement would allow a person to deposit a certified check to cover special service, regular fares could be collected on the car and if the total fares collected did not over the rate, the amount of the difference could be deducted from the check and the balance returned; or, if the fares collected exceeded the guaranty rate, the check could be returned intact. This arrangement would eliminate the overloading of special cars for the purpose of lowering the fare per passenger.

The arranging of all special service should be restricted to an officer of the company who is at all times acquainted with the demand that may be made upon equipment at the date when special service is requested.

BLOCK SIGNALING ON ELECTRIC RAILWAYS *

BY CHARLES R. BARNES, INSPECTOR OF ELECTRIC RAILROADS, PUBLIC SERVICE COMMISSION OF NEW YORK, SECOND DISTRICT.

At the last quarterly meeting of your association, held in Albany, I was obliged to ask your indulgence because I was unable to present a paper for discussion at that meeting on the question of block signals for electric railroads. I am again called upon to ask your indulgence for the superficial manner in which this important subject is treated now owing to the pressure of official duties. The statements which follow are made not as a representative of the Public Service Commission. Neither the commission nor any of its members has in any way endorsed the statements or opinions herein expressed.

The definition of a "block signal system" as presented in the modern electric dictionary of the English language is as follows: "A method of signaling especially designed to prevent collisions between trains traveling on the same line of rails." There is no block signal system in use on any of the railroads in this country which complies with the requirements mentioned in the foregoing definition; namely, "prevent collisions between trains traveling on the same line of rails." This statement needs no argument in its defense, as the records of collisions on roads equipped with the modern signal systems prove that they do occur in large numbers on some roads and that the possibility of such occurrence exists on all the roads so equipped. It is considered unnecessary in a paper to be presented to street railway men to describe the different kinds of signal systems in use on the various roads, both steam and electric in this country. It is, however, considered necessary to emphasize the foregoing remarks by stating that inherent defects which exist in all of them permit collisions.

The more important defects in signal systems as at present constructed and operated are:

First. That all systems, manual or automatic, depend upon the co-operation of human elements to accomplish what they are designed to do, namely, prevent collisions.

Second. Nearly all of the automatic signals in use are moved in one direction by motive power. The movement in the other direction is dependent upon the relationship existing between the signal engineers and Divine Providence. Under the present methods of automatic block signaling, an engineer entering a block has no positive knowledge that the signal at the outgoing end of that block is set at "danger." He has no positive knowledge when approaching a signal at "safety" whether such signal was set at "safety" for him to proceed or whether it remained at "safety" after its last operation.

Third. There is no signal system in use on any of the railroads in this country which positively provides for emergencies which may result in collision, such as that engineers may disregard danger signals or become incapacitated.

Several attempts have been made to obviate the third defect. The most important device for that purpose is the track-trip used in the subway in New York City. By this means, the train line will be opened and an emergency stop made if the motorman attempts to pass a danger signal. To illustrate the defects of the system in use on this railroad and its unreliability, it need only be pointed out that the tripping devices can be broken in such a manner as to prevent their operation for the purpose intended. Such breakages could be discovered only by close observation.

The traffic on the steam railroads of this country has been steadily increasing for a number of years past with the result that at times their operating officials must strain every point to move the traffic. To accomplish this, safety of operation has been seriously impaired in some cases. This statement is not intended as a reflection upon the judgment or ability of railroad officials generally, but is presented as a fact and one which from the standpoint of operating officials no doubt is justified. That it is a fact is demonstrated by the modification of the "31" train order in use on many roads of the "19" order; also by the use of "permissive" block signaling on roads equipped with signal systems.

Discussion of the subject of block signals with signal engineers leads me to believe that the inventive genius of these men can and would develop a signal system which would absolutely prevent collisions on railroads under all conditions. Further discussion of the subject with railway operating officials develops the fact that they consider such a system among the future possibilities. They feel, however, that the companies would not adopt such a system, as it would become impossible from the present operating standpoint to move the trains on time, and public opinion would not endorse the adoption of any means which would increase the possibility of delay to train movement. I am firmly of the opinion that a signal system can be devised and maintained in such a manner as to interfere with train movement only when absolute safety requires. I am further of the opinion that the passenger would prefer to arrive at his destination an hour late than to be brought there on time in a box.

The Interstate Commerce Commission, realizing the number of collisions occurring on the roads throughout this country, has appointed a committee of eminent experts to investigate this subject thoroughly, with authority to make such recommendations for improvement in the present block signal systems as in their judgment may be necessary. No doubt much benefit will be derived, both to the railways and to the general public, by this committee's researches and the ensuing recommendations. Reference is made to the work of this committee at this time only to show that the defects in the present block signal system are recognized and that the necessity for improvement exists.

At this point in the discussion it is pertinent to ask: "What has all this to do with the topic under which this paper is presented, namely, 'Block signaling on electric railroads?'" The foregoing has been presented because there is a tendency among some of the managers of the interurban electric railways literally to follow in the footsteps of their brothers—the operating officials of the steam railroads. In my judgment this practice is a mistake. The revenue of the interurban railway companies is in most cases confined to receipts from passenger earnings, so that the financial results of collisions to them are more serious than to the steam railroads, which have large additional revenue from freight business. In plain words, the steam railroads can afford to adopt certain methods of operation and pay the losses incident to them, whereas a collision occurring from the same method of operation on an interurban road might place the company in the hands of a receiver.

There is no intention to discourage the introduction of any of the present block signal systems on the electric railways of this State, as safety of operation would be increased on a

* Paper presented at the quarterly meeting of the Street Railway Association of the State of New York, Rochester, March 2, 1910.

number of them by the use of some of the devices now on the market. What is intended by this paper, however, is to impress on the minds of the electric railway men of this association that nothing should be left undone which will add in any way to the safety of passengers on the roads under their charge; also that the numerous fatal collisions occurring on steam railroads throughout the country and on some of the interurban electric railways outside the State of New York, will bring about the development of a block signal system which will absolutely prevent such occurrences. A crystallization of public sentiment would compel the adoption of an improved system.

Having pointed to some of the defects of the present block signals, I feel it incumbent upon me to suggest some of the essential elements of a signal system which in my judgment would fill the requirement mentioned.

Briefly stated, such a system on a steam railroad should consist of home and distant signals, normally at danger and so constructed that when an engineer is approaching the distant signal and the block is clear, the signal at the outgoing end of the block would be locked in the danger position. The locking of this signal would be a means to cause the home and distant signals at the entering end of the block to go to safety. The system would include a tripping device arranged so as to operate the throttle and the air. This tripping device should form a part of the block signal system and be so interlocked with it that if it is not in the operative position at the outgoing end of the block, the home and distant signal at the approaching end could not be brought to "safety." All engines should be equipped with a device to be operated by the aforementioned trip, the operating device on the engine to be so constructed that if it is not in the operating position the engine cannot be started, and if after the engine is started it is broken or moved from the operating position, the steam will be shut off and the air applied. All of the signals should be controlled from a central office so that a train can be stopped at any point.

While the suggestions given above apply to the equipment of a steam railroad, the main principles of such a signal system are equally applicable to electric interurban railway work.

NEW ENGLAND STREET RAILWAY CLUB MEETING

The regular monthly meeting of the New England Street Railway Club was held at the American House, Boston, on Feb. 24, with President W. D. Wright in the chair. After the usual dinner and business meeting an illustrated talk was given by C. B. Edwards, chief engineer of the Fore River Shipbuilding Company, Quincy, Mass., on the power plant of the U. S. Battleship *North Dakota*. Following Mr. Edwards, a paper was read by Milan V. Ayres, electrical engineer of the Boston & Worcester Street Railway Company, upon "The Lawyer and the Engineer." Mr. Ayres traced the influence of engineering progress upon the social fabric, emphasizing the changes in industrialism introduced by the invention of the steam engine. He pointed out that the progress of engineering has caused profound changes in all departments of the law, especially in the subject of torts. Since the time of James Watt, this subject has grown from one of the least considered subdivisions of the law into a department so great that it absorbs a majority of the time of the superior court in many large cities. Yet so slowly do new ideas gain acceptance, that the people hardly yet recognize that engineering is entitled to a place among the professions, even now being in the speaker's opinion the greatest of them all.

After reviewing the ruling power of the modern lawyer in the administration of affairs, Mr. Ayres turned to the difficulties which surround the lawyer in the conduct of casses depending upon engineering technicalities. He defined the lawyer as one skilled in the application of man-made laws to the control of mankind, and the engineer as one skilled in the application of the laws of nature to the needs of mankind. The work of the one is creative and of the other conservative. Points of contact between the legal and the engineering profession are not limited to one department of the law or one branch of engineering. The legality of a contract is the business of the lawyer; but if the subject matter is of an engineering nature, engineering knowledge may be even more necessary than legal knowledge in framing its terms. It would be easy to draw a contract which would sound all right to the lawyer, but would be impossible of fulfillment for engineering reasons. The same thing is true of franchises, for these are a special form of contract. The speaker cited a franchise in which provisions for street lighting were copied undoubtedly from a prior contract between the city and an electric light company. This franchise described a lighting system to be installed by the railway which in fact could not have been operated from its power house except by the installation of special and costly apparatus for the purpose; yet to the counsel for each party the contract was all right. On the other hand, in operating under the terms of an agreement, in testing to see if the terms are being met, and in arbitrating between parties to a dispute growing out of a contract, the engineer needs the judicial frame of mind and often a knowledge of legal terms.

Torts are the prodigal sons of engineering, and the engineer's first duty is the prevention of the tort by the avoidance of accident. To do this the engineer needs enough legal knowledge as will suffice to imbue him with a due appreciation of the cost of accidents, and his client no less. It is principally due to the imperfections of engineering that the law of torts owes its importance. America has more accidents, more persons killed by accidents and more money lost by accidents, in proportion to the volume of business, than any other country. Our laws relating to the prevention of accidents and those dealing with damage claims are about the worst in the world.

Much can be done by both the lawyer and the engineer to avert accidents, but they can never be wholly eliminated. When accidents do occur the fields of the lawyer and of the engineer are intermingled. The engineer is likely to be the first on the scene, and he needs a knowledge of law in order to secure and preserve the necessary evidence. He should combine the analytical power and special skill of engineering with the knowledge of the lawyer as to the nature of evidence in order that useful and essential evidence shall be obtained. On the other hand, the lawyer is liable to overlook important data in the search for immaterial evidence. In trying a case with technical bearings a lawyer needs engineering knowledge in order to make proper use of his own expert witnesses and to be able to ridicule any incompetent so-called experts which the other side may introduce. The engineer who is called to the witness stand as a technical expert should have enough knowledge of the law to appreciate the bearing of his testimony on the case, and particularly such knowledge of the nature of evidence and such an appreciation of the mental limitations of a jury as will lead him to give his answers without any unnecessary detail, yet with the greatest possible clearness of expression. In like manner the lawyer needs to combine with his legal and forensic abilities the knowledge of the engineer and the rarest gifts of the teacher, that he may explain scientific technicalities without superfluous detail yet with clearness.

Closely related to the work of the lawyer in relation to contracts and franchises is the work of organizing corporations, securing rights of way and special charters. Much work of this kind generally has to be done at the inception of an enterprise, especially of a public service character. The project itself is largely one of engineering. At hearings before State commissions, county and municipal authorities, the engineering features have to be explained in detail. It is customary for lawyers to do this work, calling in the engineers as special witnesses to explain the plans and estimates. This requires exhaustive study, and the man who advocates an enterprise of this kind before a public board might perhaps better be an engineer than a lawyer, provided he were gifted with the power of speech and argument. In conclusion the speaker touched upon the progressiveness of engineering and its growing influence in human affairs.

JAPANESE ELECTRIC RAILWAY STATISTICS

The accompanying table is a report on the operations of 16 Japanese electric railways for the first half of the year 1908. The Tokyo system is the largest, with a daily schedule requirement of 712 cars for 426,684 passengers carried on 97 miles of track. The daily mileage in Tokyo averages 80,252.4, but the number of passengers per car-mile is only 5.3, as compared with 6.4 on the Tosa Railway. The Tokyo Tramways lead in the daily revenue per mile, with 166.32 yen, but are far behind most of the other companies in the daily earnings per car and the earnings per car-mile, which reach the maxima of 62.09 yen (Keihin Railway) and 0.495 yen (Seto Railway), respectively. All revenue figures in the table are given in the yen, which has a current value of about 50 cents.

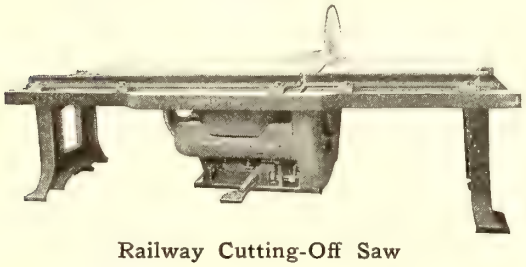
TRAFFIC RETURNS OF JAPANESE ELECTRIC RAILWAYS.

City—	Cars used daily	Passengers daily	Mileage	Car miles daily	Passengers per car-mile	Revenue	Daily revenue per mile	Daily revenue per car	Revenue per car-mile
Tokyo	712.	426,684	97.126	80,252.4	5.3	$2,794,200.000	$166.320	$21.57	$0.191
Tamagawa	7.	1,778	8.9	694.0	2.5	24,325,640	23.110	19.09	0.192
Kyoto	55.5	14,614	19.6	3,670.0	3.9	175,045.580	49.610	17.32	0.262
Keihin	26.	20,337	32.5	4,626.0	4.4	293,833,220	62.771	62.09	0.353
Yokohama	18.	18,430	6.45	2,107.9	8.7	97,732,850	82.750	29.83	0.255
Yenoshima	6.5	1,109	6.8	415.9	2.6	21,323.200	18.850	18.02	0.281
Odawara	97.	1,142	9.01	754.7	1.5	41,899.910	2.340	2.37	0.305
Hanshin	28.25	23,472	38.3	6,594.7	3.5	451,543.310	127.680	14.83	0.376
Kawagoye	4.	694	8.	452.8	1.5	16,193.020	11.000	22.24	0.196
Ise	13.	2,514	11.9	906.6	2.7	51,177.670	35.540	21.63	0.310
Nagoya	24.7	4,836	7.9	2,093.6	2.3	59,911.580	41.180	13.32	0.157
Seto	2.	405	10.	189.3	2.1	17,055.080	9.475	46.85	0.495
Sundzu	5.	871	3.7	260.9	3.3	9,634.165	14,684	10.58	0.203
Iwamura	3.	105	15.4	145.0	0.7	3,670,930	1.390	6.72	0.101
Tosa	11.	6,373	9.3	988.7	6.4	31,989.050	18.900	15.97	0.177
Bungo	4.4	1,043	7.5	855.4	1.2	37,344,360	27.350	46.63	0.239

AN AUTOMATIC RAILWAY CUTTING-OFF SAW

The accompanying cut shows a cutting-off saw made by the J. A. Fay & Egan Company, Cincinnati, Ohio, for cutting off large timbers up to 16 in. x 19 in. and material required in car and general construction work. The carriage is mounted on planed ways on the frame and is moved back and forth by double rack and pinon driven by friction. This arrangement permits the carriage to be advanced at a regular speed for cutting off, by pressure upon the foot treadle, and as soon as the treadle is released the carriage returns. The feed of the machine is driven by gears, no sprockets or chain being used. The carriage is driven by a cut rack and pinion, with the pinion located at the center of the travel of the carriage.

One of the good features on this machine is the traversing of the saw carriage by friction, so that the rate of advance is always under control of the operator while the saw is running, and the movement of the carriage is automatically stopped in either direction. The table is equipped with adjustable idler rollers permitting the material to be easily moved across its freight traffic.



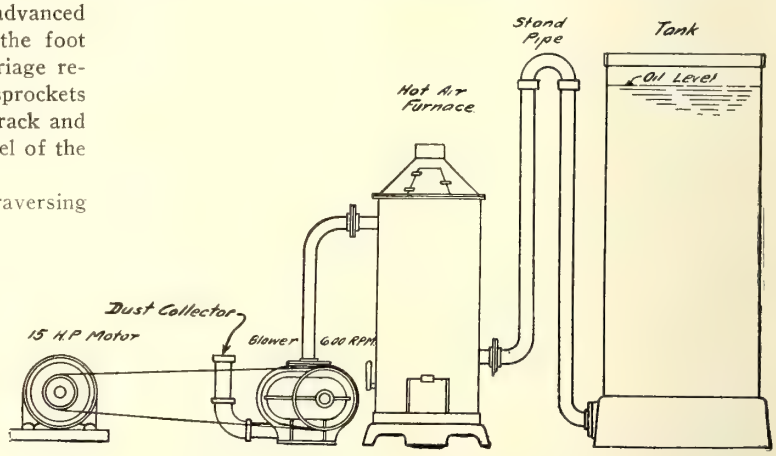
Railway Cutting-Off Saw

The West Hartlepool Corporation, Hartlepool, England, has had under discussion for some time the question of the purchase of certain sections of the local electric tramways, which are at present in the hands of the Hartlepool Electric Tramways. There has been no discussion of the subject in open Council meetings, the matter having been dealt with wholly in committee. A decision has, however, been come to to promote a bill in the coming session of Parliament for the purpose of obtaining the necessary powers to purchase.

A NEW OIL AND TRANSFORMER DRYING DEVICE

Experience has demonstrated that it is practically impossible to prevent moisture from condensation from being deposited in transformers during transportation or storage, and the device shown diagrammatically in the accompanying cut is manufactured by the General Electric Company to dry them before use. It consists of a hot air furnace, blower, dust collector, driving motor, and necessary piping, pulleys and belt.

The hot air furnace contains a 3-in. wrought iron coil suitably supported inside a sheet iron casing, the whole being mounted on a cast-iron base. The furnace is designed in a manner similar to a self-feeding stove, two doors being provided, one at the top of the furnace for the admission of fuel, and one at the bottom for removing the ashes and also regulating the draft. Wood and charcoal have proved very satisfactory as fuel, but hard coal may also be used if forced draft is provided. This can be easily accomplished. The blower has a normal capacity of 300 cu. ft. of free air per minute delivered at a pressure of 6 lb. per square inch, is designed for a speed of 600 r.p.m., and requires 15 hp to drive it when delivering normal output. The dust collector or air filter consists of a perforated sheet metal pipe 4½ in. in diameter, connected to the blower with a suitable elbow, and forms the point of entrance of the air to the blower. Cheese cloth is tied around the pipe. The piping between the furnace and oil tank is extended above the oil level to prevent flooding the furnace with oil if the valve in the base of the tank is not closed when the blower is stopped.



Oil and Transformer Drying Device

The method of its operation is as follows: After the fire has been started in the furnace the fan should be put into operation. The air is drawn through the dust collector which frees it from all impurities and is then heated in the furnace to approximately 100 deg. C. The hot air being forced through the transformer and oil at a pressure of 6 lbs. per square inch, absorbs all the moisture and raises the di-electric strength of both the oil and windings to its original value. No hard and fast rule can be given as to the time actually required for thoroughly drying the transformer, but it is believed for ordi-

nary cases of moisture, that a 10-hour run after maximum temperature is attained will be sufficient. Break-down tests should be made from time to time on samples of the oil taken from the transformer and the drying continued until the oil is able to withstand a puncturing test, the value of which is prescribed by the transformer manufacturer.

A NEW AUTOMATIC TRAIN STOP

The Automatic Train Stop Company, New York, has recently brought out an automatic train stop which cuts off the power and applies the emergency brakes when a train overruns a danger signal or when a running rail in the section ahead is broken. In this system, the contact rail or trolley wire from which the cars obtain power is cut into sections, the end of each section being connected to the adjacent end of the next section through a circuit breaker. These breakers are normally closed so that the regular operation of the road is not different from that of the ordinary electric railway. If, however, a motorman of one train attempts to run too close to the preceding train, the breakers feeding the section upon which he is then operating will open and cut off his power, while a device in the car equipment applies the brakes for an emergency stop. The successful operation of this system therefore assumes the presence of some form of automatic brake and some form of signal apparatus. It should be understood that

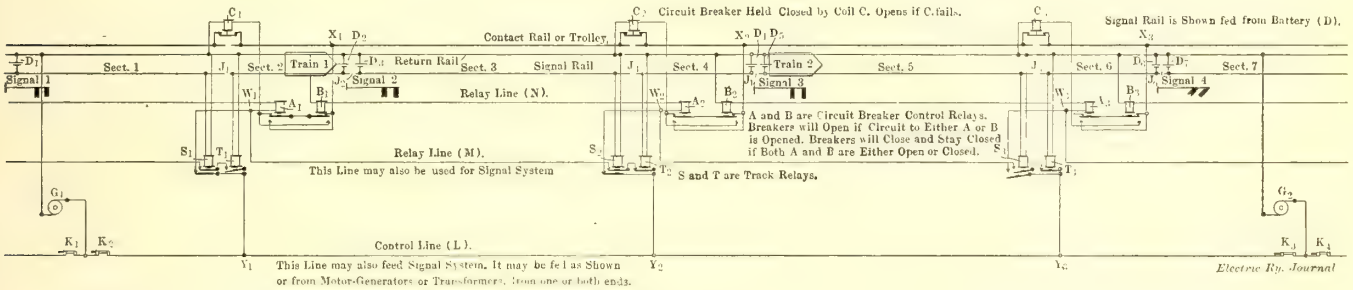


Diagram of Automatic Train Stop System with Normally Closed Circuits, for Operation in One Direction

the full conductivity of the power circuit is available and that as long as the trains are not run within a predetermined distance of the train ahead, the circuit breakers mentioned will not operate. The system has also been designed for the protection of interurban roads equipped with a signal system, in which both track rails are used for the return circuit.

Referring to the wiring diagram, it will be noted that the two track rails are marked "Signal Rail" and "Return Rail," the former being cut into sections for signal circuits and the latter continuous for the return of the power and signal circuits. The joints in the signal rail indicated at points *J* may be either insulated joints or some form of inductive bond if alternating current is used for signals. The various sections of the signal rail are each fed from the battery *D*, but the source of power may also be a feed from either an a.c. or d.c. signal line. The contact rail or trolley wire is also cut into sections, the adjacent ends being normally connected through a circuit-breaker *C*. It will be noted that the break in the contact rail occurs at a point opposite alternate joints in the signal rail. Thus, if breaker *C2* and *C3* are opened, the line between the joints *J3 and J5* is dead and the train indicated as "Train 2" will be without power. It is through the control of these breakers that this train stop system is operated.

With no trains on the line all the breakers are held closed by the current flowing through their coils. This current, for example in the case of *C2* is supplied from the contact rail at the point *X2*, passes through the front contacts of relays *A2* and *B2* through *C2* to the return rail. The relay *A2* is held closed by the control current fed from the control line at point *Y2* passing through the lower armature of track relay *S2* as shown, then through *A2* and *B1* to ground. At point *W2* is a branch feed supplied from point *Y3* through the upper armatures of *S3* and *T3*. Thus if either *S2* or both *S3* and *T3* are closed, or if all are closed, the relay *A2* will be closed. If, however, both *S2* and *S3* (or *S2* and *T3*) are opened, the armature of *A2* will drop and the circuit-breaker *C2* will open.

The relay *B2* is fed from *A3* as described above and it will be noted in the diagram that the opening of this relay also opens the circuit-breaker *C2*. If, however, both relays *A2* and *B2* drop their armatures, the circuit-breaker *C2* again receives power and is closed provided the power rail between *C2* and *C3* is alive. *S* and *T* are ordinary track relays of the type usually employed in signal systems and may be a part of such signal system if desired. These relays are energized from the battery *D* through the signal rails.

If a train is located as indicated by "Train 2," its wheels will short-circuit the battery *D5* and therefore drop the armatures of relay *S3*. This opens the branch feed to relay *A2*, but does not otherwise affect the system. If, however, "Train 1" moves past signal 2 into section 3, its wheels short-circuit battery *D3*. This causes the armature of *S2* to drop which opens the other feed to *A2*, which, releasing its armature, opens *C2*. The current is also cut off from *B1*, which opens *C1*, thus cutting off the power from both ends of the rail feeding "Train 1," which then comes to a stop. If "Train 2" then proceeds and passes out of sections 5 and 6, the relay *S3* picks up, thereby closing the circuit to *A2* and *B1*, which pick up their armatures. The circuit-breaker *C2* then closes upon which *C1* will close and normal operation is resumed.

It will be noted that in the above operation *A2* and *B2* are not both opened at the same time. If, however, the control line *L* be cut off, the current to both of these relays will cease and both armatures will fall against their back stops. This will keep the breakers closed or close them if they are open. This feature is introduced to provide means of cutting the system out of service if for any reason this course is found necessary. It may be omitted without in any way affecting the scheme. If the signal system is fed from the same line as the stop system (Line *L*) the above feature is attractive, as in that case opening the line *L* will set all signals to danger and at the same time cut out the stop system.

The distance from *J2* to *J3* must be at least safe braking distance, and the distance from *J1* to *J2* must be at least the length of the maximum train, as otherwise a portion of the train might remain on the live section of contact rail to the rear of *C1*. With these two limitations the length of the sections can be anything required for the service in hand. By variations in the apparatus this train stop system can be applied to either a.c. or d.c. line using a single-power conductor or to three-phase or similar installations. This system protects a train against accidents due to a broken rail or the removal of special work from the track. Whether the semaphore signal shows danger or not, the trains are protected in all cases.

A table of London tramway statistics has been issued by the British Board of Trade. From 1878 to March 31, 1909, the route length of line open for traffic had increased from 269 to 2526 miles; the capital expenditure from £4,207,350 to £71,023,239; the number of passengers carried from 146,000,000 to 2,660,000,000, and the net receipts from £230,956 to £4,595,779. In 1909 the mileage of electric line open was 2286 miles out of a total of 2464; in 1910 it is 2360 miles out of 2526.

LONDON LETTER

(From Our Regular Correspondent)

Albert Stanley, general manager of the Underground Railways Company, whose appointment as general manager of the London United Tramways to succeed Sir Clifton Robinson was announced in the Electric Railway Journal of Feb. 26, 1910, is constantly seeking to increase the efficiency of the underground railways in London. Mr. Stanley has begun a service with express trains on the Great Northern, Piccadilly & Brompton Railway by which the journey from Finsbury Park to Hammersmith, 9 miles, has been reduced to 30 minutes. The express trains are operated from 7 a. m. to 10 a. m. and from 5 p. m. to 8 p. m. Serious consideration is also being given by the Underground Railways Company to the substitution of escalators for lifts at stations, and plans have been completed for the installation of an escalator at the King's Cross Station of the Piccadilly tube as an experiment. As each escalator is capable of doing the work of five or six lifts it is hoped by installing escalators to encourage traffic by eliminating the vexatious delays experienced by travelers in waiting for lifts. The escalators are less expensive to maintain and operate than the elevators. All of the lines of the District Railway show increases in traffic, thus attesting to their increasing popularity.

Sir Clifton Robinson explains that while much of his work in applying electric traction to tramways has been of a pioneer character he regards his connection with the London United Tramways as completed, and has stated that he has been commissioned by Sir Edgar Speyer, with whom he was associated as a director of the Underground Railways Company, to go to the Phillippines in connection with some enterprise there.

At the half-yearly meeting of the Brighton Railway Company, the Earl of Bessborough made some interesting remarks regarding the success of the electrification of the section of the Brighton Railway between London Bridge and Victoria Stations. The system has been referred to frequently in the Electric Railway Journal. The Earl said in part:

"The electric train services between London Bridge and Victoria were commenced on Dec. 1 and met with immediate and considerable response on the part of the public, particularly in the populous districts of Denmark Hill, Peckham Rye, and Queen's Road, through which the electrically equipped line runs. In the first week the number of passengers carried increased more than 40,000, and it is obvious that neither curiosity nor the novelty of the system has been the attraction, as week by week there has been a steady and continuous gain. The increase in the number of passengers during the first two months, as compared with the corresponding period of 1908-9 amounts to 440,536 passengers, or 63 per cent. The increase in the first month was $189,000 passengers, or 55 per cent, and in the second month 251,000, or 71 per cent. From the opening day the services have run with great regularity and without breakdown of any importance whatsoever. Every credit must be given to the principal contractors, the Allgemeine Company of Berlin, for the very thorough and careful manner in which the constructional work has been done and the equipment installed.

"It is satisfactory to know that the distinguished president, Dr. Rathenau, and the managing director, Mr. Hamspohn, of the Allgemeine Company, who were recently in London, are most appreciative of the way in which the work has been carried out by the sub-contractors, R. W. Blackwell & Company, and have testified to the excellence of the overhead structure, to the perfection of the electrical work, and to the solidity, comfort and smooth running of the rolling stock, for which latter the Metropolitan Amalgamated Carriage Company, Birmingham, was responsible. I must not forget to say that the system was introduced to our notice by Philip Dawson, and that it was he who adapted its designs to the requirements of this railway. He has supervised the work throughout, and thanks are due to him for the capable way in which he has carried out his duties, and has dealt with and solved many difficult problems presented by the peculiar conditions of the line. I believe I am right in saying that this is the first recorded instance where electric traction established on an ordinary steam railroad has worked from the commencement so smoothly and uninterruptedly.

"The traffic results I have given you show that in the first two months of electrical working we have got back nearly the whole of our lost traffic on that section, and naturally these results have led the board to think of the advisability of extensions, a question which I may say is already engaging our serious and earnest attention."

At the meeting referred to Lord Bessborough was asked if there was any likelihood of the East London Railway, from Liverpool Street to New Cross, being electrified, and if the directors of the Brighton Railway would co-operate with the co-lessees. The answer was that the directors certainly would not refuse to co-operate, and when more definite results of the electrification are obtainable it is possible that an arrangement will be made. The co-lessees of the East London Railway are the Metropolitan Railway, the District Railway, the London, Brighton & South Coast Railway, the Great Eastern Railway, the South Eastern Railway and the London, Chatham & Dover Railway.

Powers for other underground railways are being sought in the new Parliament, notably a line from the Strand to the Crystal Palace under the Kearney High Speed system, and from London to Waltham Abbey. If powers are granted for the railway from London to Waltham Abbey, it will be worked by the Metropolitan Railway, of which it will virtually be an extension, though it will be constructed and owned by the Great Eastern Railway, which controls railway service in that part of London in which the new line is projected. It is certainly to be hoped that the electrification of suburban railways around London will be more vigorously pushed in the next few years. Anxiety on the part of engineers and railway managers regarding the results of the electrification of the Brighton Railway caused delay in the past.

In the Electric Railway Journal of Jan. 1, 1910, page 49, it was noted that the British Electrical Federation Company, in an endeavor to increase the earnings of its systems in Great Britain, had introduced a new system of farthing fares, by dividing the routes of the various lines into farthing zones. Although the new plan has been successful in some parts of England in the West Bromwich, Oldbury, Tipton, Darlington, Wednesbury and Smethwick districts many people have pledged themselves not to use the tramways for three months or until the old fares, including half fares for children, are resumed. It is stated that in the districts mentioned the cars are not as well patronized as formerly and the Kidderminster Chamber of Commerce has called public attention to the change of affairs in that town.

The London County Council has received from its highways committee a report regarding a communication from the County Council to the Board of Trade and the Commissioner of Police about the operation of trail cars. The Board of Trade has agreed to the use of single-deck trail cars on the route from Euston Road to Hampstead Heath as an experiment, provided the Commissioner of Police concurs in the proposal, the trail cars to be run between the hours of 10 a. m. and 5 p. m., the Council reserving the right to withdraw its consent at any time. The committee has also recommended the Council to enter into a contract for the supply of the necessary couplers. The finance committee of the London County Council has reported with reference to the Act serving notice upon the London United Tramways, Ltd., that it intends to acquire the lines of that company within the metropolitan area, that the highways committee be authorized to conduct the negotiations and to arbitrate, if necessary, the price to be paid for the tramways or that portion of them authorized by the London United Tramways Act of 1873-1908. It is also pointed out that arrangements could advantageously be made to connect the company's lines with the lines of the Council. The London County Council Tramways receive considerable attention in the daily papers. Both the Moderates and Progressives claim to have done the most valuable work, and each party accuses the other where experiments have failed and of lack of progress so as to influence votes.

A. C. S.

News of Electric Railways

Cleveland Traction Situation

There has been some question as to how the Cleveland Railway would be able to comply with the section of the new ordinance which requires that a fund of at least $500,000 should be maintained for the payment of interest and dividends. Figures compiled in the office of the receiver show that all of the funds now on hand would be required to pay the back dividends and the remainder of the claims, leaving possibly a small deficit. On Feb. 26, however, officials of the company announced that arrangements were being made by which local banks would loan the company $500,000. In addition the company has about $70,000 which will all be carried in the capital account.

At a conference between Judge Tayler, Receiver Bicknell and representatives of the Cleveland Railway on Feb. 23, it was announced that the receiver has in the treasury about $800,000. Of this amount $150,000 is due for interest on bonds. The remainder is insufficient to pay the dividends of 1½ per cent to the stockholders of the Cleveland Railway and 7½ per cent to the holders of stock guaranteed by the Municipal Traction Company. Judge Tayler hoped to be able to lift the receivership on March 1, 1910, but the conditions confronting him have delayed matters somewhat..

Neither the City Council nor the street railway commissioner has announced what fare will be charged the people of Collinwood. If the matter is left to Horace E. Andrews, president of the Cleveland Railway, the fare will probably remain at 3 cents. Some of the other officials are said to feel that the company should operate at the low fare only where the ordinance stipulates a low fare.

On Feb. 23, attorneys for the Cleveland Railway filed a formal demand with Judge Tayler for the return of the property to the company. The motion sets out that a franchise has been granted the company and that the controversy has been satisfactorily adjusted.

Since the low fare has been in effect conductors have retained a 5-cent fare where the exact change has not been proffered when fares have been paid in cash, and a resolution has been introduced in the City Council demanding that change be given and that no fare of more than 3 cents shall be collected. City Solicitor Baker has rendered an opinion to the effect that the Council has the authority to adopt and enforce the resolution. By charging 5 cents fare when payment was made in cash the company hoped to induce people to purchase tickets, as much time is consumed in making change and delays frequently result.

The directors of the Cleveland Railway have provided for placing an order for 50 new cars at once. With the 25 which the receiver ordered for delivery shortly, relief should be afforded very soon.

The tickets to be used by the company will be white board printed in black. They will be sold in strips of five for 15 cents. It is possible, however, that after the accounts with the receiver are adjusted the company will again use the metal disks.

Mr. Bicknell has stated that he will not be the expert for the street railway commissioner. No other name has been mentioned so far.

The directors of the Cleveland Railway have decided to ask the City Council to approve an increase of about 10 per cent in the capital stock of the company to cover the immediate necessities of the system. Means for taking care of the bonds of the East Cleveland Railway which mature soon were also discussed. Judge Tayler will probably be requested to authorize an issue of notes for this purpose.

Transit Affairs in New York

Mayor Gaynor, Controller Prendergast and John P. Mitchell, president of the Board of Aldermen, who compose the select committee of the Board of Estimate, conferred recently with the Public Service Commission in regard to subway matters. An application for a change in the plans of the Broadway-Lexington Avenue route is now pending before the Appellate Division of the Supreme Court. This change contemplates a double-deck subway from Houston Street to 103d Street, and from 113th Street to the Harlem River. The commissioners appointed by the court have reported in favor of the change, which will avoid much interference with property and consequent expense for damages. Twelve routes of the 29 validated are proposed for immediate construction by the commission. These involve 40 miles of subways, and will, it is estimated, cost $100,000,000. Eight of these routes are included in the Broadway-Lexington Avenue system in Manhattan and the Bronx, and two in the Broadway-Lafayette system in Brooklyn. The other two are the Fort Hamilton and Coney Island extensions of the Fourth Avenue system in Brooklyn. Six routes have been adopted and approved by the commission, but not yet validated, while plans have been prepared for crosstown subways under Twenty-third and Fifty-ninth Streets, but action was deferred on them in view of the possible use of these streets for moving platforms. The commission estimates that New York City will save at least $10,000,000 by the order issued by the Appellate Division in favor of the double-decking of the proposed Broadway-Lexington Avenue subway. If the four tracks were placed on a level they would occupy 65 ft. of the street width, and in consequence interfere with abutting properties.

The Public Service Commission has postponed the hearing of the Manhattan Bridge Three-Cent Line for a certificate of convenience and necessity, to operate over the Manhattan Bridge so as to inquire more minutely regarding the probable earnings of the company and the details of the equipment of the company.

Association Meetings

Central Electric Traffic Association.—Indianapolis, Ind., March 11 and 12.

Central Electric Accounting Conference.—Fort Wayne, Ind., March 12.

New England Street Railway Club.—Boston, Mass., March 24.

Central Electric Railway Association.—South Bend, Ind., March 24.

Missouri Electric, Gas, Street Railway & Water Works Association.—Jefferson City, Mo., April 14, 15 and 16.

Iowa Street & Interurban Railway Association.—Sioux City, Ia., April 21 and 22.

Oklahoma Public Utilities Association.—Sapulpa, Okla., May 10.

Pacific Claim Agents' Association.—San Francisco, Cal., May 20 and 21.

Street Railway Association of the State of New York.—Cooperstown, N. Y., June 27 and 28.

New Road Opened in Atlantic City.—The Venice Park Railroad, which extends from the line of the Atlantic City & Shore Railroad on Marmora Avenue, Atlantic City, across the Penrose Canal to Venice Park, a distance of less than a mile, has been placed in operation.

Storage Battery Cars in New York.—Arrangements have been made for establishing an experimental service over the Twenty-eighth & Twenty-ninth Street Crosstown Railroad with the Edison-Beach storage battery car described in the Electric Railway Journal of Jan. 29, 1910, page 183.

New Franchise Desired in Santa Barbara.—The Santa Barbara (Cal.) Consolidated Railroad has applied to the City Council of Santa Barbara for a 50-year franchise to replace a number of franchises granted to the company and its constituents which cover in most cases an unexpired term of 35 years. If the new franchise is granted the company proposes to expend $150,000 in rehabilitating its system.

Boston, Lowell & Lawrence Railroad Petition Renewed.—James F. Jackson, former chairman of the Massachusetts Railroad Commission, who is counsel for the Boston, Lowell & Lawrence Electric Railroad, has requested the Railroad Commission of Massachusetts to reopen hearings on the petition of the company for a certificate of exigency. It is urged that new evidence of the need of the road is to be forthcoming. The decision of the commission against the company was noted in the Electric Railway Journal of Feb. 26, 1910, page 367.

Annual A. I. E. E. Dinner.—The annual dinner of the American Institute of Electrical Engineers, given in honor of Prof. Elihu Thomson, first recipient of the Edison Medal, was held on Thursday evening, Feb. 24, 1910, at the Hotel Astor, New York, N. Y. There were about 500 people present. L. B. Stillwell presided and T. Commerford Martin acted as toastmaster. The other speakers were: Dr. Charles Baskerville, professor of chemistry at New York University; Samuel Insull, of the Chicago Edison Company and president of the Edison Medal Association, and Professor Thomson. A telegram of congratulation, sent to Professor Thomson by Mr. Edison, was read at the dinner.

Non-Resident Lecturer at University of Minnesota.—F. W. Darlington, Pittsburgh, Pa., lectured before the students in electrical engineering at the University of Minnesota on Feb. 23, 1910, on "The Electrification of Steam Railways." He discussed the general operating characteristics of direct, single-phase and three-phase railway motors, and compared the relative costs of the locomotives and of the generating and distributing systems. The most economical system depends upon the weight of trains, frequency of service, length and steepness of grades and other conditions. Direct-current and single-phase motors have an advantage over three-phase motors, their variable speed being an important factor in maintaining schedules and in making up time on level or down grade.

Toledo Franchise Negotiations.—Two meetings of the directors of the Toledo Railways & Light Company, Toledo, Ohio, have been held recently, but only routine business has been considered, according to the announcements. The Council of Toledo has decided to have the City Solicitor prepare an ordinance such as the city would be willing to grant the company. Albion E. Lang, president of the company, is reported to have expressed himself as being pleased with the idea of the city taking the initiative, and the bondholders' protective committee of the company has notified the Mayor that it is ready to consider any franchise which the city may proffer as a basis for negotiations. The directors of the company are said to be willing to spend about $600,000 in improvements and extensions within the next year if the bondholders' protective committee approves the plan.

Steam Railroads' Position on Wage Question.—Representatives of the Eastern railroads issued a pamphlet on Feb. 25, 1910, which gives the railroads' side of the wage question. The occasion for this is the recent action of the trainmen and conductors in demanding higher pay and shorter hours. The principal subjects discussed in the pamphlet are the decrease in freight and passenger rates, the increase in the cost of operation and the wages of railroad employees as compared with the wages paid in other industries. The position of the railroads is that, in the face of a steady decline in rates and a steady advance in the cost of operation, they are not able to grant general wage increases in addition to those already made. There were general increases in the latter part of 1906 and the early part of 1907, and there was no subsequent decrease in the wage rate on railroads, as there was in other industries, at the time of the 1907 panic.

Catalogs Discussed by the Technical Publicity Association.—The last meeting of the Technical Publicity Association of New York was devoted to the discussion of the subject of catalogs. Considerable sentiment was expressed in favor of adopting standard sizes for commercial literature of this sort. The lack of system of the sizes of the many different catalogs makes them difficult to file. A paper on the subject by Martin P. Rice, of the publication bureau of the General Electric Company, Schenectady, N. Y., was read, and many attractive specimens of current catalogs were exhibited by the speaker and other members of the association. The sizes recommended were 5 in. x 8 in., 6 in. x 9 in. and 9 in. x 12 in. One speaker declared that any book more than ¼ in. thick should bear its title on the back. The next meeting of the association will be held on March 10, 1910, to discuss the proposed increase in postal charges for second-class matter.

Application for Charter for Philadelphia Elevated Railroad and Subway Heard.—The application of the Philadelphia & Suburban Elevated Railroad for a charter to build a subway in Broad Street, Philadelphia, with elevated feeders from York Street to Wayne Junction and Frankford was heard by the State Charter Board of Pennsylvania, composed of the Governor, Attorney-General and Secretary of the Commonwealth, in Harrisburg, Pa., on March 1, 1910. S. S. Neff, president of the company, and E. O. Lewis of counsel appeared before the board. Mr. Neff stated that a certified check for $50,000 had been deposited with the West End Trust Company, Philadelphia, as an evidence of good faith. If the charter was granted and the necessary franchises secured from the City Council of Philadelphia, Mr. Neff promised to begin construction work in September, 1910, and to have the system in operation in 2½ years. He said that the running time to Frankford would be 21 minutes, as compared with 60 minutes on the street railways and 45 minutes on the suburban steam lines. At the hearing before the State Charter Board on March 1, counsel for the company said that the interests which financed the London subway lines would finance the lines in Philadelphia, and that if a favorable franchise was granted from $16,000,000 to $20,000,000 would be available immediately for construction. J. C. Bell for the company declared that Philadelphia had only 12 miles of elevated railway, as compared with 118 miles in New York, 71 in Brooklyn, 128 in Chicago and 24 in Boston.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The committee on metropolitan affairs has completed its hearing upon the various Boston subway, tunnel and elevated railway bills which were reported upon early in January by the joint board consisting of the Massachusetts Railroad and the Boston Transit Commissions. The majority of these measures were found to be unworthy of enactment into law. No one appeared on behalf of the subways petitioned for between the center of Boston and the outlying suburbs, or to advocate the removal of sections of the elevated railway in Boston. The advocates of a subway loop between Park Street, Scollay Square and the Cambridge bridge in connection with the Boston terminus of the Cambridge subway asked the committee to refer the project to the Railroad and the Transit Commissions for report to the Legislature of 1911. A resolve to authorize the Boston Transit Commission to make engineering studies for a cross-town tunnel between the Park Street and South Station districts, forming a longitudinal eastward extension of the Cambridge subway, was not opposed. Corporation Counsel Babson appeared on behalf of Mayor John F. Fitzgerald of Boston, recommending that this tunnel be extended to Dorchester Avenue in order to accommodate traffic from the Dorchester and South Boston districts.

Ohio.—C. B. Winters of Erie County has prepared a public utilities bill which may take the place of the Woods bill now before the Legislature. Under the bill the State Railroad Commission would be retained and its powers enlarged. On the evening of Feb. 24 a hearing was given the Woods bill in the Senate chamber. It was asserted by speakers that the law would prove a burden to the State rather than a means of raising taxes and that there was no public demand for such a law. A bill introduced by Representative Jones will give interurban railways the right of eminent domain in municipalities to condemn property for freight and passenger depots. On Feb. 23, representatives of the steam railways and the electric railways objected to the Langdon bill, which would take the taxing power away from the county auditors and the state board of equalization, and centralize it in a board to be appointed by the Governor.

Financial and Corporate

New York Stock and Money Market

March 1, 1910.

The stock market was stronger in tone to-day and more inclined to advance than at any time during the past two weeks, but the dealing was largely professional. During the past week the market has been practically stagnant and outside buying has not been in evidence. The traction shares have remained active and, with the exception of Third Avenue, price changes have been fractional. The price of the latter was, of course, lowered on account of the foreclosure sale. The low point to-day was 7½ and the closing price was 8⅛.

The money market is very easy. Quotations to-day were: Call, 2½ to 3 per cent; 90 days, 3½ to 3¾ per cent.

Other Markets

The market for Rapid Transit and Union Traction has been uncertain in Philadelphia during the past week owing to the strike. The selling pressure was heavy, but large financial interests have prevented serious price declines.

In the Boston market, Massachusetts Electric continues to be the most active traction issue. During the past week both the common and preferred have been a trifle stronger. There has also been some dealing in Boston Elevated at former prices.

During the week there has been but little trading in tractions in Chicago. There has been some trading in Series 2 Chicago Railways, and the price during the week has declined about 2 points.

In Baltimore, there has been no trading in traction securities, except in the bonds of the United Railways. For these the prices have not changed.

Quotations of various traction securities as compared with last week follow:

	Feb. 21.	Mar. 1.
American Railways Company	a47	a47
Aurora, Elgin & Chicago Railroad (common)	a57	a59
Aurora, Elgin & Chicago Railroad (preferred)	a93	a94⅛
Boston Elevated Railway	129½	130½
Boston & Suburban Electric Companies	a16½	a16½
Boston & Suburban Electric Companies (preferred)	72	a75
Boston & Worcester Electric Companies (common)	a11	a11
Boston & Worcester Electric Companies (preferred)	a44	a44
Brooklyn Rapid Transit Company	73¾	75⅞
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	83	84
Capital Traction Company, Washington	*134	a134
Chicago City Railway	a195	a190
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf. 1	a106½	a106
Chicago Railways, ptcptg., ctf. 2	a32	a34
Chicago Railways, ptcptg., ctf. 3	a15	a18
Chicago Railways, ptcptg., ctf. 4s	*9	a9½
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76½
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a105½
Detroit United Railway	*62	*62
General Electric Company	154½	155¼
Georgia Railway & Electric Company (common)	a108	a107
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	22	22¼
Interborough-Metropolitan Company (preferred)	55¾	55½
Interborough-Metropolitan Company (4½s)	82⅛	81⅞
Kansas City Railway & Light Company (common)	a30	a30
Kansas City Railway & Light Company (preferred)	a68	a69½
Manhattan Railway	*136¾	137
Massachusetts Electric Companies (common)	a18¼	a18¼
Massachusetts Electric Companies (preferred)	83½	a83
Metropolitan West Side, Chicago (common)	a17	a16½
Metropolitan West Side, Chicago (preferred)	a55	a53
Metropolitan Street Railway	*16	16
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	80¼	80
Northwestern Elevated Railroad (common)	a17½	a17
Northwestern Elevated Railroad (preferred)	a70	a50
Philadelphia Company, Pittsburg (common)	a51½	a51¼
Philadelphia Company, Pittsburg (preferred)	a45	a45
Philadelphia Rapid Transit Company	a24⅝	a24⅜
Philadelphia Traction Company	89	a89
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a104½	a105
Seattle Electric Company (common)	a116	a115¼
Seattle Electric Company (preferred)	a105	105
South Side Elevated Railroad (Chicago)	a53	a54
Third Avenue Railroad, New York	*10	8⅛
Toledo Railways & Light Company	*11¾	11¾
Twin City Rapid Transit, Minneapolis (common)	113¾	*113¾
Union Traction Company, Philadelphia	49½	a50½
United Rys. & Electric Company, Baltimore	a14	a14
United Rys. Inv. Co. (common)	37	*37
United Rys. Inv. Co. (preferred)	68	67
Washington Ry. & Electric Company (common)	*37	a37⅝
Washington Ry. & Electric Company (preferred)	*87⅛	a90
West End Street Railway, Boston (common)	a95	a95
West End Street Railway, Boston (preferred)	a106	a106
Westinghouse Elec. & Mfg. Company	70½	71
Westinghouse Elec. & Mfg. Company (1st pref.)	*120	*120

a Asked. * Last Sale.

Chicago City & Connecting Railways Bonds

J. P. Morgan & Company, New York, N. Y., and the First Trust & Savings Bank, Chicago, Ill., are offering for subscription at 95 and interest the new $22,000,000 issue of collateral trust bonds of the Chicago City & Connecting Railways. The following statement has been issued in explanation of the new issue:

"The above securities are held by the First Trust & Savings Bank under a trust indenture which creates a first lien upon such securities for the payment of the principal and interest of these bonds.

"These deposited securities are issues of corporations owning and operating a total of 407 miles of high-grade street railway in the southern division of the city of Chicago and vicinity.

"The amount at which the city could purchase these properties for municipal operation at the earliest date permissible under the terms of the ordinances, Feb. 1, 1911, will be in excess of $50,000,000.

"Should the city acquire these properties at that date the purchase price would be in excess of $50,000,000, while should any license company purchase them the price payable, in terms of the ordinances already referred to, would include an additional 20 per cent or in aggregate would be $60,000,000.

"The interest of the Chicago City & Connecting Railways in this purchase price of $50,000,000, after deduction of all first mortgage bonds, which are first liens on the properties, and the equity applicable to the Chicago City Railway minority stockholders, will be in excess of $23,000,000.

"After 1915 a sinking fund will also be provided, which by 1927 will result in reducing the $22,000,000 issue to $20,740,000, thus increasing the large margin over the purchase price should the city purchase the property, which purchase price, with the value of the Hammond, Whiting & East Chicago Railway, will exceed the outstanding bonds by about $4,000,000.

"The earnings of the properties for the year ended Jan. 31, 1910, applicable after the payment of all prior charges to the securities now owned by the Chicago City & Connecting Railways, aggregated $2,177,000, or approximately twice the amount required to meet the interest on the proposed issue of $22,000,000 5 per cent collateral trust bonds.

"The control of these deposited securities is vested in Elbert H. Gary, Albert J. Earling, and Samuel M. Felton, as trustees, subject to all the provisions of the trust indenture."

Combined Earnings of Stone & Webster Companies

Stone & Webster, Boston, Mass., have made public the following statement of the capitalization and earnings of the 30 public service companies under their management for the year ended Dec. 31, 1909:

COMBINED CAPITALIZATION—THIRTY COMPANIES.

Bonds and coupon notes outstanding	$62,997,500
Preferred capital and common stocks outstanding	63,198,120
Total	$126,195,620

TOTAL EARNINGS AND EXPENSES, 1909.

Gross earnings	$20,241,974
Operating expenses	11,582,862
Net earnings	$8,659,112
Interest charges and taxes	4,496,350
Balance	$4,162,762
Dividends paid	1,972,186
Balance	$2,190,576
Total disbursements for the year 1909 for interest on bonds and notes and for dividends	$5,298,016
Miles of equivalent single track operated	1,005
Passengers carried	274,567,000

Total connected electric lighting load equivalent to 1,778,000 16-cp lamps.
Total commercial power load, approximately, 83,638 hp.
Total combined power station capacity, approximately, of which 55,868 hp is generated by water power, 167,262 hp.

Belton & Temple Traction Company, Belton, Tex.—Judge Maxey in the Federal Court at Austin, Tex., has appointed a receiver for the Belton & Temple Traction Company in foreclosure proceedings brought against the company under the first mortgage for $300,000.

Brooklyn (N. Y.) Rapid Transit Company.—D. C. Herrick, as referee, has decided that the Brooklyn Heights Railroad is entitled to recover $3,356,938 from Brooklyn City Railroad, terminating the action begun 10 years ago. Of the judgment $1,740,258 is for principal and $1,616,680 is for interest. The suit involves several interesting points. In February, 1893, the Brooklyn Rapid Transit Company leased the Brooklyn City Railroad under an agreement which provided that among other considerations the subsidiary line was to expend proceeds of sale of $6,000,000 stock and bonds in electrifying its road and making other improvements. The leased road was taken over on June 6, 1893. Between these two dates the Brooklyn City Railroad expended large sums for improvements which it maintained should be subtracted from the $6,000,000 agreed upon when lease was made. The Brooklyn Rapid Transit Company held that the leased road was to expend the entire amount after control passed. The executive committee of the Brooklyn City Railroad has decided to appeal from the decision of Mr. Herrick as referee.

Calgary Street Railway, Calgary, Alberta, Can.—The statement of earnings for the six months ended Dec. 31, 1909, shows gross passenger earnings of $56,580 and miscellaneous earnings of $925, making total gross earnings of $57,505. Total expenditures, including interest, were $47,504, leaving a balance of $10,001. The number of passengers carried during the six months was 1,274,928.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—George W. McClellan and other holders of preferred stock of the Columbus, Delaware & Marion Railway have filed in the Common Pleas Court at Columbus an application to have Eli M. West, receiver of the company, commence action to have certain mortgages against the company's property declared fraudulent.

El Paso (Tex.) Electric Company.—An initial semi-annual dividend of 2 per cent has been declared on the $1,000,000 of common stock of the El Paso Electric Company, payable on March 15, 1910, to stock of record on Feb. 28, 1910.

Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad, New York, N. Y.—The sale of the property of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad under foreclosure has been postponed by Judge Lacombe of the United States Circuit Court until May 16, 1910.

Indiana Union Traction Company, Anderson, Ind.—The annual report for the year ended Dec. 31, 1909, shows gross earnings of $2,103,018, as compared with $1,902,339 for 1908, and $2,089,232 for 1907. Of the total for 1909 the gross earnings of properties leased after June 15, 1904, were $158,334 and the gross earnings of other properties were $1,944,684. Operating expenses of all the properties were $1,113,428, as compared with $1,058,745 in 1908. From the net earnings of $989,590 there was deducted $730,183 for interest on underlying bonds and taxes, leaving a net income in excess of taxes and interest on bonds of underlying or subsidiary companies amounting to $259,407. Dividends on the stocks of the Union Traction Company of Indiana and the Muncie, Hartford & Fort Wayne Railway and interest on the Indiana Union Traction Company bonds amounted to $218,573, leaving a surplus for the year of $40,834. This surplus compares with a deficit of $10,663 in the preceding year and a surplus of $20,022 in the year 1907.

Johnstown (Pa.) Passenger Railway.—The Johnstown Traction Company was incorporated with a capital stock of $500,000 at Harrisburg, Pa., on Feb. 24, 1910, as the successor to the Johnstown Passenger Railway, which was recently leased to the American Railways, Philadelphia, Pa.

Metropolitan Street Railway, New York, N. Y.—Judge Ward, of the United States Circuit Court of Appeals, has handed down the opinion of the court to the effect that the purchasers of the property of the Metropolitan Street Railway will be required to have $10,000,000; otherwise the sale will not go on. The decision is in favor of the Morton Trust Company which objected to Judge Lacombe's decree of foreclosure, in that it directed the sale of property which, it is claimed, is not held by the Guaranty Trust Company. The lower court provided that all claims on accounting should be held superior to the equity of the first mortgage, and should be paid by the purchasers of the property of the Metropolitan Street Railway Company. Parker, Hatch & Sheehan, counsel for the Twenty-third Street Railway, have filed a petition in the United States Circuit Court in answer to the receivers of the Metropolitan Street Railway asking for instructions in regard to the payment of the special franchise taxes. The petition asks the court to direct the payment of the taxes levied against the Twenty-third Street Railway and the Fulton Ferry Railway, amounting to $368,595, in order that the franchises may not be jeopardized.

New York City Railway, New York, N. Y.—Judges Coxe, Ward and Noyes, of the United States Circuit Court of Appeals, have reserved decision on the appeal of W. W. Ladd, as receiver for the New York City Railway, from the decision of the Circuit Court confirming reports of the special master disallowing claims of the New York City Railway on promissory notes amounting to $893,000 made by the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway. The notes are held by the Central Trust Company as part of the security on a mortgage for $6,000,000 given by the Third Avenue Railroad and which amount, it is claimed, was advanced to the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway for equipment and other purposes.

Pittsfield (Mass.) Electric Street Railway.—The New England Investment & Security Company has exercised the option which it took recently on the stock of the Pittsfield Electric Street Railway and new officers and directors have been elected as follows: L. S. Storrs, president; L. Candee, treasurer; T. J. Harmer, clerk; L. S. Storrs, J. T. Harmer, B. W. Warren, P. C. Dolan, Wm. L. Adams and C. Q. Richmond, directors. There is still a vacancy in the board of directors.

Third Avenue Railroad, New York, N. Y.—The property of the Third Avenue Railroad was sold under foreclosure on March 1, 1910, for $26,000,000 to John M. Bowers, representing the reorganization committee chosen by the holders of $37,560,000 general mortgage bonds of the Third Avenue Railroad issued in 1900. James M. Wallace, president of the Central Trust Company, is chairman of the reorganization committee.

West Penn Railways, Connellsville, Pa.—At the annual meeting of the West Penn Railways on Feb. 23, 1910, the stockholders approved the proposal of the American Water Works & Guarantee Company to form a new company to be known as the West Penn Traction Company, with a capital stock of $10,000,000, mention of which was made in the Electric Railway Journal of Feb. 19, 1910, page 330. Under the plan the holders of the $3,250,000 of common stock of the West Penn Railways will turn in their holdings and receive 50 per cent in preferred stock of the West Penn Traction Company and 100 per cent in common stock. Almost all of the common stock has already been deposited under this arrangement. The American Water Works & Guarantee Company also agrees to buy all of the bonds of the new company, and plans are being made for issuing about $3,000,000 of bonds for extensions and improvements.

Winnipeg (Man.) Electric Railway.—The gross earnings during 1909 were $2,623,731, an increase of $417,637, or 18.93 per cent over 1908. The operating expenses were 50.34 per cent of the gross earnings. They amounted to $1,320,665, an increase of $231,793, or 21.29 per cent over 1908. Net earnings were $1,303,066, an increase of $185,844, or 16.63 per cent. Fixed charges were $439,660. From the net income dividends aggregating $600,000 were paid, leaving a surplus of $263,406. The number of passengers carried was 26,382,773, an increase of 4,363,266 over the record for 1908. The number of transfers used was 8,925,849, as compared with 7,777,315 for 1908. The annual report to stockholders shows the following railway earnings per capita during the last five years: 1909, $10.03; 1908, $9.80; 1907, $9.84; 1906, $8.30; 1905, $6.80. President William Mackenzie states in his report that the properties of the company have been maintained efficiently. All expenses in connection with the breakdown of the water plant at Pinawa Channel on the Winnipeg River on Nov. 23, 1909, have been charged to operating expenses.

Traffic and Transportation

Street Railway Regulations in Washington Amended

The Interstate Commerce Commission adopted the following orders on Feb. 18, 1910, amending and supplementing the regulations for the operation of street cars in the District of Columbia:

"It is ordered, That the following, to be known as Section 27 of the rules and regulations for the operation and equipment of street railway cars in the District of Columbia, be, and is hereby, adopted:

"Section 27. That on and after March 1, 1910, every car operated on the lines of the street railways in the District of Columbia shall be in charge of a separate conductor, Provided that this regulation shall not apply to trailer cars operated on the lines of interurban railway companies."

"It is Ordered, That the following, to be known as Section 25 of the regulations for the operation and equipment of street railway cars in the District of Columbia be, and is hereby adopted:

"Section 25. When a car or train operating in the suburbs of Washington within the District of Columbia is delayed under circumstances under which it may be overtaken by another car or train, the conductor or other employee carrying a red light at night and a red flag by day must go back immediately a distance of at least 300 feet and stop the following car or train."

"It is Ordered, That the following, to be known as Section 1-a of the regulations for the operation and equipment of street railway cars in the District of Columbia be, and is hereby, adopted:

"Section 1-a. Section 1 of the rules and regulations for the operation and equipment of street railway cars in the District of Columbia shall not be applicable to the cars which are operated by the Washington, Alexandria & Mt. Vernon Railway and the Great Falls & Old Dominion Railroad.

"All motor cars which are operated in the District of Columbia by the Washington, Alexandria & Mt. Vernon Railway and the Great Falls & Old Dominion Railroad shall be equipped with some form of pilot such as is commonly used on interurban cars, said pilot to have a clearance of not more than five inches above the rails, and the front end of said pilot not to extend beyond the farthest outside limit of the bumper of the car.

"The speed at which the cars of the Washington, Alexandria & Mt. Vernon Railway and the Great Falls & Old Dominion Railroad shall be operated in Washington shall not exceed 10 mph. To be effective May 18, 1910."

"In order that the regulations of the Interstate Commerce Commission governing the operation and equipment of street railway cars within the District of Columbia may be properly enforced,

"It is Ordered, That the cars operated by the various street railways in the District of Columbia shall be subject at all times to inspection by the duly accredited representatives of this commission."

"It is Ordered, That Section 1 of the rules and regulations for the operation and equipment of street railway cars in the District of Columbia be amended by adding to the first paragraph the following:

"Provided, that the cars of the Washington, Baltimore & Annapolis Electric Railway may be equipped with some form of pilot such as is commonly used on interurban cars (in addition to the front automatic or platform-operated projecting pick-up fenders required in Sec. 1 of these regulations) in lieu of the automatic wheel guard and there shall be a clearance of not more than 5 inches between the rail and the lowest portion of said pilot."

Pittsfield Electric Street Railway

Following the recent serious accident on the Pittsfield (Mass.) Electric Street Railway, as a result of which an order was issued by the Railroad Commission of Massachusetts forbidding the operation of one branch of the system temporarily, negotiations were begun in behalf of the New England Investment & Security Company for that company to take over the property. These negotiations have been successfully concluded and new officers and directors have been elected for the company. In explanation of the policy of the New England Security & Investment Company in regard to the Pittsfield Electric Street Railway, L. S. Storrs, president of the New England Security & Investment Company, who has been elected president of the Pittsfield Electric Street Railway, has issued the following statement:

"It is our intention to reorganize the Pittsfield Electric Street Railway, placing the operations in charge of the operating officials of the Berkshire Street Railway and of adapting it so far as is consistent with the different class of service of the two companies with the same standard of operation and maintenance on both. Our experts are now on the ground making a complete examination of all the equipment and all necessary repairs will be started as soon as they have reported. I have noticed newspaper references to the lack of power on the Pittsfield Electric Street Railway, and if such is found to be the case, it is quite probable that we may be able to supply such deficiency from the powerhouse of the Berkshire Street Railway. There is no question but that connections between the tracks of the two companies will enable the combined company to offer a more satisfactory service to the community, and our engineers are now making plans for such connections in order that the necessary petitions may be filed with the city.

"I believe that no new arrangement of schedules will be found desirable until such connections are made, however, for the gentlemen who have had charge of the property in the past have been connected with the company for a number of years and have, of course, given the matter of the city service their best efforts.

"The members of our organization have not had opportunity to make a study of the conditions entering into the consideration of the most convenient service for the patrons of the Pittsfield Electric Street Railway, but all of our efforts will be devoted to such study, and until we have been able to reach some positive conclusions we must ask the public to bear with us and aid us by suggestions, if possible, rather than by making general complaints with the service.

"It is our desire to give Pittsfield a transportation service that will be of material benefit to the growth of the entire community, and we believe that with the combined facilities now at our disposal we will be able to accomplish this result."

Investigation of Service in Albany Asked

The Common Council of Albany, N. Y., has adopted a resolution to ask the Public Service Commission of the Second District of New York to inquire into the adequacy of the service furnished by the United Traction Company on its lines in Albany. The following allegations are made by the Council:

"1. Insufficiency of seating capacity on practically every line in Albany, especially during the hours of increased travel when it is necessary for the people in large numbers to use the cars of the company in going to and returning from places of business. This insufficiency of seating capacity causes serious inconvenience by reason of the fact that the proportion of passengers who are obliged to stand in the cars is unreasonably large.

"2. The class of cars run is entirely inadequate to provide proper transportation for a city of the size and dignity of Albany. Cars such as are used in this city at present have been retired from service on popular lines in Buffalo, Rochester and other cities for several years. Cars are not only too small to furnish seats to a proper proportion of passengers, but the limited size of the platform causes additional inconvenience and delay to persons boarding and leaving same. In other cities in sections of heavy travel, passengers are taken on at rear of cars and leave at front end. Cars are not properly lighted or ventilated. In the cities above referred to, passengers during hours of darkness can read in comfort as far as sufficiency of light is concerned. Cars which are run through city streets should present an appearance in keeping with the surroundings.

The poorly lighted cars are to say the least, no ornament to the streets of this city.

"3. Cars are not run with proper regularity and become 'bunched,' causing serious inconvenience, especially during inclement weather, as people are obliged to wait on street corners unreasonable lengths of time for these cars."

Proposed Mill Creek Valley Franchises

The Mill Creek Valley Division of the Ohio Traction Company serves a number of small towns near Cincinnati. These towns propose to grant new franchises to the company on condition that portions of the line be reconstructed and a cut-off be built through the northern part of Carthage, so that the running time can be reduced. Extra stops will be eliminated and the legal running speed will be increased to 18 mph. The people along the lines request a lower fare to Cincinnati and a schedule has been prepared which would provide a 5-cent fare between all villages and a low cash fare to Cincinnati or a higher rate of cash fare with a reduction when tickets are purchased. The following table presents the old and proposed tariffs:

Miles from Cincinnati.	To	Present fare.	Proposed fare schedules. Cash.	Cash or tickets.
5.5	St. Bernard	10 cts.	5 cts.	5 cts.
7.5	Carthage	10 cts.	5 cts.	5 cts.
8.8	Hartwell	10 cts.	7 cts.	10 cts. or 16 tickets for $1
11.3	Lockland	10 cts.	8 cts.	10 cts. or 15 tickets for $1
10.4	Wyoming	10 cts.	8 cts.	10 cts. or 14 tickets for $1
12.5	Glendale	15 cts.	12 cts.	15 cts. or 9 tickets for $1

It is proposed to make the franchises uniform for all the towns and not to issue special school or work tickets.

Accident in Hudson River Tunnel.—More than 15 passengers were injured in a collision between two trains of the Hudson & Manhattan Railroad at the Twenty-third Street station of the company in New York, on March 1, 1910.

Altoona & Logan Valley Electric Railway Increases Wages.—The Altoona & Logan Valley Electric Railway, Altoona, Pa., has increased the wages of its motormen and conductors 1 cent an hour, making the new scale 18 cents an hour for the first year, 20 cents for the second year and 21 cents for the third year.

Increase in Wages in Sacramento.—The Sacramento Electric, Gas & Railway Company has increased the wages of its conductors and motormen 2 cents an hour. Under the new scale the men receive 29 cents an hour the first year, 30 cents the second year, 31 cents the third year, 32 cents the fourth year and thereafter. The men have agreed that the new rate shall continue in force for five years.

Proposed Trip From Utica to Indianapolis.—A party of business men from Utica, N. Y., and vicinity are planning to take a trip in two private cars of the Oneida Railway about May 1, 1910, from Utica to Indianapolis, Ind.; Louisville, Ky.; Toledo, Ohio; Detroit, Mich., and return by way of Toledo and Cleveland, Ohio. The trip will extend over about two weeks. The purpose of the trip is primarily to advertise Utica.

Complaint Against Fare on the Utica & Mohawk Valley Railway.—The Public Service Commission of the Second District of New York has received a complaint from the residents in the vicinity of Stop 3 on the Utica & Mohawk Valley Railway between Utica and Frankfort. The fare from Utica to Stop 3 is 10 cents, whereas on the east, west and south the fare for a greater distance is only 5 cents. The petitioners allege that the charge to Stop 3 is an unfair discrimination against that stop and ask the commission to make an order reducing the fare to 5 cents from Utica to Stop 3.

Schenectady Railway Asks Permission to Use Franchise to Relieve Congestion.—The Schenectady (N. Y.) Railway has applied to the Public Service Commission of the Second District of New York for permission to exercise a franchise on Edison Avenue in Schenectady, to facilitate and improve conditions for handling traffic in that city in accordance with one of the suggestions in the report on transit conditions in Schenectady, made by the commission. The franchise on Edison Avenue was granted in 1907. The conclusions of the commission in its report on traffic conditions in Schenectady were published in the Electric Railway Journal of Jan. 15, 1910, page 128.

Folder of the Terre Haute, Indianapolis & Eastern Traction Company.—J. H. Crall, general passenger and freight agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has issued an advertising folder 28 in. long by 2 in. wide calling attention to the facilities of the company which folds to 2¾ in. by 2 in. The front of the folder contains the trademark of the company and the word "why" followed on the second page with the words "You should travel and transport your freight via the Terre Haute, Indianapolis & Eastern Traction Company." The reasons are then given very briefly in large type. The back of the folder contains only the trademark of the company.

Memorandum in Nahant and Lynn Fare Case.—The Massachusetts Railroad Commission has issued a memorandum in regard to the petition of citizens of Lynn and Nahant for reduced fares upon the Nahant & Lynn Street Railway, sustaining the company for the present by declining to make any recommendation at this time. The board says: "In the above-entitled matter, after hearing the board made a memorandum under date of Oct. 4, 1909. Since the annual report of the company for the year ending Sept. 30, 1909, has been filed the board has given attention to the same, and after study finds no occasion at this date to make a recommendation with respect to fares. The petition is not dismissed, but continued without prejudice.

New Operating Organization of Chicago Railways Company.—The growth of the lines and service of the Chicago Railways Company has made it necessary to divide the operation of the system into three departments, classified geographically by the territory served. Superintendents have been appointed to each division, and these men will be held responsible for the operation of all cars, maintenance of equipment, etc. Under R. R. Herzog as general superintendent, Henry L. Beach will have charge of the north division as superintendent, including all lines and car houses north and east of the North Branch of the Chicago River; Benjamin Phillips will have charge of the west division as superintendent with lines and car houses south of Lake Street and west of Chicago River, and E. L. Crawford will have charge of the northwest division, including the lines and barns north of Madison Street and west of the Chicago River.

New Time-Table of Toledo & Chicago Interurban Railway.—G. M. Patterson, general freight and passenger agent of the Toledo & Chicago Interurban Railway, Kendallville, Ind., has recently issued a table folder of a form recently adopted by the company to cover both local and interline business. Heretofore the company has issued a small local folder and a large interline folder. The new folder shows the time of the company's own trains and the time of the steam railroad trains leaving junction points, and contains a condensed through time-table of connecting interurban railways, valuable information concerning cities and towns through which the road operates, general information about operation, a map of the Toledo & Chicago Interurban Railway and the steam and electric connecting railways. The only advertising solicited for this folder was that which would benefit the traveling public, viz., hotel directory and express advertisements.

Time Extended for Complying with Subway Service Order.—The Public Service Commission of the First District of New York on Feb. 25, 1910, granted the Interborough Rapid Transit Company a postponement until March 3, 1910, for the installation of a 2-minute headway on all subway trains south of Ninety-sixth Street between the close of the morning rush hours and the beginning of the evening rush, as fixed in the order of the commission issued on Feb. 18, 1910, which was published in the Electric Railway Journal of Feb. 26, 1910, page 356. The postponement was granted to allow experiments to be made to see whether the statement of the company that it is a physical impossibility thus to operate its trains is well founded or not. The hearing which was to have been held before the commission on Feb. 24, 1910, to inquire into the service on the elevated lines of the Interborough Rapid Transit Company has been postponed until March 10, 1910.

Personal Mention

Mr. George L. Radcliffe has been appointed superintendent of the Cleveland (Ohio) Railway to succeed Mr. W. T. Cook, and entered upon his duties on March 1, 1910.

Mr. C. Q. Richmond, vice-president and general manager of the Berkshire Street Railway, Pittsfield, Mass., has also been appointed general manager of the Pittsfield Electric Street Railway to succeed Mr. F. J. Dolan.

Mr. H. B. Noyes has resigned as chief engineer of the Omaha & Council Bluffs Street Railway, Omaha, Neb., to become president of the Gate City Construction Company, Denver, Col., which will engage in general contracting.

Mr. Benjamin Phillips has been appointed superintendent of the west division of the Chicago (Ill.) Railways in charge of the lines and car houses of the company south of Lake Street and west of the Chicago River. This is a new position with the company.

Mr. L. S. Storrs, president of the New England Investment & Security Company, president of the Springfield Street Railway and president of the Berkshire Street Railway, has also been elected president of the Pittsfield (Mass.) Electric Street Railway, to succeed Mr. P. C. Dolan.

Mr. Milton Trueman has been appointed superintendent of the Toledo division of the Lake Shore Electric Railway, Cleveland, Ohio. Mr. Trueman has been connected with the Lake Shore Electric Railway since the construction of the road and for several years has been trainmaster of the company.

Mr. Henry L. Beach has been appointed superintendent of the north division of the Chicago (Ill.) Railways, in charge of all the lines and car houses of the company north and east of the north branch of the Chicago River. Mr. Beach has been connected with the company for many years, and the position to which he is appointed is a new one.

Mr. E. L. Crawford has been appointed superintendent of the northwest division of the Chicago (Ill.) Railways, in charge of the lines and car houses of the company north of Madison Street and west of the Chicago River. Mr. Crawford was formerly foreman of the Larabie Street car houses of the company, and has been connected with the company for many years. The position to which he is appointed is a new one.

Mr. S. J. Jones has been appointed trainmaster of the Oregon Water Power Division of the Portland Railway, Light & Power Company, Portland, Ore., in charge of the transportation and track maintenance departments, with offices at the East Side freight station in Portland, reporting to Mr. C. J. Franklin, general superintendent. Freight and ticket agents of the company report to the traffic manager as heretofore.

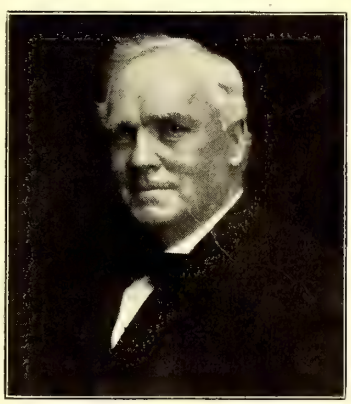
Mr. Charles Sigler, heretofore electrical engineer and master mechanic of the Winona Interurban Railway, Warsaw, Ind., has been appointed superintendent of motive power and master mechanic of the company, with offices and shops at Winona Lake, Ind., effective on March 1, 1910. Mr. Sigler will not assume the duties of superintendent of motive power of the Salt Lake & Ogden Railway, Salt Lake, Utah, as previously reported.

Mr. E. R. Sutherland, who has been connected with the office of the American Street & Interurban Railway Association for 11 months, has accepted the position of general assistant to the superintendent of the Ohio River Electric Railway & Power Company, Pomeroy, Ohio. Mr. Sutherland was graduated from the Virginia Military Institute in 1906 and received the degree of M.E. from Cornell University in 1909, and acted for a time as assistant to Prof. H. H. Norris, professor of electrical engineering at Cornell. Mr. Sutherland will enter on his duties with the Ohio River Electric Railway & Power Company on March 5, 1910.

Mr. Emil G. Schmidt has resigned as vice-president of the Rockford & Interurban Railway, Rockford, Ill.; vice president and manager of the Peoria Gas & Electric Company, Peoria, Ill.; vice-president of the Evansville Gas & Electric Company, Evansville, Ind., and as vice-president and general manager of the Springfield Gas Light Company, Springfield Consolidated Railway, Springfield Gas Light Company, Springfield Light, Heat & Power Company, Springfield, Ill., effective on Aug. 1, 1910. Mr. Schmidt proposes to spend two months with his family at Middle Bass Island, Ohio, and will probably then go to California.

Mr. H. C. Hoagland, who recently went to Muskogee, Okla., as special agent for H. M. Byllesby & Company to investigate the water-power of streams in the vicinity of Muskogee, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, 1910, has been appointed general manager of the Muskogee Gas & Electric Company, which is controlled by H. M. Byllesby & Company, Chicago, Ill. Mr. Hoagland has, however, severed his connection as vice-president and general manager of the North Missouri Central Railway Company, which contemplates the construction of a 60-mile electric railway in Missouri, to which position he was elected after he resigned as chief electrical and mechanical engineer of the Illinois Traction System.

Mr. John M. Egan has been elected president of the Kansas City Railway & Light Company, Kansas City, Mo., to succeed Mr. Bernard Corrigan, resigned. Mr. Egan is well known in Kansas City, having been connected with the Armour Swift interests, and later head of the Union Station Company, Kansas City. He was born in Springfield, Mass., on March 26, 1848. In May, 1863, Mr. Egan joined his father in the employ of the Illinois Central Railroad and remained with the company until 1869. From January, 1870, to January, 1877, he held consecutively the positions of clerk, assistant engineer, division engineer, division engineer's and chief engineer's assistant with the North Missouri Railroad, now a part of the Wabash Railroad. It was here that Mr. Egan became acquainted with Mr. William C. Van Horne. In January, 1877, Mr. Egan entered the employ of the Southern Minnesota Railroad, now a part of the Chicago, Milwaukee & St. Paul Railroad. When Mr. Van Horne took charge of the Canadian Pacific Railroad, in 1882, Mr. Egan was made general superintendent of the Western division of the company, with headquarters at Winnipeg, Man., and remained with the company until 1886, during which time he had charge of the work of extending the railroad from the northern shore of Lake Superior to the western slope of the Rocky Mountains, involving the construction of 1500 miles of railroad. In September, 1886, he became general superintendent of the St. Paul, Minneapolis & Manitoba Railroad, with headquarters at St. Paul, in charge of construction work and the extension of the line from Minot, N. D., to Helena, Mont. In February, 1888, Mr. Egan became general manager of the Chicago, St. Paul & Kansas City Railroad, a position which he retained until September, 1890, when he was made president and general manager of the company. Later Mr. Egan was assistant to the president of the Lake Superior & Ishpeming Railroad at Marquette, Mich. In November, 1896, he became vice-president of the Central of Georgia Railroad, and also held the same position in the Ocean Steamship Company. In April, 1900, he was made president of the Central of Georgia Railroad, and in June, 1902, he was also made president of the Ocean Steamship Company. In July, 1904, Mr. Egan became connected with the companies in Kansas City controlling the Armour-Swift-Burlington holdings in the North End, and in Clay County, and on June 4, 1904, he was elected president of the Kansas City Terminal Railway. He resigned this position on Feb. 6, 1907, to go to Brazil, and returned to the United States in November, 1908, when the English capitalists who controlled the property in Brazil relinquished their ownership.



J. M. Egan

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Eureka Springs Electric Company, Little Rock, Ark.**—Incorporated in Arkansas to build an electric railway in Little Rock. Capital stock, $100,000. Incorporators: Henry C. Brent, A. M. Barrow and Justin D. Bowerstock.

***Fullerton & Richfield Railway, Los Angeles, Cal.**—Incorporated in California to build an electric railway between Fullerton and Richfield. Capital stock, $130,000. Directors: A. G. Wells, G. Holterhof, Jr., W. H. Brewer, J. L. Hibbard and C. W. Jones.

***Vallejo (Val.) Traction Company.**—Incorporated in California to build an electric railway through the eastern section of Vallejo to the White Sulphur Springs. Capital stock, $200,000. Incorporators: Joseph Levison, M. H. Meacham, Theodore Bell and E. Hennessey, all of Napa, and C. G. Doty, Vallejo.

***Southern Iowa Traction Company, Albia, Ia.**—Incorporated in New Jersey for the purpose of converting the Centerville & Albia Railroad, which formerly operated a steam railroad between these points, into an electric railway. Capital stock, $300,000. Officers: William A. Boland, president; Dr. J. L. Sawyer, vice-president, and George M. Barnett, treasurer.

***Lansing & Northeastern Electric Railway, Lansing, Mich.**—Incorporated in Michigan to build a 30-mile electric railway from Lansing to Owosso, with two proposed extensions, one from Morrice via Durand to Flint, the other from Owosso to Saginaw. Capital stock, $500,000. Incorporators: G. G. Moore, K. Lathrop and S. W. Ladd, Detroit, and T. W. Atwood, Caro.

***Isothermal Traction Company, Rutherfordton, N. C.**—Chartered in North Carolina to construct an electric railway from Rutherfordton to Gastonia, a distance of 50 miles. Capital stock, $100,000. Incorporators: K. S. Kinch, J. F. Fleck and W. A. Harrell.

Johnstown (Pa.) Traction Company.—Chartered on Feb. 24 to take over the lines of the old Johnstown Passenger Railway, recently purchased by the American Railways. Capital stock, $500,000. Directors: E. M. Du Pont, president; G. Nelson Smith, S. E. Young, Joseph McAneny and Percy A. Rose.

Scranton & Binghamton Traction Company, Scranton, Pa.—Incorporated in Pennsylvania to operate a 62-mile electric railway from Binghamton, N. Y., to Scranton, Pa. Capital stock, $10,000. W. L. Connel, Scranton, president. [E. R. J., Feb. 5, '10.]

***People's Utility Company, Mannington, W. Va.**—Incorporated in West Virginia for the purpose of building an electric railway in Mannington and other parts of Marion and Wetzel Counties. Capital stock, $500,000. Incorporators: W. R. Martin, C. R. Phillips, W. T. Smith, N. H. Smith, Mannington, and I. D. Morgan, New Martinsville.

FRANCHISES

***Vallejo, Cal.**—The Vallejo Traction Company has applied for a franchise to build an electric railway from the water front in Vallejo to the White Sulphur Springs. H. M. Meacham, Vallejo, president.

Portland, Ind.—The Fort Wayne & Springfield Railway, Decatur, has been granted the right to build an extension of its electric railway from Decatur to Portland. W. H. Fledderjohann, general manager.

Paw Paw, Mich.—The Common Council has granted to William Plumb and H. H. Tucker a franchise to build an electric railway in Paw Paw. The promoters expect to continue this railway to Kalamazoo, Lawrence, Hartford and Benton Harbor. [E. R. J., Dec. 25, '09.]

Fremont, Neb.—The Nebraska Transportation Company, Omaha, has applied to the Fremont Council for an electric railway franchise. C. W. Baker, president. [E. R. J., Nov. 20, '09.]

Englewood, N. J.—The Council has granted the Hudson River Traction Company, Hackensack, the right to extend its line in Englewood to the city limits, just above Hudson Avenue. [E. R. J., Feb. 19, '10.]

Bucyrus, Ohio.—The City Council has granted the Cleveland, Southwestern & Columbus Railway, Columbus, a 25-year franchise to operate electric railways over nine streets in Bucyrus.

Spartanburg, S. C.—F. H. Knox, vice-president and general manager of the Spartanburg Railway, Gas & Electric Company, Spartanburg, has asked the City Council for a two months' extension of time in which to complete its extension to Saxon Mills.

Houston, Tex.—The Houston-Galveston Electric Railway, Houston, has applied to the City Council for right of way over certain streets in Houston. [E. R. J., Jan. 1, '10.]

San Marcos, Tex.—C. L. Hopkins, San Marcos, has been granted a 20-year franchise to construct an electric railway in San Marcos provided the railway is completed and in operation within one year. [E. R. J., Feb. 29, '10.]

Provo, Utah.—Jesse Knight has recently been granted franchises in Payson, Spanish Fork, Pleasant Grove, American Fork and Lehi. Franchises are still to be obtained from the intermediate points between Provo and Springville. Application has just been made for a franchise in Salt Lake City. This is part of a plan to build an electric railway from the south to the north boundaries of Utah County, and as soon as all franchises are secured the company will be organized. [E. R. J., Feb. 29, '10.]

TRACK AND ROADWAY

Geary Street, Park & Ocean Railway, San Francisco, Cal.—The board of public works has been requested to furnish the Board of Supervisors with an estimate of the cost of preparation of plans and specifications for the reconstruction of the Geary Street, Park & Ocean Railway which is now to be municipally operated.

Vallejo & Northern Railway, Vallejo, Cal.—It is announced that the bonds for the construction of this railway from Vallejo to Sacramento via Fairfield and Woodland have been placed and that the line will be built this year as a completion of the Northern Electric Railway, Chico, which will eventually extend from Redding to Vallejo.

Middle Georgia Interurban Railway, Atlanta, Ga.—This company has filed with the Railroad Commission in Atlanta, a petition to be allowed to issue first mortgage bonds to the extent of $1,050,000, also for the right to issue stock to the extent of $200,000. The matter will be heard by the Commission on March 9. This is the first definite step in the direction of building the projected electric railway from Griffin to Social Circle via Jackson, Indian Springs and Monticello. Grading of the line has been completed for two-thirds of the way from Indian Springs to Jackson. [E. R. J., July 31, '09.]

Egyptian Traction Company, Eldorado, Ill.—This company advises that work will begin in about three months on its projected railway which is to connect Murphysboro, Marion, Carrier Mills, Harrisburg, Eldorado, Ridgway, New Haven, Ill., and Mount Vernon, Ind. It will also reach White City, an amusement resort at Harrisburg. Officers: Geo. E. Leggett, Winchester, Ind., president and general manager; John W. Murphy, Eldorado, Ill., vice-president; G. E. K. Hixon, Eldorado, secretary; J. D. Stayton, Eldorado, treasurer, and Geo. Clark, Harrisburg, Ill., chief engineer. [E. R. J., Jan. 22, '10.]

Murphysboro (Ill.) Electric Railway.—Plans are being considered by this company to extend its line from Murphysboro to Herrin, Du Quoin, Harrisburg, Pinckneyville and back to Murphysboro, completing a loop. Surveying will start at once. A. B. Minton, president.

Bloomington, Pontiac & Joliet Electric Railway, Pontiac, Ill.—This company advises that it will complete tracklaying on its extension between Pontiac and Chenoa as soon as the weather permits. This line will be extended to Lexington, 19 miles from Pontiac. F. E. Fisher, general manager.

Winona Interurban Railway, Winona Lake, Ind.—It is reported that this company will soon begin work on its

projected 14-mile extension between Bremen and Milford. J. B. Crawford, Warsaw, purchasing agent.

Albia (Ia.) Interurban Railway.—This company is building a 10-mile extension from Albia to Buxton. The En- projected 14-mile extension between Bremen and Milford. tract. W. E. Grant, general manager.

Hutchinson (Kan.) Interurban Railway.—Work was begun on Feb. 15 by this company on the construction of 2 miles of new single track.

Louisville (Ky.) Railway.—This company is said to be considering plans for the building of an 8-mile extension from Fern Creek to Mt. Washington.

Battle Creek, Coldwater & Southern Railway, Battle Creek, Mich.—A bonus of $15,000 has been raised in Coldwater to aid this company in building a 28-mile railway from Battle Creek to Coldwater. C. E. Flynn, Erie, president. [E. R. J., July 17, '09.]

Twin City & Lake Superior Railway, Minneapolis, Minn.—This company has filed in St. Paul a $4,000,000 trust deed in favor of the American Trust & Savings Bank, Chicago. This proposed 130-mile electric railway will extend from Minneapolis to Duluth and Superior. About 60 miles of the route have been graded. L. N. Loomis, Minneapolis, president. [E. R. J., Jan. 1, '10.]

Metropolitan Street Railway, Kansas City, Mo.—This company advises that it will soon place contracts for building 3 miles of single track. W. W. Wheatley, Kansas City, general manager.

St. Louis, Montesano & Southern Railway, St. Louis, Mo.—Judge Wurdeman, of the Clayton Circuit Court, has appointed Peter Kerth receiver for this company, which was organized to build a 63-mile electric railway from St. Louis to Flat River. Authorized capital stock, $3,000,000 common and $1,000,000 preferred. Bond issue of $2,500,000. [E. R. J., June 19, '09.]

Mountain Railway, West Orange, N. J.—This company advises that it will build ½-mile of track from its present terminus at St. Cloud to the South Mountain Reservation, Essex County Park. Frank Brewer, West Orange, vice-president. [E. R. J., June 12, '09.]

Citizens' Traction & Power Company, Albuquerque, N. Mex.—This company was organized and has awarded a contract to J. H. Barrett, Pittsburgh, Pa., to build a 2-mile street railway in Albuquerque. Later a charter will be applied for to build a comprehensive system covering the entire city and a power plant will be installed. For the present power will be purchased. Officers: A. W. Hayden, president; D. H. Boatright, vice-president; J. C. Baldridge, treasurer, and Isaac Barth, secretary. [E. R. J., Feb. 29, '10.]

International Railway, Buffalo, N. Y.—This company has recently placed contracts with the Lorain Steel Company for 1500 tons of 124-432 girder rail and with the Rail Joint Company for continuous joints to splice this rail. The Kettle River Company has been awarded the contract for 21,000 long-leaf, zinc-treated ties. The company is about to order screw spikes, tie plates and drive screws sufficient to put down this rail. About one-half mile of the above rail will be used in constructing a new route in the city, the balance in rehabilitating city lines.

***Queenston & Niagara Electric Railway, Niagara Falls, Ont.**—This company is reported to have been organized to construct a 7-mile electric railway between Queenston and Niagara-on-the-Lake along the lower Niagara Gorge to Lake Ontario.

McKeesport, Clairton & Westmoreland Railway, McKeesport, Pa.—This company has been formed as a subsidiary company of the Pittsburgh (Pa.) Railways, to build an electric railway to connect McKeesport, Clairton, Elizabeth, Riverview, Monongahela, Monessen and Webster. Two parties of surveyors are now at work.

Phœnixville, Valley Forge & Stafford Street Railway, Phœnixville, Pa.—This company has secured all rights of way to build its railway between Phœnixville and Valley Forge. Thomas E. O'Connell, West Chester, president. [E. R. J., Jan. 29, '10.]

Chambersburg, Greencastle & Waynesboro Electric Railway, Waynesboro, Pa.—The directors of this company have recently increased the authorized stock to $2,500,000 and the bonded indebtedness to the same amount. A plan is being considered to build an extension from Pen Mar to Highfield, Monterey and Blue Ridge Summit.

Aberdeen (S. D.) Street Railway.—This company advises that within the next month contracts will be let for the construction of 4 miles of track. Charles N. Herreid, Aberdeen, president and general manager. [E. R. J., Dec. 4, '09.]

Nashville & Adairville Railway, Nashville, Tenn.—This company has been granted an amendment to its charter giving it the right to extend its proposed railway into Kentucky and connect at Owensboro with the Illinois Central Electric Railway, Canton. [E. R. J., Jan. 1, '10.]

SHOPS AND BUILDINGS

Central California Traction Company, San Francisco, Cal.—This company is negotiating for the purchase of a strip of land 226 ft. wide, extending from Front Street and X Street to low-water mark of the Sacramento River, upon which it will build a wharf and a warehouse during the summer. The dock will be for the use of steamer lines cooperating with this company in the handling of freight. George W. Petier, San Francisco, vice-president.

Augusta Railway & Electric Company, Augusta, Ga.—This company announces that the contract for erecting a terminal station and office building in Augusta has been awarded to the Blue Ridge Construction Company. Estimated cost is $27,000. James R. League, Augusta, general manager.

Indiana Union Traction Company, Anderson, Ind.—This company will erect a three-story brick passenger and freight station on East Main Street, Elmwood.

Port Arthur & Fort William Railway, Port Arthur, Ont.—This company states that it is building a new car house in Port Arthur. N. C. Pilchor, Port Arthur, purchasing agent.

Citizens' Railway Company, Waco, Tex.—This company is planning to build a repair shop and car house at Waco. The estimated cost is $75,000. Preston Graves, Peirce Building, St. Louis, Mo., purchasing agent.

POWER HOUSES AND SUBSTATIONS

San Diego (Cal.) Electric Railway.—This company has recently placed an order with the Allis-Chalmers Company for a 1200-kw vertical cross-compound condensing engine, 28 x 60 x 48, direct connected to a General Electric generator. The engine will operate at 80 r.p.m., and will be supplied with steam at 160-lb. pressure and a vacuum of 26 in. will be maintained.

Pueblo & Suburban Traction & Lighting Company, Pueblo, Col.—This company advises that it expects to purchase during the next four weeks coal-handling machinery. T. C. Roberts, Pueblo, superintendent of power plant.

Metropolitan Street Railway, Kansas City, Mo.—This company states that it expects soon to purchase one 2000-kw rotary converter and accessories. W. W. Wheatley, Kansas City, general manager.

Port Arthur & Fort William Railway, Port Arthur, Ont.—This company advises it has purchased for installation this month an 800-amp-hr. battery and booster from the Gould Storage Battery Company. The company has recently installed a 300-kw motor generator set purchased from the Allis-Chalmers-Bullock Company. N. C. Pilchor, Port Arthur, purchasing agent.

Aberdeen (S. D.) Street Railway.—During the next month this company will be ready to let contracts for equipment and the construction of a power plant in Aberdeen. Charles N. Herreid, Aberdeen, president.

Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis.—This company is increasing the capacity of its power plant in Appleton by the installation of two low-pressure steam turbines. These will be furnished by the Allis-Chalmers Company and will each have a capacity of 1250 kw at 3600 r.p.m., 60-cycle, three-phase, 2300 volts. Steam will be received from existing compound engines at 17-lb. absolute, and the turbines will exhaust into a 28-in. vacuum.

Manufactures & Supplies

ROLLING STOCK

Guaymas (Mexico) Street Railway has ordered three new cars.

San Diego (Cal.) Electric Railway is building 10 flat cars, each of 50,000 lb. capacity, at its shops in National City.

Ensley (Ala.) Street Railway is considering the purchase of a gasoline or gasoline-electric car to seat from 25 to 40 passengers.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., contemplates the purchase of some single-truck cars during 1910.

Stone & Webster Engineering Corporation, Boston, Mass., will place an order immediately for 10 city cars and 15 interurban cars for its Texas properties.

Indiana Union Traction Company, Anderson, Ind., will soon prepare designs for building in its own shops a 60-ft. passenger car for limited high-speed service.

Kansas City Railway & Light Company, Kansas City, Mo., is in the market for 100 60-hp motors and 25 pairs of trucks to be used under cars which the company already has.

East Shore & Suburban Railway, Richmond, Cal., expects to buy two 50-ft. city and suburban cars, three sets each of trucks, four motor car equipments and air brakes, within the next two weeks.

Cape Girardeau-Jackson Interurban Railway, Cape Girardeau, Mo., expects to buy two sets of trucks, two motor equipments complete, trolley bases, controllers and other car material within the next four weeks.

Port Arthur & Fort William Electric Railway, Port Arthur, Ont., mentioned in the Electric Railway Journal of Oct. 23, 1909, as contemplating the purchase of some cars, has placed an order with the Preston Car & Coach Company, Preston, Ont., for four 42-ft. pay-as-you-enter cars.

Cincinnati (Ohio) Traction Company has placed an order with the Cincinnati Car Company for 50 single-truck, open car bodies, to be built according to the dimensions of the type of car in service at present in Cincinnati. It was mentioned in the Electric Railway Journal of Dec. 18, 1909, that this company would purchase new equipment.

Michigan United Railways, Jackson, Mich., mentioned in the Electric Railway Journal of Jan. 15, 1910, as contemplating the purchase of 15 or 20 cars, is preparing specifications for 20 city cars and one interurban car, and will purchase two sets of trucks and 60 new motors, in addition to the cars, within a month, it is reported. The purchase of this equipment will involve an expenditure of about $158,000.

Third Avenue Railroad, New York, N. Y., mentioned in the Electric Railway Journal of Jan. 15, 1910, as having ordered 100 convertible, pay-as-you-enter cars from The J. G. Brill Company, will have the following details on the new cars:

Length of body....30 ft. 1 in.	Heaters .....Consolidated
Length over bumpers...43 ft.	Headlights....United States
Width over sills....8 ft. 2 in.	Journal boxes....Symington
Air brakes,	Motors (two per car),
National B. & E. Co.	West 310 and GE 210-A
Axles.....M. C. B. type	Seats.....Brill Winner
Brakeshoes,	Step treads..Universal safety
Am. B. S. & Fdy. Co.	Trucks,
Curtain fix....Curtain S. Co.	Brill No. 39-E single motor
Curtain material...Pantasote	Varnish .....Murphy
Destination signs....Hunter	Push button....Consolidated
Wheelguards .....H-B	Steel wheels.....Midvale
Gears and pinions.....Solid	Headlinings ..... Agasote
Hand brakes.....Peacock	

Public Service Railway, Newark, N. J., reported in the Electric Railway Journal of Jan. 29, 1910, as having ordered 100 single-end, double-truck, pay-as-you-enter cars from the Cincinnati Car Company, has drawn up the following specifications:

Wheel base.....5 ft. 10 in.	Curtain material...Pantasote
Length of body.....32 ft.	Destination signs..Keystone
Length over all.....44 ft.	Hand brakes,
Width over all.....8 ft. 6 in.	Sterling Little Giant
Height, sill to trol-	Headlights..Dayton No.1561
ley base.....8 ft. 6 in.	Markers....Lintern tail lamp
Body,	Motors...Four West. 101-B-2
Composite, wood and metal	Registers ...Sterling-Meaker
Underframe .....Composite	Roofs.....Monitor type
Axles .....4½ in.	Seats....Longitudinal rattan
Control K-6	Trolley poles and attach-
Couplers....Cincinnati radial	ments.....One No. 11 base
Curtain fix.Protected groove	Varnish .....Murphy

TRADE NOTES

Standard Railway & Timber Company, Dover, Del., has been incorporated in Delaware by J. H. Scott, Tacoma, Wash.; E. H. Brehm, Seattle, Wash., and Joseph Irving, Everett, Wash., with a capital of $500,000.

Allis-Chalmers Company, Milwaukee, Wis., reports that its Type OB air compressor governors are being installed on 10 cars which the Northern Ohio Traction & Light Company, Akron, Ohio, is overhauling, to replace the governors which were in use on the cars.

Ohio Brass Company, Mansfield, Ohio, has recently placed the following Tomlinson M. C. B. radial couplers: Spokane & Inland Empire Railroad, Spokane, Wash., 86; Oklahoma (Okla.) Railway, 12; Seattle & Everett Interurban Railway, Seattle, Wash., 12; Louisville & Eastern Railroad, Louisville, Ky., 6; Terre Haute, Indianapolis & Eastern, Terre Haute, Ind., 12.

Robert Long, South American representative of the National Brake & Electric Company, Milwaukee, Wis., has returned to the United States after a residence in different parts of South America of 2½ years, and expects to remain in this country two or three months before returning to South America. Mr. Long reports that the National Brake & Electric Company has more than 800 air brake equipments in different parts of South America.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., which manufactures many different railway shop devices and gear cases, etc., is now giving particular attention to the manufacture of brake and controller handles of all the important types. The air brake and reversing handles are made of bronze or malleable iron. The controller handles include bronze, adjustable type; malleable iron, adjustable type, and malleable iron with bronze bushings.

Electric Storage Battery Company, Philadelphia, Pa., has appointed Pierson, Roeding & Company, San Francisco, Seattle and Los Angeles, as its sole Pacific Coast selling agent. George R. Murphy, now interested with Pierson, Roeding & Company, who will represent the Electric Storage Battery Company in the sale of its batteries on the coast, has had 10 years' experience in various departments of the Electric Storage Battery Company's organization, and will devote himself exclusively to the battery business, with offices at the company's former address, Crocker Building, San Francisco. The Pacific Coast branches of the Electric Storage Battery Company's construction, operating and Exide inspection departments will be continued under the company's own control, with offices at 590 Howard Street, San Francisco. Pierson, Roeding & Company will operate the Exide battery depot at 590 Howard Street, San Francisco, and will carry an ample stock to insure prompt shipments. Charles Blizard, third vice-president and general sales manager of the Electric Storage Battery Company, has returned East after an extended trip through the West. Mr. Blizard visited the sales offices of the company at Cleveland, Chicago and San Francisco and spent some time in Seattle and Los Angeles.

C. C. Steinbrenner has recently been elected vice-president of the Galena-Signal Oil Company, Franklin, Pa. Mr Steinbrenner was born in Cleveland, Ohio, on Sept. 20, 1863, and was educated at the public schools of that city. From 1877 to 1880 he served as printer's apprentice and studied bookkeeping and stenography at night. In the spring of 1881 he was employed as stenographer and assistant clerk with the motive power department of the Pennsyl-

vania Railroad. Subsequently he became clerk in the office of the county auditor at Cleveland. In 1882 he returned to the Pennsylvania Railroad at Wellsville as assistant shop clerk. He next became assistant clerk in the office of the superintendent of machinery of the Cleveland, Cincinnati, Chicago & St. Louis Railroad at Cleveland. In 1885 he was promoted to be secretary to that official and stenographer to the general attorney of the company. In 1890 Mr. Steinbrenner was made chief clerk of the motive power department of the Cleveland, Cincinnati, Chicago & St. Louis Railroad, with offices in Indianapolis. In May, 1893, he became chief clerk of the motive power department of the Illinois Central Railroad at Chicago, but resigned that position in December, 1894, to become auditor of the railway department for the Galena-Signal Oil Company, and continued in this position until his election as vice-president of the company.

ADVERTISING LITERATURE

Hayes Track Appliance Company, Geneva, N. Y., is distributing a circular about its models of hand-operated derails.

B. F. Sturtevant Company, Hyde Park, Mass., is distributing a card calling attention to its electric dust blowing set.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued list No. 100, covering its rail and equipment department.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., is mailing two circulars on trolley ears and Brooklyn strain insulators.

MacGovern, Archer & Company, New York, N. Y., have issued Bulletin No. 14, in which attention is called to the fact that the company has on hand several dynamos for immediate shipment.

Ohmer Fare Register Company, Dayton, Ohio, has issued a series of folders in which are described indicating, recording and printing registers and equipments for pay-as-you-enter and pay-within cars.

Western Electric Company, New York, N. Y., has issued Bulletin No. 5352, 8 in. x 10 in., with 28 pages, which is devoted to Hawthorn fan motors for 1910. It is well illustrated and contains a description of each fan motor which is shown.

Cutler-Hammer Clutch Company, Milwaukee, Wis., has issued a folder in which its lifting magnets are described and illustrated. A feature of the publication is the cross-section 10 in. wide by 7½ in. high of a Cutler-Hammer lifting magnet, with an index to the details of the magnet.

W. R. Garton & Company, Chicago, Ill., have issued a folder containing list prices of their tantalum, gem and standard carbon lamps, and discounts on their "Brilliant" Mazda lamps. Another folder, just issued, contains list prices of "Brilliant" Mazda lamps alone. In addition, the company has printed "Condulet Talk No. 146," in which is described type O-162,200 condulet for two-wire molding.

Watson-Stillman Company, New York, N. Y., has issued a 120-page illustrated catalog under the title of "Hydraulic Valves and Fittings." It contains many types and combinations of hydraulic valves and fittings; also advice as to the best piping arrangements, how the valve arrangement may operate a number of cylinders or machines automatically and what types or combinations of valves are best suited to certain work.

H. W. Johns-Manville Company, Cleveland, Ohio, in the second issue of the "J.-M. Packing Expert," dated February, 1910, continues the "Story of Asbestos." The publication also contains an article in which the company tells about the location of its factories. It is accompanied by an engraving showing the city plant at Milwaukee. The company is mailing postal cards in the form of shipping tags, on which are printed blank forms for any one desiring Catalog No. 101.

National Brake & Electric Company, Milwaukee, Wis., has issued Publication No. 387, which is devoted to motor-driven air compressors, type "3 V S." The parts of the compressor are described and illustrated. In addition, the catalog contains descriptions of the company's portable air compressor outfits, gas compressors for high pressure, gas transmission and air compressors for air-lift pumps. Tables are also presented giving dimensions, capacities and other data relating to motor compressors; also capacities and cylinder dimensions at various pressures.

Kerr Turbine Company, Wellsville, N. Y., has issued two bulletins, No. 9, "Turbo-Blower Units," and No. 10, "Steam Turbine Generators, Steam Turbine Centrifugal Pumps." The first bulletin illustrates practical outfits for forced and induced draft, gas works service and for furnishing blast for cupolas. The other includes generating sets for electric power and lighting, and pumping units for boiler feeding, fire service, water supply, circulating condenser water, draining sumps, and for other service where water must be delivered at moderate or high pressure or against considerable head.

W. S. Rockwell & Company, New York, N. Y., have published Catalog No. 3 on fuel oil and gas burning appliances. "Oil as Fuel" is the subject with which the catalog is introduced. Each piece of apparatus included in the title of the catalog is briefly described and illustrated and is accompanied by specifications and code words. A number of tables are presented giving the capacities of the various sizes of oil storage tanks manufactured by the company. In addition, a line drawing has been inserted to show the appliances necessary and the method of delivering and burning fuel oil. This insert is supplemented by valuable tables and other useful information. On the last page of the publication Rockwell & Company call attention to the catalogs on the various types of oil and gas furnaces which they manufacture.

Eureka Tempered Copper Works, North East, Pa., have issued illustrated catalog and price list No. 5 dated Jan. 1, 1910. It contains 168 pages and is profusely illustrated. A heavy paper has been used, and the publication is enclosed in an artistic illuminated cover. The contents are divided into six sections. These divisions convey an excellent idea of the extent of the products which the works are prepared to supply. The subjects of the sections in the order of their arrangement in the catalog follow: Section 1, cast commutator bars, drop forged commutator bars; copper, bronze and brass castings. Section 2, new commutators, refilled commutators, assembled commutators, mica and mica insulation. Section 3, brush commutators, lighting segments, copper brushes, brush copper. Section 4, trolley wheels, bushings, bearings. Section 5, clinch and solder ears, feed and strain ears, splice ears and sleeves, wire connectors, section switches. Section 6, controller segments and fingers, brush holders.

J. G. Brill Company, Philadelphia, Pa., in *Brill's Magazine* for February, 1910, publishes the second of the series of biographical sketches of officers of street railways in the United States. The subject in the February issue is Charles O. Kruger, president and general manager of the Philadelphia Rapid Transit Company. The sketch is accompanied with an excellent portrait of Mr. Kruger as a supplement. The magazine also contains the fourteenth of the series of articles on the type of car adopted for use in large cities of the world. This time the city considered is Lisbon, Portugal. The second article in the magazine is entitled "How Light-Weight Equipment Behaves in Service—A Severe 10-Year Test," and the experience of the Metropolitan Street Railway, New York, N. Y., with light-weight cars is reviewed. These cars weigh only 27,040 lb., or 751 lb. per seated passenger, and were reconstructed for pay-as-you-enter operation. Other articles are "Wason Cars for Guatemala" and "Some Recent Types of Open Cars." The J. G. Brill Company has also issued a booklet in which its high-speed truck No. 27-M.C.B. is described. This truck was called to the attention of operators of high-speed lines at the convention of the American Street & Interurban Railway Association in Denver in October, 1909. It is of M.C.B. type with distinctive Brill features, and is built for all classes of high-speed motor and trail service. The subject matter of the booklet is divided into three sections: "The Truck and Its Frame," "Bolster and Spring Plank" and "The Brake Arrangement." Drawings, tables and specifications add to the value of the publication.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. **The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years.** Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit. ‡Includes Ferry earnings up to April 1, 1909. **xIncludes other income received.**

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Jan. '09	164,944	*94,500	70,444	43,292	27,152
	1 " " '08	147,895	*84,710	63,185	43,952	19,233
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Dec. '09	39,149	21,034	18,114	8,522	9,592
	1 " " '08	37,353	19,651	17,702	8,847	8,855
	12 " " '09	406,867	228,093	178,775	99,799	78,975
	12 " " '08	362,252	206,759	155,493	99,692	55,801
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Jan. '10	27,180	16,724	10,456	8,921	1,535
	1 " " '09	26,293	14,415	11,878	8,904	2,974
CHARLESTON, S. C. Charleston Con.Ry., Gas & Elec. Co.	1m., Jan. '10	69,340	46,525	22,815	13,917	8,899
	1 " " '09	59,645	38,828	20,817	13,817	7,000
	11 " " '10	719,429	462,042	257,387	153,083	104,304
	11 " " '09	697,303	451,854	245,449	151,808	93,640
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., Dec. '09	117,202	72,794	44,408	30,912	13,496
	1 " " '08	109,578	62,553	47,025	27,996	19,029
	6 " " '09	858,007	444,903	413,104	177,574	235,530
	6 " " '08	781,045	408,752	372,294	166,478	205,816
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Jan. '10	21,084	*11,495	9,590	8,729	861
	1 " " '09	18,986	*10,523	8,463	8,112	351
Lake Shore El. Ry.	1m., Jan. '10	78,994	*48,539	30,455	34,270	†3,816
	1 " " '09	73,591	*45,575	28,017	34,392	†6,375
DALLAS, TEX. Dallas Electric Corporation.	1m , Dec. '09	119,766	75,105	44,661	27,675	16,986
	1 " " '08	106,830	65,940	40,890	27,720	13,170
	12 " " '09	1,320,122	821,491	498,631	337,811	160,820
	12 " " '08	1,171,958	782,645	389,313	348,026	41,287
DAVENPORT, IA. Tri-City Ry. & Lt. Co.	1m. Dec. '09	204,859	110,659	94,200	.....	.....
	1 " " '08	178,259	96,652	81,607	.....	.....
	12 " " '09	2,038,728	1,148,141	890,587	.....	.....
	12 " " '08	1,819,077	1,069,317	749,760	.....	.....
DETROIT, MICH. Detroit United Ry.	1m., Dec. '09	708,864	427,941	280,923	*156,729	124,194
	1 " " '08	613,104	*376,534	236,570	133,606	102,964
	12 " " '09	8,192,388	5,042,724	3,149,664	*1,880,129	1,269,535
	12 " " '08	7,179,716	*4,559,123	2,620,593	1,618,665	1,001,928
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1 " Dec. '09	185,225	96,186	89,039	.....	.....
	1 " " '08	172,276	102,146	70,130	.....	.....
	12 " " '09	2,035,790	1,097,236	938,554	.....	.....
	12 " " '08	2,009,514	1,062,310	947,205	.....	.....
EL PASO, TEX. El Paso Elec. Co.	1m., Dec. '09	59,667	32,628	27,039	9,410	17,629
	1 " " '08	55,194	37,389	17,805	7,765	10,040
	12 " " '09	600,958	360,103	240,855	98,225	142,630
	12 " " '08	534,221	384,639	149,584	86,893	62,690
FAIRMONT, W. VA. Fairmont & Clarksburg Trac. Co.	1m., Dec. '09	42,261	16,019	26,242	.....	.....
	1 " " '08	36,808	12,912	23,896	.....	.....
	12 " " '09	472,251	165,432	306,819	.....	.....
	12 " " '08	416,882	145,884	270,998	.....	.....
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Dec. '09	129,720	73,027	56,693	.....	.....
	1 " " '08	118,835	64,738	54,098	.....	.....
	12 " " '09	1,414,526	821,723	592,804	521,350	71,453
	12 " " '08	1,322,720	737,134	585,586	488,756	96,830
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Dec. '09	108,483	61,033	47,450	17,076	30,374
	1 " " '08	97,448	54,326	43,122	15,185	27,938
	12 " " '09	1,259,551	692,735	566,816	204,139	362,677
	12 " " '08	1,080,577	630,052	450,525	189,541	260,984
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Dec. '09	100,867	58,482	42,385	23,059	19,326
	1 " " '08	96,998	54,931	42,068	20,696	21,372
	12 " " '09	1,206,544	709,034	497,510	263,899	233,611
	12 " " '08	1,088,447	627,973	460,474	245,277	215,197
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Dec. '09	90,143	45,185	44,958	18,381	26,577
	1 " " '08	81,854	42,718	39,136	20,972	18,164
	12 " " '09	1,029,011	492,855	536,156	227,056	309,100
	12 " " '08	940,645	470,985	469,660	226,949	242,711
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Jan. '10	62,087	48,294	13,793	.....	.....
	1 " " '09	57,325	43,973	13,352	.....	.....
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Dec. '09	26,083	14,234	11,849	7,106	4,743
	1 " " '08	24,833	13,299	11,534	5,805	5,729
	12 " " '09	319,966	172,551	147,415	73,326	74,090
	12 " " '08	265,576	148,245	117,331	59,632	57,699
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Dec. '09	49,011	22,106	26,905	9,270	17,635
	1 " " '08	38,965	21,548	17,417	9,052	8,365
	12 " " '09	486,778	269,196	217,582	112,866	104,716
	12 " " '08	430,838	253,943	176,895	110,792	66,103
KANSAS CITY, KAN. Kansas City-Western Ry.	1m., Dec. '09	27,509	20,263	7,246	6,875	x550
	1 " " '08	28,439	18,389	10,050	6,871	x3,225
	6 " " '09	191,369	118,921	72,448	41,250	x32,059
	6 " " '08	182,927	110,258	72,669	41,200	x31,640
LIMA, OHIO. Western Ohio Ry.	1m., Dec. '09	40,623	22,688	17,935	15,402	2,533
	1 " " '08	36,232	21,360	14,872	14,866	6
	6 " " '09	268,463	138,578	129,885	92,659	37,226
	6 " " '08	240,524	128,198	112,326	91,180	21,146
MONTREAL, CAN. Montreal St. Ry.	1m., Jan. '10	325,621	205,060	120,561	35,690	84,871
	1 " " '09	295,453	199,644	95,809	33,536	62,273
	4 " " '10	1,352,062	791,939	560,124	132,035	428,088
	4 " " '09	1,230,524	748,839	481,685	124,105	357,580
NORFOLK, VA. Norfolk & Portsmouth Trac. Co.	1m., Jan. '10	156,372	86,661	69,711	65,771	3,940
	1 " " '09	‡157,439	93,167	64,272	67,087	†2,815
PADUCAH, KY. Paducah Traction & Light Co.	1m., Dec. '09	20,884	12,556	8,328	6,711	1,617
	1 " " '08	20,751	9,379	11,372	6,705	4,668
	12 " " '09	227,344	135,753	91,591	81,644	9,947
	12 " " '08	226,614	133,393	93,220	82,550	10,671
PENSACOLA, FLA. Pensacola Electric Co.	1m., Dec. '09	20,410	11,726	8,684	4,597	4,087
	1 " " '08	18,795	10,832	7,963	4,281	3,681
	12 " " '09	246,664	141,338	105,327	52,631	52,695
	12 " " '08	209,183	144,871	64,312	51,161	13,151
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Dec. '09	8,001	6,852	1,149	1,809	†660
	1 " " '08	7,962	5,650	2,311	2,153	158
	12 " " '09	130,786	92,949	37,837	21,668	16,169
	12 " " '08	122,266	88,440	33,825	26,755	7,070
PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Jan. '10	431,011	182,044	248,966	128,995	119,971
	1 " " '09	338,226	185,876	153,349	116,770	36,579
POTTSVILLE, PA. Eastern Pennsylvania Ry. Co.	1m., Dec. '09	55,128	*31,760	23,368	.....	.....
	1 " " '08	49,495	*29,984	19,511	.....	.....
	12 " " '09	601,412	*372,412	229,000	.....	.....
	12 " " '08	562,386	*361,853	200,534	.....	.....
ROCKFORD, ILL. Union Railway, Gas & Electric Co.	1m., Nov. '09	251,350	134,711	116,639	65,027	51,612
	1 " " '08	226,808	117,156	109,652	64,835	44,817
	11 " " '09	2,534,338	1,301,649	1,232,689	708,344	524,345
	11 " " '08	2,326,110	1,202,442	1,123,668	696,184	427,484
ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Power Co.	1m., Dec. '09	92,087	45,537	46,550	21,759	24,791
	1 " " '08	83,259	36,848	46,411	20,924	25,487
	12 " " '09	979,554	505,570	473,985	256,968	217,016
	12 " " '08	909,965	455,907	454,058	247,219	206,840
ST. LOUIS, MO. United Rys. Co. of St. Louis.	1m., Jan. '10	885,782	*596,144	289,638	233,787	55,851
	1 " " '09	829,036	*544,752	284,284	235,568	48,716
SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Dec. '09	645,847	380,203	265,644	.....	.....
	1 " " '08	603,403	343,071	260,332	.....	.....
	12 " " '09	7,455,965	4,242,648	3,213,317	.....	.....
	12 " " '08	6,866,303	4,242,750	2,623,553	.....	.....
SAVANNAH, GA. Savannah Elec. Co.	1m., Dec. '09	50,288	32,683	17,605	17,590	6
	1 " " '08	54,001	33,736	20,266	17,077	3,189
	12 " " '09	603,814	392,351	211,463	209,693	1,770
	12 " " '08	595,819	388,830	206,989	206,615	375
SEATTLE, WASH. Seattle Elec. Co.	1m., Dec. '09	481,893	289,036	192,858	103,709	89,149
	1 " " '08	415,079	253,801	161,278	95,313	65,965
	12 " " '09	5,854,175	3,394,538	2,459,638	1,242,663	1,216,974
	12 " " '08	4,520,489	2,670,252	1,850,237	1,090,646	759,591
SYDNEY, N. S. Cape Breton Elec. Co., Ltd.	1m., Dec. '09	24,308	12,570	11,738	5,060	6,679
	1 " " '08	21,766	12,514	9,252	4,959	4,293
	12 " " '09	240,709	142,502	98,207	60,440	37,767
	12 " " '08	247,546	142,509	105,036	59,462	45,575
TACOMA, WASH. Puget Sound Electric Ry.	1m., Dec. '09	148,994	108,402	40,592	59,079	†8,487
	1 " " '08	136,576	92,709	43,867	43,354	513
	12 " " '09	1,869,096	1,250,588	618,508	570,048	48,460
	12 " " '08	1,639,131	1,040,905	598,226	515,140	83,086
TAMPA, FLA. Tampa Elec. Co.	1m., Dec. '09	56,389	32,495	23,894	4,816	19,078
	1 " " '08	50,063	32,671	17,392	5,211	12,181
	12 " " '09	596,303	346,104	250,199	55,968	194,231
	12 " " '08	552,574	367,909	184,665	39,774	144,891
TOLEDO, OHIO. Toledo Rys. & Lt. Co.	1m., Dec. '09	263,552	136,305	127,247	75,927	51,320
	1 " " '08	236,067	120,356	115,711	72,125	43,586
	12 " " '09	2,733,177	1,526,120	1,207,057	879,503	327,554
	12 " " '08	2,542,110	1,377,022	1,165,089	851,782	313,307
TORONTO, ONT. Toronto Ry.	1m., Dec. '09	411,144	255,398	155,746	.....	.....
	1 " " '08	387,237	223,988	163,249	.....	.....
	12 " " '09	3,926,828	2,044,597	1,882,231	.....	.....
	12 " " '08	3,610,273	1,932,826	1,677,447	.....	.....

Electric Railway Journal

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Tuesday noon of the week of issue.

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Depreciation Fund in St. Louis

With the year 1905 the United Railways Company of St. Louis began to set aside 5 per cent of its gross earnings as a depreciation reserve. It has followed that practice in the ensuing years until 1909, when a change was made in the percentage of the revenue applied to this purpose. Starting with July 1, 1909, the company credited 6 per cent to this fund. The total set aside from income during 1909 was $609,761, or substantially 5.5 per cent on the gross revenue. In addition $6,058, received from other sources, was added to the fund, making a total of $615,819. During the year the charges against the reserve fund amounted to $633,908, but a balance was left to the credit of the fund as of Dec. 31, 1909, of $154,329. The addition of 1 per cent will probably mean over $100,000 more for the depreciation fund in 1910 than would have been available at the rate of 5 per cent.

The Problem of Heavier Expenses

A pamphlet issued by the Eastern steam lines, entitled "The Demands of the Railroad Employees," contains many facts which are applicable to the existing situation upon electric railways. The tendencies of costs of labor and materials to advance and of average fares per passenger to decline are striking elements in the conditions that confront urban and interurban electric lines. While street railways in large cities cannot point to a decrease in the revenue received per passenger mile, because of the absence of statistics showing the length of haul, they can demonstrate that the average gross revenue per passenger has declined in most instances because of the fast-increasing use and abuse of the free transfer. The remedy may lie in one of several changes, namely, increased fares, restricted transfers, lessened taxes, the zone system of charge or in some other direction of greater or less resistance, but close study will be required to determine the costs and value of the service in order to place electric railways in the best position to meet the issues arising from the problems of heavier expenses.

Sympathetic Strike in Philadelphia

It is the general opinion in Philadelphia, as expressed in the public press and by others, that the sympathetic strike called in that city on March 5 to coerce the officials of the Philadelphia Rapid Transit Company into making peace with its former employees is the failure which it deserved to be and represented a desperate effort to retrieve a lost cause. The labor leaders claim that 120,000 men left work in response to their general order, but a careful enumeration by the municipal authorities indicates that less than 20,000 men were idle on March 7 because of strike conditions. Of this number 3200 men returned to work March 8, and the total included all those thrown out of work because of a strike in one or more departments of a factory. The authorities have published a list of the industries

affected and the number of men out to substantiate their claim, while the strike advocates have not. This much is certain, that the railroad company has now established a reasonably efficient transportation service which is improving every day, and that there is little to suggest to the visitor in Philadelphia the prevalence of any strike on either the railway lines or generally throughout the city. The attempt to transfer the labor contest from the railway lines in Philadelphia to all of the industries of the city has been of help in clarifying the situation because it has clearly demonstrated the uselessness of trade agreements, so far as the execution of their provisions by employees is concerned. No one claimed that the men who were called out in sympathetic strike had any grievances of their own which warranted them in stopping work, and it was evident that if their action should in any way compel the Philadelphia Rapid Transit Company to make terms with its striking employees, the latter might again be ordered from duty next week or next month to assist one of their present allies in another contest. In the meantime the Merchants Association is complaining that the existing state of affairs is diverting buyers from Philadelphia and injuring both wholesale and retail trade, and is demanding that the municipal authorities be upheld in their efforts to repress sternly all disorder. If this is done, the company should have no difficulty in rapidly restoring its service. In other words, the crisis in the Philadelphia strike seems to have passed, and matters are gradually returning to a normal condition in that city.

Liability of Automobile Drivers

Automobiles are now in such general use it is not surprising that decisions governing their use of the streets should multiply. Two which are of interest to street railway companies were recently rendered, one in Pennsylvania and the other in Colorado. The first arose from an injury by an automobile to a person who had just left the steps of a car at a regular crossing and was walking to the sidewalk. In this case (Kaufman vs. Nelson, 73 Atlantic Reporter, 1105) the court ruled that a high degree of care is required of the driver of a vehicle in passing a car which has stopped to receive or discharge passengers, but that this obligation did not relieve those leaving or boarding the car from the exercise of ordinary vigilance to avoid accident. In the second case (Gale vs. Denver City Tramway Company, 173 Federal Reporter, 787) the injury occurred because an automobile, while running parallel to a car, turned so suddenly across the tracks that the motorman was unable to bring his car to a stop. The person injured was not the chauffeur, but the court held that the motorman was not bound to anticipate that the automobile would attempt to cross the track recklessly. There is no doubt that the risks of street travel to cars and pedestrians have been greatly enhanced by the large number of high-speed and high-powered automobiles which race along the city highways and country roads regardless of those who have equal rights to be there. So long as automobiles do not violate existing ordinances as to speed, the tendency of the courts has been to regard them in the same light as other vehicles. But infractions of these speed ordinances by chauffeurs are common, and we believe that the courts will hold automobile owners to strict account in cases of collision between automobiles and street cars when it can be shown that the speed laws have been broken.

An Exhaust Steam Turbine Test

We have several times called attention to the great promise of the exhaust-steam turbine as a method of obtaining high efficiency, particularly in connection with plants already installed, and more than once have had occasion to note successful installations of this kind. The test of the installation recently made for the Interborough Rapid Transit Company and reported by Mr. Stott at the meeting of the American Society of Mechanical Engineers this week, is a very striking example of advanced practice in this line. The problem to be solved was the obtaining of additional power for the Interborough company in the most economical possible manner. The main generators, as our readers will remember, are 7500-kw generator sets, maximum rating, of which the engine part is a four-cylinder compound-reciprocating engine. It is now well known that the multiple-stage turbine can excel in the matter of economy a compound engine of any type yet tried. What the turbine can do in competition with a triple or quadruple engine with high super-heating is another problem which need not be here discussed.

Now, after casting about over all the range of things which could be done, the engineers of the Interborough company very wisely decided in favor of adding a low-pressure turbo-generator to the existing engine. This plan virtually amounts to converting the old unit into the highest class of triple-expansion engine and delivering the power gained by the better utilization of steam through a generator operated in parallel with the original one. In other words, instead of coupling on another cylinder and increasing the size of the generator, the final stage of the compounding is reached through the low-pressure turbine tied to the earlier stages of the expansion through its generator. It is noteworthy that in this instance the generator used was one of the three-phase induction type, a form of machine which possesses many merits and only recently has come to be properly appreciated in this country.

The original engine was admirably efficient at and near its rated load of approximately 5000 kw, but at half load and at the extreme load sometimes necessary in railway practice the water consumption rose to a high point. On the other hand, the turbine end of the combination increases in steam efficiency clear up to its maximum load of 7500 kw. The many curves given in the paper show in great detail the character of the actual performance. The essential thing about the matter is that the results have been highly successful from the economic and every other standpoint. The capacity of the combination is double that of the original engine, so that the maximum output of the great power house can be increased by 100 per cent without demanding additional space. It is the maximum rather than the average or rating output which has to be taken into consideration in the enormous peaks of a great traction system. Next there has resulted an average improvement in steam economy of 25 per cent in the region between rated and maximum output over the results obtained by the engine units alone. This means that overloads can be handled efficiently instead of at a very serious loss. The thermal efficiency obtained by this combination at its higher outputs, between its rated 7500 kw and its 15,500 maximum, reaches the wonderfully encouraging figure of 20.6 per cent. This is getting up into the vicinity of gas-engine efficiency and under conditions of overload at that.

Finally, it is very interesting to note that the results obtained

are stated to be at 13 per cent better in economy than could be reached by the best high-pressure turbine operated alone. If this gain over high-pressure turbine practice is fully confirmed the combination unit has an even greater future before it than has been yet predicted. It assuredly furnishes a very admirable means of increasing the output and efficiency in stations which have now reached their limit of output and are suffering from the inefficiency characteristic of overloaded reciprocating engines. A low-pressure turbine is thermo-dynamically so much better than the final expansion in a reciprocating-engine system that it really stands in a class quite by itself and the simplicity of the electrical linkage is such that the change from the old unit to the new is made with the utmost facility. We see every indication that the practice so well exemplified in the tests before us is one which should be found advantageous in many places on a very large scale.

The Wear of Bearings and Gears

The subject discussed at the Pittsburgh meeting of the committee on maintenance of equipment should be of vital interest to every railway mechanic. This committee is composed of successful electric railway men who are well qualified to make recommendations that should command widespread attention. It was not expected that the committee would arrive at any definite conclusions so early in the year, but rather would lay down plans for the preparation of a valuable report to the 1910 convention of the Engineering Association. We believe that the Pittsburgh meeting was successful in accomplishing this work. Sessions were held on two consecutive days, and the topics suggested for consideration were discussed from the viewpoints of purchase, maintenance and manufacture. Reviewing this discussion, as presented in the ELECTRIC RAILWAY JOURNAL for Feb. 26, it will be seen that the two subjects which received the most attention were gearing and car weights. Subcommittees will make special studies of these and the other subjects assigned to the committee, and it is hoped will be able to do special research work.

A rather extended discussion of gears and pinions served to emphasize one point which, although not generally overlooked is not always given full recognition. This is the effect of worn bearings and gears on the motor equipment. No matter how much care is taken in the design and cutting of gears and in the choice of long-lived gear materials this part of the power transmission train cannot do its best work unless the axles supporting the gears are held closely in alignment. The task of maintaining the gear and pinion in proper mesh thus falls upon the armature and axle bearings. If, for example, the axle bearings are permitted to wear to such an extent that there is an appreciable play, then the forces transmitted do not always act in the proper direction and the surfaces of the teeth wear irregularly. In carefully designed gears the teeth are so shaped that power is transmitted by the face of one tooth rolling upon that of another. Irregularity of wear brings about a sliding contact between the teeth and greatly increases the friction which, in turn, reduces the life of the teeth. This condition of wear will be quickly brought about if the gear and pinion are not held properly in mesh.

The question of economical maintenance appears when considering this subject. There must be some critical point in the life of a bearing when economy is sacrificed if the bearing is not replaced. Upon the proper determination of this scrapping point the life of the motor gearing will largely depend. The opinion of the engineers who discussed this subject at Pittsburgh was that axle bearings now are allowed generally to wear beyond the most economical point, if the entire motor is considered. An improvement in bearing practice would thus bring about an economy in gearing alone which would warrant the additional cost for maintaining the bearings in better condition.

A representative of one of the motor manufacturing companies who took part in the deliberations of the committee called attention not only to the thought just presented here, but also to another equally important reason for giving closer attention to motor bearings. It has been said that loose bearings bring about unequal and uneconomical wear of the gearing. In addition to the loss of power the loose bearings and gears practically force the motor to chatter and vibrate as the car moves along its route. This vibration is said to be very largely responsible for the frequent recurrence of troubles within the motor cases. As proof of this, it is noted that on single-end cars the No. 2 motors of each truck are found to be more frequently in trouble than the No. 1 motors. Briefly, the reason for this is attributed to the stresses set up when the truck receives a jar from an inequality in the track. The forces acting between the pinion and gear of a No. 2 motor have a downward direction and when the car wheels strike a "bump" the torque of the motor directly opposes the force which acts upward from the track. At the teeth of the No. 1 pinion the continuous torque of the motor is in the direction of the track reaction and so the stresses set up are not so severe as in the gearing of the No. 2 motor. The cumulative stresses must be taken care of in the axle bearings and the suspension of the motor, and as the No. 2 motor has to receive blows of greater effect than the No. 1 motor its parts are called upon to withstand more severe stresses.

Railway motors are rugged pieces of apparatus, but they should not be expected to give good service unless they are relieved of every possible outside action that might cut down their life. These fundamental points of motor maintenance are generally recognized, and so it was the consensus of opinion in the committee that considerable economy could be effected if more attention was paid to providing against the damage brought about by loose bearings and gearing. In return for the additional expense for maintenance of axle bearings and gears the owner of the motor could expect to reduce considerably the cost for maintaining armature and field coils, brush holders and commutators.

It is suggested that any additional data to substatiate these arguments would have considerable value in emphasizing the desirability for more frequent replacement of gears and axle bearings. The committee on equipment, with the resources of the Engineering Association at its command, will no doubt be able to present some definite figures which may be generally applied in motor practice. These data, which we trust will be found in the 1910 report of the committee, will tell the mechanical inspector just when to renew axle bearings and motor gears in order to obtain the greatest economy in the railway motor as a unit.

REINFORCEMENT OF CONDUIT RAILS AT WASHINGTON

By Philander Betts.

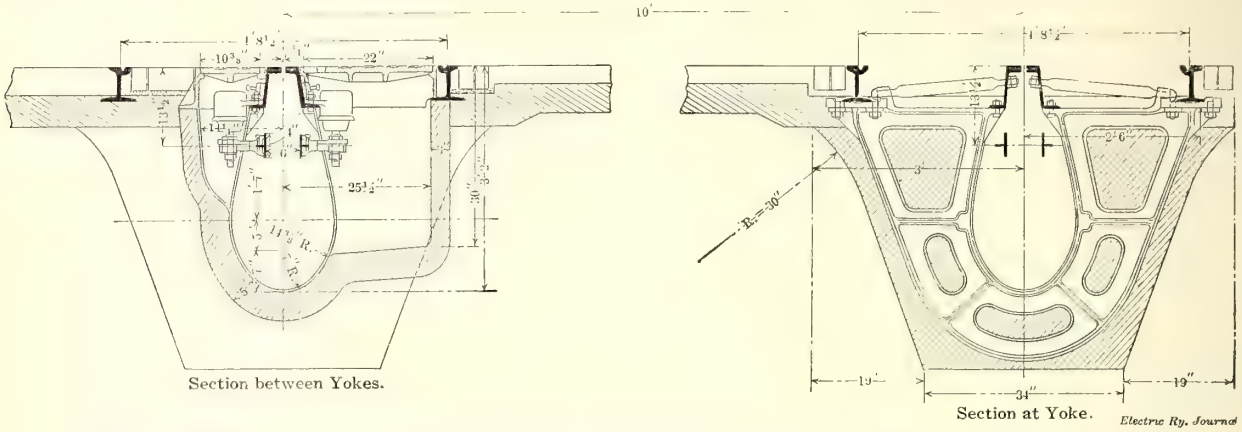
When the Washington, Baltimore & Annapolis electric railway was projected it was expected that cars or trains would run over its own tracks into the center of both terminal cities. But for various reasons the Washington terminus was located at the eastern limits of the city, Fifteenth and H Streets, N. E., and up to March 1 all passengers had to transfer to the cars of the Washington Railway & Electric Company at this point.

The cars in use on the Washington, Baltimore & Annapolis Railway when the single-phase system was used were 62 ft. 2¾ in. long and weighed 58 tons without passengers, and there were objections to their operation through the Washington streets. With direct current, smaller cars have been adopted for service in the streets of Washington and the car finally selected is 50 ft. over all and weighs without passengers about 40 tons. A description of these cars was given in the issue of the Electric Railway Journal for May 29, 1909. These cars now run in Washington to the Treasury at Fifteenth Street and New York Avenue, N. W., using the tracks of the Columbia Line of the Washington Railway & Electric Company.

The Columbia Railway was built in 1895-96 as a cable road, operating cars weighing 12,300 lb. not including passengers. In 1898 this line was changed to the underground conduit electric system, and larger cars were put in service. Four types of cars have been in use on the line, the heaviest of which weighed 17 tons without passengers. As the Washington, Baltimore & Annapolis Railway proposed to operate cars weighing 40 tons over the line, some consideration had to be given to the possible effect due to the increased weight and it was decided that the underground construction would require reinforcement. Fig. 1 shows the standard construction along this line. Fig. 2 shows the standard construction on other lines of the Washington Railway & Electric Company.

From Fig. 1 it will be seen that the track rails are supported entirely by the yokes, which are placed 5 ft. apart on tangents. These yokes are entirely encased in No. 1 concrete and the tube consists of a concrete shell. On account of the form of the yoke and its method of support, the effect of increased weight on the rails would be to depress them, widen the slot, and break the yoke. After some discussion it was decided to place under each rail a reinforced concrete beam, made continuous and shown in section in Figs. 3 and 4. The beam, as will be noted from Fig. 3, is 12 in. wide by 16½ in. deep. The reinforcement consisted of two 1⅛-in. mild steel round rods, supported in stirrups of ¼-in. steel, placed midway between each yoke, requiring one for each 5 ft. of beam.

The concrete was hand mixed and was in the proportions of 1 part cement, 2½ parts of sand and 5 parts of gravel by bulk. Rough board forms were required to hold the concrete in place, as the trench had to be excavated to an extra width to facilitate the removal of the material. The forms were afterward removed, and the spaces back filled to the top of the beam and rammed solid.



Conduit Reinforcement in Washington—Fig. 1—Original Conduit Construction, Columbia Railway

In the original construction of the road, the only material excavated was that required to allow of setting the yokes, with their enclosing concrete, and for the construction of the conduit tube, so that the material taken out to make room for the supporting beam had never before been displaced. The net result was that the beam when completed rested on solid earth foundation. The work was performed partly by contract and partly by men in the regular employ of the Washington Railway & Electric Company.

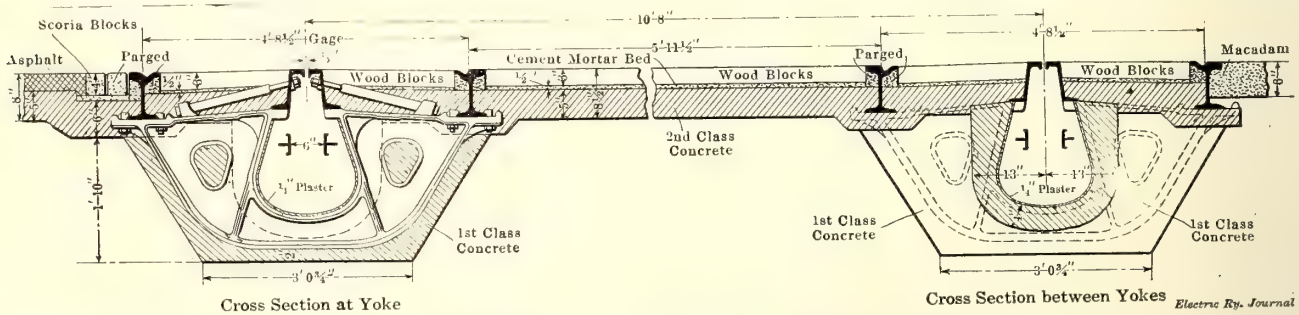
As originally planned the method of procedure was to be about as follows:

First. The brick stretcher courses were to be removed from the pavement, two rows outside and one row inside each wheel rail. Where pavement was of scoria or granite block, the necessary amount was to be removed to allow the excavation to proceed. This material was to be piled up along the line of work.

Second. Sufficient material was then to be removed to allow for the installation of the concrete beam.

Third. The additional hook bolts and liners were then to be inserted in each cast-iron yoke.

Fourth. The reinforcing bars and hangers were then to be put in place. The hangers were to be placed along each rail, one either side of and as near as practicable to each yoke. The reinforcing bars were to be hung with joints overlapping 5 ft.



Conduit Reinforcement in Washington—Fig. 2—Standard Construction of Other Conduit Lines

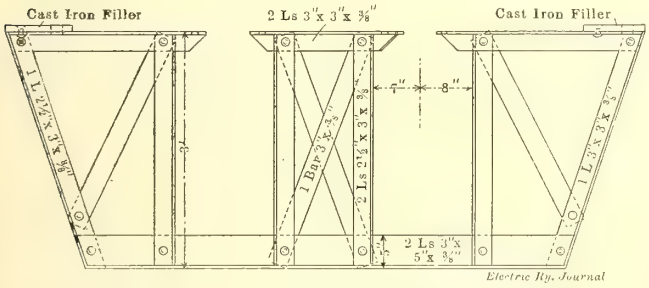
Fifth. The work of mixing and placing concrete was then to follow.

Sixth. After the concrete beam had set sufficiently, bearing surfaces were to be placed upon the beam 1 ft. 3 in. each side of each yoke. These surfaces were to be of a strong mixture of sand and cement and be brought to a true surface ⅝ in. below the base of the track rails.

Seventh. When the cement bearing surfaces had reached a permanent set, bearing plates 8 in. x 8 in. were to be inserted between the bases of the rails and the tops of the bearing surfaces upon the concrete beam.

Eighth. The necessary concrete paving base was then to be replaced and the street pavement repaired.

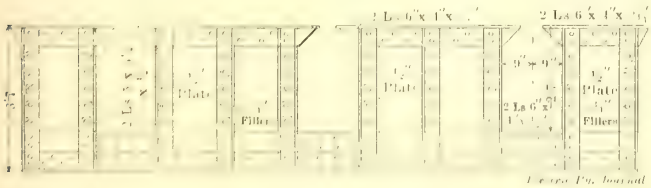
Some of the details mentioned above had to be modified. It was found necessary to remove part of the asphalt pavement adjacent to and outside of each rail in order to insert the 8-in. bearing plates and to get sufficient room to excavate for the beam. It was also decided to place the bearing plates and hangers 5 ft. apart and midway between yokes. It was at first planned to provide a bed of cement and sand and drive in the steel plates, but this could not be done without destroying the cement beds. An attempt was then made to bring the concrete beam to sufficient height under the rail without using cement grout and before the beams should take their first set, screening off sufficient concrete to permit a driving fit of the plates and allowing the beam to take a final set before inserting the plates.



Conduit Reinforcement in Washington—Fig. 5—Old Type of Special Work

This was found very unsatisfactory because of uneven shrinkage in the beam.

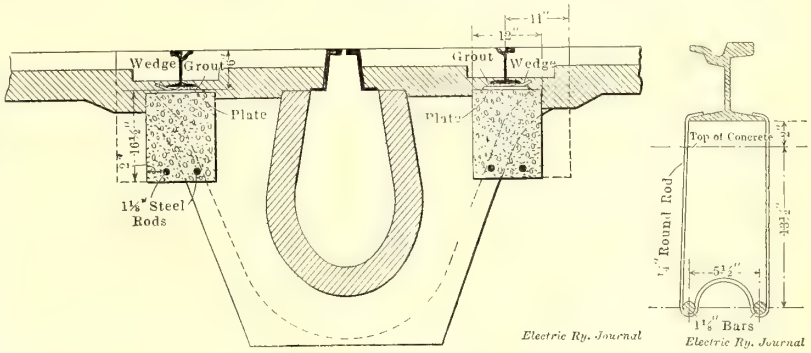
The final and most satisfactory method and the one which was adopted was to place shortly after the concrete was in place 8-in. x 8-in. iron bed plates, 5 ft. apart, on top of the concrete beam and at the center of the span between the yokes. These plates were placed ½ in. more or less below the bottom of the rail and were allowed to set in the concrete beam. After the concrete had finally set, a 2-in. x 4-in. x ⅝-in. wedge was driven between the top of each plate and the bottom of the rail and a moist mixture of one to one sand and cement was rammed full width between the bottom of the rail and the top of the beam, throughout its entire length. After experimenting with this scheme the rail was found to be perfectly rigid and it has been possible to maintain a true bearing surface uniformly over and along the concrete beam.



Conduit Reinforcement in Washington—Fig. 6—New Type of Special Work

The special work at five intersections and at the new terminus had to be renewed, using, of course, much heavier construction. Fig. 5 shows the type of the old sub-structure which was removed from the crossover near the terminus at the Treasury. Fig. 6 shows the new construction.

Fig. 7 shows the electric crane in the act of placing portions of the new work. This crane is employed ordinarily in reclaiming coal at a power plant, but was brought into the city to handle the new special work, the heaviest single piece of which weighed 5600 lb. The greater weights of this special work presented an unusual problem in this class of work, which, however, was very nicely solved by the use of the electric crane.



Conduit Reinforcement in Washington—Figs. 3 and 4—Section Between Yokes, Showing Rod Reinforcement

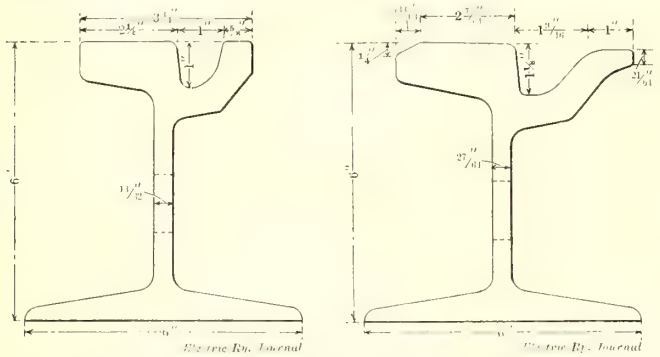
All street railways in Washington since 1896 have used a grooved rail requiring a small wheel flange. A new type has recently been adopted which has many advantages over the old style. Fig. 8 shows the old standard rail. Fig. 9 shows the new rail section. All the new special work was built up using the new rail, but on the old special work which was not replaced, the groove had to be enlarged. This was accomplished



Conduit Reinforcement at Washington—Fig. 7—Electric Crane

by means of motor-driven emery wheels, using current from the conductor bars.

Some figures regarding the cost of the work may be of interest. The entire route from the city limits on the east, to the new terminus at the Treasury on the west, comprises about 2¾ miles of double track, or to be exact 60,063 ft. of single rail. Special work at intersections, etc., not reinforced as above, caused deductions so that the total length of beam amounted to 57,400 ft. This required approximately 64,575 ft. of 1⅛-in. steel rod, 22,960 hangers, 11,480 8-in. x 8-in. x ⅝-in. plates and 11,480 2-in. x 4-in. x ⅝-in. wedges.



Conduit Reinforcement in Washington—Figs. 8 and 9—Old and New Rails

Below is a statement of costs of all work connected with the reinforced beam:

The cost per foot is based on 57,400 ft. of beam.

	Total.	Per ft. of beam.
Cement	$4,250	.074
Sand and gravel	5,600	.098
Rods, plates and hangers	8,250	.144
Paving	14,500	.261
Hauling	300	.005
Lumber	500	.009
Total material	$33,400	.580
Total labor	51,300	.895
Miscellaneous materials and tools	5,300	.092
Total for beam work	$90,000	1.567

An analysis of labor costs for a period when the work was progressing at its best may be interesting:

Removing asphalt and sub-base per ft., single track	$ .295
Removing excavation per ft. of track	.370
Cleaning yokes per ft. of track	.165
Forms and iron in place per ft. of track	.150
Concrete beam per ft. of track	.170
Tamping and wedging per ft. of track	.125
Backfilling	.180
Cleaning bricks	.065
Plastering manholes	.030
Total cost per ft. of single track	$1.550
Total cost per ft. of beam	.775

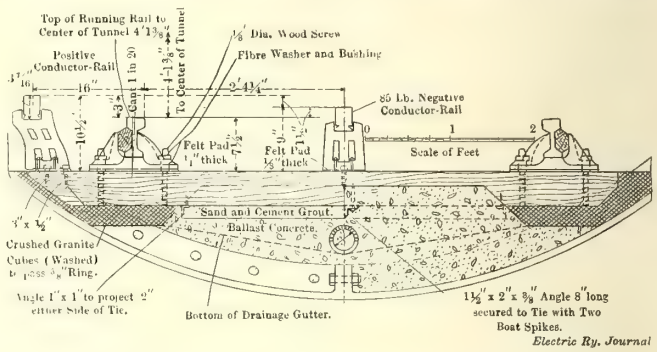
Contractor's profit not included.

The entire work was carried out under the direction of C. S. Kimball, engineer, Maintenance of Way, of the Washington Railway & Electric Company.

At a recent meeting of the Isle of Wight Central Railway Percy Mortimer referred to the proposal of a syndicate for equipping the railways in the Isle of Wight with electricity. He said that no railway in the United Kingdom which carried a mixed traffic of passengers, goods and minerals such as the company did had yet been electrified, and he did not think that the small extra traffic which it would get would justify the expense of electrification.

RAIL WEAR ON LONDON UNDERGROUND LINES

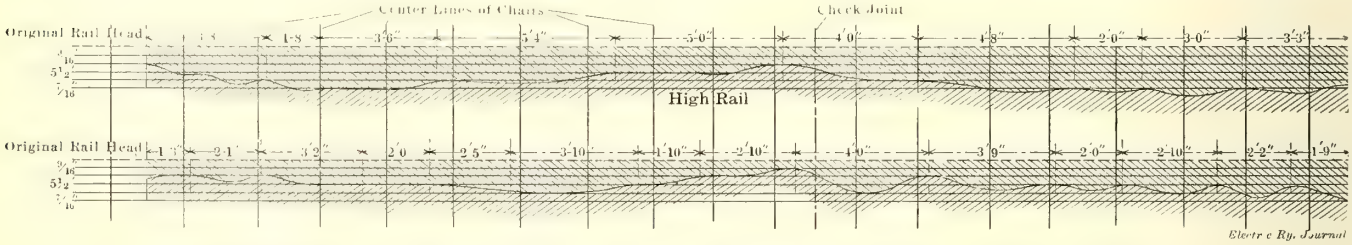
The experience of the London Underground Railways in the wear of rails casts an interesting light on the question of corrugation, for, although the Metropolitan District Railway interchanges trucks and motors with its three associated tube lines, only the former road suffers from serious rail wear. This wear takes the form of corrugation, battering and side-cutting. Corrugations occur at only few places and are devel



Cross Section of Roadway in London Tubes

oped in particular on curves of large radius, these curves naturally being unchecked. The centers of the depressions are about 4 in. to 5 in. apart. Battering is the chief cause of rails being changed after being in the road only for a short time. This battering consists of hollows at centers varying from 2 ft. to 5 ft. and occurs mainly on curves of short radius. The hollows form more quickly on the low rail than on the high one, and they bear no relation to the position of the chairs and at any particular place they do not follow a regular pitch. At certain places depressions ¼ in. deep are formed in six months, necessitating the renewal of the rails.

Side cutting has been almost done away with by the use of graphite grease and accurate lining up and leveling of the road, together with the introduction of larger ties with closer spacing, preventing the formation of slacks.



Profile of Battered Rail at Victoria Station, London, on a Curve of 660-ft. Radius

Steel rails manufactured under the Sandberg process of added silicon have been used for four years now, with satisfactory results—both with open hearth and Bessemer acid processes. The chemical composition of the rails recently obtained is as follows:

	Bessimer Acid. Per Cent.	Open Hearth. Per Cent.
Silicon	0.35 to 0.45	0.2 to 0.4
Manganese (not to exceed)	0.80	0.90
Phosphorus (not to exceed)	0.07	0.06
Sulphur (not to exceed)	0.07	0.07
Carbon (as high as mechanical test will allow, but not less than)	0.50	0.65

These rails are much tougher and have given increased wear though no appreciable reduction in battering has been obtained.

The Metropolitan Railway, which operates the so-called "Inner Circle" jointly with the Metropolitan District Railway, has also installed the Sandberg rail. At the 1907 engineering conference of the Bristol Institution of Civil Engineers, W. Willox, engineer of the Metropolitan company, also referred to the prevalence of battered rails. He spoke of depressions in the rail from 9 in. to 5 ft. in length and from 1/16 in. to 5/32 in. deep created in periods ranging from six weeks to four years. Mr. Willox has since found that the Sandberg rail is much less

subject to battering, and that side wear on curves can be eliminated by using a guard rail which is much harder than the running rail.

Neither the Charing Cross or Piccadilly tubes have shown the slightest sign of corrugation ever since the opening of the lines. The third tube, the Bakerloo, had about 900 ft. of corrugated rail, which was taken out about the end of 1908. This corrugation appeared on a 1500-ft. curve in the form of 4-in. waves and 1/16-in. depressions. In general, corrugation in the tubes has never gone beyond the incipient stage.

As the motors and trucks in the tube lines are exactly the same as those used on the Metropolitan & District line, the only reason for the freedom from corrugation appears to be the difference in roadway construction. In the tubes the ties are set on a concrete cement-topped foundation for only part of their length and the running rails are carried on the overhanging ends. This construction gives such a springy track that the ends of the ties move as much as 3/16 in. under the load of passing trains. This type of roadway was designed by James R. Chapman, chief engineer of the Underground Electric Railways of London. Its efficiency may be judged from the fact that after nearly three years' service on the Piccadilly tubes 18 miles of single-track, not a single rail has required removal. The power rail is carried outside one of the running rails, and requires careful attention owing to the effect of vibration on the insulators, otherwise the maintenance of the tube roadbeds is a simple matter. The rails are of the open-hearth type similar to those discarded on the "Inner Circle."

Arthur R. Cooper, engineer for the associated tube lines and the Metropolitan District Railway, has been much interested in investigating the corrugation and battering trouble of the latter line. He is not prepared to believe that these faults are due to the composition or rolling of the rail, but attributes them as due more probably to a combination of factors which place an undue stress on the rails.

Among these factors are the low center of gravity of electric cars, the dead weight or partial carrying of the motors direct on the axles without intervention of springs; and in a lesser degree to the lightness of the trucks, slipping of one wheel on curves, and with small axles a one-sided drive. Since the more elastic tube roadbeds are subject to the same conditions, yet are, nevertheless, free from corrugation, Mr. Cooper reasons that the like result might be obtained on the Metropolitan District line if the same degree of springiness could be introduced in the rolling stock. An improvement in the District roadbed itself might be effected by a closer spacing of ties than was originally adopted for steam traction.

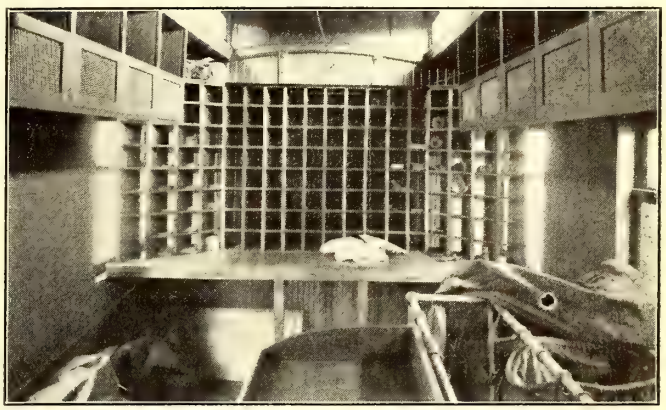
In further reference to the point whether corrugation is due to the rolling mill, it may be mentioned here that according to a recent statement by A. L. C. Fell, managing director of the London County Council Tramways, this effect has not appeared in some cases until the rails had been in service for two years. It is probable that if these rails had been of uneven hardness, the trouble would have developed much sooner.

At present experiments are under way by German railways and rail-makers to determine this point by trials at the mills and in service.

INLAND EMPIRE MAIL SERVICE

About the first of the year the Spokane & Inland Empire Railroad Company increased its already well-established mail service by putting a fully equipped mail motor car into service on the Inland division of that road between Spokane, Spring Valley and Colfax, Wash. Immediately after this schedule was inaugurated several of the towns along the Spring Valley-Moscow division petitioned for electric railway mail service and as a result a closed pouch service has just been established between Spring Valley Junction and Moscow, 34.4 miles apart. Spring Valley Junction is about midway between Colfax and Spokane. The Inland Empire system now has on its southern division mail car service covering 76 miles of track and a closed pouch service covering 90.4 miles. It is expected that the pouch service soon will be replaced by a combined railway mail, express and baggage car just rebuilt at Spokane.





Exterior and Interior of U. S. Railway Mail, Express and Baggage Car used on Spokane & Inland Empire Railway

The Inland Empire system has carried mail on the Couer d'Alene division since the road was opened. During the summer of 1907 the company made a contract to collect and deliver regular United States mail at important points, making two round trips daily between Spokane and Couer d'Alene. The mail car is in charge of a mail clerk.



Interior of Spokane Mail Car, Showing Pouch Racks

The accompanying illustrations show three views of one of the rebuilt mail and baggage cars used on this road. The cars are fitted with the regular mail equipment required by the United States postal department and are largely the product of the shops of the railway company.

A concession is being sought in Paris for the construction of an underground freight railway to connect all of the railroad terminal stations.

ROLLING STOCK IMPROVEMENTS OF THE CONEY ISLAND & BROOKLYN RAILROAD

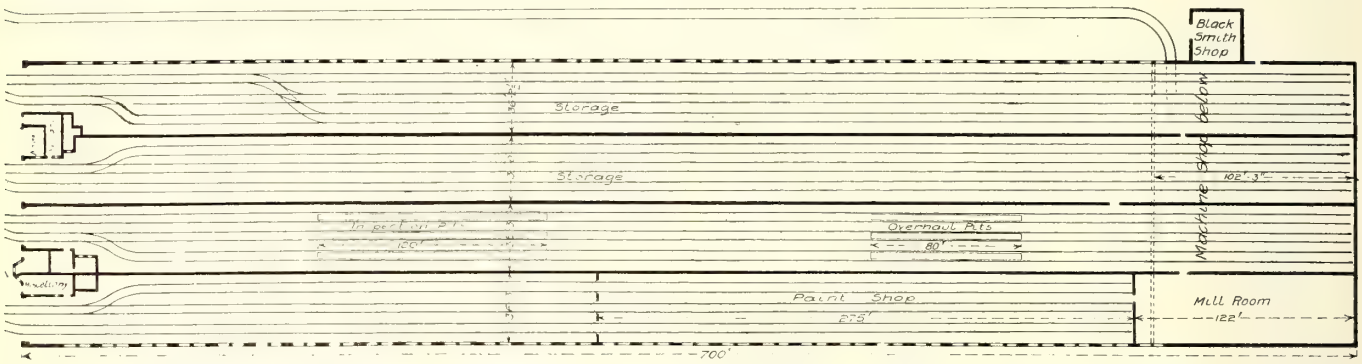
The Electric Railway Journal of Aug. 14, 1909, contained an extended account of the important economies obtained by the Coney Island & Brooklyn Railroad through the rearrangement of its power distribution and the erection of a turbine station. The improvements, however, have not been confined to this department, but have also embraced the line, track and rolling stock. In this article some particulars will be given of the work which has been done in connection with the cars under President S. W. Huff's administration within the last two years.

During the fiscal year 1908-1909 the company rebuilt and repainted 67 closed cars; the remaining 111 closed cars and 216 open cars were thoroughly overhauled for satisfactory operation. The practice of having a canopy switch at one end and a circuit breaker at the other was abandoned, all cars being equipped with double GE circuit breakers and double-fuse boxes. The old stands were replaced by the No. 11 and No. 13 designs of the Electric Service Supplies Company, and the general safety of the cars increased by the installation of double brake chains and Van Dorn & Dutton solid gears for split gears. Careful attention was given to the wiring circuits, and while conduits were installed only in the cars of the DeKalb Avenue division, the canvas hose used elsewhere was renewed and relocated to better advantage. The controller and resistances were completely disassembled and rebuilt. The company has also secured much better results from its standard Westinghouse No. 49 and No. 68 motors by using armature coils made by John A. Roebling's Sons & Company instead of supplying its comparatively small needs by home manufacture. Besides the motors mentioned, there are 10 new cars operated with GE-90 motors. Only the work cars have four-motor equipments. A more recent change has been the adoption of the "Ideal" trolley wheel. The mechanical improvements on the cars, aside from the general overhauling and painting, included the substitution of 4-in. diameter axles for the 3¾-in. driving axles used with the 33-in. wheels of the maximum traction trucks.

It was originally proposed after a car had been rehabilitated in the manner outlined to inspect it every sixth night, irrespective of the mileage made. However, a test record was kept of the runs made by each car, and when it was found that the mileage for the same period varied from 2000 miles to 5000 delay of 10 hours and 21 minutes; in May, 1909, 20,215 cars were operated, with 12 break-downs and 23 minutes' delay; in June, 1909, 20,735 cars were operated, with 10 break-downs and 20 minutes' delay, and in July, 1909, 21,629 cars were operated, with only 17 break-downs and 37 minutes' delay.

In undertaking the rehabilitation of the rolling stock the management found itself greatly handicapped by the absence of proper shop buildings and equipment. The policy of the preceding management had been to have as much repair work as possible done by outsiders. Thus wheels and axles were sent to their manufacturer for returning and replacement; all woodwork was done by the local mills, and cars were painted on a contract basis. This practice proved unsuccessful, both as regards cost and time, despite the fact that there were plenty of foundries, wood-turning mills and the like in the vicinity. As an instance it may be mentioned that formerly the company paid $26.50 to have a pair of wheels fitted to a 3¾-in. axle and the gear bored; to-day the same work is done on a 4-in. axle both at a lower total cost and much quicker delivery. During the overhauling period as many as 15 pairs of wheels were refitted daily. At present, the daily capacity is six pairs, which is ample to cover steady requirements. So far as car woodwork is concerned, the objection to the old practice was that the mills not only charged high prices, but were responsible for vexatious delays when they were too busy to fill promptly the comparatively small orders of the railway company. It was not unusual to have a car tied up for weeks due to the absence of a few moldings. The company also decided to do its own car painting, to make certain that this work would include more than a few coats of varnish spread over uncleaned and unscraped panels.

In seeking to establish a repair shop the management was obliged to adopt a part of its principal storage building for that purpose, owing to the lack of funds for an entirely new structure in a central location. The place selected is at Covert and DeKalb Avenues, at the eastern extremity of the system. The building, which was put up only five years ago, is of brick and steel and covers an area of 720 ft. x 150 ft., divided into four through bays by solid brick walls. However, a basement running across the building has been built at the rear to accommodate a miscellaneous repair shop and storeroom. This portion has been arranged by transferring the few old woodworking tools elsewhere and building a lean-to for a steam-heating plant and for the blacksmiths so that the smoke from the forges will not interfere with the work in the general machine and electrical shop. This basement has no direct communication with the car floor, but it has a track entrance from the adjoining storage yard through which tools and supplies can readily be delivered. It would have been very desirable to have had an elevator to the new shop above and some mode of sending supplies quickly to the overhauling and inspection tracks, but these plans were met by strong objections from the fire underwriters and had to be abandoned. As the building has been rearranged, the first and second bays remain for storage; the third is used for inspection and overhauling, and the fourth is partitioned for a painting room 275 ft. long, and a mill room at the rear 122 ft. long. This arrangement was the best possible considering the great length of the building and the refusal of the fire underwriters to permit the removal of any part of the longitudinal partition walls. The master mechanic's office is located across the front of the first and second bays, the headquarters of the local car superintendent having been placed in a separate building on the other side of DeKalb Avenue. Three open-air storage tracks have been provided also to stall the layover cars, which formerly entered the car house.



Coney Island & Brooklyn Improvements—Plan of Car House as Partially Adapted for Maintenance

The company purchased a considerable number of tools to carry out its program of doing all maintenance at home. The machine shops received a 150-ton Caldwell wheel press, Bement-Niles-Pond borer, Hampden grinder, Columbia axle straight-

ener, Columbia field winder, a double-spindle bolt machine for making bolts out of scrap, a three-spindle drill press, etc. The latest addition is a Christensen compressor of 150 cu. ft. capacity for shop air lines. The mill room equipment, which had comprised only such tools as a cross-cut saw, band saw and rip saw, were reinforced by a Rogers molder, single surfacer and a two-spindle shaper from the American Woodworking Machinery Company. All of the woodworking tools are driven from one 25-hp motor.

As the bulk of the heavy overhauling has been completed, more attention is being devoted to equipment records. In connection with the shop foreman's daily car report, reproduced, the master mechanic has a board showing, with the aid of detachable numbered tags, the condition of every car on the system. Mileage records have been started for gears, trolley and car wheels, lubrication and for the new detachable brake shoes. Some of the record blanks used are shown on this page.

During the overhauling period time was found to build three wrecking cars, one gondola car and a depot fare-collection car which is also used as a pay car. All of the rolling stock rehabilitation and construction has been done by M. C. Killeen, master mechanic, under the direction of S. W. Huff, president.

CONEY ISLAND AND BROOKLYN RAILROAD COMPANY
CAR HOUSE SHOP FOREMAN'S DAILY CAR REPORT

DATE..... ..190

CAR HOUSE	Cars Assigned	Schedule	Cars Available	CAUSE OF DISABLEMENT						Cars at DeK Shop	Cars Sent to DeK Shops	Cars Rec'v'd From DeK Shops	Cripples Turned In	Cripples Found O. K.	Cars in Coney Island
				No. Cars Disabled	Collisions	Controller Troubles	Flat Wheels	Motor Trouble	Other Trouble						
DeKalb															
Franklin															
Smith															
Coney Island															
Grand Total															

Telephone to Master Mechanic's Office 9 a.m.....190

Weather.....

Master Mechanic

Daily Report on Disabled Cars made up by the Master Mechanic.

CONEY ISLAND AND BROOKLYN RAILROAD COMPANY
OIL AND GREASE REPORT FOR MONTH OF.....190

CAR HOUSE	RECEIVED					USED DURING													ON HAND 190				
	Car Oil	Motor Oil	Machine Oil	Gear Grease	Motor Grease	Car Oil	Per M Miles	Motor Oil	Per M Miles	Gear Grease	Per M Miles	Motor Grease	Per M Miles	Machine Oil	Cars	Mileage	Mileage per Car	Aver. Cost 190 M Miles	Aver. Cost 190 M Miles	Car Oil	Motor Oil	Machine Oil	Gear Grease	Motor Grease
DeKalb																								
DeKalb Shop																								

CONEY ISLAND AND BROOKLYN RAILROAD CO.

Gear No.....*Taken From* *Put On* Axle No.....

Wheel No.....

Trouble.....

Date..... Workman.....

CONEY ISLAND AND BROOKLYN RAILROAD CO.

Wheels *Pressed On* *Pressed Off*

Wheel No..... Axle No.....

Trouble.....

Date..... Workman.....

CONEY ISLAND AND BROOKLYN RAILROAD CO.

WHEEL SLIP

Car No..... Wheels *Put In* *Taken Out* Size.....

Wheel No..... Axle No.....

Trouble.....

Date..... Foreman.....

Shop Slips each 3½ in. x 2½ in. in size upon which the office card records are based.

Coney Island & Brooklyn Improvements—Some Maintenance Forms Used at the Shops

An American consul in a European city reports that a local municipality will advertise within the next few weeks for bids for the construction of an electric line. Should any firm desire to bid, a letter in German should be addressed to an official named in the report, specifying exactly what work or equipment it is prepared to furnish. The system as planned will cost about $1,000,000. Copy of the report giving full details and a map of the city indicating the line can be obtained upon application to No. 4610, the Bureau of Manufactures, Washington.

TESTIMONY ON DEPRECIATION BEFORE NEBRASKA COMMISSION

Prof. Edward W. Bemis, formerly of Cleveland and now Deputy Commissioner of Water Supply, Gas and Electricity of New York City, testified before the Nebraska State Railway Commission in relation to the consolidation of the properties comprising the Lincoln Traction Company. Professor Bemis stated on the subject of depreciation:

"The experience of street railways all over the United States the last few years has shown that from 4 cents to 5.5 cents per car-mile are needed for current repairs, which take about one-half of this, and for renewals from time to time of the various parts of the plant itself. The half dozen street railways of Massachusetts, the nearest in size to the Lincoln Traction Company, spent 4.14 per car-mile for maintenance during the year covered by the last report of the Massachusetts Railroad Commission, Sept. 30, 1907-08. The track only has a life of 12 to 18 years, cars and other equipment from 15 to 20 years, the power plant and boilers, aside from buildings, have only 15 to 20 years, and so on with the rest of the plant. Of course, real estate does not depreciate, and good brick buildings have a long life; but they are only a small portion of a street railway plant. A plant with an average of 20 years would have to set aside 3 per cent of its investment annually in a 5 per cent sinking fund to pay out the principal at the end of 20 years. In taking 4 cents per car-mile for maintenance for the Lincoln Traction Company and 3.5 cents for the Citizens', which did not have a power house, a very conservative figure and one below the views of the best street railway experts and the experience of the best managed companies, was taken. One-half cent a car-mile more would probably have been nearer the correct figure for both companies."

RECEIVER DISCHARGED IN CLEVELAND

At 1:30 a. m. on March 1, 1910, after the last day car had made its trip, Warren Bicknell, receiver of the Municipal Traction Company, relinquished control of the property by order of Judge Tayler, of the United States District Court, and at 4:30 a. m., the time for placing the first day cars in service, the Cleveland Railway took possession, as arranged on Feb. 28, 1910, at conferences between representatives of the company and Judge Tayler. The company was required by Judge Tayler to return to the receiver the $70,000 balance of unexpended funds advanced some time ago under court order and the $500,000 secured on a loan to represent the interest fund. The court then ordered the receiver to pay Henry J. Davies $339,721 and C. W. Stage $344,189. They, as trustees, are to pay claims for supplies furnished and dividends on stock. Of the amount entrusted to Mr. Davies $150,000 will be paid for salaries, attorneys' fees and expenses incurred by the Cleveland Railway before the receivership was ended; the remainder will be paid to the stockholders as a dividend of 1½ per cent. Mr. Stage will pay the debts of the Municipal Traction Company, the salaries of officers, the attorneys' fees and the 7½ per cent dividend which the holders of guaranteed stock are to receive. All other funds were turned over by the receiver to the Cleveland Railway.

A statement of the earnings of the Municipal Traction Company during the receivership, with the exception of February, 1910, follows:

Gross earnings from operation	$7,502,591
Operating expenses:	
Maintenance	1,501,426
Transportation	2,581,247
General	524,097
Total expenses	$4,606,770
Net earnings	$2,895,821
Neutral Street Railway rental	13,676
Taxes	373,516
Interest rental	567,151
Dividend rental	994,231
Total	$1,948,574
Surplus	947,247

G. M. Dahl, street railway commissioner, assumed the duties of his office when the Cleveland Railway received its property from the court on March 1. He has employed Ernst & Ernst, public accountants, to do the accounting work of his office, with the idea that if independent public accountants do the work no complaint will develop from the company or the city. Mr. Dahl will have offices in the Electric Building, near those of the Cleveland Railway.

Problems difficult to solve have arisen since the final steps in the traction settlement were taken in Cleveland. That which is giving the greatest trouble is that of the fare that shall be granted to the people of Collinwood, which entered the city just before the referendum election was held. The county commissioners had previously taken action providing for the annexation of the village. If it should be shown that the village was really a portion of the city at the time the Tayler measure was passed the rate of fare in force in Cleveland might be demanded under the ordinance. If Collinwood was not a part of the city when the Tayler ordinance was passed the contract between the village and the company will have to be enforced. This provided for a 5-cent fare from the city of Cleveland to Adams Avenue in Collinwood and 10 cents to Euclid Beach. Years ago the company voluntarily reduced the Euclid Beach fare to 5 cents.

Street Railway Commissioner Dahl has rendered an opinion to Mayor Baehr that Section 30 of the Tayler ordinance provides that the company shall not increase the service or reduce the fare below the requirements of existing suburban contracts. This would apply in case the company should be willing to operate at 5-cent fare to Collinwood.

It has been suggested that the Tayler ordinance be amended to include the territory that is taken into the city, but it is doubtful if the company would accept an amendment of that kind.

Another matter that has caused trouble is the continuation of the custom of charging a 5-cent cash fare unless either a ticket or the exact change is tendered. This practice was inaugurated under the management of the Municipal Traction Company and, as no special inducement is offered to lead people to purchase tickets, the company desires to continue the custom of making an extra charge for cash fares. Commissioner Dahl has rendered no opinion upon the legal point involved, but has stated that it will be best to continue the old practice in order to avoid delay in boarding cars. People will either have to secure tickets or tender the exact change, if the rule is allowed to stand. Mr. Dahl says that no financial advantage to the company is involved, as the dividends are fixed by the ordinance.

At a meeting of the board of directors on March 1, heads of departments were named. With one exception they are all men who left the departments when former-Mayor Johnson took charge of the system, and are as follows: General superintendent, George L. Radcliffe; auditor, Thomas Kilfoyle; assistant treasurer, William J. Meade; claim agent, W. F. Weh; cashier Frank Price; purchasing agent, C. H. Stanley; master mechanic, T. Scullin; superintendent of power, L. P. Crecelius; engineer of maintenance of way, Charles H. Clark. Mr. Crecelius held his position under the Municipal Traction Company.

A resolution was adopted by the board to establish the scale of wages agreed upon shortly before control of the property was acquired by the Municipal Traction Company. This means an advance of 2 cents an hour over the wages the men were receiving. The new scale provides for 23 cents an hour for the first year's service, 25 for the second and 26 for the third. It is said that many of the old men, who left the service when the strike occurred, are being taken back. No radical changes are being made, however.

Plans for converting the old cars for pay-as-you-enter operation were discussed at the meeting, but no definite action was taken. The question of securing more cars will be taken up later. No changes have been made yet in the routing of cars and this matter will probably be left for decision after careful study of the subject.

GOOD FOR THREE (3) CENTS TOWARD FARE

WORDING ON NEW TICKET IN CLEVELAND

Street Railway Commissioner Dahl made an inspection trip over the system with the officers early in the week. President Horace E. Andrews and Vice-President John J. Stanley also wanted to inspect the condition of the property.

In all probability negotiations will be opened with the Cleveland Electric Illuminating Company for the surplus power needed by the system, but if it cannot be purchased at least as cheaply as it can be produced in the company's own power houses, additions will be made to the existing plants.

The loss through operation at 3-cent fare averages about $2,000 a day. Whether this will continue under different and better conditions is a question that can be answered only by experiment. One estimate indicates that a heavy loss will result in the eight months during which the company must operate at this low rate. The average fare at the rate of seven tickets for 25 cents plus 1 cent for a transfer, if that should be installed, has been figured at about 4.02 cents.

On the Cleveland Stock Exchange the securities of the company have shown a gradual gain, although an occasional large block of stock is thrown on the market and causes momentary weakening. The stock reached 98½, and remained about 98 most of the time, although it declined to 97½ when offerings were heavy.

Mayor Baehr sent a letter to the Cleveland Railway on March 7 ordering that the fare provided in its grant from the village of Collinwood be placed into effect to the section of the city formerly included in that village. This is five cents to Adams avenue and 10 cents beyond that point and to Euclid Beach. Mayor Baehr based his action on the opinion of City Solicitor Baker, who said that under the new grant to the Cleveland Railway the fare provided in the Collinwood grant would have to be charged.

DISCUSSION ON CHICAGO ELEVATED RAILWAY IMPROVEMENTS

Several conferences have been held between officials of the elevated railroads of Chicago and city representatives to formulate some acceptable plan for improving the elevated service in the business district.

As a result of preliminary conferences a committee chosen with the approval of Mayor Busse held executive sessions in the offices of the Board of Supervising Engineers on March 6 and made arrangements for gathering physical, operating and financial data which can be used in determining a feasible plan for through routing or partial through routing of the elevated trains using the Union Elevated Loop. Those who met at the first conference were:

Representing the city of Chicago—Bion J. Arnold, chairman; George Weston, assistant chief engineer Board of Supervising Engineers of Chicago Traction, and R. C. St. John.

Representing the elevated roads—South Side, Charles V. Weston, president; Garrett T. Seeley, general manager and chief engineer; Metropolitan, Britton I. Budd, president; James Walker, chief engineer; Northwestern, Mason B. Starring, president; C. F. Uebelacher, consulting engineer; Chicago & Oak Park, Clarence A. Knight, president; E. C. Noe, general superintendent.

After this committee has agreed upon a definite plan it will be submitted to the city. At one of the informal meetings of the committee a number of concessions which one member thought the roads should ask in return for changing their present plans of operation and installing through routes were suggested, as follows:

"Withdrawal by the city from litigation against the loop.

"Extension of loop platforms and a tacit validation of the loop's location.

"The right to carry mail, express and freight at night.

"Permission to bring interurban cars over the loop.

"The right and privilege to extend the systems into outlying territory.

"Permission to build additional express tracks on the structures.

"The right to separate grades where it seems advisable.

"A guaranty that the roads will be given trackage through the subway when it is completed."

Representatives of the city did not express any opinion concerning these concessions.

At the meeting on March 6 it was practically agreed that at least two of the stations on the Union Loop should be eliminated so that the running time could be reduced during the rush hours, and that the feasibility of running eight-car trains should be determined by an engineering committee comprised of one representative from each road and Messrs. Arnold, Weston and St. John representing the city. It is probable that if two stations on the loop are eliminated those chosen will be at La Salle and Van Buren streets and at Clark and Lake streets. It has been pointed out that these stations greatly increase the congestion of trains at the loop junction points at Van Buren Street and Fifth Avenue and at Lake Street and Fifth Avenue. Among the other engineering problems which were outlined are:

"The feasibility of running South Side trains to Chicago Avenue.

"The feasibility of running North Side trains through to Twelfth Street or Twenty-second Street.

"The feasibility of running North Side and South Side trains west to Halsted Street.

"The feasibility of a system of complete through routing of trains to and from the extreme North, South and West Sides.

"Determination of means of turning back trains at terminal in a possible 'zone' system of limited through routing, by turning back on cross-over tracks, loops systems or storage yards."

No action was taken regarding the question of transfers and fares in connection with a through-route system. This subject was discussed, however, and officials of the roads promised to prepare complete data on the present cost of carrying a passenger, the average length of haul, and the distance the roads could afford to carry a passenger for 5 cents. It is stated that if through routes with terminals outside the congested district are established, storage yards may be required at the terminal points.

Meetings of the committee of engineers were announced for this week. Mr. Arnold agreed to organize and put into the field at once an engineering corps which would obtain detailed data regarding operating and service conditions within the district bounded by Twelfth Street on the south, Halsted Street on the west and Chicago Avenue on the north.

Regarding the meetings of the committee held during the week ending March 5 Mayor Busse is quoted as having said that representatives of the elevated roads had agreed to grant transfers if a feasible plan could be worked out. The Northwestern and Oak Park roads, it was shown, stood willing to accept through routing, but the other companies favored limiting the through-routed trains to a zone bounded by Eighteenth Street on the south, Division Street or North Avenue on the north, and Center or Halsted streets on the west. They also argued that any through routes that might be established under this plan be limited to six days of the week.

The establishment of a "through-route zone," it was pointed out, would not mean necessarily that passengers could not cover the entire length of the two lines. Travelers might be required to change cars and travel to their destinations on transfers given at the zone boundary, where the first train on which they rode turned back.

Mr. Arnold is quoted as having said that through routing by all the elevated roads is practicable from an operating standpoint and that the only questions are financial considerations, extent of service and fares to be charged. Mr. Arnold did not favor the discussion of transfers at the beginning of the conferences because they would give a passenger a longer ride for a single fare and would not relieve congestion on the loop.

One suggestion regarding the relief of congestion was that all trains on the loop run in the same direction instead of in opposite directions as now. Associated with this scheme was the plan to route the Metropolitan trains over the outer tracks and change the Northwestern trains to the inner tracks. Objection to this was raised by one of the roads using the inner tracks because it has built entrances from the various loop platforms into department stores and would lose the benefit of this traffic. The main question discussed during the week was the practicability of giving through service by separately owned roads operating trains over foreign tracks and passing through the loop district.

TRADEMARK OF FT. WAYNE & SPRINGFIELD RAILWAY

The Fort Wayne & Springfield Railway, Decatur, Ind., is distributing blotters among shippers and retail dealers in the communities reached by the company. The blotters contain a trade-mark which was originated by F. R. Fink, formerly general passenger and freight agent of the company, and is reproduced herewith. The blotter advertises especially the interurban freight service. It is headed "Stop! LOOK! Listen!" and calls attention to the following points:



Trademark of Fort Wayne & Springfield Railway.

"Let us haul your goods and save you money.

"Time is money and we save you time.

"We give you express service at freight rates.

"Goods received from and delivered to all parts of Indiana and Ohio.

"Call us up at any time and we will be glad to give you rates or any other information you may desire."

EFFECT OF FLOODS IN MOHAWK VALLEY

Flood conditions in the Mohawk Valley caused interruption of railway traffic for several days during last week.

The principal point of difficulty for electric railways was at Herkimer, N. Y., which is on the line of the Utica & Mohawk Valley Railway and is also a terminal of the Otsego & Herkimer Railroad. The flood, which submerged the streets of the village of Herkimer, resulted from an ice jam which accumulated last winter and was not carried off or lessened materially until the warm weather about March 1 caused a thaw. The ice jam began at a point where the West Canada Creek enters the Mohawk River and extended up the creek north for a distance of approximately two miles. The ice was formed in that position in the middle of December and with the thaw of Feb. 25 and 26 immense quantities of water that rushed down the West Canada Creek were diverted on account of the ice and used the streets and the bed of the hydraulic canal for a channel.

C. Loomis Allen, vice-president and general manager of the Utica & Mohawk Valley Railway, writes that the damage to the property of the company so far as is known now consisted only of damage to field coils and armatures resulting from the fact that cars were operated through 2 and 3 ft. of water on the first day of the flood. The tracks of the company were covered with sand and gravel which was washed down and, on account of the risk of derailment, operation through Herkimer was discontinued temporarily. The road bed was not washed out and no loss resulted from injury to bridges.

During the worst of the flood conditions, the New York Central & Hudson River Railroad tracks on the main line at Herkimer were under water and all trains were operated over the West Shore tracks with resultant delays. About one-half mile of the main track of the New York Central road was undermined, but, when the water subsided, the damage was repaired in about eight hours.

Accompanying illustrations, showing the water in the streets of Herkimer, which have been received by the courtesy of Mr. Allen, give some indication of the extent of the floods in the locality.

Joseph K. Choate, general manager of the Otsego & Herkimer Railroad, writes that while that road was deluged with water and its track was overflowed at more than a dozen points, and one bridge was under water, the floods that were experienced were nothing like those that existed in the Mohawk Valley. By the courtesy of Mr. Choate, two photographs are reproduced showing the snow conditions on the lines of the Otsego & Herkimer Railroad four days before the thaw commenced.

These illustrations indicate the conditions with which this company had to contend and some of the sources of the water that did the damage in the Mohawk Valley. One of the illustrations shows a snow bank 47 ft. high. This is illustrated by comparison of the snow bank with the pole carrying the d.c. transmission wires. It will be observed that an extension, which was 7 ft. in height, was placed on the top of this pole in order to carry the telephone wires with certainty that they would be kept out of the snow. The other illustration shows one of the large rotary plows in action.

While these photographs were made in reality to show the snow conditions with which the company had to struggle, Mr. Choate states that they are not exaggerations of the conditions existing on the 60 miles of road operated by the company.

W. H. Collins, general manager of the Fonda, Johnstown & Gloversville Railroad, writes that the only difficulty which that company experienced resulted from the flood in the village of Fonda, where it was impossible to reach the station on account of the high water in the streets. This condition lasted for only a short period.

The daily newspapers published accounts of the existence of serious flood conditions at Schenectady and Albany. E. F. Peck, general manager of the Schenectady Railway, states that no bad conditions affecting operation of the property existed in the locality served by that company. Edgar S. Fassett, general manager of the United Traction Company of Albany, states that while the usual spring freshet interfered with travel to some extent, conditions were not different from those prevailing in previous years.

FLOODS IN OHIO

Melting snow in Ohio last week caused high water in many localities, and great difficulty was experienced in operation of some of the electric lines. The Lake Shore Electric Railway was unable to use its track through Fremont for a few days, and passengers were taken through the water in cabs from one car to another. Late in the week the Cherry Street bridge at Toledo was damaged by water and ice and the cars could not reach the terminal in the city. Passengers were taken over another bridge in cabs or 'busses. At Zanesville the lines of the Ohio Electric Railway were covered for several days and cars could not be operated. Trouble was experienced at Springfield, Dayton, Defiance, Napoleon and several other points in the State.

MEMBERS OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

A. L. Neereamer, secretary of the Central Electric Railway Association and chairman of the Central Electric Traffic Association, has just issued the annual list of members of those organizations.

The book contains the following information regarding the Central Electric Railway Association: List of officers and committees; revised list of members, showing 47 company members with 3604 miles of track; report of the secretary for the last year; a copy of bulletin No. 5 on "Charges for the Interchange of Equipment," both passenger and freight; and copy of the report of the committee on rules governing annual transportation.

For the Central Electric Traffic Association the following information is printed: List of officers and committees for 1910; annual report of the chairman; revised list of members of the 1000-mile interchangeable ticket agreement, which includes 27 companies with 2356 miles of track; rules for uniform method of accounting for traffic association mileage; and an announcement regarding official watermark paper for ticket stock. The following resolution has been adopted:

"That an official watermark paper be adopted using the official seal or trademark of the Central Electric Traffic Association as a watermark, and that the paper manufacturers be instructed to furnish this paper only to legitimate ticket printers (as designated by this association), and further that said ticket printers be instructed not to use this stock when printing tickets for lines not members of this association."

GARBAGE AND UTILITY CAR FOR CHICAGO

The Chicago Railways will receive from the Arthur Koppel Company a garbage and utility car of new design. The car is to be used on the North and West Side lines in Chicago with a view to determining the practicability of removing city garbage over the surface railways. The car is of all-steel construction, 34 ft. long and subdivided into three equal sections, with a total carrying capacity of 20 yd. The sections are so shaped and arranged that one man with a pole can dump a heavily loaded section by a movement entirely mechanical and without the use of air cylinders. The car body will be mounted on two Pullman No. 150 trucks, which are standard for the Chicago Railways.

No motors will be installed. Construction materials will be handled in the car during the day, and at night the garbage will be handled for the city. The subdivision of the car into three sections greatly increases its utility for maintenance work because a different class of material can be handled in each section. The sections are watertight and wet concrete or garbage will not leak on the pavement.



View in Herkimer, Showing Water Over the Tracks of the Utica & Mohawk Valley Railway



High Water in Herkimer and Method of Transporting Passengers Adopted Temporarily by Utica & Mohawk Valley Railway



Views Showing Snow and Rotary Plow on Otsego & Herkimer Railroad Four Days Before Thaw Commenced—The Snow Bank Illustrated in the Left-Hand View Was 47 Ft. High.

CAST-IRON AND STEEL WHEELS DISCUSSED AT HARTFORD

Upon invitation of the Connecticut Company, F. A. Beebe, general superintendent of the Griffin Wheel Company, Chicago, Ill., gave an interesting talk on cast-iron and steel wheels on Monday, March 7, at the Hartford shops in the presence of over 50 superintendents, master mechanics and shop foremen. Mr. Beebe's paper was prepared along rather novel lines, as it was composed principally of answers to practical questions submitted to him in advance. These questions had been gathered from the men and arranged in order for Mr. Beebe's replies by A. Blanchard, superintendent of the Hartford shops. Mr. Blanchard also presided at the meeting and explained that the invitation to Mr. Beebe was the result of a desire for further enlightenment on wheels after a discussion which the foremen had had among themselves at a meeting last December. Mr. Beebe's paper and the ensuing discussion follows.

CAST-IRON AND STEEL WHEELS

I will endeavor to answer as best I can the questions submitted with Mr. Blanchard's letter, but before doing so it may be of interest to mention something of the manufacture of cast-iron wheels. The starting point is with the analysis of the iron that makes up the given mixture. Iron in its pure state is not suitable for manufacturing purposes, and must contain a certain percentage of the following: Silicon, manganese, carbon (graphitic and combined), phosphorus and sulphur. After the chemist has determined the amount of each element desired in the wheel he selects and weighs the different kinds of iron that, after allowing for oxidation, will give him an iron closely approximating the predetermined analysis. The iron is then placed in the cupola in layers with the fuel, melted and tapped into a large ladle which contains sufficient iron to pour several wheels.

Before starting to pour, a test ladle of iron is taken and poured against a cast-iron block, chilled and broken. The chill or the amount of white iron shown is the guide as to whether the iron to be poured will give the necessary chill for the wheels. The regular pouring then begins, the iron being drawn from the large ladle into smaller ladles and delivered to the molders, who pour it into the flasks. The latter contain a ring of metal which conforms to the shape of the tread and throat side of flange. This ring, known to wheel-makers as a chiller, has a very important function in wheel-making in that it prevents the combined carbon in the iron from returning to the graphitic state, thus producing the extremely hard wearing surface found on cast-iron wheels. After it is cooled in the mold a sufficient length of time, the wheel is removed and sent to the annealing pits, where it is placed in a pit with several others. The pit is then covered and left to cool for four days.

After the annealing process is finished the wheels are removed and passed through a sand-blast cleaning machine, which removes the sand. It is further left to cool and on the following day it is chipped and inspected for surface defects. Representative wheels are then selected and tested to destruction in a drop-testing machine. The structure of the iron and the depth of the chill is examined, and if satisfactory, the wheels are passed for shipment. The entire process consumes approximately six days, and that is the reason you cannot order a wheel to-day and get it to-morrow.

We will now consider the questions in their order:

What causes thin flanges on steel or cast-iron wheels?

The causes of wheel flanges wearing thin are many, and may be due to one of the following, or to a combination of two or more of them:

(*a*) Wheels improperly mated as to diameters.

(*b*) Improperly mounted as to gage.

(*c*) Improperly put on axles; that is, the distance from end of journal to gage line on one end of axle being greater than the other.

(*d*) Improperly shaped flanges.

(*e*) Trucks out of true.

(*f*) Cars riding on side bearings, preventing free movement of the truck, bringing the work of turning on the flange.

(*g*) Track out of gage on curves.

(*h*) Improper elevation of outer rail.

(*i*) Running cars in one direction; that is, when cars at the end of the line run around a loop instead of being turned.

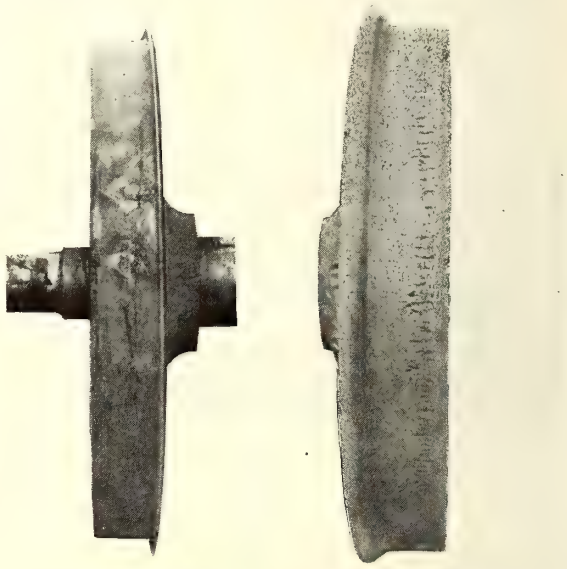
(*j*) Sanding one rail, causing one wheel to wear down faster than its mate.

Is the grooved rail any harder on the wheels in general than the T-rail?

No, providing the groove and flange are properly designed and the necessary clearance allowed.

In putting on new cast-iron wheels or turning down steel wheels, what should be the minimum difference in the circumference of the wheel?

Where possible, wheels mounted on the same axle should be of exactly the same circumference. This ideal condition does not exist in present-day practice as the shopmen will not take the necessary time properly to go over the stock to select wheels of the same tapes. It is not uncommon to find wheels varying as much as 5/8 in. in circumference mounted on the same axle. It is recommended that wheels be taped and paired with a variation of not over 1/32 in. difference in circumference. Under no circumstances should the variation be over one tape size, or 1/8 in. A difference of 1/8 in. in the circumference of wheels



Sharp-Flange Steel Wheel and Comby Tread of Cast-Iron Wheel

mounted on the same axle amounts to a slippage of 6.366 ft. per mile. Assuming a car runs 100 miles a day, this would mean a slippage of 636 ft., or, in other words, one wheel would make approximately 74 revolutions more than its mate. As the wheels are mounted rigidly on the axle, this must be compensated for by the sliding of one or both of the wheels.

In city work, from which trucks are best results obtained in relation to flange wear, a long-base truck or a short-base truck?

This is a question that could be best answered by the truck builders. From the wheel-maker's standpoint the distance between the centers of the axles should not be less than the track gage and not great enough to cause flanges to bind on the sharpest curves.

On some cast-iron wheels the flange is not true; in other words it appears warped. How much could a wheel of this kind be out of true before it should be condemned?

About 3/16-in. warpage is allowable.

What do you consider the maximum allowable difference in the diameter of wheels in the same car?

Little or no attention is given to this point. It is quite common to find steel wheels under the same car ranging in diameter from 34 in. to 31 in. Theoretically this would seem bad practice where the axles are motor-driven, as the heaviest load is thrown on the motor-driving axle with the largest wheels. I understand the motor builders do not build motors of the same

design or horse-power to run closer than 5 per cent in speed. In general, good practice would dictate that the wheels under the same cars should be of the same diameters to get uniform distribution of power to all motors. This would seem to be a field for considerable investigation, and no doubt some interesting data could be obtained if a series of tests were conducted to determine the effect the speed of the various motors has on wheel wear under the same car.

What is the proper tonnage to press cast-iron or steel wheels on an axle in relation to the diameter of the axle and the weight of the wheel?

The following pressures are used by the Griffin Wheel Company in pressing wheels on axles:

3 -in. wheel fit	25 to 35 tons
3½-in. wheel fit	30 to 40 tons
4 -in. wheel fit	35 to 45 tons
4½-in. wheel fit	40 to 50 tons
5 -in. wheel fit	45 to 55 tons
5½-in. wheel fit	45 to 60 tons
6 -in. wheel fit	50 to 65 tons

The diameter of the hub on cast-iron wheels should be approximately twice the diameter of the wheel fit.

Do you get as good results from braking power on cast-iron wheels as you do with steel wheels, taking into consideration change of weather; also should we use shoes with steel inserts or soft cast-iron shoes?

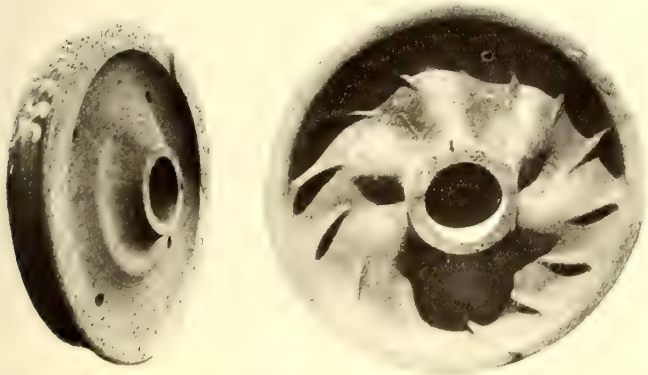
The Master Car Builders' Association is now conducting a series of experiments to determine what style of shoe will give the best braking result, also its relation to wear on the wheel. The kind of shoe used must largely be determined by each road. However, one should not lose sight of the point that it is better to wear out brake shoes than it is to wear out wheels.

Why do some cast-iron wheels run about half as long as others on the same kind of car, running on the same line and with both wheels of the same make?

Some of the causes bringing about this condition are improperly mated wheels, improperly adjusted brakes and improperly hung brakes.

Does it pay to grind out flat spots in cast-iron wheels?

Yes; but it depends on whether the wheel has slid and been burned beyond the ability of the grinder to restore the tread and leave enough wearing value to warrant the cost of grinding. Neither does it pay if the flat spot is too long, and if the metal is so badly burned that the indications are that it will disintegrate and drop out. There are a few street railways which remove the wheels from service immediately on discovering the smallest kind of a flat spot and carefully grind them to remove as little metal as possible. In this way these companies have been able greatly to increase their wheel mileage. The facilities



Flange Failure and Cracked Inside Plate of Steel Wheels

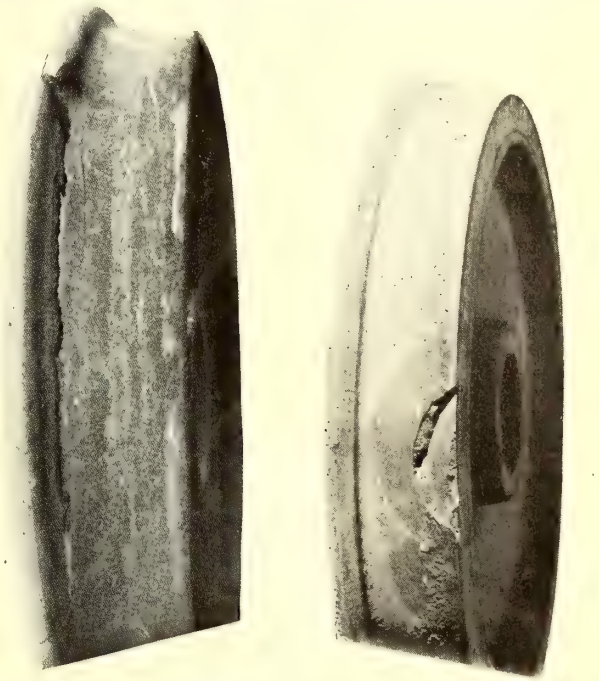
for removing and applying wheels to the cars and the machine-shop facilities for grinding must largely govern the practice of the different systems.

In grinding the flat spots out of our cast-iron wheels we grind the tread practically flat instead of taper, and in turning our steel wheels we turn them flat also. Theoretically the taper of the tread is correct, but do you think that for all practicable purposes it would be better if it was nearer flat?

The original idea of making wheel treads taper was to compensate the difference in diameter between wheels on the same axle. It is also thought that this would compensate for some of the slippage in going around curves. Theoretically there would only be one radius of curve where this result would obtain. The Griffin Wheel Company has recently adopted as a standard a tread with much less taper than formerly. There can be no objection to grinding your wheels as indicated above.

Are steel wheels softer after being once turned down?

I understand from talking with various users of steel street-

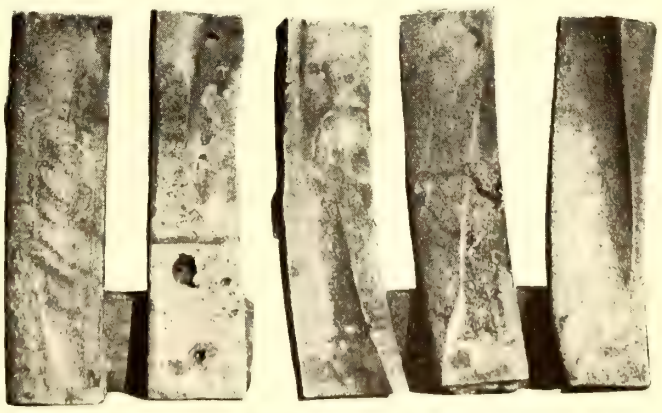


Steel Wheels with Seam in Throat and Damaged Tread Due to Defects in the Ingots

car wheels that this is the case. The usual result is that the mileage on the second and third turning is not as great. The reason for this is that it is impossible to obtain homogeneous metal through the entire thickness of the tread by rolling, the metal becoming less dense toward the center of the rim.

What causes flanges on steel wheels to wear more quickly after being turned than when new?

This is due to removing the hard, dense metal on the outside.



The Result of Improper Brake-Shoe Adjustment

Would the springing of the truck frame have anything to do with the wear of flanges?

Yes.

What weight cast-iron wheel do you recommend for 25-ton cars?

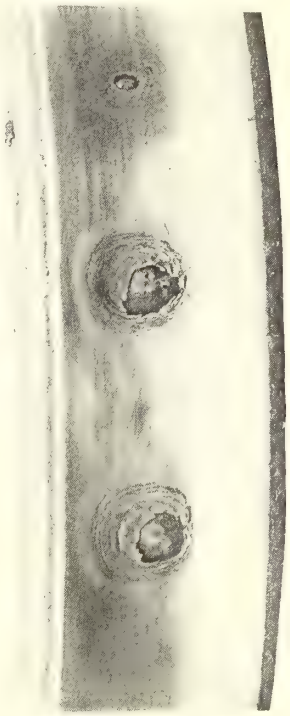
Five hundred lb. to 575 lb., depending on the diameter of the axle, the width of the tread and the size of the flange.

What is the smallest flange you would recommend on 25-ton cars used in city, suburban and interurban railway service?

Common practice indicates that flanges of 5/8 in. in city, 3/4 in. in suburban and 7/8 in. in interurban service are safe.

If one flange is starting to wear smaller and the other larger, either on a cast-iron or steel wheel, is it possible to correct this by the use of emery shoes or any other device without taking the wheel out from the truck?

No doubt the wheel could be corrected if proper facilities were provided for the car-house men to determine the difference in the circumference of the two wheels so that they could apply the emery shoe to the proper wheel. To do this the truck would have to be jacked up and the circumference of the wheel measured. There is danger that the wheel would be ground down too much. The proper remedy would seem to be to remove the axle from the car and to place it in the grinder, where the work could be properly done and the diameters of the two wheels made exactly the same.



Shelled-Out Cast-Iron Wheel

What is the average life of a 33-in. cast-iron wheel on a 25-ton car when used in city and suburban service?

This is a rather difficult question to answer, as much depends on the number of stops per mile and the care with which the motorman applies the brakes. Statistics show that the average mileage varies considerably, being as low as 35,000 miles and as high as 55,000 miles.

What is the advantage of a solid cast-iron wheel over spoke wheels, and for what weight car would you recommend one or the other?

For 25-ton cars and over the double-plate cast-iron wheel has some advantages as a better distribution of metal in the wheel can be made. For the lighter cars, spoke wheels are usually used.

Is there anything which you can suggest that the mechanical department could do to eliminate flat spots on cast-iron wheels?

The following suggestions are offered for the consideration of the mechanical department:

(*a*) See that the brakeshoes are properly adjusted.

(*b*) Braking apparatus adjusted so that in coming to a stop the wheels will not lock.

(*c*) See that the percentage of brake pressure is in proper relation to the load on the wheels.

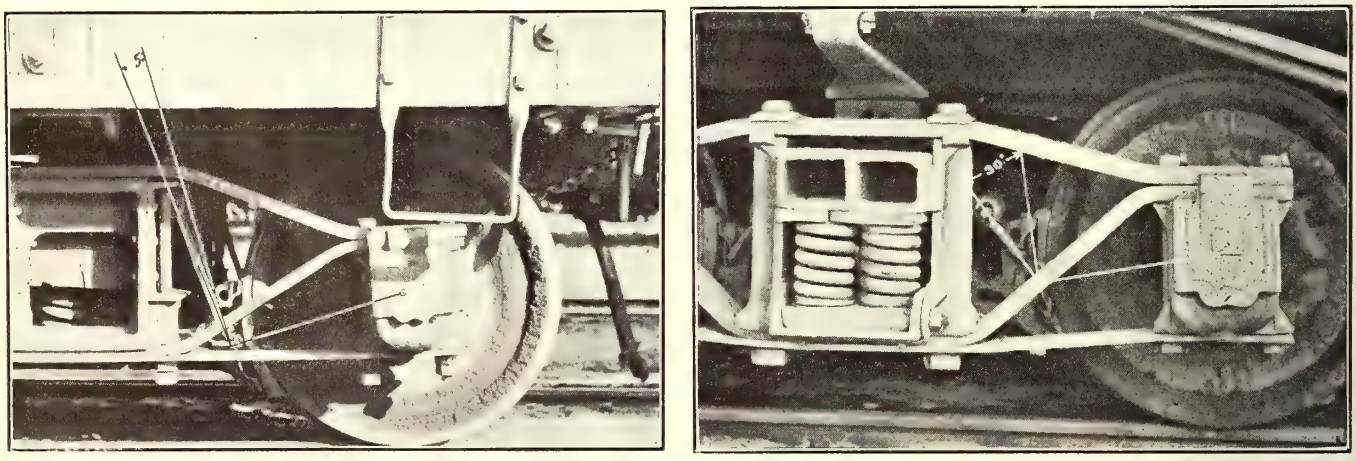
(*d*) An important point is the manner of hanging the brake. Most brake hangers are placed below a line passing through the center of the axle, parallel with the trucks, which allows the brake to fall away from the wheel by gravity. This angle may be made too large, so that with badly worn and loose parts the application of the brakes causes the shoe to crowd up against the wheel. This makes a toggle joint, producing excessive pressure on one pair of wheels in the truck and causing them to stop rolling while the other pair is still revolving. This is a prolific cause of slid flats and also results in excessive wheel wear. No doubt this peculiar condition has been noticed by railway men. This reply has a direct relation to the earlier question on the variations in the life of the same manufacturer's wheels under the same car.

Are manufacturers of cast-iron wheels succeeding in getting any greater life from wheels than was obtainable 10 years ago? If so, what is the average life according to the best statistics available?

When it is taken into consideration that the weight and speed of cars in the last 10 years have increased at a phenomenal rate and that there has also been a change from hand brakes to air brakes with a very slight increase in the weight of wheels to carry the increased loads, the showing made as to average mileage has been quite gratifying. As local conditions largely govern, it is difficult to state what average will be obtained under the varied conditions existing in different parts of the country.

Has any improvement in casting operations been developed lately to obviate spongy places in the tread of cast-iron wheels? The presence of these spongy spots is generally recognized as chiefly responsible in bringing about the flats to which we all object.

There seems to be a rather fixed opinion in the minds of most street-railway men that wheels have spongy spots in the tread. There are no such spots in the treads of cast-iron wheels as far as the writer's observations go. This so-called spongy condition has been called to our attention numerous times and without fail the wheels have had comby spots due to brake burning, causing cracks in the tread and the falling out of some of the metal. They are not the cause of flat spots, but the reverse is true.



Proper and Improper Brake-Shoe Hanger Adjustment

DISCUSSION ON MR. BEEBE'S PAPER

In reply to a query on sand holes, Mr. Beebe said they were not due to sand, but frequently to the wheel sliding flat, which caused the metal to drop out through burning. The lecturer exhibited several specimens showing how one part of the wheel had been burned off in spots without affecting the rest. One of the men present said that the mechanical department could help to reduce flat spots by eliminating worn king bolts and lost motion in the brake rigging. Another master mechanic explained how he had failed to secure good braking on certain

cars despite the most careful adjustment until he fitted them with shoes taken from other cars which were braking well. Mr. Beebe thought the trouble might have been caused by using a compromise shoe. He was also of the opinion that it was very difficult to grind the treads of a wheel pair exactly alike when using pit grinders. He had seen cases where one of the grinding wheels barely scratched the first tread, while the other wheel ate right into the second tread. So far as his company's tests showed there was no difference in chill to account for this condition. Possibly this divergence in taking hold arose from differences in the length of wear and inequalities in the grinding wheels. In response to another question, the speaker stated that nothing was gained by grinding new wheels before sending them to the user. In fact, his company had discarded that practice as it figured that grinding a new wheel was equivalent to cutting down its life by about 10,000 miles.

Referring to the two views of brake-shoe hangers and shoes reproduced, Mr. Beebe said that they showed how the wheels were made to slide before the full braking power was applied because the shoe acted as a toggle between the hanger and the wheel.

CLEARING FROZEN, CLOGGED SWITCHES

Figs. 1 and 2 show diagramatically a special design of fuel oil burner that was most effective in keeping clear the many switches and intersections in the yards and terminals of the Market Street Elevated Railway of Philadelphia during a recent snowstorm. Manual labor was entirely unequal to the occasion, and prompt recognition of this fact by the superintendent of roadway, J. Doughty, led to hasty development of the burner and accessories by Charles Radure, superintendent of shops, and obviated train movement delays.

The fittings shown were mounted on top of a 20-gal. tank, the top outline of which is indicated by the dotted circle in

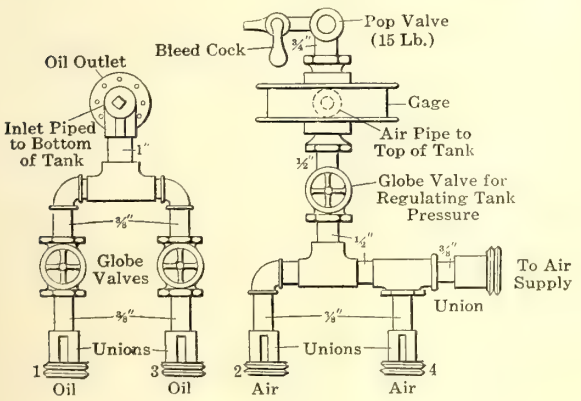


Fig. 1

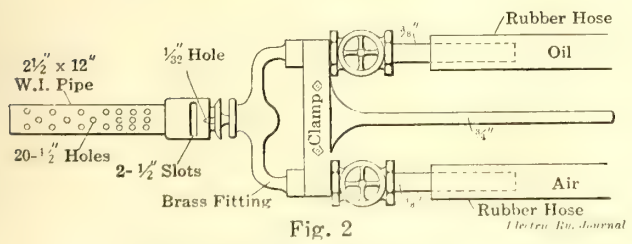


Fig. 2

Fittings for Fuel Oil Burner

Fig. 1. The shop air supply at 60 lb. per square inch is piped to convenient points in the yard and the rubber hose of the burner is sufficiently long to reach all areas with the given layout. The pressure acting to force the fuel oil from the tank is reduced to 15 lb. per square inch by means of the valve and gage provided for the purpose, and further regulation of the air pressure at the burner is afforded by the valves indicated in Fig. 2. The sketches and information were courteously provided by Superintendent McCoubrie, of the elevated division.

MODIFICATION OF FRANCHISE REQUIREMENTS ASKED IN RICHMOND, VA.

William Northrup, president of the Virginia Railway & Power Company, of Richmond, Va., published recently in the daily newspapers of that city a two-page advertisement discussing the modifications desired by the company in its franchises. Maps included in the advertisement show the present and the proposed trackage of the lines.

The existing lines are operated under three franchises. One, granted to the Richmond Traction Company, expires on Jan. 1, 1926. The franchise of the Richmond Passenger & Power Company expires on Jan. 1, 1931. A franchise granted to the Westhampton Park Railway, covering only the right to cross the city boulevard, is unlimited as to duration, but is subject to revocation by the Council. The present State constitution of Virgina provides that municipal franchises for the use of streets may be granted for a period not exceeding 30 years.

"It is obviously to the advantage of the city," the company says, "to have all the franchises within its corporate limits expire on the same date, as it gives a greater value to any new franchise to be granted at the expiration of the period and saves complications with respect to existing companies.

"In the recent reorganization through foreclosure sale of the properties in this city, it was necessary to place upon the properties a new mortgage to secure a new issue of bonds to provide for the acquisition of the property under the reorganization and for future betterments, extensions and improvements. For well understood financial reasons it was found impracticable to place a bond which matured in a shorter period than 25 years from the date of the mortgage, and even a bond of this maturity is not as popular as one for a longer period.

"The bonds secured by the mortgage expires on July 1, 1934, which is beyond the period of the existing franchises. This fact not only proved a difficulty in connection with the reorganization, but will be a constant obstacle to the sale of bonds for improvements at reasonable prices, and if these bonds have to be sold at a large discount the company is thereby required to pay a greater rate of interest for money necessary for extensions and improvements, with a corresponding increase in the burdens upon the property and indirectly upon the public served, from which the revenue must be derived.

"For these reasons it would seem obvious that an extension of the limit of the expiration of the franchise for a period of 30 years from 1910 would be to the advantage of the community and of the company."

In explaining the advantages of rearranging tracks and rerouting cars in accordance with the detail plans suggested, the company states:

"The electric railway system in this city is the result of the consolidation of a number of small lines and the competitive conditions existing at various times in the development of the system and especially from 1896 to 1902 resulted in the construction of mileage far in excess of the requirements of the community, many tracks being directly parallel only only one block apart. Much of this trackage is unnecessary for the public service, resulting in an excessive car mileage with corresponding obstructions to traffic and burdens upon the community served. It it believed that by a rearrangement of trackage and the rerouting of cars to meet the existing conditions, a better service can be rendered and some of the present waste in operation avoided."

Provisions fixing the schedules of cars in the present ordinances should be changed, the company urges, to require as much service as the traffic reasonably warrants. At present the schedule is far in excess of the ordinance requirements at times, while at other times the ordinance requirements are very much in excess of the demands of the traffic.

In addition to taxes on gross earnings as compensation for the use of the streets the companies comprising the system are subject to a State franchise tax of 1 per cent on gross transportation receipts, and are taxed on real and personal property for State and city purposes. Various other public benefits are re-

quired by ordinances. Under this system of taxation the companies paid to the city of Richmond in 1909 taxes on property and railway earnings as follows:

On real and personal property	$31,154.99	
On railway earnings	49,975.42	
Total		$81,130.41
Other charges:		
Street paving and repairs (approximate)	$20,000.00	
Sprinkling streets	4,719.00	
Free transportation to policemen, firemen and officers	8,650.00	
Free lighting	2,391.30	
		35,760.30
Total		$116,890.71

In addition the companies are required by franchises to sell tickets between 6 and 7 a. m. at 2½ cents each and to sell school tickets at the same rates. The company computes the operating loss on this traffic within the city of Richmond at the rate of 2½ cents per passenger at $18,849.03 per annum, making the total taxes and charges $135,739.74. or 13.56 per cent of the gross railway earnings within the city for 1909, not including State and Federal taxes; while the entire taxes paid for 1909, including State and Federal taxes for the entire territory and including the special charges and loss on special tickets, amounted to $187,664.31.

"It is obvious from these figures," the company declares, "that the taxation upon the street railways is out of all proportion to the taxes paid by other enterprises in the community. If the existing franchises are consolidated, resulting in the consolidation of the gross earnings, the aggregate amount of gross earnings subject to the maximum tax under the present franchises would be greatly increased, and the resulting taxation would be most burdensome. If, therefore, this consolidation of franchises is made, the rate of tax should be readjusted with reference to the consolidation income, without causing a reduction in amount of taxes paid.

"It is suggested that if a new franchise be granted, or the present franchises be consolidated, the rate of franchise tax be fixed at 5 per cent on the gross earnings, regardless of amount, within the city of Richmond. This would be a slight increase over the present amount paid the city, and would increase in future as the earnings increase, and with the other charges for street paving, free transportation, sprinkling and other expenses which arise incident to the operation upon the streets of the city, and which are constantly increasing, will make the public charges upon the company much heavier than those borne by any other enterprise within the community, and certainly as heavy as the traffic will bear."

Taking up the allied subjects of fares and transfers, the company computes the operating cost of carrying each revenue passenger, not including interest on capital, at 3.35 cents, divided as follows: Operating expense, 2.78 cents; taxes, State, city and county, 0.32 cent; depreciation, or provision for extraordinary maintenance, renewals and replacements, 6 per cent of gross earnings, the amount fixed in Chicago, 0.25 cent.

The average revenue per revenue passenger for the first 10 months of 1909 was 4.18 cents. The average revenue per revenue and transfer passenger for the same period was 2.97 cents. The company adds:

"If this subject be considered from the standpoint of car-miles, careful analysis has disclosed that the average operating cost of carrying each passenger a mile, including taxes, depreciation, and excluding interest on capital, is 2.14 cents, and for two miles is 4.28 cents, and for three miles is 6.42 cents; that upon this basis the average cost of carrying a passenger from Seventh and Broad Streets to Seven Pines, a distance of 9¾ miles, is 21 cents, while tickets are sold at only 4 1/6 cents, and in certain hours only 2½ cents; that the average cost of carrying a passenger from Seventh and Broad Streets to Westhampton Park, approximately 6½ miles, is 14 cents, while tickets are sold at only 4 1/6 cents, and at certain hours 2½ cents."

Costs of labor in the various departments in 1909 as compared with the period from 1896 to 1900 increased as follows: Transportation, 51.7 per cent; shop, 28.67 per cent; track, 26 per cent. Various commodities specified in detail are shown to have increased in cost from 1897 to 1907 an average of 68 per cent. The average fares per passenger on the Richmond division declined from 1904 to the 10 months' period ended Oct. 31, 1909, as follows: Including transfers, 3.19 to 2.97 cents; excluding transfers, 4.24 to 4.18 cents. In the same period the percentage of revenue passengers riding on transfers increased from 32.60 to 40.50 per cent.

Either the zone system of fare or a sufficient rate to give a reasonable return for the service rendered is suggested.

In response to an insistent demand the company experimented by extending the transfer system, with the result that 40 per cent of the revenue passengers now use transfers, the danger of "loop" trips has increased and the average revenue per passenger lowered. As a remedy it is suggested that transfers be given only at the time of the payment of fare, and only good at points of intersection, which would not restrict the present number of transfer points, but would enable the company to control the abuse of transfers; and that the transfer on a transfer be abolished.

The company concludes that if the zone system is not adopted and the present method of charge is followed a straight 5-cent fare is the least amount under existing conditions which will enable the continuation of an efficient service with modern equipment and the extension of the system from time to time to promote the convenience and encourage the development of the community.

THROUGH ROUTES BETWEEN ELECTRIC AND STEAM ROADS

Supplementing the formal hearings before the Committee on Interstate and Foreign Commerce of the House of Representatives on the railroad rate bill, of which a report was published in last week's issue, letters were received by the committee from various sources, principally in relation to the effect of the proposed legislation upon steam railroads. Letters relating to the electric railway interest in the situation were submitted by F. W. Coen, vice-president and general manager, Lake Shore Electric Railway, Sandusky, Ohio, and by Bentley W. Warren, of Boston.

LETTER OF F. W. COEN

Mr. Coen's letter is addressed to Congressman Paul Howland, of Ohio, and is in part as follows:

"We feel that that part of the bill prohibiting the Interstate Commerce Commission from establishing joint rates between steam and electric railroads is against the interest of the traveling public, the patrons of the interurban railroads, and the prosperity and development of such interurban roads.

"The Lake Shore Electric Railway Company has many points along its railroad where passengers do not take its cars to go to a nearby town or junction with a steam railroad to make their journey, for the reason that they cannot buy a through ticket to their destination; nor can they get their baggage checked to their destination, but, on the other hand, are required to travel upon the trains of our steam road competitors, who operate not more than two or three trains a day, affording very little train service as compared with the Lake Shore Electric Railway. The steam railroads working together and against the electric railroads in a case of this kind not only injure the electric railroads but inconvenience the traveling public. The traveling public under such circumstances do not get all the available benefits that are in store for them.

"There are also a number of points on this property where we have a large exchange of passenger traffic between this company and steam roads. In these instances it is now necessary for the travelers to purchase two tickets and have their baggage checked twice to reach their point of destination, and oftentimes are compelled to have their baggage transferred. These travelers are therefore receiving only a part of the advantages to which they are entitled when, on account of the convenience to them, they use an interurban and a steam road, while the steam roads

between themselves extend these advantages to the traveling public.

"I wish to say, however, that we have traffic arrangements with three different steam roads whereby through tickets are sold and baggage checked in exactly the same manner as the steam roads do among themselves and in these cases the public are receiving all the benefits.

"Looking at this matter broadly, it would seem to us that the portion of the bill should be amended so as to give the Interstate Commerce Commission authority to order through rates and through tickets as between interurban and steam roads, if in their judgment it was proper and advantageous to the public.

"If I have not made myself clear on the matter, I should be glad if you will advise me and I will endeavor to explain more in detail."

LETTER OF BENTLEY W. WARREN

Mr. Warren's letter, addressed to Congressman Andrew J. Peters, of Massachusetts, states in part:

"I have already sent you certain official figures from the Railroad Commissioners' report of Massachusetts relative to the small amount of freight or express business done by the Massachusetts street railway companies. Those figures showed that the receipts of the companies in Massachusetts from the sources indicated were less than 1 per cent of their gross receipts.

"I have now obtained similar figures, based on the proposed census report relative to street railways. These figures are not authoritative census department figures, nor is that department responsible for them. I nevertheless believe that they are approximately accurate and will be substantially confirmed by the census report on street railways when issued. These figures relate to 939 companies, and include not only street railways, but interurban roads. The sources of their total operating earnings, which amount to $418,187,858, are classified as follows:

Passengers	$382,132,494
Chartered cars	705,261
Freight	5,231,215
Mail	646,575
Express	1,560,802
Sale of electric current	20,093,302
Miscellaneous sources	7,818,209

"You will notice that the receipts from freight, as distinguished from mail and express, are but a small fraction over 1 per cent of the gross receipts. Including mail and express with freight, the receipts from all three sources are less than 2 per cent of the gross receipts.

"The sale of electric current is an item of some significance which may interest you. Many of the companies furnishing street railway transportation are equally electric light and power companies, manufacturing and selling electric current for use in the different cities and towns in which they also operate street railways. This would seem an additional reason for excluding street railways from the proposed legislation, if the avoidance of further complications between Federal and State jurisdiction and control is desired."

The seventh annual convention of the American Railway Engineering and Maintenance of Way Association will be held in Chicago, at the Congress Hotel, formerly the Auditorium Annex, March 15 to 17. As usual, there will be an exhibit of track appliances in connection with the convention. The exhibit will be held in the Coliseum Building on Wabash Avenue, opening March 14, and will continue the entire week.

The subjects upon which committees will report will include the following: Roadway, ballast, ties, rail, track, wooden buildings and trestles, signs, fences and crossings, signals and interlocking, records and accounts, iron and steel structures, economies of railway location, wood preservation, electricity.

An outline of the work of the committee on electricity follows: (1) Report on proper lateral and vertical clearances required for installations for electric traction; (2) report on best safeguards to be used in connection with transmission line crossings over tracks, giving recommendations in the form of specifications; (3) insulation; (4) maintenance organization; (5) electrolysis.

TEST OF A 15,000-KW. STEAM-ENGINE-TURBINE UNIT *

BY H. G. STOTT AND R. J. S. PIGOTT

During the year 1908 it became apparent that owing to the cost of increasing traffic in the New York subway, it would be necessary to have additional power available for the winter of 1909-1910.

The power plant of the Interborough Rapid Transit Company, which supplies the subway, is located on the block bounded by Fifty-eighth and Fifty-ninth Streets, and by Eleventh and Twelfth Avenues, adjacent to the North River; it contains nine 7500-kw (maximum rating) engine units, besides three 1250-kw, 60-cycle turbine units which are used exclusively for lighting and signal purposes.

The 7500-kw units consist of Manhattan-type compound Corliss engines, having two 42-in. horizontal high-pressure cylinders and two 86-in. vertical low-pressure cylinders. Each horizontal high-pressure cylinder and vertical low-pressure cylinder has its connecting rod attached to the same crank, so that the unit becomes a four-cylinder 60-in. stroke compound engine with an overhanging crank on each side of a 7500-kw, maximum rating, 11,000-volt, three-phase, 25-cycle generator. The generator revolving field is built up of riveted steel plates of sufficient weight to act as a flywheel for the two engines connected to it. This arrangement gives a very compact two-bearing unit. The valve gear on the high-pressure cylinders is of the poppet type, and on the low-pressure of the Corliss double-ported type. The condensing apparatus consists of barometric condensers, arranged so as to be directly attached to the low-pressure exhaust nozzles, with the usual compound displacement circulating pump and simple dry-vacuum pump.

These engine and generator units are in general probably the most satisfactory large units ever built, as five years' experience with them has proved; their normal economic rating is 5000 kw, but they operate equally well (water rate excepted) on 8000 kw continuously.

In considering the problem of how to get an additional supply of power, every available source was considered, but by a process of elimination only two distinct plans were left in the field. The electric transmission of power from a hydraulic plant was first considered, but owing to the high cost of a double transmission line from the nearest available water-power, and the impossibility of getting reliable service (that is, service having a maximum total interruption of not more than 10 minutes per annum) from such a line, further consideration of this plan was abandoned. The gas engine, while offering the highest thermo-dynamic efficiency, at the same time required an investment of at least 35 per cent more than an ordinary steam-turbine plant with a probable maintenance and operation account of from 4 to 10 times that of the steam turbine. The reciprocating-engine unit, of the same type as those already installed, was rejected in spite of its most satisfactory performance, on account of the high first cost and small range of economical operation. Reference to Fig. 1 will show that the economic limits of operation are between 3300 kw and 6300 kw; beyond these limits the water rate rises so rapidly as to make operation undesirable under this condition, except for a short period during peak loads.

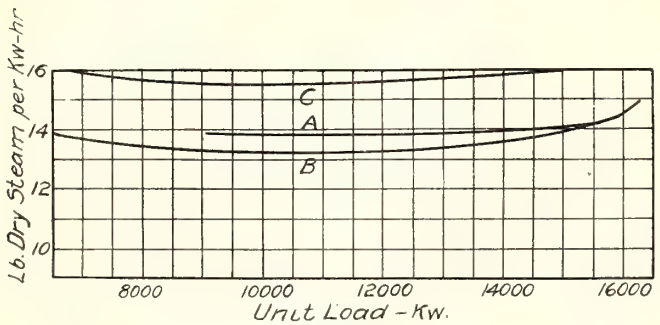
The choice was thus narrowed down to either the high-pressure steam turbine or the low-pressure steam turbine. There was sufficient space in the present building to accommodate three 7500-kw units of the high-pressure type, or a low-pressure unit of the same size on each of the nine engines, so that the questions of real estate and building were eliminated from the problem.

The first cost of a low-pressure turbine unit is slightly lower than that of a high-pressure unit, due to the omission of the high-pressure stages and the hydraulic governing apparatus, but the cost of the condensing apparatus would be the same in both cases. The foundations and the steam piping in both cases

* Abstract of paper presented at joint meeting of American Society of Mechanical Engineers and American Institute of Electrical Engineers, New York, March 8, 1910.

would not differ greatly. The economic results, so far as the first cost is concerned, would then be approximately the same, if we consider the general case only; but in this particular instance the installation of high-pressure turbines would have meant a much greater investment for foundations, flooring, switchboard apparatus, steam piping and water tunnels, amounting to an addition of not less than 25 per cent to the first cost.

The general case of displacing reciprocating engines and installing steam-turbine units in their place was also considered. The best type of high-pressure turbine plant has a thermal efficiency approximately 10 per cent better than the best reciprocating-engine plant, but the items of labor for operation



A. Constant nozzle pressure. B. Variable nozzle pressure. C. Recent guarantee for high-pressure turbine under the same plant conditions.

Variation of Unit Water Rate with Load

and for maintenance, together with the saving of about 85 per cent of the water for boiler-feed purposes and the 10 per cent of coal, reduce the relative operating and maintenance charges for the steam-turbine plant to 80 per cent, as compared to 100 per cent for the reciprocating-engine plant.

Assuming that the reciprocating-engine plant is a first-class one and has been well maintained, about 20 per cent of its original cost (for engines, generators and condensers) may be realized on the old plant and so credited to the cost of the high-pressure turbine plant. But on the other hand, if the high-pressure turbine installation is to receive credit for the second-hand value of the engines, it must also have a debit charge for 100 per cent of the original reciprocating-engine plant which it displaced. The relative investments, therefore, upon this basis would be approximately equal for the high-pressure or the low-pressure turbine; but 80 per cent of the cost of the original engine plant would have to be charged against the high-pressure turbine plant, as against an actual increase in value (to the owner) of the engine by reason of its improved thermal efficiency, due to the addition of the low-pressure turbine.

The preliminary calculations, based upon the manufacturers' guarantees for the low-pressure and high-pressure turbines, showed that the combined engine-turbine unit would give at least 8 per cent better efficiency than the high-pressure turbine unit, so that it was finally decided to place an order for one 7500-kw (maximum rating) unit, as by this means we would not only get an increase of 100 per cent in capacity, but at the same time give the engines a new lease of life by bringing them up to a thermal efficiency higher than that attained by any other type of steam plant.

The turbine installed is of the vertical three-stage impulse type having six fixed nozzles and six which can be operated by hand, so as to control the back pressure on the engine, or the division of load between engine and turbine. An emergency overspeed governor, which trips a 40-in. butterfly valve on the steam pipe connecting the separator and the turbine and at the same time the 8-in. vacuum breaker on the condenser, is the only form of governor used. The footstep bearing, carrying the weight of the turbine and generator rotors, is of the usual design supplied with oil under a pressure of 600 lb. per square inch. with the usual double system of supply and accumulator to regulate the pressure and speed of the oil pumps.

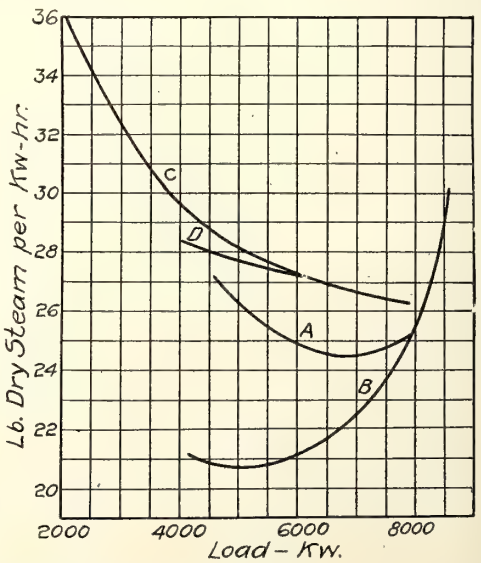
The condenser contains approximately 25,000 sq. ft. of cooling surface arranged in the double two-pass system of water circulation with a 30-in. centrifugal circulating pump having a maximum capacity of 30,000 gal. per hour. The dry vacuum pump is of the single-stage type, 12 in. and 29 in. by 24 in., fitted with Corliss valves on the air cylinder. The whole condensing plant is capable of maintaining a vacuum within 1.1 in. of the barometer when condensing 150,000 lb. of steam per hour when supplied with circulating water at 70 deg. Fahr.

The electric generator is of the three-phase induction type, star-wound for 11,000 volts, 25 cycles and a speed of 750 r.p.m. The rotor is of the squirrel-cage type with bar winding connecting into common busbar straps at each end. This type of generator was chosen as being specially suited to the conditions obtaining in the plant.

With nine units operating in multiple, each one capable of giving out 15,000 kw for a short time, operating in multiple with another plant of the same size, it is evident that it is quite possible to concentrate 270,000 kw on a short circuit. If we proceed to add to this synchronous turbine units of 7500-kw capacity, which, owing to their inherently better regulation and enormous stored energy, are capable of giving out at least six times their maximum rated capacity, the situation might soon become dangerous to operate, as it would be impossible to design switching apparatus which could successfully handle this amount of energy. The induction generator, on the other hand, is entirely dependent upon the synchronous apparatus for its excitation, and in case of a short circuit on the busbars would automatically lose its excitation by the fall in potential on the synchronous apparatus.

The absence of fields leads to the simplest possible switching apparatus, as the induction generator leads are tied in solidly through knife switches, which are never opened, to the main generator leads. The switchboard operator has no control whatever over the induction generator, and only knows it is present by the increased output on the engine-generator instruments.

The method of starting is simplicity itself—the exciting current is put on the engine generator *before* starting the engine, and then the engine is started, brought up to speed and synchronized in exactly the same way as before. While starting in this way, the induction generator acts as a motor until sufficient steam passes through the engine to carry the turbine above synchronism, when it immediately becomes a generator and picks up the load. Three of these 7500-kw low-pressure turbine units have been installed and tests run on Nos. 1 and 2.



A. Water rate of engine with constant nozzle pressure. B. Water rate of engine with variable nozzle pressure. C. Water rate of turbine with variable nozzle pressure. D. Water rate of turbine with constant nozzle pressure.

Variation of Water Rate with Load

No. 3, having been just started, has not yet been tested.

Tables and curve sheets follow. Two tests on the combined

unit are given. The conditions of vacuum and quality of steam entering turbine nearly standard, so that corrections are small.

The net results obtained by the installation of low-pressure turbine units may be summarized as follows:

a. An increase of 100 per cent in maximum capacity of plant.

b. An increase of 146 per cent in economic capacity of plant.

c. A saving of approximately 85 per cent of the condensed steam for return to the boilers.

d. An average improvement in economy of 13 per cent over the best high-pressure turbine results.

e. An average improvement in economy of 25 per cent (between the limits of 7000 kw and 15,000 kw) over the results obtained by the engine units alone.

f. An average unit thermal efficiency between the limits of 6500 kw and 15,500 kw of 20.6 per cent.

DISCUSSION

Dr. Charles P. Steinmetz said that the combination of a low-pressure turbine with an induction generator was assuming high industrial importance. He wished to say something about the electrical side of this combination. The characteristics of the induction generator have been known for a long time, but only now have conditions arisen which make it preferable to the synchronous generator. There are two types of a.c. generators—synchronous and induction. Constructively, the stators of both types are practically the same, as they comprise a polyphase winding located in a laminated stationary structure. The difference is in the rotor, for the rotor of the synchronous generator has a revolving magnetic field excited by direct current, while that of the induction generator has a short-circuited or squirrel-cage winding similar to that of an induction motor, the rotation of which induces an electromotive force in the stationary generator winding. The magnetic field of the induction generator is produced by the reaction of the alternating currents issuing from it. In consequence of the difference between the two types, the synchronous generator must run in step with the frequency of the a.c. system, that is, the rotor must move exactly one pole for every reversal of current on the a.c. system; conversely the induction generator cannot run in step with the frequency, but only runs faster, exceeding synchronism by a percentage dependent upon the load. Synchronizing is not required in the induction generator. Furthermore, since the induction generator does not depend upon running in step with any other machine, the possibility of see-sawing from the step position or "hunting" cannot exist. Unlike the synchronous machine, the induction generator has no regulation and no magnetic field dependent upon the voltage at the terminals and on the load. It must be understood that the induction generator can generate current only when connected to a system in which there are synchronous machines, whether the latter are generators, motors or converters, for it has no voltage of its own. The regulation of such a combined system of synchronous and induction apparatus therefore means simply the regulation of the synchronous machines. Hence, the induction generator is merely a machine feeding power into the system but not participating in its regulation or control, that is, while the synchronous machine on open circuit has voltage at its terminals, the induction machine has none under the same condition. Nor has the induction generator any short-circuited current because the current dies out as naturally as it does in a reactive coil when the current is withdrawn. The synchronous generator can generate current of any character-energy, reactive, wattless, lagging or leading—the proportions of the different kinds depending upon the nature of the system to which it is connected and the power factor of the supply system. The induction generator can generate energy current only while on the other hand it continually consumes a certain amount of reactive, wattless current as required for its excitation by the synchronous machines in the system. Thus, the induction generator alone cannot supply a general a.c. lighting, power and railway distribution system. Where a combination of generators is used the synchronous units must supply all the lagging current. In a system requiring considerable lagging currents a large percentage of induction generators would be a questionable advantage, as too much work would be thrown upon the synchronous generators; but for a system like that of the Interborough Rapid Transit Company, with its many rotary converters, the induction generator is of the greatest advantage. The induction generator is a typical converter of mechanical to electric power, giving straight conversion from one to the other. It is, therefore, an ideal machine to float upon an a.c. system for receiving mechanical power in any form, as from a low-pressure turbine, a water-wheel, etc.

Max Rotter asked Mr. Stott how he eliminated the oil from the exhaust steam. He also inquired whether with the efficiencies shown in comparison with other prime movers, Mr. Stott would recommend the described combination of a reciprocating engine and low-pressure turbine for an initial installation in preference to high-pressure turbines alone. He questioned the statement that the improvement in the case described by Messrs. Stott and Pigott was 13 per cent over the best high-pressure turbines. The figure of 8 per cent given elsewhere probably was more nearly correct. He thought that under the proper conditions the high-pressure turbine would show up just as well as the combination. The low-pressure turbine, of course, has to be operated under the unfavorable condition of a comparatively low speed. He was a little doubtful as to whether Mr. Stott had compared a 7500-kw high-pressure turbine with a 7500-kw low-pressure turbine or, more properly, with an engine and turbine having the combined capacity mentioned. What he wished to point out in this connection was that the cost of the condensing apparatus for high-pressure and low-pressure turbines of the same size differed considerably. In conclusion, Mr. Rotter said that the high-pressure turbine guarantees given by Mr. Stott were probably not as good as those attainable in practice owing to the tendency of the manufacturers not to guarantee more than they could safely perform. He thought that the figure of 15.6 lb. of steam per kw-hour quoted could be bettered by at least 2 lb.

Mr. Junggren, turbine engineer of the General Electric Company, quoted some figures from Messrs. Stott's and Pigott's paper to show that a high-pressure turbine working under the same conditions would not have adapted itself so readily to the variations in load. The high-pressure turbine could be expected to give excellent results at full load but was not as good as the combination on half loads. Of course, the cost of the single high-pressure turbine is less, but it could probably be improved if as much money could be spent upon it as on the combined reciprocating engine and low-pressure turbine. The vacuums obtained were remarkable, and show what can be done when a low vacuum is a necessity.

George R. Parker said that during the past year he had investigated several low-pressure turbine possibilities, that is, engine stations where the addition of low-pressure turbines might improve the results. He was frequently met by the statement, particularly from the owners of the smaller plants, that if one could get 80 per cent to 90 per cent more power in a non-condensing plant without any increase in coal consumption and with a much less proportional coal increase in a condensing plant, why were these turbines not installed in every condensing plant in the country. He thought that the manufacturers and engineers would be more successful in securing orders if they promised, say, 15 per cent to 20 per cent improvement only. He would not recommend changing over plants of less than 300-kw to 400-kw capacity because in these very small installations the actual cost of power production is not so important as the relatively high fixed investment and labor charges.

Mr. Samuelson, of the British Thomson-Houston Company, Rugby, Eng., said that during the last 12 months his company had been very busy manufacturing mixed-pressure turbines, for which the field was fully opened up in England. The low-pressure turbines employed abroad are of several types and have all been more or less successful. Many practical difficulties have been met and overcome, especially in the case of hoisting machinery, for which it was necessary to devise means of shutting off the supply from the engine when the pressure of the

steams falls to or below that of the atmosphere.

H. B. Carroll read a letter from W. L. R. Emmett, who pointed out that in many cases the question of first cost is not so important now as the cost of producing power from the fuel. There may be cases where it is better to install high-pressure turbines alone, but there are many reciprocating plants which could not afford to make such a change. Mr. Emmett wrote also that the difference between the guaranteed steam consumption figures of the low-pressure turbine and those actually obtained was due to the fact that the guarantees were based on dry steam operation only.

Dr. Steinmetz pointed out that the conditions described in the paper were hardest for the turbine and easiest for the reciprocating engine.

C. O. Mailloux expressed his regrets that so little had been said about improving power stations with poor reciprocating engines by using low-pressure turbines. He believed that very good results could be obtained, particularly if the engine were supplied with superheated steam. As to oil in engines, he had recently seen in London, Eng., an engine connected to a generator of 1500-kw or 2000-kw capacity which for over two years has been successfully lubricated with graphite. When oil was used the life of the piston rings was only about 550 engine-hours, whereas with graphite cylinder lubrication one set of piston rings had reached a life of 4000 engine-hours at the time he left London. This engine is lubricated by the injection of 0.1 oz. graphite every eight hours.

In summing up the discussion, Mr. Stott replied to Mr. Rodder's inquiry about the separation of the oil from the steam by saying that the separator specifications demanded that there should be no more than 0.4 grain of oil per gallon, an amount which he considered entirely harmless. The separator after some preliminary troubles soon came well within the specified limits, and the plant is using all the condensed steam that comes from the turbine. As to Mr. Rodder's query about what machines he would recommend for an initial installation, Mr. Stott laughingly replied that if one recommendation could be made to cover all conditions there would be little use for engineers. The answer to this question depended largely upon the power factor of the plant or, in other words, the ratio of the fixed charges to the operating charges. If the fixed charges are very high, one should not bother so much about the operating cost. For a plant with a 10-per cent peak load, he would not consider a highly expensive initial installation of any kind, particularly such machinery as gas engines. In these instances it was a fallacy to speak of low stand-by charges as the fixed charges were more important. As to Mr. Rodder's statement that the high-pressure turbines probably could do better than their guarantees, Mr. Stott said that he had not received much encouragement from the makers when he was investigating that point. He agreed with Mr. Mailloux that the principle of the low-pressure turbine also was applicable to stations with poor engines. In conclusion Mr. Stott pointed out that all the tests recorded in the paper of the evening were made under operating conditions with the loads varying 15 per cent plus and minus.

STORAGE BATTERY CAR POWER RECORDS MADE IN NEW YORK CITY

During the last week the Edison-Beach storage battery car, described in a recent issue of this paper, has been in operation on the Twenty-eighth and Twenty-ninth Street Crosstown line in New York. Tests were made March 1 to determine the power consumption of the car. Eleven runs, aggregating 52.47 miles, were made in ten hours and five minutes. The gross weight of the car is approximately 6 tons. The watt-hours used were 35,925, making the energy consumed per car-mile 684.6 and the per ton-mile 114.1. The Twenty-eighth and Twenty-ninth Street Crosstown line has few grades, but the track conditions are not very good, and there are several short double curves. The weather during the test was rainy.

THE PHILADELPHIA STRIKE

The refusal of the Philadelphia Rapid Transit Company on March 1, 1910, to arbitrate the differences between the company and its former employees, and that of Mayor Reyburn to intervene in behalf of the strikers, forced the labor leaders to declare effective on March 4, 1910, at midnight, the sympathetic strike with which they had threatened the city and which they claimed would paralyze business interests by throwing between 100,000 and 150,000 men out of work. As soon as the sympathetic strike had been declared, the committee representing the affiliated unions addressed an appeal to the working people of Philadelphia to assemble at Independence Square, on Saturday afternoon, March 5, at three o'clock, "to peaceably participate in a demonstration in behalf of the street-car men's union now on strike."

Mayor Reyburn was prompt to act, and gave wide publicity through the newspapers to a proclamation urging the maintenance of order. He said that no application had been presented for a permit for the assembly, and that the intended assembly would be in violation of his proclamation of Feb. 20, and would endanger the public safety. He called attention to the decision of the Supreme Court defining the uses of highways. It is estimated by the police that 60,000 people congregated in the vicinity of Independence Hall in obedience to the call of the unions, and for the first time since 1776 Independence Hall was closed to American citizens.

The company has gone steadily ahead perfecting its plans for operating cars without the assistance of its former employees, and reported on March 6 that it had 810 cars in operation out of about 1400 cars operated ordinarily on Sunday. The record of cars operated since the beginning of the strike, as published in the Electric Railway Journal of March 5, 1910, showed that on March 1 925 cars were operated, and that the company had 3960 men available. Since then the company has operated the following cars: March 2, 1000; March 3, 994; March 4, 1113; March 6, 810 and March 7, 1156. The record of passengers carried since Feb. 23 follows: Feb. 23, 201,440; Feb. 24, 250,658; Feb. 25, 389,000; Feb. 26, 476,651; Feb. 27, 199,827; Feb. 28, 450,000; March 1, 560,312; March 2, 760,312; March 3, 750,000; March 4, 800,000; March 5, 725,000; March 6, 300,000; March 7, 820,000. On March 9 the company reported that on March 8 it had operated 1090 cars and carried 925,000 passengers. The company is receiving many applications for employment at its Philadelphia offices. Branch employment offices have also been opened in Washington, D. C., Wilmington, Reading, Cincinnati and St. Louis. The company by the end of next week expects to have its full complement of men. In the meantime it is offering to board and provide rooming accommodations for the new men until they can secure permanent quarters.

The labor leaders declared on March 8 that more than 100,000 men were on strike in sympathy with the car men, but according to a police canvas made by Director Clay, of Public Safety, there were less than 20,000 workmen on sympathetic strike. He said that factories employing 121,239 men were not in the least affected by the strike, and in substantiation of the figures which he prepared he issued a statement showing the number of men employed in the principal establishments in the city that had responded to the call of the unions. Such large employers of labor as the Baldwin Locomotive Works, the J. G. Brill Company, the Cramp Ship Building Company and William Sellers & Company reported that the normal number of men was at work in their shops and plants. If more men responded to the call for the sympathetic strike than was indicated by the figures made public by Director Clay, the labor leaders up to March 8 had not issued any statement to refute the figures made public by the director. On March 9, Mr. Clay reported that 3200 of those on general strike had returned to work.

It is generally admitted that the strike is fast petering out, and that the unions were put severely to the test when the company and the Mayor refused to consider arbitration and thus compelled the labor leaders to show the extent of the sympathy of labor itself with the misguided strikers.

In a letter addressed to J. Burwood Daly, attorney for the strikers, dated March 6, 1910, the company, through Mr. Kruger, acknowledged Mr. Daly's letter of March 3, 1910, in which the company was asked to join him in an appeal under the Act of 1893 to the court to settle what Mr. Daly had referred to as serious differences between Division 477 of the Amalgamated Association and the company. Mr. Kruger quoted the statement of one of the representatives of the men on strike to the effect that he knew of no such law. This man had said that he was not surprised that "the company and its City Hall allies



Disabled Car in Philadelphia

should want to bring this controversy into the politically directed courts, where they are so fond of bringing individuals who oppose them." In his letter Mr. Kruger said, in part:

"Passing over your attempt to force a recognition of an association officered and controlled by people not citizens of this commonwealth, which attempt has now twice within one year paralyzed the business interests of this city, I beg to point out to you that whatever benefit could have been derived from the act in question has been rendered impossible by the action of your association.

"You precipitated a strike at a time when questions between this company and its employees were being adjusted, and so severed the relationship of employer and employee, which is a prerequisite to jurisdiction under the act of 1893. This action on your part puts the question at issue between this company and its former employees beyond the reach of this legislation. The men who were formerly employees of this company, and who gave up that employment at the command of your association, are no longer its employees. They left the company's service on Feb. 19, 1910, thus breaking the yearly contract which their accredited representatives had made with the company on June 5, 1909. Their action in severing the relationship of employer and employee was accepted by the board of directors of this company on Feb. 25, when it notified them that they must return if at all on or before March 1.

"As a reply to the official representative of the Amalgamated Association this letter ends here. However, in order that the attitude of this company may be plainly understood by its former employees and by the public, and in order to show our willingness to adopt any legal method of settlement that promises lasting peace, we here reiterate what we stated in our answer to the Ministers' Association a week ago, viz.: That if our former employees will apply for work we will take back into our employment so many of them as we have room for, giving them such runs as are open, and taking those only whose past records have been satisfactory to the officials of the company; this, however, will cover a very large majority of those on strike.

"Inasmuch as very many of our former employees have been deterred from applying for reappointment under the false and malicious rumors constantly circulated that some form of settlement with the union was going to take place, the directors have extended the time within which application may be made under the order of Feb. 25 to midnight of March 7, and warn them not to be further misled by rumors to the same effect, which will be doubtless circulated, but which will not be true.

"After these men have again become our employees we will confer with them with respect to the differences which were being considered when broken off by the strike, with the distinct understanding, however, 'that employees shall be free to join or not to join any organization and may present their grievances to the company individually, or if members of any organization of employees by a committee or the representatives thereof, and there shall be no intimidation or discrimination against any employee so doing by any officer of the company or their subordinates.'

"The strike called by your association was notice that the men affiliated with that association would not agree to this clause or permit any recognition by our company of non-union men, and this is the real issue between the company and the strikers.

"The question, however, has now passed beyond this point and the paramount issue to be determined by the outcome of this strike is whether law should rule and business be conducted in a legal manner under the protection of law.

"As a particular method of treating with our employees as above set forth we suggest that a committee of employees, say, of nine, be selected—three from those hereafter re-employed from those now on strike, three from those who have remained in service during the strike; these six to select three from the whole body of employees in service after March 7. Such a committee would be representative of the whole body of our employees."

On March 3 the company posted up the following notice in all of its depots:

"To Our Loyal Men:

"To quiet any misapprehension that may exist among our loyal men, the management wishes to inform them that they need have no fear that they will be asked to surrender their runs or positions to any man or set of men returning to the



Police Removing Obstructions in Philadelphia

service of the company. Men who have remained loyal to the company will certainly receive every preference, in respect to the giving of runs and otherwise. Men who have worked during the strike will not be expected to give way to, nor asked to endure, the abuse that, we are informed, they have heretofore suffered from former employees now on strike.

"The officials and board of directors take this opportunity to thank the men who have remained on their cars during the past 10 days; we appreciate your loyalty and devotion and shall not be slow to recognize by every means that lies in our power your faithfulness to the interests of this company."

TEN-CENT FARE TO CONEY ISLAND UPHELD BY PUBLIC SERVICE COMMISSION

An order of the New York Public Service Commission, First District, was issued on March 8, dismissing the complaints against the fare of 10 cents to Coney Island charged by the Brooklyn Rapid Transit system. Although the effort to force reduction of the fare to 5 cents thus fails, the commission was divided on the subject. Commissioners McCarroll, Bassett and Eustis voted for the order. Commissioner Maltbie voted against the order and Chairman Wilcox voted against the order, making the following statement: "I am in favor of dismissing the complaints so far as they affect lines other than the Brighton Beach line operated by the Brooklyn Union Elevated Railroad Company and as the order affects that line I wish to be recorded against the order." Commissioner McCarroll, who presided at the hearings on these complaints, submitted a long opinion. Commissioners Bassett and Maltbie also submitted opinions. The two complaints which led to the consideration of the fare to Coney Island were made by Jonas Monheimer and Scott MacReynolds, who contended that the rate of 10 cents was unlawful, unreasonable and excessive.

Opinion of Commissioner McCarroll:

The opinion of Commissioner McCarroll describes the four elevated routes and seven surface routes of various subsidiary railways of the Brooklyn Rapid Transit Company which are involved in the proceeding. Mr. McCarroll states in part:

"The contention of the complainants that the 10-cent fare charged is unlawful appears to be without foundation in the light of the decision by the Court of Appeals in the case of People vs. Brooklyn Heights Railroad Company, 167 N. Y., 48.

"There has been no change in the situation since that decision was rendered, except that the unified plan of operation has been broken up and the separate companies are in most instances operating their own sections of the respective routes. This makes a less favorable case for bringing the several routes within the terms of the statutes because in the state of facts before the Court of Appeals the entire system was operated, under various leases and agreements, by a single street surface railroad company, the Brooklyn Heights Railroad Company, whereas at present substantially all of the elevated routes and a considerable portion of each of the surface routes are operated by companies holding either an elevated franchise or a steam surface franchise.

"On the question whether the 10-cent fare is excessive or unreasonable the complainants also fail to make out a case against any of the defendant companies.

"The complainant MacReynolds, who took the active part in presenting the complainants' case, directed most of his attention to the subject and method of operation of the several lines, in an endeavor to establish that the respective lines were operated through to Coney Island by a single company. The evidence failed to establish this contention except in the case of the Brighton Beach line and the Coney Island and Gravesend line. The fact of through operation by a single company is not sufficient to invoke the statutory provisions in regard to a single fare, as to either of the two routes last named, and it would not have been sufficient in the case of any of the other routes if the complainant had established such fact of through operation as to them. Neither would the fact of through operation by a single company be a sufficient ground for an order of this commission reducing the fare, without conclusive evidence that the existing fare was unreasonable or excessive. On this point the complainants offered no evidence whatever.

"The only evidence produced by either of them, except on the question of joint or single operation, had reference to the question of over-capitalization of some of the companies, chiefly the Brooklyn Union Elevated Railroad. So far as the evidence adduced by either party is concerned the record tends to indicate a considerable retrenchment by the Brooklyn Union Elevated Railroad Company and some of the other companies through a decapitalization of the securities of some of their predecessors in title. Even if the complainant had established over-capitalization such fact would not necessarily sustain a reduction of fare without some evidence either (1) that a charge of 10 cents is inherently excessive for the length of ride involved or (2) that the total business of the particular companies is unreasonably profitable and that the earnings of the Coney Island business could be reduced without imposing an unfair burden on the traffic of the remaining portion of the company's line. On all of these points the evidence offered by the complainants is silent. Such evidence as was presented by the complainants could not be regarded as establishing anything upon which reliance could be placed in regard to the cost or value of the properties of the several companies nor anything in regard to the cost of operation nor as to the burden of excessive capitalization."

As tending to show that the 10-cent fare is not excessive Commissioner McCarroll included in his opinion the following table showing the distances in miles which the companies carry passengers for a 5 and a 10-cent fare:

Route.	Distance for 5-Cent Fare.	Distance for 10-Cent Fare.
Brighton Beach Line	8.763	11.878
West End Line	9.879	11.527
Sea Beach Line	8.986	11.353
Culver Line	9.027	11.393
Nostrand-Culver Line	9.846	12.353
Tompkins-Culver	10.462	12.968
Reid Avenue Line	11.314	13.814
Vanderbilt Ave. Line	8.544	11.051
Union Street Line	8.620	10.927
Fifteenth Street Line	6.087	8.394

These distances are compiled without reference to extensive transfer privileges, which make the distances susceptible of very significant increases. On each of the routes transfers are given which make a total ride of more than 18 miles for five cents in some cases and of more than 21 miles to Coney Island for 10 cents in some cases.

"It is evident," Commissioner McCarroll says, "that the conditions of travel on the lines of the defendant companies involve very wide variations in the ratio of fare to distances traveled by the individual passenger. Variations of this character occur on the lines of nearly all urban companies in this country, but the conditions prevailing in this city and especially in the Boroughs of Brooklyn and Queens seem extreme and unique. In the case before us the system of fare makes it possible for the great majority of users of the lines in question, on normal and actual routes of transit, to travel 8, 10 and 11 miles, and by transfer even further, as has been shown, for a single fare of five cents. While it is possible that an occasional passenger might have to pay 10 cents for a comparatively short ride in case he boarded a car just before entering a fare zone and left it just after leaving the fare zone, the commission is not cognizant of any complaint that the boundaries of the fare zone are improperly placed. The average length of the fare zones on the several lines is more than three miles, and the boundaries of the zone appear to be so fixed with reference to the business and residential section that few passengers confine their journey to the territory adjacent to the fare zone."

As to whether the 10-cent fare is unreasonable the commissioner says it is necessary to ascertain values, earnings and the relation between the two. The officials of the several defendant companies offered voluminous evidence on the subject of original cost of properties, reductions of capitalization and results of operation "freely and with apparent frankness." After a careful study of the record the commission became convinced that an investigation and valuation of the physical properties would be necessary. Commissioner McCarroll refers to the engagement of Bion J. Arnold in this connection and the resulting appraisal as follows:

"Mr. Arnold is an engineer of wide experience and distinguished reputation in the construction, operation and valuation of electrical railroads. He and a large staff of assistants were engaged for several months in a detailed examinaton of the properties of the several defendants. The complexity of the examination was greatly increased by the fact that the defendants are separate companies and must be dealt with as

such. Owing to the fact that the Brooklyn Rapid Transit Company owns or controls each of the companies it is generally supposed that the entire system is merely one company.

"This impression is strengthened by the close administrative and operating relations between the various subsidiary companies and a confusion has undoubtedly been fostered by the illogical action of the various companies in marking their cars 'Brooklyn Rapid Transit,' and adopting a standard Brooklyn Rapid Transit uniform for employees. The fact remains, however, that the parties with which the commission is concerned are the various separate defendant companies.

"Mr. Arnold presented sworn statements as to the values of the properties of the separate companies as he found them. These values in the case of real estate are based on the assessed valuation, and in the case of other tangible property are based on the actual cost to reproduce the property, making allowance for reasonable expenses for contractors' profit, surveying, planning and other engineering charges and various incidental items, which although intangible are essential disbursements in the creation of any property such as a street railroad or elevated railroad. The following table contains a summary of the values of the properties of the several companies as testified to by Mr. Arnold and also shows the operating income of the several defendants for the fiscal year ending June 30, 1909, and also the ratio in percentage, which the operating income bears to the value of the property used in operation:

Company.	Value.	Income.	Percentage.
Bklyn. Un. El. R. R. Co.....	$25,262,154.18		
Canarsie R. R. Co. (leased to Bklyn. Un. R. R. Co.).....	3,283,672.57		
	$28,545,826.75	$2,416,374.90	8.46
Bklyn. Hgts. R. R. Co.....	$510,726.65		
Bklyn. City R. R. Co. (leased to Bklyn. Hgts. R. R. Co.).....	25,066,297.00		
	$25,577,023.65	1,949,086.52	7.62
Nassau Elec. R. R. Co.....	11,924,049.18	902,452.30	7.56
Bklyn., Q. Co. & Sub. R. R. Co..	4,962,498.70	325,964.10	6.57
So. Bklyn. Ry. Co.....	2,799,279.24	31,024.48	1.10
Sea Beach Ry. Co. (deficit)....	1,489,519.32	7,766.88	...
C. I. & Gravesend Ry. Co.....	463,511.95	7,032.53	1.51
	$75,761,708.79		

"In the table the value of the property of the Carnarsie Railroad used by its lessor, the Brooklyn Union Elevated is added to the value of the property of the Brooklyn Union Elevated Railroad, in order to get the proper figure of value compared with the corporate income of the Brooklyn Union Elevated Railroad. Similarly, in the case of the Brooklyn Heights Railroad, the value of the Brooklyn City Railroad property is added to that of the Brooklyn Heights Railroad, as the corporate income of the latter company is made up in large part of earnings of the Brooklyn City Railroad.

"From the total valuation as given above there might be deducted the sum of $797,000 which represents the amount contributed by the city toward the cost of improvements—bridges, crossings, etc.—of the Brighton Beach road of the Brooklyn Union Elevated Railroad. But that affects the percentage figure as stated to such a fractional degree that the change is inconsiderable.

"The foregoing items of valuation do not include any allowance for assessments or for other real estate values in excess of assessed valuation. Neither do they make any allowance for franchise values nor for a considerable amount of development expenses, as for example, interest during period of construction on capital used in construction, reasonable profits of promoting the enterprise, preliminary legal expenses or organization and other legal preliminaries, cost of complying with various preliminary requirements of law. All of these items would be absolutely essential disbursements in the reproduction of any existing railroad, and they would add considerably to the figures of valuation given in the foregoing estimate if proper allowance were made for them.

"Neither has any deduction been made from the income for amounts that would be properly chargeable to reserves and similar accounts. Were these made there would, of course, be a decrease in the amount of net income or earnings from that shown in the table, and a corresponding deducton in the percentage of profit given. Attention should perhaps here be called to the testimony by the expert as to the excellent standard of efficiency in which the equipment has been constantly maintained, which is highly creditable to the management of the company. He testified that the properties of the companies were in excellent condition and hence any allowance for depreciation would be the minimum usually made, the margin of which varies in such computations from 15 to 20 per cent or more, according to the conditions, 85 per cent is regarded as an average standard of good condition."

The commission reaches the conclusion after examination of the percentages of corporate income, that the figures do not indicate unreasonable earnings on the part of any of the companies. Disturbance of fares of some of these companies would constitute confiscation of the property and therefore be unconstitutional and unlawful. * * * The dividends paid have been infrequent in most cases and small in all cases except that of the dividend paid by the Brooklyn Heights Railroad on the stock of the Brooklyn City Railroad. These dividends to the Brooklyn City Railroad have been relatively small for the reason that the total capitalization of the Brooklyn City Railroad amounts to less than $19,000,000, as against a present value of approximately $25,000,000, for its property used in operation. The total payments to holders of securities of the Brooklyn City Railroad at present represent as a consequence only about 6 per cent on the value of the Brooklyn City Railroad property. On a small capitalization of its own the Brooklyn Heights Railroad has very greatly increased the efficiency and serviceability of the Brooklyn City Railroad as it existed at the time of the lease. Neither this commission nor the Legislature could invalidate the lease as it exists, and it would seem that the Brooklyn Heights Railroad is entitled to earn some return on the value which it has added to the property leased.

"While the figures of valuation upon which the foregoing percentages are based, are not complete appraisal of the property, the expert employed by the commission has stated that he is satisfied that there is property of at least the value given in each case and that a more detailed examination would increase the estimate. It is evident, therefore, that the valuations are extremely conservative and that further study of the subject would only have the result of decreasing the percentages of income which have been set forth above.

"It is to be borne in mind in this connection that physical assets are not the only real and valuable properties of a company upon which it is entitled to a fair return. There are numerous other elements which may be properly regarded as capital charges to be considered. We have not dealt with these. It is, of course, true that when existing physical properties closely approach in value the capitalization of a company and the income on the value of these alone is not shown to be an undue, or more than a reasonable, profit, there would be no ground upon which any action could be taken that would look to a reduction of income. The case would be conclusive without going further. That is shown to be the fact in this case."

Certain other general conditions along the line of public policy tend to confirm the opinion of the commission.

"It may well be anticipated," Commissioner McCarroll adds, "that the growth of population in the now so-called 'outlying sections,' will produce a volume of local and short riding travel as will be remunerative to the company, and justify a commensurate reduction in fare. In the meantime, the fact is that the travel in these outlying sections is mostly of long distance riders without compensating short distance travel.

"It is important to bear in mind that almost all the Coney Island travel is peculiarly expensive to the carrying companies as compared with regular residential or business traffic in more settled parts of the city. Aside from the length of the ride, the handling of the Coney Island business is expensive by reason of its extreme fluctuations in volume. While the or

dinary traffic of the company contributes a steady income and involves a regular demand upon its facilities, the Coney Island business requires the company to be prepared to handle enormous numbers of passengers in a single day at irregular intervals during a short period in the summer months. This large volume of travel is most uncertain, varying with the weather and other conditions, but nevertheless, it requires the companies to maintain a large power capacity and equipment useful only when the demand is at its height. This necessarily occasions the investment of an abnormal amount of capital idle during a large portion of the time.

"Testimony upon this point was offered by the defendants going to show that by reason of this peculiar nature of the operations of those lines, the Coney Island business, even at a 10-cent fare, was not profitable. It was testified that a loss upon it was shown on the books of the company for the year 1907 of $463,443.98. The weight to be given to this statement of loss must be qualified by the fact, also disclosed in the testimony that figures which could be regarded as strictly accurate could not be reached showing the results of the Coney Island business itself, because this has not been segregated in the system of accounting. It must, therefore, be regarded largely in the nature of an estimate. Under the new accounting required by the commission the actual results of this, as well as each of the other branches of the business, will be shown in the future.

"But in the meantime the trend of the testimony offered would indicate that this Coney Island business is not profitable to the companies and there is nothing that would justify the commission in ordering a 5-cent fare. This is more apparent when it is also borne in mind that companies in a solvent and prosperous condition best serve the welfare of the public, both as travelers and investors, and it is in their interest as well as that of their many employees that they should be maintained in this condition."

OPINION OF COMMISSIONER MALTBIE.

Commissioner Maltbie wrote that he opposed "the dismissal of these complaints at this stage of the proceeding. The evidence thus far taken does not warrant such action; upon the contrary, it indicates that the fare should be reduced below 10 cents upon certain lines at least.

"It is probable that the wisest solution of these cases would be a reduction of fares from 10 cents to 5 cents upon the surface lines of the Brooklyn Rapid Transit system running to Coney Island. A 10-cent fare for rapid transit and a 5-cent fare for slower transit not only would be equitable but would tend to distribute the traffic more evenly among the various lines. Those who wish a rapid transit to Coney Island would use the 10-cent lines; those who wish to travel more leisurely, who prefer the surface lines or to whom a 10-cent fare is objectionable financially, would use the 5-cent lines. The net result to the Brooklyn Rapid Transit Company, which controls the various surface and rapid transit lines and to which all net earnings ultimately go, would thus be a gain through the equalization of traffic; and even if a single line did lose thereby, the added profits from other lines would more than offset this loss. Common carriers have long recognized this principle and often have different rates between points varying according to the comfort and rapidity of the service.

"Owing to the doubtful jurisdiction of this commission over the Brooklyn Rapid Transit Company, it is possible that the commission could not force the company to adopt such a plan, however desirable it might be. The only other course apparently open to the commission is to consider separately each of the constituent companies of the Brooklyn Rapid Transit system and to determine whether the 10-cent fare to Coney Island upon its lines should be reduced and by what amount. Such a course might compel a reduction of fare upon the very line which gave the best and most rapid service, and thereby attract to it a still greater number of persons, leaving the other (10-cent) lines with less to do; for if the fare is the same and a passenger has a choice, he will prefer the best and most rapid line. But no matter how illogical it may be, the position of the Brooklyn Rapid Transit Company and the working of the statutes have forced the commission to consider each company by itself."

After discussing some of the figures of the valuation, Commissioner Maltbie adds: "Financial factors, however, are not the only ones to be considered in this case. Coney Island is virtually a large public park for the Greater City. It is one of the few ocean breathing spaces which are accessible to the masses of our citizens, thousands of whom go there daily during the summer to enjoy the seashore and to secure relief from the heat of the over-crowded city. The dwellers in the congested tenement-house districts of Manhattan and Brooklyn find their only vacation in such trips, and to them the charge of 20 cents for a round trip is a factor of no small importance. Everything that is done, therefore, to bring Coney Island nearer to these crowded districts has a direct effect upon the well-being of the city, and it is in the public interest that fares should be as low as consistent with a fair return upon the capital actually represented in the enterprise.

"It should not be inferred that I favor free or cheap riding at the expense of the stockholders, or that it would be wise to require the companies to carry people at less than a fair return even to parks. I merely wish to point out that in this case there are factors which do not appear in the ordinary fare case having to do with rates from one business or residential district to another.

"Further, the companies in the Brooklyn Rapid Transit system have virtually been given the use of the Brooklyn and Williamsburg bridges.

"In my opinion the evidence so far presented does not warrant a refusal to lower fares, but does indicate that fares can be reduced upon certain lines."

MEMORANDUM OF COMMISSIONER BASSETT.

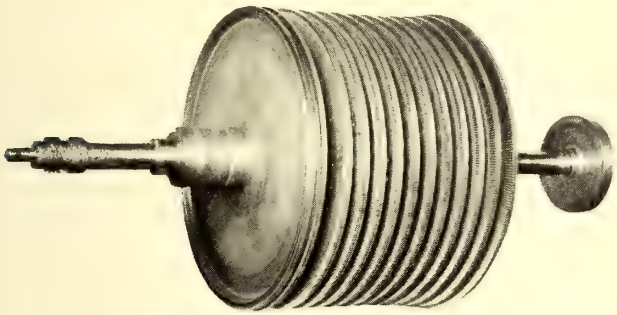
A memorandum filed by Commissioner Bassett says in part: "If a railroad company from its beginning maintains reserves so that at all times it has its entire capital either in its reserves or its depreciated property, its total earnings will be represented by its income from fares and from its reserves. A reasonable rate can then be predicated on its entire income. But if, as in the case with the Brooklyn Union Elevated Railroad, no reserves representing depreciation have been maintained, then the rate must be predicated on the depreciated value of its property. In the case of this railroad, however, if we add all existing elements of value other than franchises to the depreciated value of its property, my opinion is that a total figure is found equal to or greater than that used by Commissioner McCarroll. The rate now earned on this capital is not unreasonable, and if the non-earning years of the company are taken into account it is difficult to say with certainty that present fares should be reduced.

"Even if it were found that present earnings of the Brooklyn Union Elevated Railroad were excessive, it would probably be impossible under existing law to compel a rational fare reduction on the Brooklyn Union lines to Coney Island. Only one line, the Brighton Beach, runs all the way. Parts of the other lines are operated by companies whose returns plainly show that they are not earning an excessive income.

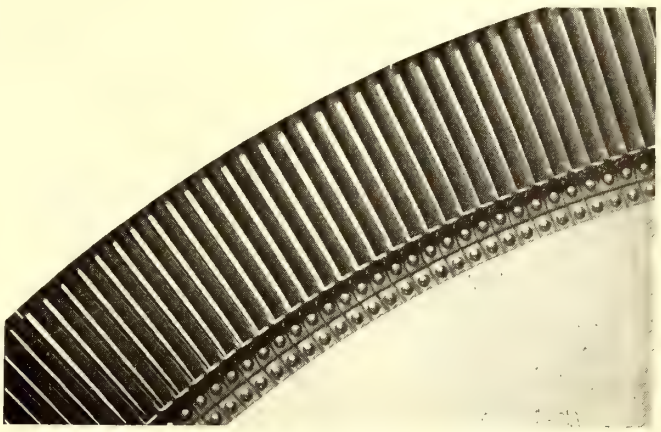
"The accounts of all the companies controlled by the Brooklyn Rapid Transit Company should be so kept that the commission could obtain statistics actually independent instead of fictitiously independent. It is possible that the Public Service Commissions law will be perfected so that the commission can compel a correct practice in this regard. It is also possible that the through route and joint rate provisions of the law will be made more clearly applicable to urban passenger service. Then when the commission finds from statistics, yearly made more perfect, that a lower rate will be a reasonable rate it will be able to prescribe it effectually, regardless of multiplicity of franchises, owners and operating companies."

A NEW HORIZONTAL IMPULSE TURBINE

The accompanying illustrations show the details of the Bergman turbine, as built by Dick, Kerr & Company, Limited, London. This machine is of the impulse type and from five to fifteen pressure stages or chambers, with the same number of wheels, are employed, according to the size of the turbine. In the first chamber the principle of velocity stages has been adopted. Here the steam is allowed to expand from a working pressure of 150 lb. to a pressure of from 15 to 45 lb. The wheel moving in this chamber carries two series of blades separated by a set of stationary reversing blades. This construction eliminates high pressures and temperatures from the rest of the turbine body and simplifies the problem of sealing the turbine from the atmosphere and between the stages. An ingenious "labyrinth" device is employed as a seal in the first chamber.



Rotor for Dick, Kerr Turbine



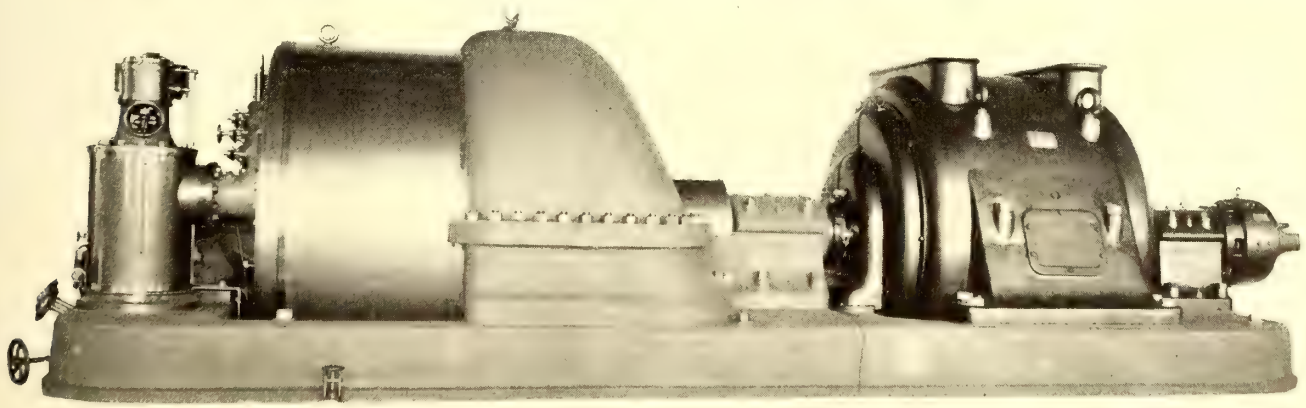
Segment of Low-Pressure Wheel

The body of the turbine consists of a single cast iron cylinder, split horizontally in the center. At the admission end the cylinder is closed by a cover in one piece, which in the case of the smaller sizes of machines is made of cast iron, and in the larger machines of cast steel. No special cover is required on the exhaust end. The body is supported freely on one support, which surrounds the vacuum end of the lower cylinder and the exhaust flange. This pedestal bears the entire weight of the cylinder, and is at the same time a support to the turbine and generator bearings. A special pedestal support at the high pressure end of the body is unnecessary. The outer bearing pedestal is provided with a flange bolted to the end cover, near the center, so as to insure correct alignment, and at the same time offer no resistance to expansion. This end bearing pedestal also carries the governor, oil pump and guide block.

The stationary vanes, or guide wheels, are built in two halves, with an annular space in the middle through which the turbine shaft passes. At this point special sealing rings of white metal are fixed, which enclose the shaft without rubbing, and are provided with grooves to reduce the steam leakage between the neighboring chambers to a minimum..

The physical conditions which govern the expansion of steam in the first set of guide blades necessitate nozzles, the section of which increases from the narrowest part to the end. From 10 to 20 such nozzles are placed together and form a nozzle segment, and this latter forms the first set of guide blades, which is set immediately behind the throttle valve and regulates the admission to the velocity wheel. This segment is made of bronze, and is fastened to a casting of steel so as to be quite steam tight. The casting has a flange for connection to the high pressure steam supply, and there are two handles for operating two valves, by means of which a certain number of the nozzles in the segment can be opened and closed, thus regulating the area of the steam passage. In the larger types the handles operating the valves are carried forward in front of the throttle valve and governor, so as to be clear of the parts which are mounted on the end cover. A suitable opening is made in the end cover to carry the complete inlet apparatus.

The guide blades for the remaining stages are of a much simpler construction. The steam channels have the same section throughout their length, and are made of vanes of sheet nickel cast into an iron ring which forms the periphery of the guide wheel. The first stage and the following two or three pressure stages have partial admission, and the remaining stages have all-round admission. The guide wheels, as stated, are in halves fitted together with a steam-tight joint.



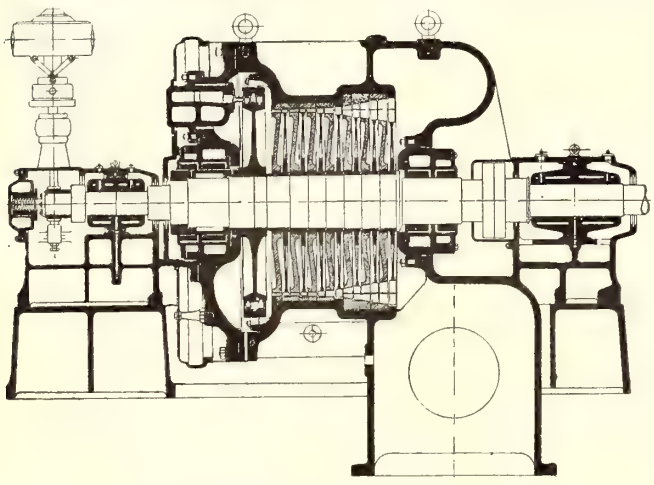
6000-HP Turbine Direct Connected to 4800-KVA Alternator, 1500 R.P.M.

The rotating wheels of all stages are complete discs of Siemens-Martin steel, and are cast with a thickened hub bored to provide a firm seating on the shaft. The first wheel, which is of the design characteristic of a wheel of uniform strength, is provided with a bulb-shaped rim in which two slots are turned to carry the two series of blades already mentioned. The slots are dovetailed to fit the base of the blades, which are composed of special nickel steel. The high steam velocity in the first stages necessitates a channel of constant area, in order to avoid wasteful steam eddies. This is attained by the blades having a special pro-

file, but in the normal pressure stages this channel is not required.

The ends of the blades of the velocity wheel are closed by means of a band, whose function is to form a confined passage. No forces act upon the band except the centrifugal force due to its own weight. A band similar to that used for the velocity wheel is carried on the ends of the blades of the low-pressure wheel, and after completion the wheels are balanced separately and tested mechanically by running them at a speed corresponding to twice the normal strains.

The bearings which support the shaft are provided with water-cooled oil-pressure lubrication. Oil rings and dividing partitions seal the bearings from the interior of the tur-



Cross-Section of Turbine

bine, so that oil is excluded from the latter and the condensation can be employed for boiler feeding without preparation. A small geared pump, which is driven direct from the turbine shaft, keeps the oil in circulation under a pressure of from 15 to 30 lb. per square inch. After passing through the whole length of the bearings, the oil is pumped to an oil reservoir, where it is cleaned and simultaneously cooled.

The turbines are usually direct connected to electric generators, and, both machines being made in the same factory, the unit is designed as a whole. In the smaller units three bearings permit a rigid coupling between the generator and the turbine shaft. In the larger units four bearings are provided, two for the turbine and two for the generator. In this case a flexible coupling is used, consisting of a number of fine steel wires, which allow for any small inaccuracies in the alignment of the shafts and insure quiet running.

The governor is spring controlled and of the "Hartung" type. It is driven by means of a worm from the turbine shaft, and controls by means of a connecting rod and a guide valve, which directs the flow of the pressure oil into one of two channels. From here the oil passes through into the top or bottom of the cylinder and moves the piston accordingly. The piston rod is direct connected with the throttle valve on the steam supply, so that the latter follows the pressure exerted on the piston by the oil. The operation of the governor is rapid, and lasts but a few seconds. It is, moreover, entirely independent of the pressure of the steam supply, so that it is possible to run the turbine without adjustment with a steam pressure which is much less than normal.

To avoid a great increase in the relative steam consumption at light loads, a second method of governing is provided for the high pressure turbines. The first set of guide blades is divided into several groups, each of which is controlled by means of a hand-operated valve. The single valves can be opened and closed according to the load, and thereby the admission to the first wheel so chosen to obtain the minimum steam consumption. As soon as normal speed is raised more than 10 per cent a safety device closes the steam inlet valve. The exhaust outlet is made of exceptionally large dimensions, so as to reduce the pressure drop between the rotor and the condenser to the lowest possible figure.

VALUATION OF THE CONEY ISLAND & BROOKLYN RAILROAD PROPERTY.

A hearing in the fare case involving valuation of the Coney Island & Brooklyn Railroad, took place before the New York Public Service Commission, First District, on Feb. 17.

E. G. Connette, transportation engineer of the commission, testified that he had had 10 years' experience with steam railroads and about 19 years as superintendent or manager of street railways in Nashville, Tenn., Syracuse, N. Y., and Worcester, Mass. With a staff of engineers and other assistants, acting under his direction, he had made an appraisal of the property changes in the Coney Island & Brooklyn Railroad from Feb. 1, 1909, to Feb. 1, 1910, supplementing the valuation made by Bion J. Arnold, as of Feb. 1, 1909.

Mr. Connette offered in evidence a statement showing the result of the supplementary appraisal. W. M. Dykman of counsel for the company, objected on the ground that the statement was not sufficiently authenticated. The objection was overruled by Commissioner Bassett.

Concerning the method which was followed in making the supplementary appraisal Mr. Connette testified that the value of the betterments which were made during the 12 months ended Feb. 1, 1910, was added to the reproduction value as of Feb. 1, 1909, together with three other items, which appeared to have been omitted from the original appraisal. The three items were: Real estate, not used in the operation of the property, $27,400; buildings not used in operation, $70,048; feeder wires omitted by mistake, $3,105.53. The value of the betterments was $81,206.82. After the value of the betterments was added, a deduction was made from the total amount to cover depreciation under the rules for depreciation followed in the original appraisal. The cost to reproduce the property as of Feb. 1, 1909, as figured by Mr. Arnold, was $5,877,661.69. The reproduction value on Feb. 1, 1910, was $5,958,858.48. After a deduction for depreciation accrued during the 12 months of $42,941.43, the present value of the property as of Feb. 1, 1910, was fixed at $5,861,122.67.

In making the appraisal a statement from the company of its claims as to additions made to the property was checked and every item allowed except one for paving, which was reduced $1,000, as it was found, after the pavement was opened, that no concrete base existed. The records of the commission showed a concrete base.

The witness had checked a statement presented by Frank R. Ford, of Ford, Bacon & Davis, concerning additions and betterments which would be needed within the next three years. In this statement allowances of 10 per cent for contractors' profits and 15 per cent for incidentals were made. Mr. Connette and his engineers thought that the latter allowance was rather high for an existing company and had accepted the statement of improvements which Ford, Bacon & Davis said would be necessary, allowing, however, 10 per cent for contractors' profits and but 10 per cent for incidental expenses. The elimination of allowances for State or city permits and fees on property and local consents for doing this work, which Mr. Connette thought would not involve any expense in this instance, would about make up the 5 per cent difference.

Cross-examination of the witness was deferred until Feb. 24.

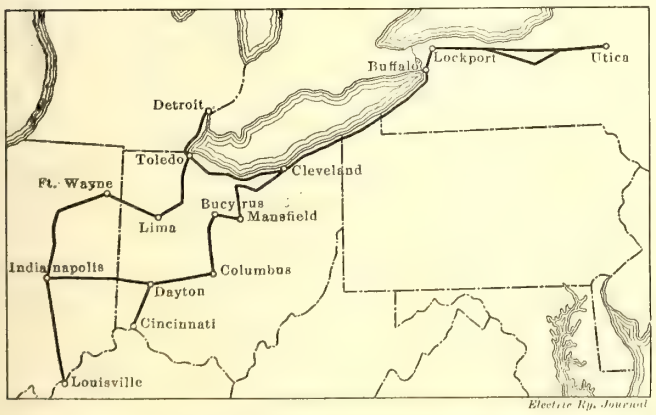
Mr. Connette took the stand on Feb. 24 and March 2 for cross-examination by William N. Dykman, of counsel for the Coney Island & Brooklyn Railroad. He was followed by Frederick A. Delatour, of Dykman, Oeland & Kuhn, counsel for the company, and James A. Emery, of Ford, Bacon & Davis. Another hearing was held on March 9.

LONG TRIP BY TROLLEY

The trip by trolley from Utica, N. Y., to Indianapolis, Louisville, Toledo, Detroit and Cleveland, planned by business men of Utica, N. Y., and vicinity, as mentioned in the ELECTRIC RAILWAY JOURNAL of March 5, 1910, page 426, will be made some time before May 3, 1910, according to arrangements made at a meeting of those interested in Utica recently. At this meeting the following chairmen of the various committees were selected: Entertainment, Lieut. W. G. Mayer; publicity, J. Soley Cole; finances, F. W. Bensberg; hotels, T. W. Johnson; invitation committee, E. B. Odell, F. W. Sessions, P. J. McQuade, W. I. Taber, John L. Maher, Dr. E. H. Douglas and F. J. Baker. The figures secured from the various companies over whose lines the party will travel show that the aggregate distance of the round trip will be 2049.82 miles and that the running time, as made by the cars regularly in operation over those lines, is 81 hours and 48 minutes. Cars of the Oneida Railway will be used for the trip. The summary of the daily runs, the distance and running time follow:

First day, Utica to Rochester, 134.82 miles, 4 hours, 18 minutes; second day, Rochester to Erie, Pa., 169 miles, 7 hours, 33 minutes; third day, Erie, Pa., to Mansfield, Ohio, 202.50 miles, 9 hours, 46 minutes; fourth day, Mansfield, Ohio, to Columbus, Ohio, 98 miles, 4 hours, 35 minutes; fifth day, Columbus, Ohio, to Cincinnati, Ohio, 131 miles, 5 hours, 10 minutes; sixth day, Cincinnati, Ohio, to Indianapolis, Ind., 163.66 miles, 6 hours, 53 minutes; seventh day, Indianapolis, Ind, to Louisville, Ky., 117 miles, 4 hours; eighth day, Louisville, Ky., to Fort Wayne, Ind., 251.50 miles, 8 hours, 40 minutes; ninth day, Fort Wayne, Ind., to Toledo, Ohio, 148 miles, 5 hours, 22 minutes; tenth day, Toledo, Ohio, to Detroit, Mich., 56 miles, 2 hours; eleventh day, Detroit, Mich., to Cleveland, Ohio, 172 miles, 6 hours, 35 minutes; twelfth day, Cleveland, Ohio, to Buffalo, 190.50 miles, 9 hours, 35 minutes; thirteenth day, Buffalo to Utica, 215,82 miles, 7 hours, 21 minutes.

In making the trip the party will pass over the lines of different companies in the following order: Oneida Railway; Buffalo, Lockport & Rochester Railway; International Railway; Buffalo & Lake Erie Traction Company; Cleveland & Erie Railway; Pennsylvania & Ohio Railway; Cleveland, Painesville & Eastern Railway; Cleveland, Southwestern & Columbus Railway; Sandusky, Norwalk & Mansfield Electric Railway; Mansfield Railway, Light & Power Company; Columbus, Marion & Bucyrus Railway; Columbus, Delaware & Marion Railway;



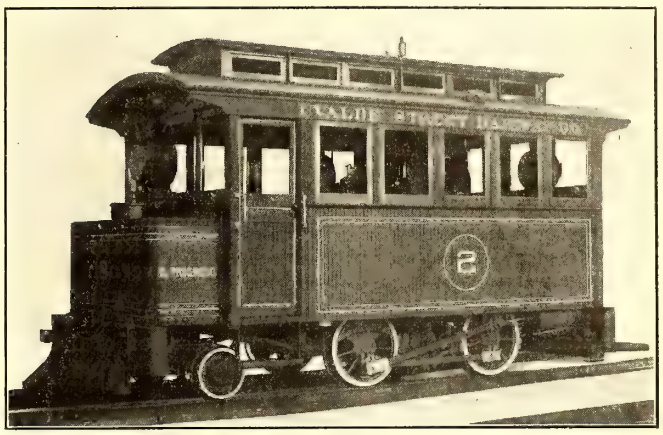
Route of Electric Railway Trip

Columbus Railway & Light Company; Ohio Electric Railway; Terre Haute, Indianapolis & Eastern Traction Company; Indianapolis & Louisville Traction Company; Indiana Union Traction Company; Fort Wayne & Wabash Valley Traction Company; Ohio Electric Railway; Western Ohio Railway; Toledo, Bowling Green & Southern Traction Company; Toledo Railway & Light Company; Detroit United Railway; Lake Shore Electric Railway. The itinerary for the trip was arranged by C. Loomis Allen, general manager of the Oneida Railway, and Charles R. Gowen, secretary to Mr. Allen.

A STREET RAILWAY STEAM MOTOR CAR

The accompanying illustration shows a steam motor car built by H. K. Porter Company, Pittsburgh, Pa., for the Uvalde Street Railway Company, Uvalde, Tex. This machine is simply an entirely enclosed light locomotive, not intended to carry passengers, but to haul one or more light passenger cars. The entire locomotive was built by the Porter company. It is designed for operation on a standard-gage track.

The cylinders are 8 in. x 14 in.; diameter of driving wheels, 30 in.; weight in running order, 28,500 lb.; weight on drivers, 20,000 lb.; boiler pressure, 105 lb.; tractive force 4174 lb.;



Enclosed Steam Locomotive for Street Service

straight-type boiler, diameter, 32 in.; number of tubes, 67; diameter of tubes, 1¾ in.; length of tubes, 4 ft. 9 in.; length of firebox, 37 in.; width of firebox at top and bottom, 26¾ in.; heating surface of tubes, 143.2 sq. ft.; heating surface of firebox, 32.5 sq. ft.; total heating surface, 175.5 sq. ft.; water capacity, 300 gal.; coal capacity, 300 lb.

COMMITTEE ON RAILWAY MAIL PAY

The committee on railway mail pay, the chairman of which is J. Kruttschnitt, vice-president and director of maintenance and operation of the Union and Southern Pacific systems, has issued a circular and a primer discussing the subject which the committee was organized to investigate. The primer states that the committee represents 139 railroads with 192,808 miles of road. The circular says in part:

"Postal revenue has been increasing at the rate of $10,000,000 annually and if postal expenses are controlled they should increase much more slowly and in two or three years the deficit should disappear, unless the greater revenue is used for further improvements in service, and, if it is, the public should be willing to foot the bill. The railroads are now underpaid and are receiving less and less of the postal revenue for greater measures of service rendered. Ten years ago, in 1899, of each dollar of postal revenue, 38 cents was paid to the railroads; in 1909 only 24 cents, a decrease of 14 cents, or 37 per cent. The 1909 postal deficit was 8 cents per dollar of revenue, so that had the 14 cents saved from the railroad proportion (or the equivalent of $29,000,000 on basis of 1909 revenue) been used to reduce expenses instead of further serving the public, it would have wiped out the deficit and left a surplus of 6 cents per dollar, or $12,000,000. Instead, however, the $29,000,000 wrung from the railroads was applied to various purposes with the resulting deficit.

"Whether the service shall be improved with an annual deficit or remain stationary with no deficit, or with a surplus, depends on whether further improvement of the service or a favorable financial showing is to be the paramount consideration. The able men in charge of our postal service can easily bring about either result. It is for the public to decide which they want, but in deciding we appeal for justice and a square deal for the railroads."

News of Electric Railways

Tenth Annual Meeting and Banquet of the New England Street Railway Club.

The tenth annual meeting and banquet of the New England Street Railway Club will be held at the Hotel Somerset, Boston, Mass., on March 24, 1910. The regular meeting will convene at 3 p. m. The polls for balloting for officers will open at 3 p. m. and will be closed at 5 p. m. At 6 p. m. there will be a reception and at 6:30 p. m. the banquet will be held.

E. S. Draper, Governor of Massachusetts; Frank B. Weeks, Governor of Connecticut; H. B. Quinby, Governor of New Hampshire; A. J. Pothier, Governor of Rhode Island; G. H. Prouty, Governor of Vermont; Bert M. Fernald, Governor of Maine; Joseph T. Robinson, Arkansas, Congressman from the Sixth District; James F. Shaw, president of the American Street & Interurban Railway Association; P. F. Sullivan, president of the Boston & Northern Street Railway and the Old Colony Street Railway, and William A. Murphy, private secretary to Governor Draper of Massachusetts, have accepted invitations to make after-dinner speeches. Should all the Governors of the New England States attend it will be the second occasion of the kind in the history of New England when the Governors have appeared together on a public occasion.

The price of the banquet tickets is $3.00 each. As the number of seats is limited, members are requested to make early application for tickets to J. J. Lane, 12 Pearl Street, Boston, secretary of the club, sending the names of the parties who are to use the tickets so that it will be possible to prepare and print a diagram of the seating arrangements.

Program of Central Electric Accounting Conference.

The twelfth regular meeting of the Central Electric Accounting Conference is to be held at the Anthony Hotel, Ft. Wayne, Ind., on March 12, 1910, at 1 p. m. The program of the meeting follows:

Paper—"The Auditor's Relation to the Operating Executive," by A. J. Lamb, of Toledo Railways & Light Company.

Discussion—"Passenger Fare Collections."

Discussion—"Affiliation with Central Electric Railway Association."

Transit Affairs in New York

Mayor Gaynor of New York and his associates on the Board of Estimate have voted to grant a franchise to the Manhattan Bridge Three-Cent Line, which desires to operate cars between the Desbrosses Street ferry, Manhattan, and the Fulton Street shopping district in Brooklyn. This is the route of the proposed new line: Start at Desbrosses Street ferry in West Street, Manhattan; through Vestry Street to Canal Street and by Canal Street to the Manhattan Bridge; over the bridge to Fulton Street, Brooklyn, by way of the Flatbush Avenue extension; then one block up Fulton Street to Rockwell Place; through Rockwell Place to Flatbush Avenue; loop there into Fourth Avenue, and thence by way of Livingston Street to Hoyt Street to Fulton Street, to Bridge Street and, by way of the Flatbush Avenue extension and Manhattan Bridge, back to Manhattan. There the cars will run westward in Canal Street to Vestry Street, and loop around the Desbrosses Street ferry by a short spur through Greenwich Street, which will complete the loop at that end.

John C. Brackenridge, vice-president of the Manhattan Bridge Three-Cent Line, has estimated that it will cost $850,000 to build and equip the line. He estimates the gross earnings of the company at $900 a day.

Mayor Gaynor, President Mitchell of the Board of Aldermen, and Controller Prendergast, constituting the special committee on transit of the Board of Estimate, held another conference with the members of the Public Service Commission on March 7, 1910. Chairman Willcox of the commission informed those present that the preparations for holding hearings on the form of the new subway contracts would soon be completed. Both the Mayor and Mr. Willcox said that President Shonts of the Interborough Rapid Transit Company had not signified whether the company would submit bids on this subway. The impression prevails that the company will shortly present a new proposal to the commission.

The New York Central & Hudson River Railroad has awarded contracts for the construction of two buildings to cover the blocks between Lexington Avenue and Depew Place, Forty-sixth Street and Forty-eighth Street, to be 12 stories high and cost about $4,000,000. Each building will cover about 16 city lots and will be connected by a series of bridges, which will be built over Forty-seventh Street. The structures will be built by James Steward & Company, from plans by Reed & Son. The Merchants & Manufacturers' Exchange, organized in St. Louis in 1909, and including in its membership about 300 manufacturers throughout the country, has arranged for a lease of the buildings which will provide space for trade conventions and the exhibitions of merchandise and machinery.

D. Cady Herrick, referee appointed by the Supreme Court in the suit of the New York Central & Hudson River Raillroad against the City of New York to prevent the removal of its tracks in Eleventh Avenue and in the west side of Manhattan, has decided in favor of the company on every point. It has been suggested that the company build a tunnel on Eleventh Avenue and electrify its line.

Judge Coxe, of the United States Circuit Court, has directed the return of the suit brought by the people of the State of New York against the Bleecker Street & Fulton Ferry Railroad and others to the State Supreme Court. The action is for the forfeiture and annulment of franchises granted to the company by the Legislature in 1860 and 1873, and for noncompliance with the resolution of the Board of Aldermen adopted Dec. 20, 1883. It was claimed that the company had failed to construct connecting tracks on Mail Street and other streets in New York, and had therefore abandoned all the rights and privileges granted by the franchises.

Electric Locomotives in the Cascade Disaster.—The avalanche which crushed the two trains of the Great Northern Railroad at Wellington, Wash., near the west portal of the Cascade tunnel on March 1, 1910, carried with it three locomotives and four electric locomotives, the passenger station and the water tank. The service will be conducted temporarily with steam.

New Elevated Station Petitioned for in Boston.—A petition has been filed with the Massachusetts Railroad Commission asking that the commission require the Boston (Mass.) Elevated Railway to build an elevated station on its recently completed Forest Hills extension at Green and Washington Streets, in the Jamaica Plain district. The petition raises the issue of the relative ability of the surface and elevated lines to handle the traffic, working in conjunction as at present, with local service by the former and express service by the latter, and the plan of multiplying elevated stations in the outlying districts.

Fenders in San Francisco.—The special committee of the Board of Supervisors of San Francisco which has had under consideration the matter of prescribing a type of fender for use in San Francisco, and which was largely responsible for the passage of the ordinance fixing the type of fender described in the Electric Railway Journal of Dec. 25, 1909, page 1278, agrees with C. N. Black, vice-president and general manager of the United Railroads of San Francisco, that the fender described in the ordinance has too much overhang to be serviceable, and has granted the company a continuance until a test can be made with a new type of Eclipse fender.

Spokane Transportation Club.—More than 50 representatives of steam and electric railways doing business in Spo-

kane met in that city recently and organized the Spokane Transportation Club to promote friendship and sociability among railway officials. It was decided to admit all railway officers, including chief clerks, to membership. The club will meet at luncheon the second and fourth Saturdays of the month. Officers were elected as follows: Waldo G. Paine, Spokane & Inland Empire Railroad, president; J. T. Andrus, North Coast Railroad, first vice president; H. N. Kennedy, Northern Pacific Railroad, second vice president; J. W. McIntosh, Spokane & Inland Empire Railroad, secretary; R. L. Ford, Chicago, Milwaukee & St. Paul Railroad, treasurer.

New President in Kansas City Outlines Policy.—John M. Egan, whose election as president of the Kansas City Railway & Light Company, Kansas City, Mo., was announced in the ELECTRIC RAILWAY JOURNAL of March 5, 1910, has issued through the newspapers a statement to the public in which he said in part: "It gives me great pleasure to become once more a resident of Kansas City. My best effort will be used to forthwith familiarize myself with the properties and to furnish to patrons of its lines the best street car service possible. I fully understand the difficulties in furnishing the service that an impatient public may demand. The interests of the companies and the public being largely in common, with mutual aid and forbearance, nothing but good results should follow. My past experience here will, I trust, cause the citizens to have confidence in the statement that the interest of the patrons of the lines and of the cities at large will occupy first place in my mind. The office of the president will be always open to receive suggestions that will have for their object improvement of the service and development of the cities' resources. In speaking of Kansas City I include both cities of that name, as well as the adjacent cities that are served by the companies. The employees can rely on fair treatment and their loyalty to the company's interest and their consideration of the public will be duly recognized."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—George R. Gaither, representing the Western Maryland Railway and other companies, appeared before the judiciary committee recently and severely arraigned the advocates of the Strauss public utility bill for their lack of judgment in proposing a measure which he characterized as expensive and unnecessary. The bill, he said, if enacted as it is now drawn will injure the best interests of the State, as Maryland occupies a peculiar position economically when compared with other States, and there has been no real demand for a public utilities commission. Mr. Bryan, the former Attorney-General of Maryland, after explaining that the Pullman Company should not be subject to the commission, said that the Legislature cannot delegate legislative functions to an executive department. Those who demand a public utilities act have permitted four bills to be prepared. There is, first of all, the public utilities bill prepared by Attorney-General Strauss in response to the pledge of the Democratic platform. This bill is now in the judiciary committee of the House of Delegates, whence it will probably be reported very soon. Next is the Pairo bill, which the Republican leaders have drawn up. Both of these bills conflict with a bill prepared by the Reform League. Mr. Gaither has also presented a public utilities bill. A further complication is the appearance in the House of the gas and electric repeal bills, which have diverted attention temporarily from the general public utilities question and also opened up the question of control through competition.

Massachusetts.—The committee on metropolitan affairs has reported a resolve in the House providing that the Massachusetts Railroad Commission and the Boston Transit Commission, sitting as a joint board, shall investigate the subway proposed for the West End district of Boston by the Codman petition and resulting bills recently heard by the committee. The decision rendered by the Transit Commission some months ago was in favor of terminating the Cambridge subway at Park Street, in accordance with the suggestion of the public authorities and the Boston Elevated Railway. The new bills are designed to accommodate the representation which favored the Scollay Square terminus by the construction of a loop from Cambridge Street to Bowdoin and Scollay Squares and Park Street. The committee on railroads has voted to withdraw the bill providing for the election of the Railroad Commission by the people, and the prospects are that both branches will sustain this view.

The committee on street railways gave a hearing on March 1 upon the bill to require the Boston Elevated Railway to establish a free transfer station at the intersection of Huntington and Massachusetts Avenues, in the Back Bay. Frederic E. Snow, counsel for the company, stated that the matter was one which should be passed upon by the Railroad Commission. It was only natural for passengers to desire to be transferred up and down Huntington Avenue from Massachusetts Avenue cars, but there was no way of confining travel within the limits desired by the petitioners. On account of the abuse of the transfer system, the company felt obliged to refuse to grant any more transfer points than were absolutely necessary. The company was doing all it could to meet the situation by running extra cars direct to the educational institutions concerned, and by giving extra service between the Boston Opera House and the suburbs. The time for final committee reports expired on March 9, but by concurrent vote the time may be extended a month on measures which have still to be discussed and reported.

The committee on street railways has so far reported its conclusions upon only one bill, an unimportant measure concerning the Mt. Sugar Loaf reservation. The committee heard the bill recently to prohibit persons from riding on the running boards of open cars. C. S. Sergeant, vice-president of the Boston Elevated Railway, said it would be impossible to observe the provisions of the measure. The committee on metropolitan affairs has had the various Boston electrification bills referred to it by request of the committee on railroads. The former committee brought in a resolve recently that the railroad corporations operating within the metropolitan district of Boston be requested to prosecute studies with reference to electrifying their passenger and freight service within the district, and to report the results of their studies before Sept. 1, 1910, to the joint board on public improvements for the district created by the Acts of 1909, Chap. 113. At a hearing on the bill to provide for a better connection between the North and South Stations at Boston on March 7, T. E. Byrnes, vice-president of the New York, New Haven & Hartford Railroad, stated that the company desired to build a tunnel for electrified service between the two terminals, and that the suburban lines could be electrified at the same time. The tunnel construction would require about three years and cost $16,000,000. Mr. Byrnes recommended that a four-track tunnel be built, and stated that if the public authorities are to handle the construction, the company would prefer to have the State rather than the city of Boston do the work.

Ohio.—Although the Woods bill, providing for a public utilities commission, was reported upon favorably by the railroad committee of the House on March 1, indications point to the defeat of the measure in its present form, at least. The passage of the Langdon bill, which creates a State tax commission and extends the provision of the Nicholas law to steam and electric railways, is reported to depend upon the opinion of the Attorney-General regarding the constitutionality of the Cole excise law, which imposes a tax of 2 per cent on the gross earnings of corporations. The Winters bill, which extends the authority of the State Railroad Commission, has not made much progress. A bill has been introduced to require gates at all places where steam and electric railways cross at grade. This would mean the employment of watchmen at all crossings. The Mather bill, which would give electric railways the right of eminent domain outside of municipalities, was passed by the Senate on March 1. A bill introduced by Senator Matthews of Cleveland provides that a franchise for a street railway shall not be operative after a petition for a referendum is signed by 15 per cent of the electors until a vote is taken upon the question. The purpose of this bill is to remove the doubtful point in the Schmidt referendum law.

Financial and Corporate

New York Stock and Money Market

March 8, 1910.

Wall Street seems to have recovered, in a measure, from its uneasiness and to have lost its dread of adverse legislation. There was a steady advance during the week on fairly active trading, with considerable evidence of outside buying. To-day there were signs of profit taking, but not enough to cause noticeable price recessions. Traction shares have been active and Interborough and Brooklyn Rapid Transit have advanced. Third Avenue in only traded in speculatively, the price being about 8.

The money market continues to be easy with quotations at former rates. Quotations made to-day were: Call, 2¾ to 3 per cent; 90 days, 3¾ per cent.

Other Markets

The labor troubles in Philadelphia are not having the depressing effect upon traction shares that was anticipated. Rapid Transit has declined 2 points during the week, but Union Traction has held its own.

In the Boston market there has been some trading in Boston Elevated and in the shares of the Massachusetts Electric Companies. Prices have advanced only fractionally.

In the Chicago market last week a sale was made of three shares of Chicago City Railway Company's stock at 185. This is the first sale of this stock for many months, and is an advance of 5 points over the last sale. Trading in other tractions was unimportant.

There have been no trades recorded in traction stocks in the Baltimore market during the past week. Sales of the bonds of the United Railways Company continue liberal at former prices.

Quotations of various traction securities as compared with last week follow:

	Mar. 1.	Mar. 8.
American Railways Company	a47	a45¾
Aurora, Elgin & Chicago Railroad (common)	a59	a57¾
Aurora, Elgin & Chicago Railroad (preferred)	a94⅛	a94¼
Boston Elevated Railway	130½	130¼
Boston & Suburban Electric Companies	a16½	a16½
Boston & Suburban Electric Companies (preferred)	a75	a76
Boston & Worcester Electric Companies (common)	a11	a11
Boston & Worcester Electric Companies (preferred)	a44	a44
Brooklyn Rapid Transit Company	75⅞	77¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84	84
Capital Traction Company, Washington	a134	a133½
Chicago City Railway	a190	a195
Chicago & Oak Park Elevated Railroad (common)	*2	*2
Chicago & Oak Park Elevated Railroad (preferred)	*10	*10
Chicago Railways, ptcptg., ctf 1	a106	a106
Chicago Railways, ptcptg., ctf. 2	a34	a33
Chicago Railways, ptcptg., ctf. 3	a18	a18
Chicago Railways, ptcptg., ctf. 4s	a9½	a9⅛
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76½	a76½
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a105½
Detroit United Railway	*62	*62
General Electric Company	155¼	157
Georgia Railway & Electric Company (common)	a107	a107½
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	23¼	23⅛
Interborough-Metropolitan Company (preferred)	55½	58¼
Interborough-Metropolitan Company (4½s)	87⅞	82⅛
Kansas City Railway & Light Company (common)	a30	a30
Kansas City Railway & Light Company (preferred)	a69½	a71
Manhattan Railway	137	139
Massachusetts Electric Companies (common)	a18¼	a18½
Massachusetts Electric Companies (preferred)	a83	a84½
Metropolitan West Side, Chicago (common)	a16½	a16
Metropolitan West Side, Chicago (preferred)	a53	a55
Metropolitan Street Railway	16	15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	80	81¼
Northwestern Elevated Railroad (common)	a17	a17
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a51¼	a51¼
Philadelphia Company, Pittsburg (preferred)	a45	a44½
Philadelphia Rapid Transit Company	a24⅜	a23⅜
Philadelphia Traction Company	a89	*89
Public Service Corporation, 5 per cent col. notes	*100⅞	*100⅛
Public Service Corporation, ctfs.	a105	a105
Seattle Electric Company (common)	a115¼	a115
Seattle Electric Company (preferred)	105	a106
South Side Elevated Railroad (Chicago)	a54	a54
Third Avenue Railroad, New York	8⅛	8⅜
Toledo Railways & Light Company	11¾	*11¾
Twin City Rapid Transit, Minneapolis (common)	*113¾	114
Union Traction Company, Philadelphia	a50½	a50½
United Rys. & Electric Company, Baltimore	a14	*14
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	67	*67
Washington Ry. & Electric Company (common)	a37⅝	38
Washington Ry. & Electric Company (preferred)	a90	a89⅛
West End Street Railway, Boston (common)	a95	a95
West End Street Railway, Boston (preferred)	a106	a105
Westinghouse Elec. & Mfg. Company	71	75⅞
Westinghouse Elec. & Mfg. Company (1st pref.)	*120	125

a Asked. * Last Sale.

Quarterly Earnings of New York City Companies

The New York Public Service Commission, First District, has issued a statement comparing the earnings of the New York City railways for the quarters ended Sept. 30, 1908 and 1909. Following are the principal operating figures for several of the large properties:

Quarters Ended Sept. 30, 1908 and 1909.

System or company and year.	Railway operating revenue.	Railway operating expenses.	Net revenue, railway operations.	Gross income for corp. and leased prop.
Hudson & Manhattan (*a*):				
1909	$374,399	$196,096	$178,302	$327,428
1908	128,606	134,239	*D* 5,632	99,011
Interborough Rapid Transit:				
Elevated division—1909	3,469,626	1,445,486	*b* 2,024,140	*b*3,437,609
Subway division—1909	2,826,940	1,086,910	*b* 1,740,030	
Both divisions—1908	5,507,316	2,675,709	2,831,606	2,680,821
Brooklyn Rapid Transit:				
1909	5,773,538	3,239,020	2,534,518	2,326,886
1908	5,165,990	3,085,552	2,080,438	1,941,400
Metropolitan Street Railway:				
1909	3,743,738	2,391,338	1,352,400	1,052,543
1908	3,609,953	3,343,252	266,701	*D* 58,445
Third Avenue Railroad:				
1909	2,107,329	1,148,281	959,048	867,734
1908	1,864,955	1,258,997	605,958	538,409
Coney Island and Brooklyn:				
1909	482,064	265,472	*b* 216,592	*b* 197,306
1908	485,553	326,976	158,577	146,348
Grand total, all companies:				
1909	$19,506,782	$10,235,501	$9,271,281	$8,459,839
1908	17,434,165	11,296,314	6,137,850	5,544,447

N. B.—Deficits and losses are designated by the prefix *D*. (*a*) Operation of the lower tunnel (from Jersey City to Cortlandt Street Station), began July 19, 1909; the length of line operated Sept. 30, 1908, was 3.19 miles; on Sept. 30, 1909, 6.44 miles. (*b*) Amounts shown above are subject to deductions for depreciation of way and structures and equipment which were not charged to operating expenses.

Boston & Worcester Street Railway, Boston, Mass.—The Railroad Commission of Massachusetts has approved an issue of 4370 shares of additional stock by the Boston & Worcester Street Railway at $100 a share. The proceeds of 1580 shares are to pay floating debt; the proceeds of 370 shares, land damage; the proceeds of 1400 shares for permanent additions and 1020 shares for working capital. The company has also applied for permission to issue $360,000 of additional 4½ per cent bonds for improvements and to retire floating debt.

British Columbia Electric Railway, Vancouver, B. C.—A private underwriting prospectus issued in London recently offered holders of preferred and deferred stock of the British Columbia Electric Railway £530,000 of 4½ per cent perpetual consolidated debenture stock, ranking pari passu from March 31, 1910, with the existing £800,000 of 4¼ per cent perpetual consolidated debenture stock.

Chicago (Ill.) City Railway.—The Chicago City Railway has declared a quarterly dividend of 2½ per cent, payable on March 30, 1910, to stock of record on March 4, 1910. This dividend is the first for the fiscal year, and hereafter quarterly declarations will be at the same rate, or 10 per cent annually, without extra disbursements as heretofore. In 1909 four quarterly dividends of 1½ per cent each were declared and 4 per cent extra, making 10 per cent, as compared with 9 per cent for 1908.

Chicago (Ill.) Railways.—The report of the Chicago Railways for the year ended January 31, 1910, compares as follows with the report for the year ended January 31, 1909: Gross receipts for 1910, $12,438,052, as compared with $11,037,071 for 1909; expenses for 1910, $8,706,637, as compared with $7,725,966; net income for 1910, $3,731,415, as compared with $3,311,105 for 1909; interest for 1910, $2,275,718, as compared with $1,739,684 for 1909; surplus for 1910, $1,455,697, as compared with $1,571,421; city's 55 per cent for 1910, $800,633, as compared with $864,270 for 1909; company's 45 per cent for 1910, $655,064, as compared with $707,147 for 1909.

Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.—The Fort Wayne & Wabash Valley Traction Company has sold to Gavin L. Payne, Indianapolis, Ind., an issue of $100,000 of 5 per cent equipment notes dated March 1, 1910, and due $10,000 semi-annually to March, 1915, inclusive. The Fidelity Trust Company, Philadelphia, Pa., is trustee of the issue. The notes are secured by a first lien on 26 closed city passenger cars, four interurban cars,

which cost $11,000 each; two motor express cars and four double-truck trailers for interurban service. The total cost of the equipment was $135,800, of which $35,800 was paid in cash.

Lake Shore Electric Railway, Cleveland, Ohio.—The directors of the Lake Shore Electric Railway have asked the holders of the $3,000,000 of 5 per cent preferred stock of the company to deposit their stock with the Citizens' Savings & Trust Company, Cleveland, Ohio, for exchange for a new issue of $1,000,000 of 6 per cent cumulative preferred stock and $2,000,000 of 5 per cent non-cumulative preferred stock on the basis of one share of the new 6 per cent cumulative stock and two shares of the new 5 per cent non-cumulative stock for three shares of the original 5 per cent preferred stock. The $3,000,000 of 5 per cent preferred stock was issued in two lots of $1,500,000, with a year and a half intervening. About 7.083 per cent more is due in dividends on the first lot than on the later issue. This difference in the accumulation of dividends will be cared for by the payment of 7 per cent in new stock in the proportion of one-third in the 6 per cent cumulative and two-thirds in the 5 per cent preferred, or in the payment of 3½ per cent in cash if that is desired. About 75 per cent of the stock is owned by investors represented by the Everett-Moore interests.

Meadville & Conneaut Lake Traction Company, Meadville, Pa.—The sale of the property of the Meadville & Conneaut Lake Traction Company under foreclosure has been ordered for April 12, 1910. The company controls the Meadville Traction Company and the Meadville, Conneaut Lake & Linesville Railway and operates between Meadville, Harmonsburg and Linesville, a distance of about 30 miles.

Menominee & Marinette Light & Traction Company, Menominee, Mich.—The Railroad Commission of Wisconsin has authorized the Menominee & Marinette Light & Traction Company to issue $200,000 of 5 per cent bonds of the denomination of $1,000 and $500, dated March 1, 1910, and due March 1, 1925, to provide for the completion of the company's power development and the payment of outstanding floating debt.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—The Railroad Commission of Wisconsin has authorized the Milwaukee Electric Railway & Light Company to issue $1,000,000 of additional refunding and extension mortgage 4½ per cent bonds. The proceeds of the issue are to be used for extensions and improvements. This will make $7,728,000 of the issue outstanding.

Philadelphia (Pa.) Rapid Transit Company.—The Philadelphia Rapid Transit Company has arranged with Drexel & Company, Philadelphia, to purchase at par and interest the $250,000 of second mortgage 5 per cent bonds due on March 1, 1910, and extend them at 4 per cent till 1960 without the right of prior redemption.

Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y.—The property of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad will be sold under foreclosure on March 23, 1910, by Jos. P. Day, auctioneer, at 14 and 16 Vesey Street, New York. The upset price is $50,000.

Washington, Baltimore & Annapolis Electric Railway, Washington, D. C.—Judge Morris in the United States Circuit Court at Baltimore on Feb. 28, 1910, signed an order extending the time of the receivers of the Washington, Baltimore & Annapolis Railway 90 days to pay the coupons due on March 1, 1910, on the $1,703,000 of guaranteed 5 per cent bonds of the Baltimore Terminal Company.

The Washington (Ind.) Street Railway, operating three miles of line in Washington, suspended service on Feb. 28, 1910, on account of a disagreement with the City Council on the price to be paid for power furnished by the municipal light plant. The contract for power had expired. The company wanted power at 1¼ cents per kw, while the members of the Council were opposed to selling power for less than 3 cents per kw. Service was restored on March 3, 1910, pending an agreement between the city and the company

Traffic and Transportation

Increase in Wages in Roanoke

The Roanoke Railway & Electric Company, Roanoke, Va., increased the wages of its conductors and motormen in some instances 2 cents an hour on Feb. 1, 1910. The statement of the company concerning the increase was signed by J. W. Hancock, general manager, and is as follows:

"1. The following rates of pay for conductors and motormen will be in effect beginning Feb. 1, 1910: First year, 17 cents per hour; second year, 19 cents per hour; third year, 20 cents per hour; fourth year and thereafter, 21 cents per hour. For work on regular schedule cars on the Salem division, running through to Salem, and on extra cars running through to Salem on which fares are collected, 1 cent per hour in addition to the above schedule will be paid. This will not apply on chartered cars or extra cars to Fairview.

"2. Any employee or any number of employees who have a complaint will be given a hearing by the superintendent in accordance with the rules, and in the event that the action of the superintendent in reference to any complaint is deemed unsatisfactory, it may be referred to the general manager; and should the general manager find a suspended or dismissed employee not guilty of the offence for which he was suspended or dismissed he will be reinstated without deduction from his wages for the time lost by reason of such suspension or dismissal.

"3. Conductors and motormen will be provided with badges entitling them to transportation, and a reasonable amount of transportation will be given them for their immediate families upon proper request.

"4. Crews will be assigned to runs according to length of service, the men who have been longest in the service of the company being given preference, with regular runs as nearly 10 hours as possible, except on Sunday.

"5. Crews will be paid from the time they report for work under orders previously given until relieved, and when held on duty for emergency will be paid for the time so held, following the custom heretofore existing, and for not less than one hour unless relieved by request."

Order Regarding Service to Lake Park, Milwaukee

In the decision by the Railroad Commission of Wisconsin regarding service over the Lake Park line of the Milwaukee Electric Railway & Light Company it is held that no vested rights exist which may be urged by citizens to resist the discontinuance of street railway service on any line when the change would be more beneficial to the general public. The commission says in part:

"We do not believe that the testimony would warrant us in ordering such service for 12 months in the year. We think that an improved service from June 1 to September 30, inclusive, of each year, as long as the conditions remain as they are today, will meet the requirements; nor does it appear to us necessary to provide an additional direct line into Lake Park during all the hours of the day during which the street car system is being operated. We think that direct service over the Farwell Avenue line into the park between the hours of 9 a. m. and 9 p. m. will be sufficient to overcome the objections which have been raised in the testimony against the existing service. In other words, it must be inferred from the testimony that at least some of the residents of Prospect Hill believe that as property owners there they have a vested right in a certain part of the line of the street railway and the service furnished over that line. We doubt whether this position is well founded either in ethics or in law. Even a casual examination of the entire street railway system of Milwaukee shows quite conclusively that in many sections of the city inhabitants are obliged to walk greater distances than the residents of Prospect Hill in order to reach a street car line. If we should hold in this respect that the street railway service on Prospect Hill is inadequate we should by the same process of reasoning, be compelled to declare the street railway service furnished to many other sections of the

city of Milwaukee inadequate. There may be inadequacy of service in some sections of the city. At the present time we are not discussing that."

Bulletin on Courtesy

J. F. Roach, chief despatcher of the Oregon Water Power Division of the Portland Railway, Light & Power Company, Portland, Ore., who has been addressing a notice daily to the employees under his jurisdiction concerning some phase of their work issued substantially the following communication to the conductors recently.

"You are urged to be as courteous as possible to your passengers and persons asking for information, and you should use your best efforts to show your willingness to do this. Numerous cases could be quoted where a facetious or discourteous answer has been directly responsible for the adverse criticism of the company and its agents by parties seeking information. It is not fair to assume that every one is as fully acquainted with the various phases of operation as you are, and persons who ask what may appear to you a foolish question, generally do so because they are confused at the time and have not stopped to think. In cases of this kind, the conductor, above all persons, should be the one to assist them. He should make allowances for the shortcomings of those with whom he is thrown in contact daily, rather than hold them up to ridicule. Courteous attention should be given to cases of this kind and to those who are disposed to cause trouble. No matter how caustic or insinuating a remark may be, the person who utters it generally finds his match in the conductor who is civil. Civility is the best weapon that a conductor can use and it seldom misses the mark. While this is addressed to conductors on account of their coming into very close contact with the public, motormen will do well to follow the advice given."

Freight Rights Asked in Evansville.—The Evansville (Ind.) Terminal Railway has applied to the Board of Public Works of Evansville for permission to carry freight in Evansville.

West Penn Railways Resumes Trolley Talk.—The West Penn Railways, Connellsville, Pa., has resumed the publication of *Trolley Talk*, a four-page circular devoted to the interests of the company.

Service on the Oregon Electric Railway.—The Railroad Commission of Oregon has ordered an investigation of the accommodations provided passengers by the Oregon Electric Railway, Portland, Ore.

Fender Ordinance Passed in Roanoke.—The Common Council of Roanoke, Va., has adopted an ordinance requiring the Roanoke Railway & Electric Company to equip its cars with fenders by May 1, 1910.

Convention of the Southwestern Electrical & Gas Association.—The sixth annual convention of the Southwestern Electrical & Gas Association will be held in Beaumont, Texas, on May 12, 13 and 14, 1910.

Pay-as-You-Enter Cars in Cincinnati.—The Cincinnati (Ohio) Traction Company placed three pay-as-you-enter cars, built under license from the Pay-As-You-Enter Car Corporation, New York, N. Y., in operation on its lines on March 1, 1910. Others will follow.

Snow Cost in Boston.—Up to March 1, 1910, the snow expense of the Boston (Mass.) Elevated Railway for the winter of 1909-1910 was $170,000, or $145,000 more than the winter of 1908-1909. The snow expense for 1909-1910 is the heaviest since 1904-1905, when the expense was $190,104.

Conference with Employees of Connecticut Company.—Representatives of the employes of the Connecticut Company conferred in New Haven on March 3, 1910, with Calvert Townley, vice-president of the company, and J. K. Punderford, general manager, regarding the readjustment of the terms of service. Another conference will be held.

Toledo & Chicago Interurban Railway Increases Facilities.—The Toledo & Chicago Interurban Railway, Kendallville, Ind., is extending its telephone line to the interurban station in Ft. Wayne so that connections may be arranged for through passengers if cars of the initiating line are late. The company has increased its Saturday train service out of Indianapolis.

Buffalo & Lake Erie Traction Company Commutation Ticket.—The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., on March 30, 1910, will begin the sale of a 54-trip individual non-transferable ticket at the rate of 1 cent per mile or fraction thereof per trip. No ticket will be sold for a distance of less than 5 miles. This is a reduction over the regular rate of one quarter of a cent per mile.

Ticket Books in Poughkeepsie.—On March 28, 1910, the Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., will place on sale ticket books containing 15 tickets, for $1.00, each ticket good for one fare in either direction between any point within the 5-cent zone of the company and the Fulton Street station of the Central New England Railroad at Poughkeepsie. This is a reduction from the combination of local fares.

Freight Service Desired in Montreal.—The Montreal (Que.) Street Railway has asked the City Council of Montreal to grant the company a 10-year franchise for the transportation of freight in the city, provided the company pays the city 5 per cent of its gross annual earnings above $100,000 from the operation of the freight service. Freight cars would not be run between 5 p. m. and 7 p. m. The Board of Control has been asked to report to the Council on the matter.

Extension of New York Central Electric Service.—The New York Central & Hudson River Railroad has announced that service with electric trains will be begun over its Harlem division to White Plains on March 14, 1910. An advertisement of the company published in the daily newspapers recently which called attention to this feature of the company's service was reprinted in the Electric Railway Journal of Feb. 19, 1910, page 333. The new service will practically double the mileage served by the electrified lines of the company.

Advertising Department Office of Illinois Traction System in Peoria.—The advertising department of the Illinois Traction System, which has been located at Springfield, Ill., in the offices of the traffic department, has been moved to Peoria and the routine work consolidated with that of the department of publicity, located in the general offices of the Illinois Traction System and the Western Railways & Light Company. J. H. Ryan will continue his duties as advertising manager under the direction of the department of publicity, which is in charge of Fred G. Buffe.

Clubhouse for Subway and Elevated Employees in New York.—The Interborough Rapid Transit Company, New York, N. Y., opened on March 2, 1910, at the Bronx Park terminal of its elevated lines the first of six clubhouses which are being built for the exclusive use of its employees at the terminals of the subway and elevated lines. Each of the houses is being fitted with shower baths, kitchens, billiard and pool tables and a library. Good, wholesome food will be served to the men at cost. The directors of the company set aside $50,000 for building and equipping the clubhouses, and August Belmont, chairman of the board of directors of the company, gave $10,000, which will be used for special furnishings, newspapers and periodicals.

Unsanitary Cars Caused by Thoughtless Passengers.—T. F. Grover, general manager of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has asked the State Board of Health to assist that company in a crusade against unsanitary cars. In a letter to the board Mr. Grover stated that the patrons of the company were largely responsible for the unsightly and unsanitary condition of many cars and assured the board that the company would be glad to accept any recommendation that would tend to improve these conditions. Secretary Hurty of the board thought Mr. Grover's attitude a commendable one. According to Mr. Hurty the board will take the matter up with railways with a view to adopting measures to restrain passengers from abusing the privileges which they now enjoy.

Interchangeable Coupon Ticket Books on the Buffalo, Lockport & Rochester Railway.—On February 22, 1910, the

Buffalo, Lockport & Rochester Railway, Rochester, N. Y., with the approval of the Public Service Commission of the Second District of New York, placed on sale at $10 each interchangeable coupon ticket books containing transportation of a face value of $12, good for the passage of the purchaser and family for one year from the date of sale between all local stations on the Buffalo, Lockport & Rochester Railway and over the lines of other electric railways as specified in the tariff. Local mileage books are to be sold at the following prices: for books of 300 miles, not heretofore sold, $5; for books of 500 miles, $8.33, a reduction of $1.66; for books of 1000 miles, $16.66, a reduction of $3.34.

Near Car-Stop Rule in Chicago.—The railway and police officials in Chicago are reported to have decided on a traffic zone bounded by Halsted Street on the west, Chicago Avenue on the north, Lake Michigan on the east and Twelfth Street on the south inside of which, beginning on April 1, 1910, street cars will stop on the near side of the street. On corners where cars pass around curves, however, they will be permitted to stop at the far end of the curve at the request of the railway officials. It is expected that the near-crossing rule will aid in relieving congestion in the business district, as the cars will be required to make only one stop at street intersections. Preliminary arrangements for this change in operation were made in December, 1909, but the date of inaugurating the plan was postponed until April 1, 1910, so as to avoid the holiday congestion and any inconvenience which snow-covered streets might cause.

New Folders of the Terre Haute, Indianapolis & Eastern Traction Company.—Two folders of similar typographical design have just been issued by the Terre Haute, Indianapolis & Eastern Traction Company. One contains a list of 300 towns and cities in Indiana, Ohio and Illinois, between which express service is offered at freight rates. The freight pamphlet contains a map of the system and an excellent illustration of a large express car. The passenger pamphlet contains an alphabetically arranged list of 425 passenger stations in Ohio, Indiana and Illinois reached by the railway; an illustration of one of the 62-ft. limited passenger cars; an announcement of special and chartered cars; the connections with intersecting steam railroads and a map of the system. It is stated that passengers can secure through tickets at all principal stations to points reached by electric railways in Indiana, Ohio, Kentucky and Illinois. The Central Electric Traffic Association 1000-mile book, good over interurban railways in Ohio and Indiana which operate more than 2000 miles of line, is accepted by the Terre Haute, Indianapolis & Eastern Traction Company on its limited trains.

Service in the New York Subway.—Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, submitted a plan for improvement of the express service in the subway which may be substituted for the order issued by the commission on Feb. 18, 1910, and published in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910, page 356. The plan went into effect on March 8, and will be continued until March 17. The commission has suspended its order until that time, when Mr. Hedley's plan will be substituted if it has proved satisfactory. The order required the operation of both express and local trains at maximum capacity during the rush hours, and at two-minute headway during the rest of the day, except after 8:30 at night, when a three-minute headway was to be allowed. The schedule proposed by Mr. Hedley follows: From 7 a. m. to 10 a. m., headway of 1 min. and 48 sec.; from 10 a. m. to 10:30 a. m., headway of 2 min.; from 10:30 a. m. to 2:53 p. m., headway of 2½ min.; from 2:56 p. m. to 3:40 p. m., headway of 2 min.; from 3:40 p. m. to 6:10 p. m., headway of 1 min and 48 sec.; from 6:10 p. m. to 6:40 p. m., headway of 2 min.; from 6:40 p. m. to 12 o'clock midnight, headway of 3 min. Between the hours of 10:30 a. m. and 2:56 p. m., under the 2½-min. headway, the company proposes to run eight-car trains on the Lenox Avenue branch and five or six-car trains on the Broadway branch. The schedule of the local trains of the company will not be changed until a thorough trial has been had under the new plan which has gone into effect on the express lines of the company.

Personal Mention

Mr. S. P. Bradshaw, master mechanic of the Berkshire Street Railway, Pittsfield, Mass., has also been appointed master mechanic of the Pittsfield Electric Street Railway.

Mr. Alexander Shaw, one of the superintendents of the Berkshire Street Railway, Pittsfield, Mass., has also been appointed superintendent of the Pittsfield Electric Street Railway.

Mr. J. C. Elberson, formerly chief engineer of the Philadelphia & Western Railway, Philadelphia, Pa., has become connected with the sales department of the Electric Storage Battery Company, Philadelphia, Pa.

Mr. H. S. Kneedler, who for five years was in charge of the publicity department of the Pacific Electric Railway, Los Angeles, Cal., has been appointed secretary of the Commercial Club, of Caldwell, Idaho.

Mr. Gustaf Holmgren, formerly chief engineer of the alternating-current department of the All. Svenska Elektriska Aktiebolaget (Swedish General Electric Company) at Westeros, Sweden, is on a visit to the United States.

Mr. J. B. Crawford has resigned as superintendent and purchasing agent of the Winona Interurban Railway, Warsaw, Ind. Mr. Crawford will reside in Warsaw for the present, but has not yet announced his plans for the future.

Mr. John C. Parker, mechanical and electrical engineer of the Rochester Railway & Light Company, Rochester, N. Y., has been appointed non-resident lecturer on electric power transmission at the University of Michigan, Ann Arbor, Mich.

Mr. C. B. Baker, who has been connected with the Western Ohio Railway, Lima, Ohio, for some time, has been appointed auditor of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, to fill the vacancy caused by the death of W. I. McClure.

Mr. Clyde J. Furlong, for three years car house foreman of the Detroit, Jackson & Chicago Railway at Ypsilanti, Mich., has been appointed division superintendent of the Detroit (Mich.) United Railways, with headquarters at Flint, to succeed Mr. George Ferguson, resigned.

Mr. Waldo G. Paine, second vice president and traffic manager of the Spokane & Inland Empire Railroad, Spokane, Wash., has been elected president of the Spokane Transportation Club, recently organized by representatives of steam and electric railways doing business in Spokane to promote sociability among the officials of the companies.

Mr. D. Van Dermei, who has been employed with the Illinois Traction System, Peoria, Ill., as superintendent of overhead lines for the last six years, has resigned from the company to become superintendent of the electrical department of the Muskogee Gas & Electric Company, Muskogee, Okla. Mr. Van Dermei was formerly connected with the Kalamazoo Valley Electric Company.

Mr. C. Nelson Ryan, who has been assistant secretary and assistant treasurer of the Eastern Pennsylvania Railways, Pottsville, Pa., for two years, has accepted the position of auditor of the Albany & Southern Railroad, with headquarters at Albany, N. Y. Prior to his connection with the Eastern Pennsylvania Railways Mr. Ryan was traveling auditor for J. G. White & Company, Inc., of New York, N. Y. His associates at Pottsville presented him a handsomely engraved gold watch as a token of their esteem.

Mr. Thomas A. Leach, whose appointment as superintendent of employment and inspection of the Worcester (Mass.) Consolidated Street Railway was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 19, 1910, began his railway career as a switchboy on the Metropolitan Street Railway in Boston in 1869. He subsequently became a starter, and in 1881 and 1882 served as inspector. From 1884 to 1887 Mr. Leach was connected with the South Boston Railway and the Highland Railway. In July, 1887, he became connected with the street railways in Worcester under Mr. J. N. Akarman, superintendent. He was subsequently appointed inspector of the Worcester Consolidated Street Railway and, when Mr. R. T. Laffin was general manager of the company, he was appointed superintendent of Division 1 of the company.

Mr. H. B. Kamschulte has resigned as engineer of way of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to become associated with Mr. G. Pickhardt in the Kamschulte-Pickhardt Engineering & Construction Company, Milwaukee, Wis. Mr. Kamschulte was connected with the Milwaukee Electric Railway & Light Company more than 10 years, and located all the lines of the company. Mr. Pickhardt was also connected with the Milwaukee Electric Railway & Light Company, and assisted in building the Milwaukee Western Electric Railway, now under construction from Beaver Dam to Milwaukee, and also helped to electrify and extend the Salt Lake & Ogden Railway. Mr. Kamschulte is president of the Kamschulte-Pickhardt Engineering & Construction Company, and Mr. Pickhardt is secretary-treasurer of the company.

Mr. C. Ernest Calder, chief clerk of the Eastern Pennsylvania Railways, Pottsville, Pa., for the last two years, has been elected assistant secretary and treasurer of the company to fill the vacancy created by the resignation of Mr. C. N. Ryan, who has accepted the position of auditor of the Albany Southern Railroad, Hudson, N. Y. Mr. Calder's railway experience covers a period of more than eight years. In 1902 he was employed in the construction department of the Choctaw, Oklahoma & Gulf Railway, with headquarters at Little Rock, Ark. He resigned this position to become revision clerk with the Cincinnati, Hamilton & Dayton Railroad and the Pere Marquette Railway at Cincinnati, Ohio. After serving in that capacity for two years he resigned to accept the position of assistant cashier for the J. G. White Construction Company, which had charge of the extensive construction work for the Tri-City Railway & Light Company, Davenport, Ia. In 1906 he was appointed cost analysis engineer by the J. G. White Construction Company, and in 1907 resigned to accept the position of chief clerk of the Eastern Pennsylvania Railways. Mr. Calder was instrumental in introducing many new and important features in the accounting department of the company, and in recognition of his valuable services was elected assistant secretary and treasurer.

Mr. George L. Radcliffe, whose appointment as superintendent of the Cleveland (Ohio) Railway to succeed Mr. W. T. Cook was announced in the Electric Railway Journal of March 5, 1910, has been superintendent of the Schenectady (N. Y.) Railway since July 18, 1908. Mr. Radcliffe, however, for many years was general superintendent of the Cleveland (Ohio) Electric Railway, and accepted the appointment to the Schenectady Railway following the turning over of the management of the lines in Cleveland to the Municipal Traction Company. Mr. Radcliffe first served as a clerk under Mr. J. J. Stanley with the Broadway & Newburg Railway, in Cleveland. He was advanced gradually in the service and finally became superintendent of the Cleveland Electric Railway. When Mr. H. A. Everett and his associates secured control of the company, Mr. Radcliffe became connected with one of the companies which now is part of the Utica & Mohawk Valley Railway and remained in Utica for three years. Following the embarassment of the Everett-Moore syndicate and the taking over of the Cleveland Electric Railway by Mr. Horace E. Andrews and Mr. J. J. Stanley, Mr. Radcliffe returned to the company as superintendent. After the consolidation of the Cleveland City Railway and the Cleveland Electric Railway, Mr. Radcliffe became general superintendent of the consolidated system, controlling all the lines in the city.



G. L. Radcliffe

Mr. E. B. Kirk has resigned as general manager and purchasing agent of the Atlantic Shore Line Railway, Kennebunkport, Maine, and sailed for London, Eng., on the *Kaiser Wilhelm der Grosse* on March 8, 1910, to become connected with the operating department of J. G. White & Company, Inc., in charge of their railway and electric light properties at Para and Manaos, Brazil. Mr. Kirk was born in Chicago, Ill., on Aug. 29, 1874, and was graduated from Purdee University, Lafayette, Ill., in 1897 with the degree of electrical engineer. In July, 1897, he took charge of a small lighting station at the State Hospital, Jacksonville Ill., and in July, 1898, he entered the service of the Jacksonville (Ill.) Railway as working foreman in the repair shop. In January, 1899, Mr. Kirk was made superintendent of the Jacksonville Railway. He next entered the commercial field as engineer of tests of the Milwaukee Electric Company, but in October, 1903, he became electrical engineer and master mechanic of the Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., in charge of the power house, substations and repair shops. In December, 1904, Mr. Kirk was appointed vice-president and general manager of the Winnebago Traction Company, Oshkosh, Wis. In July, 1907, Mr. Kirk was appointed general manager of the Sterling, Dixon & Eastern Railway and the Lee County Light Company. He remained with these companies until March, 1908, when he accepted the position of general manager of the Atlantic Shore Line Railway, operating 95 miles of electric railway in Southern Maine.

OBITUARY

Allen P. Scovill, for 40 years connected with the Alton, Granite & St. Louis Traction Company, and the East St. Louis & Suburban Railway, East St. Louis, Ill., is dead. For the last 10 years Mr. Scovill had charge of the construction and reconstruction work on the company's lines.

Albert Stetson, who with James N. Stetson, his cousin, controlled the California Street Cable Railroad, San Francisco, Cal., is dead. Mr. Stetson was born in Kingston, Mass., in 1834, and was graduated from Harvard. Among his associates were Ralph Waldo Emerson, Oliver Wendell Holmes and Horace Mann.

Lazarus F. Minzesheimer, attorney for the Chicago (Ill.) City Railway, died on March 2, 1910, following an operation for the removal of a tumor. Mr. Minzesheimer was born in New York in 1861. Early in his career he was connected with Judge Julius S. Grinnell, and in 1887, was associated with Mr. Lazarus Silverman in the banking business. During the negotiations for the rehabilitation franchises for the street railways in Chicago in 1907 Mr. Minzesheimer took an important part in the deliberations before the local transportation committee of the Chicago City Council and is credited with having made many suggestions which led to the completion of the final franchises.

NEW PUBLICATIONS

Kalender für Betriebsbeamte Elektrischer Bahnen (The Electric Railway Operator's Annual). By Arthur Ertel. Published in Hanover, Germany, by Dr. Max Jänecke; 168 pages; illustrated. Price in paper covers 4.20 marks ($1.05), and in cloth, 5 marks ($1.20).

Engineering annuals are very popular in Germany, but this appears to be the only one prepared for railway managers. The idea of the author is to give illustrated descriptions of the principal apparatus in each department, together with digests of operating rules, legal regulations, transportation methods, etc., and a diary to cover entries for one year. The book is revised annually. In general, the text is very readable although rather elementary from the standpoint of the experienced operator.

Metal Statistics for 1910. New York: The American Metal Market Company. Cloth, 175 pages.

This is the third annual edition of this work, which is a compilation of reliable statistics relating to the production, consumption and price movements of iron and steel, copper, tin, spelter, lead, antimony and other metals. The iron and steel statistics cover 50 pages, and give a wide range of useful information concerning iron ore, pig iron and also the various finished steel products. Owing to the special interest that has been taken in the copper market during the past year, the section devoted to copper statistics has been considerably enlarged, and in it are presented all the more important facts relating to this metal. The tables are so arranged that comparisons can be made over a period of 25 years. The other metals are treated with space commensurate with their importance, and several diagrams of price fluctuations are given.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Illinois Oil & Coal Belt Railway, McLeansboro, Ill.**—Incorporated in Illinois to build a 190-mile electric railway to connect Terre Haute, Ind., Robinson, Olney, Fairfield, McLeansboro and Cairo, Ill. Capital stock, $1,000,000. Headquarters, McLeansboro. Officers: J. R. Campbell, McLeansboro, president; Joseph W. Crowley, Robinson, vice-president; Isaac H. Webb, McLeansboro, secretary; J. H. Lane, McLeansboro, treasurer; Allen G. Russell, Chicago, chief engineer.

***Springfield (Ill.) Traction Company.**—Incorporated in Illinois to build an electric railway from Springfield to Vandalia via Pawnee, Harvel and Hillsboro. Capital stock, $10,000. Headquarters: 402 Booth Building, Springfield. Incorporators: C. E. Hazelett, Rochester, president and general manager; Ernest H. Helmle, A. M. Fitzgerald, George B. Gillespie and Dixon Grant, Springfield.

***Oklahoma-Kansas Railway, Baxter Springs, Kan.**—Incorporated in Kansas to build a 23-mile electric railway from Galena, Kan., to Hattonville, Okla., via Baxter Springs. Capital stock, $2,000,000. Incorporators: Dr. Charles M. Jones, E. B. Morgan, M. C. Harper and Charles L. Smith.

Louisville, Lincoln Farm & Mammoth Cave Traction Company, Glasgow, Ky.—Incorporated in Arizona to build a 50-mile electric railway between Hodgenville and Glasgow, Ky. Incorporators: L. W. Preston, J. C. Preston, J. A. McDaniel, J. F. Taylor and J. L. Williams. [E. R. J., Jan. 29, '10.]

Eastern Oklahoma Traction Company, Muskogee, Okla.—Incorporated in Oklahoma to build an electric railway from Muskogee to Tulsa, 48 miles; a branch to Wagoner, 9 miles; from Wagoner to the Grand River, 10 miles; Tulsa to Sapulpa, 14 miles; Muskogee to Webber's Falls, 23 miles; Muskogee to Checotah, 21 miles; Muskogee to Okmulgee, 39 miles; Okmulgee to Oklahoma City, 87 miles. Total, 251 miles. Capital stock, $100,000. Headquarters, Muskogee. Directors: H. B. Spaulding, R. N. Eggleston, J. W. Mattox, L. B. Kershaw, W. L. Tull, J. B. Furry and Guy Bowman, Muskogee. An auxiliary company, to be known as the Railway Construction Company, was also chartered. Capital stock, $50,000. Headquarters, Muskogee. Directors: R. N. Eggleston, W. R. Robinson, L. R. Kershaw and J. B. Furry, Muskogee, and W. P. Keegan, Tulsa. [E. R. J., Jan. 29, '10.]

***Montreal Underground & Elevated Railway, Montreal, Que.**—Application for a charter has been made by this company to build and operate, by electricity or other motive power, underground and elevated railways through the city and island of Montreal. Capital stock, $20,000,000. A number of Canadian and American capitalists are said to be back of the scheme. This company will absorb the Montreal Street Railway, Montreal Light, Heat & Power Company and the Shawinigan Light & Power Company, all of which are operating in Montreal. T. B. Butler is attorney for the applicants.

***Brownwood Southwestern Railway, Brownwood, Tex.**—Chartered to build a 30-mile railway from Brownwood through Brown and Coleman Counties to a point 4 miles north of Colorado River. Capital stock, $30,000. Headquarters, Brownwood. Incorporators: R. A. Love, Kansas City, Mo.; H. T. Love, Brooke Smith, B. E. Hurlbert, D. F. Johnson, Brownwood; J. C. Kerby, John L. Smith, A. J. Eilers, Louis Davis and F. M. Covert, Austin.

***Fairmont & Pittsburgh Railway, Fairmont, W. Va.**—Incorporated in West Virginia to construct an electric railway from Fairmont to Blacksville, Waynesburg and Pittsburgh; also a line from Fairmont to Mannington, Blacksville, Morgantown and along the Monongahela River back to Fairmont. Capital stock, $1,000,000. Incorporators: William M. Laws, Jersey City, N. J.; H. F. Smith, J. R. Linn, S. E. Miller, Fairmont, and J. F. Beatty, Mannington.

FRANCHISES

***Los Angeles, Cal.**—The City Council granted a franchise to Messrs. Edwards & Willey for $100 to build a street railway on Melrose Avenue, Los Angeles.

Lewiston, Idaho.—M. A. Means, president of the Lewiston Terminal Company, has again applied to the Council for a franchise to operate cars over the tracks which were constructed in Lewiston last year by the company. [E. R. J., Aug. 7, '09.]

Bryant, Ind.—The Town Board has granted a franchise to the Fort Wayne & Springfield Railway, Decatur, to build an electric railway in Bryant. This completes the necessary franchises for the proposed railway between Decatur and Portland. Construction work will begin early in the spring.

Covington, Ky.—The Covington & Big Bone Traction Company has applied to the Board of Aldermen for a perpetual franchise to build an electric railway in Covington. This is part of a plan to build a 22-mile line from Covington to Big Bone Springs. [E. R. J., Dec. 4, '09.]

Saginaw, Mich.—The Common Council has granted a 13-year franchise to the Saginaw Valley Traction Company for the construction of a loop in the downtown district. This franchise expires in 1923 with the rest of the franchises of the company.

Fremont, Neb.—The City Council has granted a franchise to the Nebraska Transportation Company, Omaha, to build an electric railway in Fremont. The proposed railway is to connect Fremont and Omaha. The franchise calls for the completion of the line in 1912. C. W. Baker, president. [E. R. J., March 5, '10.]

Brooklyn, N. Y.—The Board of Estimate on March 4 voted to grant a franchise to the Manhattan Bridge Three-Cent Line, Brooklyn, to operate cars across the Manhattan Bridge from the terminal of the Long Island Railroad at Flatbush Avenue and Atlantic Avenue, Brooklyn, to the foot of Canal Street, on the North River. John C. Brackenridge, vice-president. [E. R. J., Feb. 5, '10.]

New York, N. Y.—Application will be made to the Board of Estimate and Apportionment on March 18 by the Interborough Rapid Transit Company, the Bronx Traction Company and the Union Railway for franchises to build several extensions in Manhattan and the Bronx. The Interborough Rapid Transit Company plans to build two extensions, one in the Hunt's Point section and the other from Intervale Avenue, on Dougan Street, to Washington Avenue. The Bronx Traction Company plans to build several extensions and the Union Railway will construct a double-track extension from the intersection of Southern Boulevard and Pelham Avenue to the Eastern Boulevard.

Columbus, Ohio.—The County Commissioners have granted to the Ohio & Southern Traction Company a 20-year franchise to build a 2½-mile extension from Hartmann Farm to Shadeville.

***Brownsville, Tex.**—B. G. Stegman and associates have applied for a 30-year franchise to operate an electric railway over the principal streets in Brownsville.

Provo, Utah.—The City Council has granted a 100-year franchise to Jesse Knight to build an electric railway over some of the principal streets in Provo. With the exception of Springville, all franchises have now been secured to build the projected railway through Utah County. [E. R. J., March 5, '10.]

Morgantown, W. Va.—H. R. Warfield will apply to the County Court on April 4 for a franchise to extend the Sabraton Railway, Morgantown, from its present terminus to the State line near Cheat Haven and there connect with the McKeesport Belt Line Street Railway, thus giving a trolley connection between Morgantown and Pittsburgh.

Wellsburg, W. Va.—Application for a franchise will be made on March 16 to the City Council by the Wellsburg, Bethany & Washington Railway, Wellsburg, for the right to extend its electric railway in Wellsburg. Jos. West, general manager. [E. R. J., April 2, '09.]

TRACK AND ROADWAY

Fort Smith & Interurban Railway, Fort Smith, Ark.—This company advises that construction will soon begin on

the proposed 25-mile electric railway between Fort Smith, Bonanza, Jenny Lind and Greenwood. George Sengel, Fort Smith, president, and Jerome Sengel, secretary and treasurer. [E. R. J., Feb. 29, '10.]

Pacific Electric Railway, Los Angeles, Cal.—This company has secured the right-of-way for a 6-mile extension of its La Habra line from the present terminus at Pillsbury via Olinda to Riverside. Construction will start at once.

Modesto (Cal.) Interurban Railway.—Work has been started on this 4-mile railway which will connect Modesto with the main line of the Atchison, Topeka & Santa Fé Railroad. The Modesto Interurban Railway was financed entirely by local capital, and the promoters are now considering the extension of the railway west to Newman and east to Waterford, Oakdale, La Grange and other towns in the eastern part of Stanislaus County. W. A. Cooper, 1370 Franklin Street, Oakland, chief engineer.

Southern Pacific Company, San Francisco, Cal.—Press report states that this company will soon extend its Alameda electric service to Elmhurst and Melrose over the old right-of-way through Bay Farm Island, joining the mainland in Eden Township and connecting with the main line at either Melrose or Elmhurst.

Norwich, Colchester & Hartford Traction Company, Norwich, Conn.—It is reported that the directors of this company have decided to start work about April 1 on the proposed 40-mile electric railway which will connect Hartford and Norwich. Construction will begin at the Hartford end of the line. Nearly all of the $300,000 has been subscribed. [E. R. J., Jan. 29, '10.]

Fitzgerald & Ocilla Electric Railway & Power Company, Fitzgerald, Ga.—This company has begun work in Fitzgerald on its 12-mile electric railway between Fitzgerald and Ocilla. C. A. Holtzendorf, Fitzgerald, general manager. [E. R. J., May 22, '09.]

La Grange, Ga.—C. M. Awtrey, La Grange, confirms the report that he and associates have been granted a street railway franchise in La Grange and states that this is only a preliminary step in the plans the promoters have in view. Application will be made for a charter as soon as a company is organized.

Chicago, Bloomington & Peoria Railway, Chicago, Ill.—It is stated that surveys have been completed and most of the right-of-way purchased by this company for its projected electric railway from Chicago to Bloomington and Peoria. [E. R. J., Jan. 15, '10.]

Evansville (Ind.) Railways.—This company is actively interested in a plan to build a combination highway and railroad bridge across the Ohio River at Evansville. If the bridge is built the company will probably construct an electric railway across the bridge to Henderson and Owensboro, Ky. The present plan is to organize a company to build the bridge in which the county would take 1 per cent cent of the stock and hold preferred stock for its contribution. If the county votes against the project, the chances are that the bridge will not be built.

Evansville & Eastern Railway, Evansville, Ind.—This company has completed plans for the extension of its electric railway from Rockport to Grandview, a distance of 6 miles. [E. R. J., Sept. 12, '09.]

Kokomo, Frankfort & Terre Haute Traction Company, Frankfort, Ind.—Oliver Gard, J. V. Kent, M. B. Thrasher and Albert Alter, of this company, who owned franchises in Frankfort and Kokomo and 80 per cent of the right-of-way for the proposed electric railway between the two cities have sold their interest to Judge Kirkpatrick and J. C. Reynolds, Kokomo, George Marott, Indianapolis, and Messrs. Carter and Hall, Marion. [E. R. J., Feb. 6, '09.]

Iowa City, Ottumwa & Southwestern Electric Railway, Iowa City, Iowa.—This company is said to have partly secured funds for building its proposed 74-mile electric railway between Iowa City and Ottumwa via Sharon Center, Frytown, Amish, Wellman, Keota and Ollie. Surveys have been made and most of the right-of-way has been obtained, Frank Tanner, Iowa City, vice-president and general manager. [E. R. J., Dec. 18, '09.]

Lansing & Northeastern Electric Railway, Lansing, Mich.—This company has awarded the contract for building the proposed 25-mile electric railway from Owosso to Lansing to W. E. Tench & Company, 210 John R. Street, Detroit. Headquarters have been established in Morrice. This new line between Owosso and Lansing will be virtually an extension of the Michigan United Railways, Lansing. [E. R. J., March 5, '10.]

Duluth (Minn.) Street Railway.—This company announces that it plans to make several improvements to its West End lines this year. The Piedmont Avenue extension will be built and Garfield Avenue tracks will be relaid from the viaduct to interstate bridge. Herbert Warren, Duluth, general manager.

Kansas City, Lawrence & Topeka Electric Railway, Kansas City, Mo.—This company has obtained an order from the Commissioners of Johnson County for a condemnation of a right-of-way from its present terminus at Shawnee to Zarah, 6 miles west. Work will be started as soon as the weather permits.

Montana Rapid Transit Company, Helena, Mont.—Press reports state that this company has been successfully financed and that early in the spring work will be commenced on the 75-mile electric railway between Helena and Butte via Jefferson City, Corbin, Wickes and Amazon. The route will be over the old grade of the Northern Pacific Railroad. Power will be obtained from the United Missouri River Power Company. Jos. K. Toole, president. [E. R. J., June 5, '09.]

Whitefish & Polson Electric Railway, Kalispell, Mont.—This company has completed its surveys for its projected electric railway from Kalispell to Whitefish. [E. R. J., Feb. 19, '10.]

Long Island Railroad, Long Island City, N. Y.—This company has secured all property necessary for double-tracking its North Shore division from Winfield Junction to Port Washington. Engineers who have charge of the electrification and double-tracking have finished the profiles and maps and contracts for grading have been awarded to the John F. Dolan Contracting Company.

Isothermal Traction Company, Rutherfordton, N. C.—This company, which proposes to construct a 50-mile electric railway from Rutherfordton to Gastonia, has effected a permanent organization by the election of the following officers: K. S. Finch, president and general manager; John C. Mills, vice-president; J. F. Flack, secretary and treasurer. Other promoters are W. H. Harrill, E. B. Harris, C. F. Geer and Dr. Young. [E. R. J., March 5, '10.]

Ohio Electric Railway, Cincinnati, Ohio.—Negotiations are under way for a franchise in Dayton which will make possible the reconstruction of the interurban tracks of the Ohio Electric Railway on South Main Street. This route now serves the factory of the National Cash Register Company, but only with the regular interurban schedule. It is proposed to provide for a 10-minute local service in addition to the interurban cars. The reconstructed tracks also will lead to a flat-iron shaped property on which the Ohio Electric Railway Company soon will build a freight terminal.

Ohio & Southern Traction Company, Columbus, Ohio.—This company has filed amended articles of incorporation to permit the building of an electric railway in Franklin County from intersection of Columbus and Chillicothe Pike south 6.82 miles to Lockbourne Road.

Dayton & Troy Electric Railway, Dayton, Ohio.—This company, it is said, contemplates extensive improvements on its right-of-way. The work is to include the eliminating of several sharp curves, reballasting of a considerable amount of track and the overhauling of overhead construction.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company has obtained the approval of the Railway Commission for the route of its projected electric railway from Welland to Bridgeburg via Port Colborne. Construction has begun between Welland and Port Colborne. When this line is completed the company will have a through line from Port Dalhousie on Lake Ontario to the Niagara River.

Johnstown & Altoona Railway, Johnstown, Pa.—Negotiations are in progress whereby this company may effect

an agreement with the Southern Cambria Railway, Johnstown, to run its cars into Johnstown over the latter company's tracks. Wallace Sherbine, Wilmore, president. [E. R. J., Feb. 19, '10.]

New Wilmington & New Castle Railway, New Castle, Pa.—Promoters of this company have been notified that J. G. White & Company, New York, N. Y., will provide $500,000 of the amount necessary to construct and equip this proposed electric railway from New Castle to West Middlesex, via New Wilmington, provided the remaining $130,000 will be taken by local capitalists. About $300,000 has been issued in preferred stock, and $300,000 will be issued in bonds.

West Penn Railways, Pittsburgh, Pa.—This company is reported to have completed plans for building a 10-mile extension from Greensburg to Latrobe via Jamison. W. E. Moore, Connellsville, general manager.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—This company advises that it will soon place contracts for building 4 miles of track. P. H. Gadsden, Charleston, president.

La Crosse & Winona Traction Company, La Crosse, Wis.—It is stated that this company will expend about $30,000 in double-tracking some sections of its lines in La Crosse. [E. R. J., Dec. 25, '09.]

SHOPS AND BUILDINGS

Phœnix (Ariz.) Railway.—This company is rebuilding its car house at Phœnix, which was recently destroyed by fire. The new structure will be of the same general type as the old one, but larger and with more modern arrangements. It is to be built of wood and corrugated iron. S. H. Mitchell, Phœnix, superintendent. [E. R. J., Feb. 19, '10.]

Pacific Electric Railway, Los Angeles, Cal.—Plans are now being prepared by this company for the erection of a three-story concrete and steel station to be built on the Oxford property of the company in Los Angeles. [E. R. J., March 1, '10.]

North Carolina Public Service Company, Greensboro, N. C.—This company has purchased a tract of land on South Main Street, High Point, on which it expects to build a car house. J. K. Russell, Greensboro, manager.

Cincinnati (Ohio) Traction Company.—This company has recently purchased 7 acres of land as an addition to its 5-acre Winton Place. Repair shops and storage houses will be built so that part of the buildings now occupied by the company can be used by the Cincinnati Car Company, which proposes practically to double its facilities.

POWER HOUSES AND SUBSTATIONS

Brooklyn (N. Y.) Rapid Transit Company.—This company has asked for bids for about 9000-kw equipment in rotaries and transformers for use in its substations. It is probable that the contract for this apparatus will be let before the end of the present month.

Toledo Railways & Light Company, Toledo, Ohio.—It is announced that this company has decided to build and equip a new power house at a cost of about $300,000.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—It is stated that this company is considering plans to double the size of its power plant at Waynesboro, and to build a substation on the mountain similar to the one now in use at Marion. R. D. Sefton, Waynesboro, general manager.

Winchester & Washington Railway, Winchester, Va.—This company has awarded a contract to Henry S. Rippel, 1-7 Clay Street, Baltimore, Md., for the construction of a steam-power plant in Winchester. P. O. Keilholtz, Continental Building, Baltimore, Md., engineer. [E. R. J., Jan. 1, '10.]

Chippewa Valley Railway Light & Power Company, Eau Claire, Wis.—This company has ordered from the Allis-Chalmers Company, Milwaukee, the complete hydraulic equipment for its Red Cedar plant, comprising one 3600-hp generator operating under 48-ft. head and placed in a hollow dam of the Ambursen Hydraulic Construction Company's build, with complete hydraulic governor and 170-hp exciter unit, also head gates, trash racks, etc., for the plant. [E. R. J., Jan. 29, '10.]

Manufactures & Supplies

ROLLING STOCK

Danbury & Bethel Street Railway, Danbury, Conn., is in the market for two cars.

Scranton (Pa.) Railway will probably purchase 10 or 20 new cars in the near future.

Pittsburgh (Pa.) Railways is reported to be receiving bids on 150 double-truck city cars.

Roanoke Railway & Electric Company, Roanoke, Va., is in the market for four interurban cars.

Fitchburg & Leominster Street Railway, Fitchburg, Mass., is reported to contemplate the purchase of two cars.

Washington Railway & Electric Railway, Washington, D. C., is reported to be in the market for several baggage cars.

Public Service Railway, Newark, N. J., has ordered 10 class 70-18 A motor trucks from the Baldwin Locomotive Works.

Jersey Central Traction Company, Keyport, N. J., has ordered four double-truck, semi-convertible cars from The J. G. Brill Company.

Houghton (Mich.) County Traction Company has purchased two cars from the G. C. Kuhlman Car Company through Stone & Webster.

Morris County Traction Company, Morristown, N. J., has ordered six large interurban cars from MacGovern, Archer & Company, New York, N. Y.

Great Falls (Mont.) Street Railway has ordered two 10-bench, open cars and two 20-ft. closed cars from the American Car Company for May 1, 1910, delivery.

Rhode Island Company, Providence, R. I., has purchased 31 15-bench, open cars from the Bradley Car Works, Worcester, Mass. Standard type O-50 trucks have been ordered for use under these cars.

Athens (Ga.) Electric Railway, reported in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1909, as expecting to be in the market for three or four cars, has ordered six cars. Three of these cars will be built by the American Car Company.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., has ordered five cars to be equipped with Consolidated heaters and to be duplicates of the five cars ordered in June, 1909, from the McGuire-Cummings Manufacturing Company.

Puget Sound Electric Railway, Tacoma, Wash., has ordered two cars from the Cincinnati Car Company, Cincinnati, Ohio, through Stone & Webster. Mention of this contemplated purchase was made in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910.

Houston (Tex.) Electric Company, reported in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910, as contemplating the purchase of some cars through the Stone & Webster Engineering Corporation, has placed an order for 15 cars with the American Car Company.

Worcester (Mass.) Consolidated Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 29, 1910, as being in the market for 10 12-bench, open cars, has ordered 15 cars from the Bradley Car Works, Worcester, Mass., to be mounted on Standard type O-50 trucks.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C., chronicled in the ELECTRIC RAILWAY JOURNAL of Dec. 11, 1909, as having ordered four 20-ft. 8-in. cars from The J. G. Brill Company, has also purchased four double-truck cars from the same car builder.

Northern Texas Traction Company, Fort Worth, Tex., has ordered 10 cars from the American Car Company through the Stone & Webster Engineering Corporation. That these cars would be bought was mentioned in the ELECTRIC RAILWAY JOURNAL of March 5, 1910.

Hudson & Manhattan Railroad, New York, N. Y., recently mentioned in the ELECTRIC RAILWAY JOURNAL as having ordered 50 cars from the American Car & Foundry Company, has purchased 50 Baldwin trail trucks, class 66-30-S, and 50 Baldwin motor trucks, class 78-30-S, on which to mount these car bodies.

Whatcom County Railway & Light Company, Bellingham, Wash., mentioned in the Electric Railway Journal of Dec. 18, 1909, as receiving bids on three 47-ft. double-truck city cars, has purchased these cars through Stone & Webster from the American Car Company. Standard Motor Truck Company's type O-50 trucks were specified.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., mentioned in the Electric Railway Journal of Feb. 19, 1910, as considering the purchase of five suburban cars, has ordered these cars from the Cincinnati Car Company, Cincinnati, Ohio. Hale & Kilburn Manufacturing Company's seats and Baldwin Class 78-22A trucks were specified.

Connecticut Company, New Haven, Conn., has ordered 89 cars from the Bradley Car Works, Worcester, Mass., to be mounted on Standard Motor Truck Company's type O-50 trucks, for service as follows: New Haven, 31; Bridgeport, 17; Waterbury, 14; Hartford, eight; Meriden, four; Port Chester, six; New Britain, two; South Norwalk, four; Middletown, three.

TRADE NOTES

Holland Trolley Supply Company, Cleveland, Ohio, has opened an office in Chicago at 704 Fisher Building. C. J. Albert is the representative of the company for the West.

Messrs. Davis, Keyes and Jackson, of the office of Sprague, Keyes and Jackson, consulting engineers, Boston, Mass., recently visited the plant of the Pittsfield (Mass.) Electric Street Railway to investigate the physical condition of the property, and have completed a report with recommendations as to the changes necessary for improving the physical and operating conditions of the property.

David Lupton's Sons Company, Philadelphia, Pa., has appointed George P. Heinz & Company, Denver, Col., Western selling agents, with headquarters in Denver, for the territory west of the Missouri River. Messrs. Heinz & Company will handle the sale of David Lupton's Sons Company's specialties, viz.: Lupton steel sash, Lupton rolled steel skylight, Pond operating device and the Pond continuous sash.

Whipple Supply Company, New York, N. Y., is pleased with the behavior of the Hedley anti-climber in the Hudson & Manhattan Railroad's tunnels on March 1. W. G. McAdoo, president of the railroad, was quoted in the newspapers as stating that these anti-climbers greatly minimized the serious consequences of the accident. This device is the invention of Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company.

Robins Conveying Belt Company, New York, N. Y., will move its main offices to the twenty-sixth and twenty-seventh floors and both towers of the Park Row Building, 13 Park Row, New York, on March 12. These offices were occupied by the company up to two years ago, when the offices were removed to the works at Passaic, N. J., and a branch office opened at 30 Church Street. The offices at Church Street will now be discontinued and combined with the office in the Park Row Building.

Pay-Within Car Company, Philadelphia, Pa., reports that it has recently closed a contract with the Public Service Railway, Newark, N. J., for apparatus and license under pay-within patents covering 1250 cars. This covers all of the cars now operated by the Public Service Railway, and includes 103 cars with short platforms, converted for pay-within operation by the removal of bulkheads and installation of manually operated platform doors. Other prepayment cars operated in Newark and Jersey City are being equipped with folding platform gates, manually operated by patented apparatus furnished under this contract. One hundred new cars are also being constructed under pay-within license by the Cincinnati Car Company for the Public Service Railway, the door-control apparatus being furnished by the Pay-Within Car Company.

MacGovern, Archer & Company, New York, N. Y., have disposed of part of the electrical machinery which they took over from the United Railroads of San Francisco recently and which included the equipment of six substations, consisting of 25-cycle rotary converters and transformers. In all there were about 36,000 kw, in detail as follows: Five 1500-kw Westinghouse rotaries, 5 1650-kw Westinghouse air blast transformers, 5 1000-kw General Electric rotaries, 5 1100-kw General Electric air blast transformers, 1 750-kw Westinghouse rotary, 1 825-kw Westinghouse air blast transformer, 6 750-kw General Electric rotaries, 5 500-kw General Electric rotaries, 9 185-kw General Electric transformers and 3 275-kw General Electric air blast transformers. A large portion of this apparatus is said to be entirely new, and some of it had never been installed. The original cost of the equipment was about $300,000, and MacGovern, Archer & Company are able to make immediate deliveries. All of this apparatus was sold because the United Railroads of San Francisco is standardizing its apparatus by changing from 25 cycle to 60 cycle, in order to conform with the new power plants purchased when the Stanislaus River hydro-electric developments were taken over. Among the equipment which MacGovern, Archer & Company have sold are 5 1500-kw rotaries and 5 1650-kw transformers.

Buffalo Foundry & Machine Company, Buffalo, N. Y., has placed orders for buildings, equipment, etc., required for its large new machine shop. Several years ago this company took up the manufacture of vacuum drying machinery and all the various appurtenances connected with vacuum drying apparatus, and also absorbed the David Bell Engineering Company, continuing to manufacture the famous Bell steam hammers as one of its specialties. These lines have now grown to such an extent that the company has decided to build a machine shop north of the company's present foundry, on property lying between Scajaquada Creek and the New York Central Belt Line. Approximately $200,000 will be spent at the present time on the machine shop. The building will be of concrete and steel construction, with traveling cranes in the bays and galleries to lift individual pieces weighing as much as 200 tons. Orders have been placed for exceptionally large machine tool equipment, all the tool equipment having been ordered special so as to obtain the highest production and get an exceptionally large range of work. All the tools will be motor driven, the motors being twice the size ordinarily used on the same machines. The entire plant will be operated by Niagara Falls power. The company is about to take up several other lines of manufacture.

ADVERTISING LITERATURE

Liberty Manufacturing Company, Pittsburgh, Pa., is mailing a postal card calling attention to its Cyclone boiler cleaners.

Jeffrey Manufacturing Company, Columbus, Ohio, has issued Bulletin No. 35, descriptive of its rubber belt conveyors. Illustrations are presented which show several types of rubber belt conveyors installed in different parts of the country. The bulletin also contains price lists covering the separate parts of the conveyor. Attention is also called to the company's different types of belt trippers.

Fairbanks, Morse & Company, New York, N. Y., have issued Catalog 109B on hydraulic, ball and roller bearing and compound jacks, in which the company's new forged steel hydraulic jacks, their construction and adaptability to various classes of work are described in detail. Many other types of jacks manufactured by the company are fully described. There are also price lists. The publication is 6 in. x 9 in. and contains 48 pages.

Canton Culvert Company, Canton, Ohio, has issued several booklets known as series "M. R. & C.-3," in which are included its 1910 general catalog of Acme nestable corrugated metal culverts, a special railway brochure entitled "Acme Culverts for Steam and Electric Railways," a booklet on "No-Co-Ro Metal," also a bulletin and a folder printed in Spanish. The series describes the company's corrugated metal culverts and contains numerous half-tone engravings which show these culverts in use.

Gisholt Machine Company, Madison, Wis., has issued an attractive 64-page catalog entitled "Gisholt Turrett Lathes." It contains detailed descriptions and illustrations of the various types of lathes manufactured by the company, and descriptions of finishing a few different parts. The catalog is profusely illustrated with views of the company's plant, and of machine shops where its apparatus has been installed. An interesting feature of the publication is a series of engravings which show the progress made in the past 25 years on the company's lathe. Attention is also called to the company's boring mills and tool grinders.

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The Philadelphia Strike

The chief developments in the Philadelphia strike during the past week have been the continued failure of the strike leaders to make good their efforts to create a general sympathetic strike within the city, threats on their part of the establishment of a State-wide strike in sympathy with the ex-employees of the Philadelphia Rapid Transit Company, a material increase in the service given by the company under quieter conditions, and the failure of an attempt to end the strike by reconciling the diverse opinions of the management of the company and its former employees. A new element was introduced into strike campaigns by a call on all union men to withdraw their deposits from the banks because of the alleged reason that the banking interests were unduly favorable to the Philadelphia Transit Company, but as yet no financial institutions have been reported to be in an embarrassed condition because of this attack. The State-wide strike seems to be an even more desperate effort to create a diversion from the main issue than even the city sympathetic strike or the futile boycott of financial institutions. Like them, it furnishes a good example of the old adage that those whom the gods wish to destroy they first make mad.

Equipment Standards in the South

In going over the electrical equipments of a considerable number of Southern railways, one is rather astonished to find how many of the older 25 hp to 35 hp motors are still in use and giving good service. An investigation of this matter brings to light the fact that the cities in which they are employed have few grades, so that high-powered motors with better qualities of acceleration really are not essential. Again motors of these sizes are usually of ample capacity for the single-truck cars which must be employed in small cities to give a short headway at lowest cost. The Southern railway managers generally are keenly watching the progress in the design of electrical equipment and rolling stock. If they appear backward in adopting the latest types of motors and cars on the market, the reason in most cases is that they do not yet require them or else cannot apply them to their conditions. Thus one large company would like very much to try prepayment cars but believes it cannot do so because the narrow streets and sharp curves over which it operates make it practically impossible to lengthen the car platforms as required to carry out this method of fare collection.

The Southern electric railways, however, are giving very close attention to high standards in permanent way construction, as indicated by their extensive use of tie and pole preservation. Again, while their power stations cannot boast very large units, there are many which have been successfully employing the steam turbine ever since it was brought before American power users.

The Results of an Electric Railway Consolidation

The physical benefits of the consolidation of adjoining public utility systems are usually not difficult to demonstrate if the new management maintains a progressive policy after the properties are united. The public soon forgets the kind of service rendered by the old and formerly separated organizations, and for this reason it is an excellent policy to keep on file the schedules, photographs of the line, right-of-way, rolling stock, power house exteriors and interiors, showing the exact conditions before and after the merger. Such data may be worth their weight in bank notes at some future public hearing before a State commission in some sharply disputed accident suit, or in connection with the securing of new or repeated franchise rights.

An illustration of the benefits of a recent electric railway merger is afforded by two systems which up to two years ago had dragged out a comparatively unprofitable existence in adjacent territory. One paid no dividends, and the other disbursed insignificant returns to its stockholders. The tracks were not laid far enough into the country from each system's center to permit the establishment of through service, or even to allow a passenger to travel from one center to the other by trolley. A progressive electric railway manager and promoter saw the possibilities of the region, and about 14 months ago succeeded in uniting the two systems into one organization, now covering 140 miles of track and serving a population of 130,000 people. What have been the results?

The public has gained by the establishment of through service and by the institution of a liberal transfer privilege in the urban centers of the system, where practically no transfers obtained under the old conditions. The character of the rolling stock has been improved to a large degree. In place of the short and uncomfortable single-truck cars formerly run over the radial lines of each system, double-truck semi-convertible cars with high-speed motor equipments have been substituted; the track has been relaid in many districts and heavier rails installed; new lines have been built to tie the different communities together, and a parcels express service set in motion. Under the old conditions the larger of the companies had given no transfers and the smaller one but few. The average fare per passenger was 4.95 cents.

The establishment of the transfer privilege reduced the average fare per passenger to 4.6 cents. This was a gain to the public, but it cut the revenue of the company by some $27,000, or 1 per cent of its entire capital stock. There was an increase in riding, due to the inauguration of the transfer facilities, amounting to a gain of over 887,000 passengers in a given period, or an increase of 13 per cent. To handle this business the car-mileage had to be increased 9.6 per cent, and the number of paying passengers in the period increased but 6 per cent.

The company met the situation by increasing the necessary car-mileage without any increase in car-hours. It ran 152,593 car-miles more under the new conditions with an actual decrease of 4,532 car-hours, or 2.6 per cent. The saving in labor cost was accomplished by running the cars at higher schedule speeds, covering more miles per day per car, and by rearranging the time-tables to avoid excessive lay-overs at the ends of the lines and at turn-outs. The result to the company was a gratifying increase in net earnings, and on this basis it plans to give the public increased facilities.

Electric Railway Sleeping Car Service

The first sleeping cars were built for electric railway service about five years ago, but because of physical obstructions along the proposed route these cars never were operated on the line for which they were constructed. Later these cars were purchased by the Illinois Traction System and for nearly two years they have been operated over a 95-mile division of that road between Springfield and East St. Louis, Ill. The practicability of interurban sleeping-car service has been demonstrated with these equipments, even though in the light of present car-building and operating methods, the design of the older cars is not now considered entirely satisfactory. But they demonstrated the possibilities of sleeping car traffic for electric lines, and the Illinois Traction System has just had built according to designs of its officials, two new sleeping cars that include many innovations, all intended to increase the comfort and safety of the passengers. The new features comprise improvements in berth construction as well as a radical step forward in car body design. Elsewhere in this issue the constructional features of the new cars are described in detail. These cars are probably the first large interurban equipments to be built with turtle-back roofs. Viewed from both interior and exterior, although they are without monitor decks, the car bodies present a very good appearance. Certainly it is possible to build a car roof of this form more cheaply and make it stronger than when the upper structure is irregular in shape to permit the installation of deck lights in the customary position. The unbroken carlins spanning from side to side form a strong roof structure which is light in weight and easily protected from the weather. The questions of ventilation and illumination have been solved by adding a row of windows in the sides of the car above the gothics of the main windows. Additional ventilation is provided by exhaust hoods on the roof over each of the several compartments.

These new cars will no doubt attract attention to the railway company operating them. Sleeping car service at this time has a double value. A steady through traffic is obtained because under the conditions under which it is given the service is a great convenience to the traveling public and the railroad receives considerable advertising because of the novelty. The newly designed cars have easy riding M. C. B. four-wheel trucks and will be operated as trailers in connection with motor cars which will carry both express and passengers and will make fast through runs at night. By this combination of service the sleeping cars may be handled at a relatively low cost, for labor and power.

The field for sleeping car service on electric lines is usually as distinct from that on steam lines as is the passenger and freight service. The trunk railroads make up their train schedules, as a rule, to accommodate the traffic between the large terminal cities reached, and the times at which the trains arrive at or depart from intermediate points is often most inconvenient. For these shorter runs at night very rapid transit is no advantage. The average passenger would much prefer to travel more slowly if by doing so he can get a good night's rest, rather than to sit up until two or three o'clock in the morning to wait for his sleeper on a through train, or else be compelled to leave his berth at four or five o'clock in the morning because the train reaches his destination at that time. Here is where the electric line can give him the service which he desires. It can vary the length of its train

to the demands for accommodations, running but one car if necessary, and it can operate cars directly between cities which it would be impracticable to provide with such a service under steam railroad conditions. The absence of smoke and cinders during a ride at night on the electric line is an advantage which should also appeal strongly to the intending passenger, especially when it is combined with the other comforts, compared with a steam railroad sleeper, contained in the cars of the Illinois Traction Company. We look to an extension of sleeping car service by electric lines.

A 10-Cent Fare Legal and Reasonable

After an inquiry extending over a period of two years, with the complete access to the books of the Brooklyn Rapid Transit Company which the law now permits, the New York Public Service Commission, First District, reaches the wise conclusion that "present conditions do not justify a reduction" in the fare of 10 cents charged to Coney Island by the constituent companies of this system. While the Commission was divided in its judgment and but three of the five members voted for dismissal of the complaints, it is plain that the conclusions of the majority were reached as a result of a most searching investigation and a careful consideration of all the facts obtainable respecting the entire business of the system and the Coney Island traffic, supplemented by a physical appraisal by Bion J. Arnold, consulting engineer for the Commission.

Unfortunately the majority did not unite in an opinion which makes it possible to show the reasons for the brief conclusion that conditions do not justify a reduction, but the Commissioner who presided at the hearings, Mr. McCarroll, filed an able review and discussion of the evidence, presenting the considerations which made him clearly of the opinion that the complaints should be dismissed. Commissioner Bassett, who voted with the majority, filed a separate opinion, in which he stated that if all existing elements of value other than franchise are added to the depreciated value of the property of the Brooklyn Union Elevated System, his belief is that the total figure will be found equal to or greater than that used by Commissioner McCarroll. Commissioner Eustis rendered no opinion in voting for dismissal of the complaints. Commissioner Maltbie filed a negative opinion and Commissioner Willcox, who also voted against the orders, declared himself in favor of dismissing the complaints so far as they affected the lines other than the Brighton Beach line operated by the Brooklyn Union Elevated Railroad. As the orders affected that line, he wished to be recorded against them.

In the absence of a decision reviewing the principles upon which the majority agreed in voting to dismiss the complaints it may be taken for granted that in the main the convincing and vital considerations upon which Commissioners McCarroll and Bassett lay weight, in their individual opinions, are those that determined the finding that the 10-cent rate of fare is legal and reasonable.

Early in the consideration of the case the Commission concluded that it could not reach a fair determination of the questions involved without a physical valuation of the property. Mr. Arnold's appraisal, reaching a total of $76,000,000, as included in the opinion of Commissioner McCarroll, was confined in the determination of the case very largely to physical elements. This total is less than that to which Mr. Arnold testified during the hearings and the reduction in amount does not indicate a reduction in appraised values, but simply an attempt to segregate carefully the property directly involved in the Coney Island service. The values used for real estate were the assessed values which, of course, are less than the values for operating purposes. Actual costs to reproduce were compiled with allowances "for reasonable expenses, for contractor's profit, surveying, planning and other engineering charges and various incidental items which, although intangible, are essential disbursements in the creation of any property such as a street railroad or elevated railroad." No allowances were made in this valuation for franchise values or for "a considerable amount of development expenses." No allowances are made for depreciation, although Mr. McCarroll refers to the testimony of Mr. Arnold that the properties were in excellent condition and that hence any allowance for depreciation would be the minimum usually made.

It appears from the statements of facts and from the discussion of Mr. McCarroll that the valuation of the property in this rate case disclosed so strong a position for the company that it was not considered necessary to do more than to make an incomplete appraisal. What the effect might be of a complete appraisal with absolute valuation of the physical elements and fair estimates for the intangible values is an interesting subject for conjecture.

Commissioner McCarroll admits that it is evident that the valuations are extremely conservative and that further study of the subject would have the effect of decreasing the percentages of income realized by the various properties during the fiscal year ended June 30, 1909. That is, it seems to have been accepted by the Commission as perfectly clear in this case that the income from the value of the physical elements alone was not unreasonable. In every enlightened valuation, allowances are made for other than purely physical elements.

As the Coney Island service affords accommodation during a brief period of hot summer weather and the traffic is therefore of a special character, the Commission evidently tried by every known method, with the figures available, to segregate the revenues and expenses from the other operations of the system. The opinions indicate that other attempts at analysis will be made. Of course, any complete segregation of the Coney Island business, without regard for the operation of the other parts of the system through the year, would undoubtedly show a failure of this traffic to meet expenses, charges, taxes and a fair return on the value of the property.

A suggestion in the negative opinion of Commissioner Maltbie that financial factors are not the only factors to be considered and that it would be an advantage to the community if dwellers in congested districts could reach the seashore at small expense is, of course, not worthy of consideration in a question that should be decided solely upon its merits as a business proposition. If charity is to be bestowed for worthy objects, it should be done voluntarily and not by a virtual assessment upon revenues that may be overcharged with proper and necessary expenses. It is commendable that the majority decision should have been based upon the admissible considerations that the 10-cent rate of fare is legal and not excessive in this case and that the earnings from the entire business are not unreasonable. It indicates the strong position of the company that these conclusions were reached without taking into account the non-earning years when the properties, undergoing development and improvement, yielded no adequate returns to their security-holders.

SLEEPING CARS OF RADICALLY NEW DESIGN FOR THE ILLINOIS TRACTION SYSTEM

On April 1 the Illinois Traction System will inaugurate a new sleeping-car service between St. Louis and Peoria. This is a run of 172 miles. Two cars for this service have just been delivered from the St. Charles (Mo.) plant of the American Car & Foundry Company. These equipments include a number of innovations in car building, all designed to make sleeping-car service more comfortable and more safe. H. E. Chubbuck, general manager, and J. M. Bosenbury, superintendent of motive power and equipment, Illinois Traction System, are joint inventors of many of the novel features. An underlying motive in the design of these cars was to offer a passenger means for passing a more comfortable night while en route over the electric line than could be had on the regulation sleepers of any competitive steam road. As a step in advance the sleeping car of this new design has upper berths into which daylight and air are readily admitted. An outside view is obtainable through two windows at the side of each upper berth. Other novel features which will appeal to the night traveler are mentioned below.



Illinois Traction System Sleeper—New Design of Car Body with Turtle-Back Roof

The new type of sleeping car has a turtle-back roof. The excellent appearance of this car should attract the especial attention of those railway men who long have held that the monitor deck was an heritage from horse-car days and of little value under present interurban operating conditions.

SLEEPING-CAR SERVICE

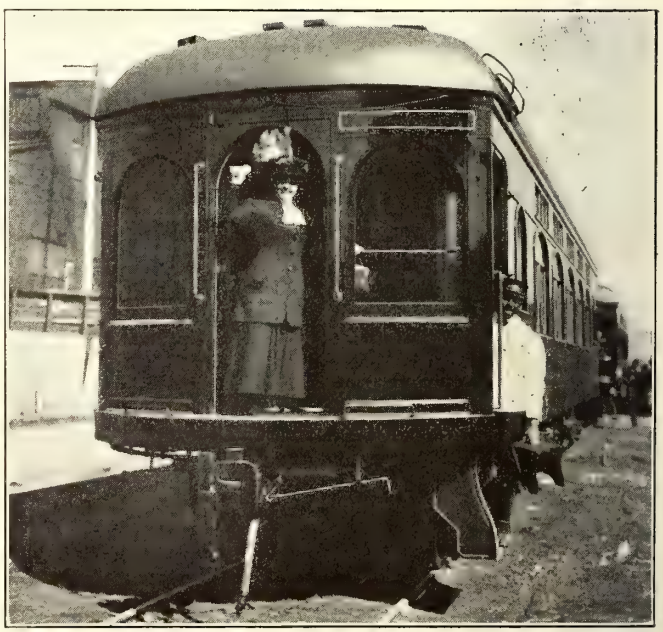
The present sleeping-car service of the Illinois Traction System includes two motor-operated sleepers running between Springfield and East St. Louis. This service has given very satisfactory results, even though the cars operate under their own motive power and therefore are more noisy than will be the new trailer sleeping cars. The Springfield-St. Louis service will be continued with the cars now in operation.

The schedules for the new cars are as follows: One car will leave Peoria at 11:30 p. m. daily, arriving at East St. Louis at 6:30 the next morning. Another car will leave East St. Louis at 11:59 daily, arriving at Peoria at 7 a. m. The cars will be open for the reception of passengers at 9 p. m. The leaving time of the sleepers has been arranged so that connection may be made at Peoria with all the evening trains arriving on the steam roads. It is expected that substantial through traffic will be had from the Chicago, Rock Island & Pacific train which reaches Peoria at 10:20 p. m., and serves the cities of Ottawa, La Salle, Peru and Chillicothe, lying north of Peoria. The only other sleeper service between Peoria and St. Louis is over the Chicago & Alton, which has a branch line into Peoria with a train leaving two and one-half hours earlier than the electric sleeper and arriving at St. Louis one-half hour later. Passengers from St. Louis to Peoria will have ample time to reach the electric train after the closing of theaters.

The regular Pullman rate of $1.50 a berth will be charged with the exception that the upper berths will be 25 cents less. One colored porter will act as attendant on each car. A third porter will relieve the regular men on every other trip. Each day the cars will be thoroughly cleaned and aired at the terminals. Every consistent means will be used to insure the comfort of the passengers. Hot coffee and rolls will be served each passenger from a portable fireless cooker provided for each car. No charge will be made for this service. In announcing the schedules of the new sleeping cars especial care has been taken to state plainly that the porters are well paid and the company expects them not to receive tips.

CAR-BODY DESIGN

Ten upper and 10 lower berths, each 37 in. wide, are provided in each car. At one end of the car are a smoking-room and toilet facilities for the men, and at the other end are the women's toilet-room, a heater compartment and linen lockers. Reference to the accompanying engravings will show the substantial construction of the car body, the heavy underframing and the appearance of this type of car with its turtle-back roof.



End View of Sleeping Car

The controlling dimensions of the body are as follows:

	Feet.	Inches.
Length over buffer plates	54	0
Length from buffer pulling face to coupler pulling face	55	9⅛
Length over vestibules	51	4
Width over side sills	9	1¾
Width over siding	9	3
Height between sills and plates	7	3
Height over roof boards	9	4 13/16
Height from rail to bottom sill	3	5
Height over all	12	9 13/16

INTERIOR ARRANGEMENTS

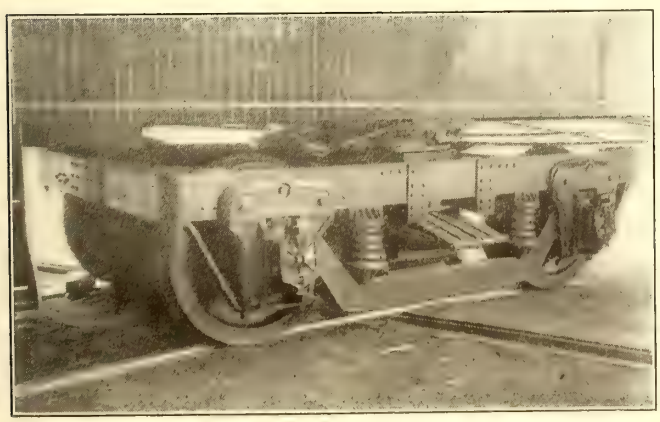
The general arrangement of the interior equipment of one of these interesting cars is designed to provide a convenient center passageway from one platform to the other. The men's smoking-room at one end of the car occupies the full width of the car body and is 5 ft. 3 in. long. A door from one corner of this room leads to a toilet-room approximately 4 ft. square, enclosing a Duner flush hopper with wall pull. The fittings in the smoking-room and men's toilet include a two-basin wash-stand with open plumbing and a water cooler, made of nickel-plated white metal, a large mirror, lockers for linen supply and a leather-upholstered seat 5 ft. long with lockers below. The water supply is carried in tanks above a false ceiling at the car sides. These tanks may be filled from the roof or from the bottom of the car. A view of one corner of the men's smoking-room is shown. Two doors lead out of this room, one to the car platform and the other to the sleeping section. All doors swing on hinges.

At the opposite end of the car is the women's toilet with similar fittings, occupying a space 6 ft. 3 in. long on one side of the center aisle. At the platform end of this room is a heater compartment about 3 ft. square lined with sheet steel. This compartment occupies part of the platform space and encloses a No. 1 C Peter Smith heater. A supply of coal is carried in a box cellar underneath the car framing. Radiation is effected with two rows of 2-in. pipe on each side of the car. At this end of the car and opposite the women's room are two linen lockers each 2 ft. 6 in. square and extending to the height of the deck rail. A tool locker opening onto the corridor is built above the linen lockers.

The car has a single-entrance door at either end with platforms about 4 ft. x 5½ ft. in area. The step openings are protected by Edwards foot-lifting trap doors. The vestibule floors are covered with inlaid linoleum.

SLEEPING SECTIONS

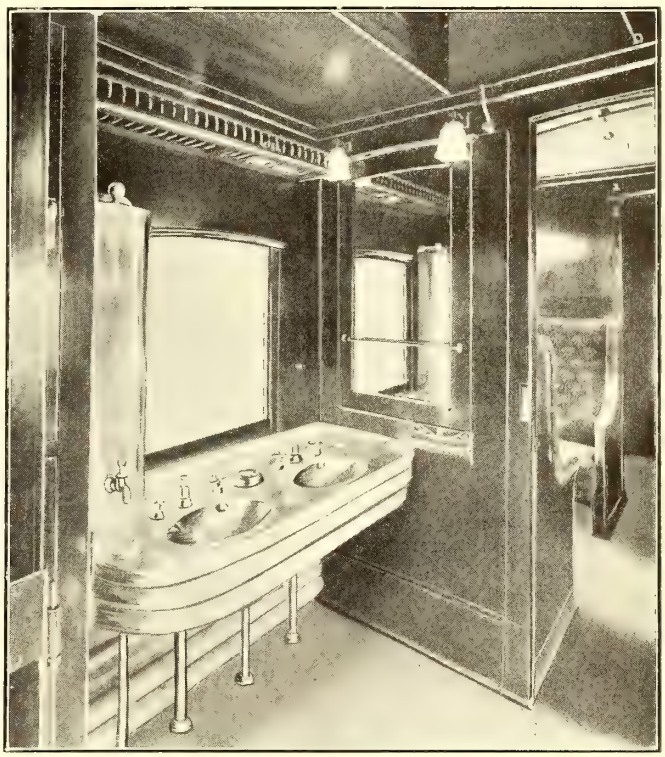
Ten upper and 10 lower berths are provided in the middle division of the car. These berths all face a center aisle 26 in. wide. All berths are 37 in. wide and the top of the lower berth is 18 in. above the floor. The head room between the lower and upper berths is 36 in. Each pair of sections is set



Illinois Traction System Sleeper—M.C.B. Four-Wheel Truck

off from its neighbor by a solid mahogany bulkhead pierced by a corridor opening 26 in. wide and 7 ft. high. The cross partitions which separate the sleeping sections serve to stiffen the car body and materially provide against accidents to passengers in event of a car overturning.

The two end compartments are each equipped with two National Sleeping Car Company sections with upper and lower berths. In the daytime these sections are made up into seats similar in appearance to those in a Pullman car. At night the seat cushions slide together in conjunction with two auxiliary cushions stored during the daytime, to form a lower berth with deep springs. The seat backs are hinged at the top and swing upward to form the upper berth. Thus, one of these sections at night has the appearance of a Pullman section. The mattresses and pillows are stored during the daytime in boxes underneath the seat cushions. The National seats are up-



Illinois Traction System Sleeper—View in Smoking Room

holstered in green frieze plush and the mattresses and pillow have a green wool covering.

NEW TYPE BERTHS

The three compartments in the middle of the car are each equipped with two upper and two lower berths of the new design credited to Messrs. Chubbuck and Bosenbury. The construction is such that the berths can be swung and locked to the sides of the car. It is not intended that passengers shall be seated in these compartments except just before retiring and after arising. The two berths in each section occupy the full length of 6 ft. 5 in. between the cross partitions of the car. Each berth is hinged to the side framing of the car and its weight is balanced so that it may be folded up against the windows. The individual berths are removable so that they can be carried outside of the car for thorough cleaning and airing. The lower berth has removable spring frames and each berth is provided with two feather pillows, two Pullman blankets and duplicate sets of sheets and pillow cases.

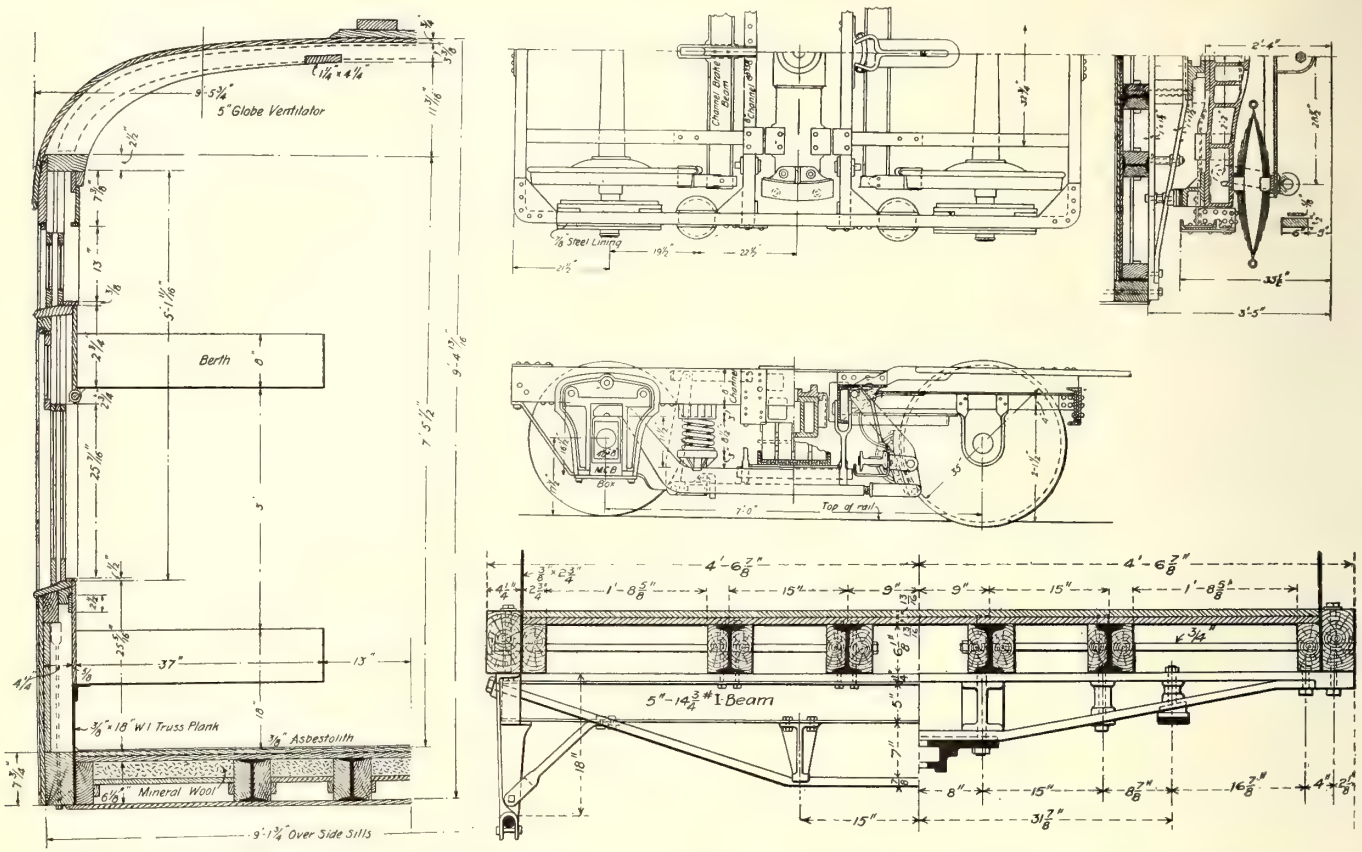
Some of the advantages that this new type of berth is said to have, as compared with Pullman construction, should claim the appreciation of the passengers. The features of cleanliness and sanitation are important. In addition to these a passenger sleeping in a lower berth when arising in the morning may fold his berth against the wall and have the entire floor space and room below the upper berth for dressing. A neat leather-seated folding chair is stored under each berth and available for use when the berth is lifted. The usual hammocks and head and foot baskets are provided for the reception of clothing at night. At night each section is shut off from the corridor by a pair of long goat-hair satin berth curtains carrying the berth numbers. These curtains are hung from bronze pipe rods

carried near the upper deck. A pair of short curtains also is available for each berth.

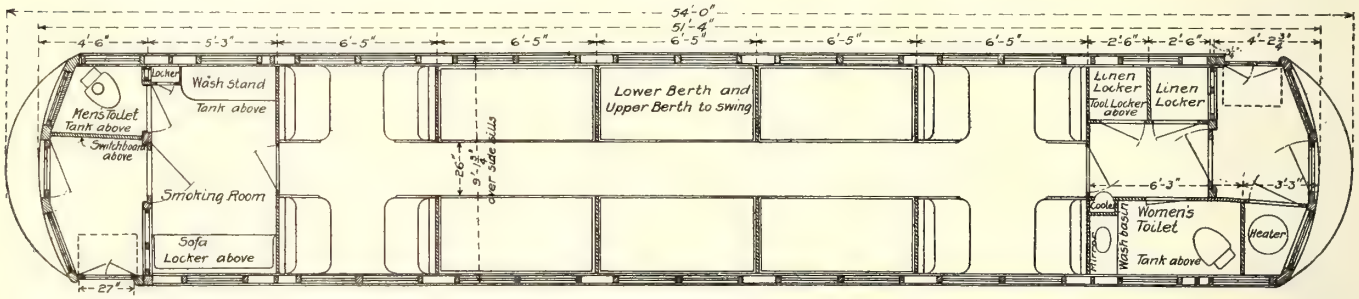
As a convenience to passengers this type of berth permits that the bed clothing can be arranged for the night during the day, and the berth folded out of the way against the wall so that at night when a passenger desires to retire it is only necessary to lower the berths and hang the curtains.

A 25-call annunciator system is installed with the indicating box in the smoking-room. There is a push-button in each upper and lower berth. All the berth fittings are made of statuary bronze designed according to attractive patterns. The upholstery is all in green-colored stock.

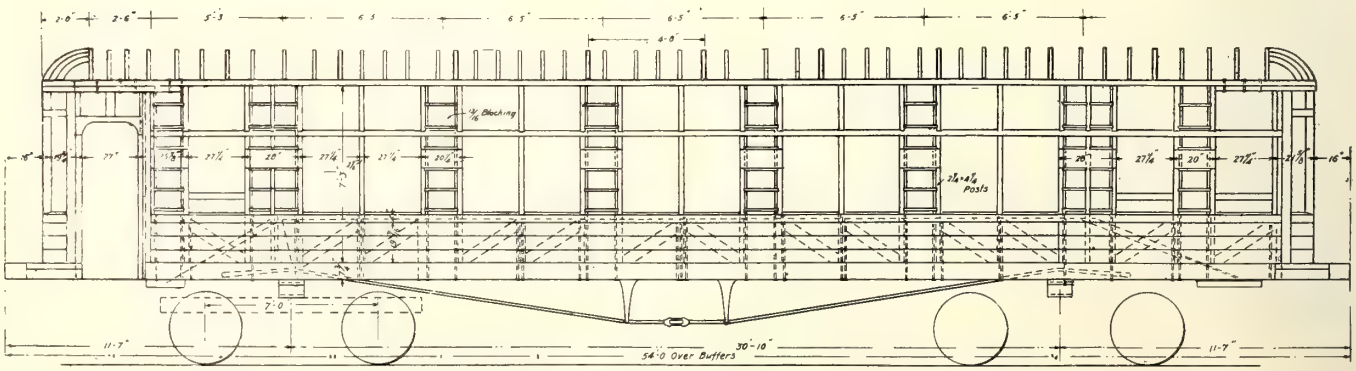
A novel feature for the convenience of passengers is the installation in the side wall at each berth of a plush-lined steel locker provided with a Yale lock. The locks are so designed that two keys are required for opening. A master key will be carried by the car conductor and each passenger will be provided with an individual key for the box in his berth. These keys will be attached to rubber rings so that they may be slipped over the wrist at night.



Illinois Traction System Sleeper—Cross Section of Body, Steel Trailer Truck and Cross Section of Underframing



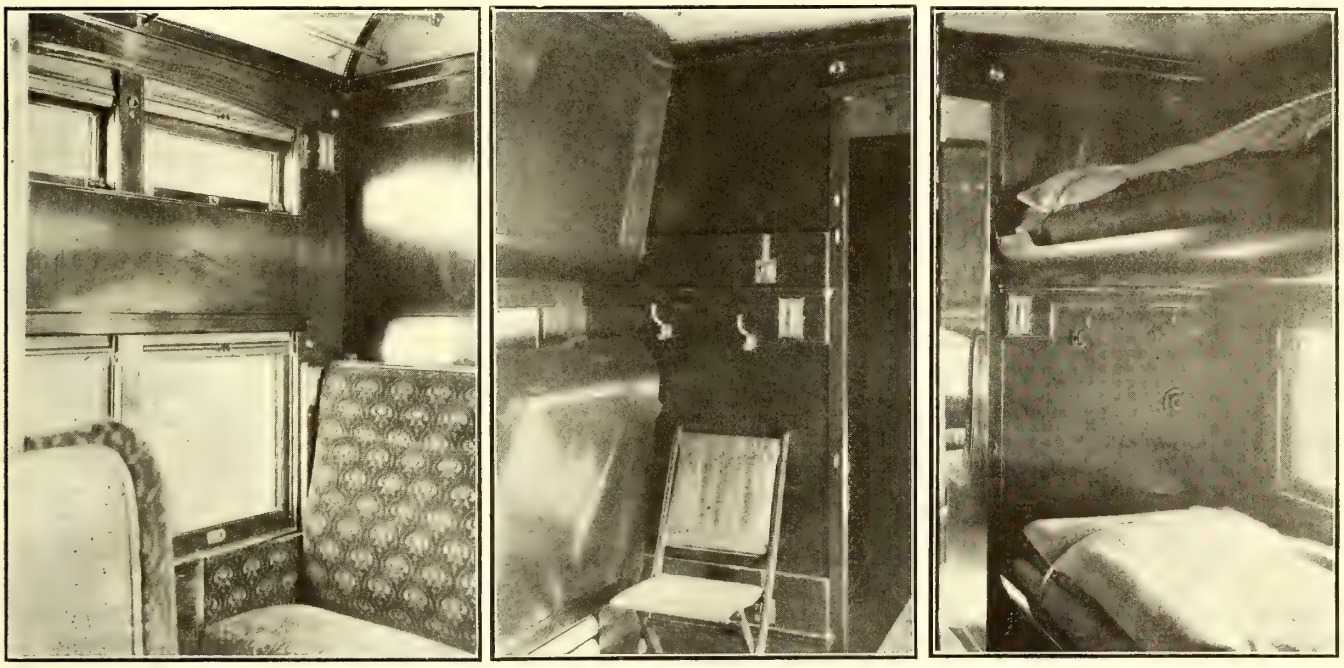
Illinois Traction System Sleeper—Floor Plan, Showing Arrangement of Berths and Toilet Rooms



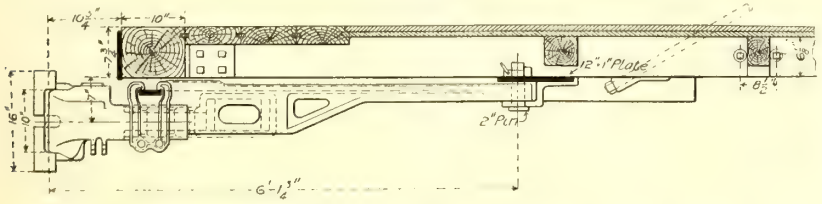
Illinois Traction System Sleeper—Elevation of Side Framing

There are two windows in each berth. Those in the lower berth are of the usual type found in Pullman cars with double sash. The windows in the upper berths are 25 in. long and have a clear opening 10 in. high. Hardware for the windows was furnished by the O. M. Edwards Company. The inside sash on the upper windows is provided with a spring pin which passes through the sash and fits into a socket in the sash of the outside window. The passenger may adjust this pin so that the two sashes will or will not raise together.

The lower windows in the sleeping compartments are fitted with single outside one-piece gothics. The windows in the smoking, toilet, linen locker and heater rooms have high single-arched sash with 3/16-in. clear leaded glass in hard metal frames. All window sash are made of mahogany. Metallic weather strips are provided on all windows and doors and during the summer screens will be fitted to the upper and lower berth windows. The window curtains in the sleeping compartment are made of silk-covered Pantasote and have Forsyth roller-tip ring fixtures. All of the curtain rollers are concealed behind the finish of the car. The swing doors along the corridor of the car are of solid mahogany, fitted with art glass in hard metal frames. The inside finish of the car is all in mahogany with five-ply veneer. The arched ceiling is three-ply poplar with mahogany ceiling bands and is light yellow in color decorated with gold stenciling.



Illinois Traction System Sleeper—Double Row of Windows, Berths Folded Against Side Walls, Berths Lowered



Illinois Traction System Sleeper—Longitudinal Section Ahead of Bolster, Showing Coupler Mounting

VENTILATION

A complete system of ventilation is provided in this type of car, even though it has a turtle-back roof without the customary deck sash. Five-inch ventilators with exhausters above are inserted in the roof over the full length of the car. Each ventilator terminates in a brass ring beneath the ceiling. This ring is provided with a shutter held in place by a spring so that a slight tension is necessary to adjust the ventilator opening. There are two such ventilators in each sleeping section arranged over the center line of the upper berth and similar ventilators are installed over the toilet and smoking-rooms.

ILLUMINATION

Illumination for the general body of the car and the berths is provided by means of a generous number of 8-cp, 32-volt spherical incandescent lamps fed from a Gould storage battery carried in a case under the car. The control board for the lighting circuits is installed against the toilet-room partition on one of the platforms. Trolley connections are provided for charging the battery from the line through resistance. General illumination is had from three lamps mounted against the ceiling of each sleeping section. Two individual lights are provided for each berth. The berth lamps are installed in statuary bronze pockets set flush with the woodwork. In each pocket is one lamp, mounted as a part of the swinging cover to the pocket. On pressing a button the pocket door is opened by a spring and the lamp automatically is cut into the circuit. These fixtures were manufactured by the Adams & Westlake Company.

TRUCKS

The car body is mounted on two trailer trucks of the M. C. B. all-steel four-wheeled type built by the American Car & Foundry Company. The dimensions of the truck are as follows:

Wheel base	7 ft.
Journal centers	6 ft. 3 in.
Truck frame	10 ft. 7 in. by 6 ft. 6 in.
Frame material—two pieces	8-in. channel
Bolster springs	36 in.
Equalizer springs, double coil	7¼ in.
Equalizer bars	6 in. by 2 in.
Wheels, Midvale, rolled steel	35 in.
Journal boxes—Symington	4¼ x 8 in. M. C. B.
Transoms	8-in. channels
Dust guards	Security
Brakebeams	Inside-Hung I-beams

The new sleeping cars are equipped with Westinghouse schedule AMS automatic air brakes having 12-in. cylinders.

UNDERFRAMING

The underframe main members are four 6-in. I-beam center and intermediate sills with 2¾-in. x 6⅛-in. yellow pine sub-sills and side sills made up of 4¼-in. x 7⅜-in. yellow pine pieces joined to ⅜-in. x 18-in. steel plates extending the full length of the car. The center and intermediate sills extend into the wooden bumper blocks and are anchored thereto with 5-in. x ½-in. angle plates fastened with ¾-in. bolts. The overhang of the car is 11 ft. 7 in. from king pin to face of bumper. The body bolsters are of the built up type made of top and bottom plates 12 in. x 1⅛ in. in section. The truck

center distance is 30 ft. 10 in. and the car is 54 ft. long over buffers. The outside truss rods are 1½ in. in diameter with 1¾-in. ends. These rods are supported on the tops of the bolsters close to the side sills to which they are secured. The queen posts are of malleable iron 18 in. deep and braced to the cross ties, which are 5-in. I-beams. The underframing is given a camber of ¾ in. between bolsters and ½ in. between the bolsters and the ends of the cars.

The cross framing is so arranged that a free space 12¼ in. wide is left between the center sills from end to end of the car, except where cast spacing blocks are placed. These blocks have an opening through their web and thus provision is made for a straight run of conduit under the middle of the car. The over-all width of the underframing is 9 ft. 1¾ in.

A wooden floor 13/16 in. thick is laid on top of the sills. Above this is a second wooden floor of the same thickness supporting a wearing surface of Asbestolith ⅜ in. thick. This surface extends from side to side of the car and is given a fillet at the edges to prevent the collection of dirt. The space between the center and side sills is packed with a layer of mineral wool 2½ in. deep held in place by a false floor. The entire underframing also is ceiled smoothly underneath by a wooden covering. The underframing and floor have a depth of 7¾ in. This elaborate floor construction, including four wooden floors, one of composition, and a layer of deadening material is installed for the purpose of preventing the noise from the running gear from disturbing the passengers.

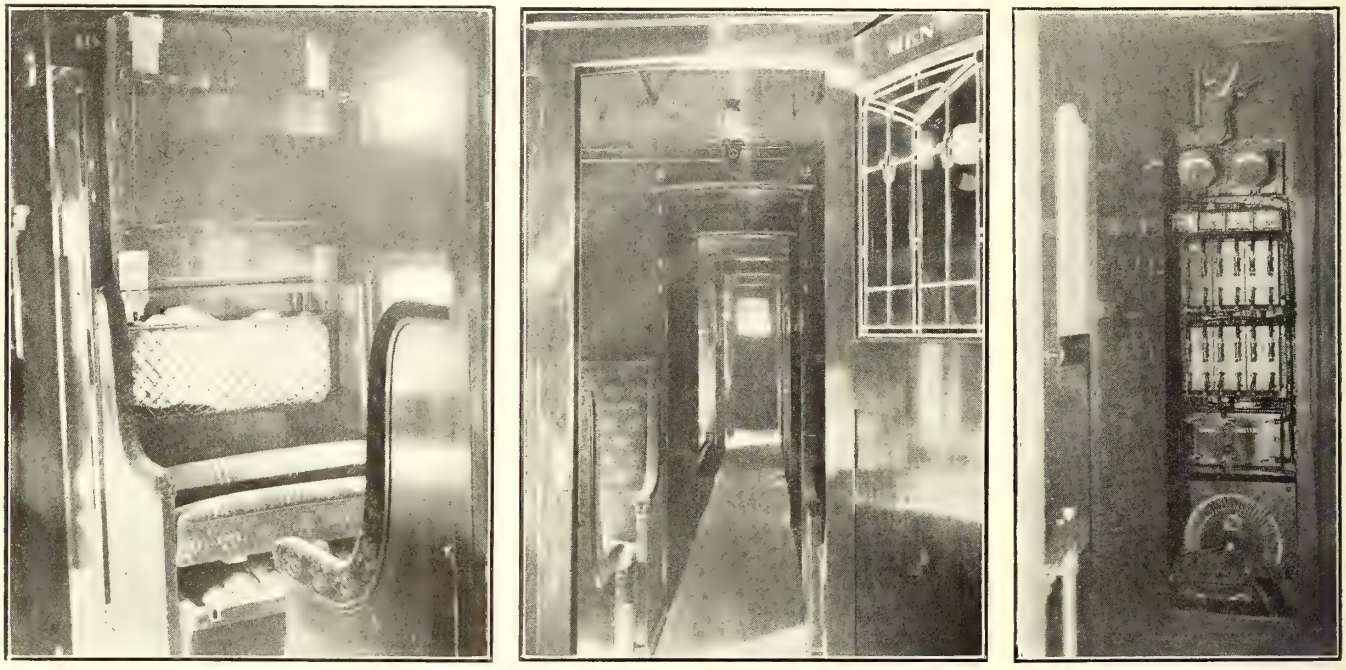
BODY CONSTRUCTION

The side framing of the car is of wooden construction and below the window rail has a continuous blocking 1⅛ in. thick. On the interior, the sides of the car are straight from the floor level to a height of 7 ft. 5½ in. The rise from this elevation to the ceiling is 11 13/16 in. The width of the cars over eaves is 9 ft. 5¾ in. and the height from bottom of sill to top of roof is 9 ft. 4 13/16 in. The windows are 25 7/16 in. above the floor and the lower window opening is 25 7/16 in. high. The upper windows have a clear opening 10 in. high. The distance between the top of the lower window and the lower sash of the upper window is 15 in.

The sides of the car above the window rail are made up of window sections 5 ft. 3½ in. wide enclosing two lower and two upper sash, and blocked posts 20¼ in. wide. A 2¼-in. mullion divides the window section vertically. The blocking in the posts between the windows is 13/16 in. thick and is fitted between ½-in. rods which tie the deck rail to the side framing. A lateral member extends from end to end of the body between the upper and lower side windows tying the posts and window structure together against longitudinal movement. Steel roof carlins are placed on 4-ft. 8-in. centers and between each pair of these are four ash carlins. All wood carlins are 1½ in. thick and iron carlins are ½ x 1¾ in. in section. The iron carlins are anchored to the vertical tie rods which pass through the side framing and through the end framing of the car. The carlins are 14 13/16 in. high above the deck rail. The ends of the car have swinging doors for train operation filling openings 30¾ in. wide.

COUPLERS

These cars, which are for trailer service, are equipped with the Bosenbury type of M. C. B. coupler with radial anchorage. As shown in the illustration, this coupler has the same contour and couples with an M. C. B. coupler. The face of the knuckle is 16 in. deep, which permits great variation in the heights of the cars without danger of uncoupling. This type of coupler has been used several years on the Illinois Traction System with considerable success. The coupler shank is carried in a flexible radial carrier and is anchored by a 2-in. pin carrier in a 12 in. x 1 in. plate bolted between the center sills.



Illinois Traction System Sleeper—Views Showing Parts of Berths, Corridor Along Center of Car, and Switchboard for Lighting System

A hearing was held before Milo R. Maltbie, of the Public Service Commission of the First District of New York, on Feb. 23, 1910, to determine whether the resolution of the commission made on June 11, 1909, which approved a type of wheel guard known as the 1907 Parmenter wheel guard, in use in Manhattan, should not be rescinded and an order entered prescribing the substitution of what is now known as the 1909 Parmenter wheel guard.

Mr. Connette, transportation engineer of the commission, said that the 1909 Parmenter model was a decided improvement over the 1907 model. H. H. Adams, superintendent of rolling stock and shops of the Metropolitan Street Railway, said that the company had practically eliminated the 1907 type of Parmenter guard and that it was the intention of the company gradually to rebuild the 1907 wheel guard to the 1909 type, particularly when guards of the 1907 type were partially destroyed in service. The company had a special department in which the repairs to this equipment were carried out.

CONSTRUCTION FEATURES OF WARSAW-PERU LINE

The Winona Interurban Railway Company, as announced in this paper, recently inaugurated service over a new line from Warsaw to Peru, Ind. The completion of this line marks an important step in the growth of the interurban network of Indiana. Through electric travel from Chicago to Indianapolis is now possible. Already the railway companies interested are planning to put into service a through limited chair-car schedule between South Bend and Indianapolis, which probably will make the run of 160 miles in about six hours. At South Bend this service will connect with other electric service to St. Joseph, Mich., Michigan City, Ind., and Chicago. At Indianapolis connection can be made with limited electric cars for Terre Haute, Ind., Louisville, Ky., Dayton and other Ohio cities. On account of the possibilities of through freight as well as passenger service the new connecting link has been built according to high interurban railway track standards. Preparations are being made for handling carload freight and it is quite probable that the traffic department of the Winona Interurban Railway can obtain considerable freight traffic in handling grain and live stock from the country districts to the steam-railway shipping centers.

The northern division of the Winona Interurban Railway was opened for service in the fall of 1906. The route is 25 miles long, connecting Goshen and Warsaw, Ind. The contour of the country is such that a very fast line was easily built. The new southern extension is 44 miles long. Outside of the five cities and towns which it connects there are no curves in the track which will require slackening speed. Just west of Warsaw the line passes over the main line of the Pennsylvania Railroad on a steel viaduct with earth approaches. From this crossing the route is a tangent extending in a southwesterly direction through level farming country for 9 miles to Mentone. At Mentone the new interurban line passes under the New York, Chicago & St. Louis Railroad, and thence extends southward with a second 9-mile tangent to Akron, a town of about 1000 inhabitants located on the Erie Railroad. The interurban line passes through the main street of Akron and just south of town crosses over the main line of the Erie Railroad on a timber viaduct. This structure will be replaced with a steel one supported on concrete piers. Southward from this viaduct the new line is practically a tangent for 11 miles to a point just north of Chili, where the Vandalia Railroad is intersected. The grades of the two lines are separated and the new electric cars pass through a concrete subway under the Vandalia tracks.



Interurban Crossing Over Pennsylvania Railroad at Warsaw, Ind.

The right-of-way and roadbed from Chili, 9 miles, to North Peru was built by the Wabash Railroad from which the interurban company purchased it about two years ago. As this section of the route was formerly used for steam-train operation it is now in excellent shape for high-speed electric service. At North Peru track connection is made with the main line of the Wabash Railroad. The cars of the interurban company enter Peru over the city streets. As soon as track connection is made with the local company the Winona cars will jointly use a station of the Chicago, Cincinnati & Louisville steam railroad with the Indiana Union Traction Company.

The track standards according to which the northern division of the road was built have been followed in constructing the southern extension. Seventy-pound rails are bonded with American Steel & Wire 7/8-in. terminal, 8-in. pin-driven bonds. Sidings are placed about 4 four miles apart and the switches have the Pennsylvania Steel Company's standards with disappearing blades. Eight-day switch lamps of Adams & Westlake manufacture are used.

POWER SUPPLY

Power for the operation of the entire line is generated in a modern-type station located at Winona Lake, near Warsaw.



Temporary Viaduct at Akron, Ind.

The constructional features of this station were described in the Street Railway Journal for Nov. 17, 1906, page 962. The station contains two 600-kw, 2300-volt, 25-cycle revolving-field Allis-Chalmers-Bullock generators driven by Allis-Chalmers Corliss engines. Current is stepped up to 33,000 volts for distribution to five rotary converter substations equipped with Allis-Chalmers apparatus. Three of these substations have recently been constructed for serving the new southern extension. The present converter capacity of each substation is one 300-kw unit. The power station contains a similar unit for supplying the local lines in Warsaw and Winona Lake.

Current is distributed to the new substations over a three-phase transmission line carried on the poles which support the trolley brackets. The transmission wires are of aluminum, with a capacity equivalent to No. 2 copper. Current is distributed to the cars by a bracket-supported No. 000 grooved-trolley wire and an aluminum supplementary feeder with a cross-section equivalent to 450,000 circ. mil copper. Garton-Daniels lightning arresters are spaced five to the mile for the protection of the d.c. conductors. The Blocki & Brennan Company, Inc., of Chicago, executed the contract for installing the high-tension and d.c. feeder lines. Telephone jack boxes are installed ½ mile apart along a single pair of wires which extends through the length of the road. Stromberg & Carlson instruments are used.

SERVICE

This interesting connecting interurban link was opened for service on Feb. 14, 1910. At the present time small interurban cars are operated between Warsaw and Peru awaiting the completion of the work of ballasting the roadbed. Five large interurban motor-cars are being built for use on this road. These cars will conform closely in design to the very satisfactory equipment purchased in 1906 for the northern division. The cars are 57 ft. 8 in. long and 9 ft. 4 in. wide over all, subdivided into three compartments.

As there is no steam line parallel with the new southern ex-

tension it is expected that considerable through passenger travel will be had. The passenger fares are based on a rate of 2 cents per mile with a 10 per cent reduction for round-trip tickets. All classes of freight traffic are solicited, and the company is especially well prepared to handle carload lots. It is expected that during the summer season the newly opened route can develop considerable traffic in fruit from southern Michigan to Indianapolis and points farther south.

LETTER OF W. A. HOUSE REGARDING PROPOSED UTILITIES COMMISSION IN MARYLAND

William A. House, president United Railways & Electric Company of Baltimore, has published, with the approval of the board of directors, an open letter in the daily newspapers of Baltimore discussing the proposed Public Utilities Commission. The letter is addressed to the judiciary committee, the members of the Legislature and the public.

In the following paragraph Mr. House gives a brief history of the development of the property:

"This company is a consolidation of all the street railways of the city. Its constituent companies passed through the experiences common to all large city railways of bitter competition for business, for franchises, for capital and for favorable legislation. The competing lines thus merged also passed through the customary stages of costly experimentation, not only as to possible traffic, but as to equipment as well. They passed from horse to cable to electric motive power. Constant improvements in street railway equipment and methods made frequent and costly changes necessary. Millions of dollars went to the scrap-heap and to the profit and loss account of experience. Capital was hesitant and suspicious as to the future, and the struggles to obtain it were severe and expensive. All the companies were necessarily drawn more or less into the turmoil of politics, and the relations between the companies and the public were often ill-defined and inharmonious. Out of this welter of conflict and experimentation, with its failures and mistakes, no more peculiar to Baltimore, however, than to every other large city, emerged a few years ago the present company, and with it began a new era in street railway affairs in Baltimore."

As the company realized that its most valuable asset and its chief guaranty of success was the good-will of the public, it set about to acquire this. "It studied the public needs and the city's probable future," Mr. House says, "and although laboring under a burden of taxation amounting to about 10¼ per cent of its gross annual revenue, or 65 per cent of its net earnings, it borrowed millions of capital and incurred an enormous floating indebtedness to so equip itself that no city in the world might surpass it in service. Most of this involved a discount of the future, and has been done at the expense of its security holders. It was done, of course, not as a matter of sentiment, but because we believed it was good business policy to please the public."

Mr. House states that the company "has refused to permit itself to be drawn into any political affiliations or operations." He asks the following pertinent questions:

"Having set itself the ideal of serving the public fairly, and trusting the public fully, it now has a right to ask, What are its shortcomings? Why must its affairs be turned over to a commission? If there is anything which the public demands and which is practicable, commission or no commission, it is and has been our desire to supply it. Are there any complaints which the company has ignored? Is there any one who knows the facts who believes that we overcharge our patrons when we carry them at an average rate, after deducting the park tax, of 3.15 cents per person? Has any city a better equipment, or a prompter and wider service? Does the city or State want to investigate our finances, as provided for in this utilities bill? The city already does that through the park tax, and the State through its tax commissioner; and the corporation income tax law also compels us to give full publicity, even if we did not already voluntarily give it. Are we in danger of issuing watered securities? The present corporation law, and the change of public sentiment in corporate financing, are safeguards against this. Do we need to be kept from 'merging or consolidating or absorbing'? Are we abusing our franchises? Are we retarding public development and growth? If we are doing any of these things, the Legislature can correct them."

The objections to the bill under consideration, as expressed by Mr. House, are in part as follows:

"Here is a bill pregnant with the greatest possibilities of danger, likely to do far more harm than good, more far-reaching in its provisions than any law on our statute books—and yet it threatens to become a law just because it embodies a more or less abstract idea which for the time is popular. Not one man in a thousand has read this voluminous measure or knows its full purport. Few members of the Legislature will find time to digest its provisions.

"To-day, government by commission is a fad. A few years ago it was 'Home Rule' and 'Municipal Ownership.' Regulation of public utilities has caught the popular fancy. Few stop to reason how or ask why. But it behooves the Legislature, at least, not to be swayed by every passing fancy, and not to mistake a popular phrase for a popular demand.

"The drastic character of this bill can hardly be overstated. It gives a commission of three men, appointed by the Governor, the most absolute and far-reaching power over the affairs of this company—its finances, construction, rates, equipment, operations, extensions, etc. It supersedes the board of directors and officers of the company in its internal affairs, and, in addition, has powers co-equal with the Legislature; and the only protection the company has is an appeal to the courts, and that is a protection only against abuse or misconstruction of the law, and not against ignorance or mistakes of judgment. If we deserved to have our rights and liberties thus taken from us, it might be different. But having done our full duty, our investments and our success should not be thus paralyzed, or at least jeopardized.

"A railway like ours is an extremely intricate and complicated proposition, involving many delicate adjustments of means to ends, and calling for the most expert and specialized kind of knowledge of all the multitudinous facts and conditions involved in its operation, having 4000 employees, operating 775 cars over 401 miles of track, and carried last year 202,632,546 passengers. An official of the road ignorant of his business might issue a seemingly harmless order, or recommend an apparently desirable innovation which could quickly produce disorganization and disaster. Every railway has learned this lesson at great cost. Isn't it evident that the best-intentioned commission might easily make serious blunders?

"If it be said that we are assuming that this proposed commission will abuse its broad powers, or not act thoroughly and honestly, let it also be said that to exercise great powers fairly involves not merely honesty, but knowledge. How can such a commission, having a comparatively small appropriation, act with full knowledge of the facts in the case of a large corporation?

"It costs the New York commission over $1,000,000 a year to get expert service, and no other service is fair or even worth having; how much will it cost Maryland? The commission is likely to spend its estimated $75,000 a year either in doing nothing of consequence because it is too conscientious to go at it blindly, or it will have to expend several hundred thousand dollars in doing intelligently what it will find, after it gets the facts, is already as well done as it can be done.

"Even if there were no other objections, it seems amost absurd for the taxpayers of Maryland to load themselves with this expensive commission to regulate its few utilities. If regulation is deemed to be necessary, there seems to us to be no good reason why the city should not regulate its own utilities, through its own functionaries.

"Not only does this company believe such a commission useless so far as actual needs are concerned in Maryland, but it is a positive menace to the prosperity of our city and State. The

counties of Maryland, above all things, need improved transportation and public service facilities. The State needs capital. We will need it to reach the rural sections. All these improvements are a matter of capital, and every one who has to do with obtaining capital, where public franchises or governmental interferences or uncertainties are concerned, knows how timid it is. It is unreasonable to suppose that men will embark in any enterprise over which such a commission has supreme power. This commission can willfully or unwittingly break any company within its jurisdiction. Will any capital take this chance? It might take it in New York or Massachusetts or Wisconsin, where the possibilities of profit are great; it will not take it here, where the chances of loss are still greater."

Mr. House refers to the danger that a commission would inevitably draw public service corporations more or less into politics, and suggests the appointment of a commission to study the question and report to the next Legislature.

Commenting on the advertisement of the company, the Baltimore *Sun* says editorially:

"While there is a widespread and, in our opinion, a just and enlightened demand for a commission in this State, the public will recognize the right of the United Railways Company to present its point of view with reference to legislation which vitally affects its interests.

"The attitude and methods of the street railway company are in striking contrast with those of the gas company. As the latter has been getting into politics the former has been getting out. Under the presidency of Mr. House the railway business, and not political campaigning and legislative trickery, has been the concern of the management. The result has been a steady growth in popular esteem and prosperity."

CLEVELAND TRACTION SITUATION

At a meeting with officials of the Cleveland Railway on March 10, Street Railway Commissioner Dahl insisted that some registering device be placed on the pay-as-you-enter cars, so that the conductors may keep an account of the fares that are dropped into the box. He suggested that the register show both inside and outside the car. General Manager J. J. Stanley stated that he would see what could be done.

In reply to requests for extensions of service in Newburg Heights and Lindale, Commissioner Dahl has taken a stand against extensions of any kind at present. He says that the amount of money required for purchasing new cars and converting old cars is so large that the company is in no position to extend the service. Petitions had been sent from both places and Mr. Dahl communicated his answer to the officials by letter. Objections have been made to the proposed 10-cent fare to Euclid Beach by the Humphrey Company, which owns that resort, and claims that an existing contract with the railway company requires a fare of 5 cents. It is said that the Humphrey Company will test its contract in the courts if the city and company insist on operating on the present plan.

The receivers' report for February is as follows:

Gross earnings from operation		$442,701.57
Operating expenses:		
Maintenance	$97,093.60	
Transportation	178,915.19	
General	29,830.33	305,839.12
Net earnings		136,862.45
Neutral street railway rental		936.68
Taxes		25,601.94
Interest rental		38,399.62
Dividend rental		73,378.00
Total		$138,316.24
Deficit		1,453.79

Three causes probably conspired to make the first monthly deficit that has occurred in the operation of the lines for a year. The immense amount of snow that was handled entailed a heavy expense. The month was a short one and the receipts may not have been in proportion to the fixed expenses charged in the interest and rental accounts. The third cause was the operation of the entire system at 3-cent fare. This cause will have to be considered for the next seven months, at least.

The report of operations made by Receiver Warren Bicknell, while the property was in the hands of the court, follows:

Gross earnings	$7,495,292.71
Operating expenses	4,912,609.27
Net earnings from operation	$3,032,683.44
Neutral street railway company rental	14,612.36
Interest	605,551.02
Surplus	$940,512.74
Balance, March 1	$196,172.52

In discharging the receiver Judge Tayler allowed him $7,500 in addition to the salary of $1,000 a month, as originally fixed. He also allowed Frank A. Scott an additional compensation for the time he served as co-receiver. The receivership covered the period from Nov. 13, 1908, to March 1, 1910. All debts of the Municipal Traction Company have been paid and the property turned over to the Cleveland Railway Company clear, although with no surplus to take care of immediate requirements and the conditions imposed by the new grant.

On the afternoon of March 10 the conductors and motormen who had been employed under the Johnson administration left their cars at the Holmden Avenue car house. The arrival of General Manager Stanley and Superintendent Radcliffe quieted the trouble, and the men continued at work. The report that the men would leave on the morning of March 12 also gained circulation. The company had plenty of extra men at the car houses to take out all cars and this had the effect of dissuading the men from causing trouble. Extra motormen were on many of the cars through the day. Some of the trainmen who held places during the Johnson administration have been dismissed, it is said, and their places have been given to men who struck to enforce the Municipal Traction Company, to carry out the terms of the contract made by the Cleveland Electric Railway.

It is said that many of the men employed by the Municipal Traction Company have arranged to go to Philadelphia as strike-breakers since they have lost places in Cleveland.

During a conference with the railway officials on March 11, Commissioner Dahl requested that the company surrender its grants in that portion of the city formerly embraced in the village of Collinwood and accept a new grant drawn in accordance with the Tayler ordinance. Mr. Stanley stated that this was a question for the directors of the company to decide. Councilman I. D. Laferty has prepared an ordinance providing for this extension and will probably introduce it at an early date. It will stipulate that the company must accept it within five days after its passage or not at all.

Plans and specifications for the new pay-as-you-enter cars have been placed in the hands of W. E. Davis of the Cleveland Construction Company, who will act as engineer for Commissioner Dahl for this special purpose. After he has passed upon the plans an order will probably be placed. Some of the new cars ordered by Receiver Bicknell have been placed in operation

On March 12, before leaving for New York, former Mayor Johnson cancelled the lease made between the Municipal Traction Company and the Cleveland Railway Company and all the papers signed in the negotiations conducted by himself and F. H. Goff. Mr. Johnson will probably not return to Cleveland until May. His friends are said to be very much worried over his health.

WESTINGHOUSE STORAGE BATTERY SOLD TO ELECTRIC STORAGE BATTERY

Announcement has been officially made that The Electric Storage Battery Company, of Philadelphia, has acquired all the patents and rights of the Westinghouse Storage Battery Company. The Westinghouse Storage Battery Company owned all the rights of the General Storage Battery Company, and the storage battery interests and patents of the Westinghouse Machine Company. From this time on The Electric Storage Battery Company will have the sole right to manufacture Westinghouse batteries.

NEAR VS. FAR-SIDE STOPPING IN CHICAGO AND OTHER CITIES

It has been decided that beginning April 1, 1910, all cars of the Chicago street railway systems in the district north of Twelfth Street, east of Halsted Street and south of Chicago Avenue will stop for passengers only at the near side of street intersections and after rounding curves. Before this rule went into effect, the conditions governing near and far-side stops in other cities were carefully studied for the Chicago City Railway Company to assist in determining which of these methods was the most suitable for Chicago. The following abstract of the report made to the company as a result of this study shows how many factors enter into the different solutions of this ever-present problem:

METHODS OF INFORMING THE PUBLIC AS TO CHANGES IN STOPPING PLACES

In cities where the far-side stop has been discontinued various means are used to indicate where cars stop. The following are some of the methods used:

White bands on poles.

Red band above white band to denote special stopping places.

White and blue enameled signs suspended from span wires and reading: "South bound cars stop here," etc.

Sign on pole at near side, reading: "Cars stop here," with hand pointing. Sign on far side, reading: "Cars stop next crossing," with hand pointing.

Small iron standard or post set near curb at stopping point, bearing a red ball or sign.

Heavy white mark on pavement to indicate where cars stop.

Corrugated iron plate embedded in pavement at side of track and bearing the words, "Cars stop here." The plate is located at the point where the rear platforms of the cars ordinarily stop.

Posters and signs in cars.

Newspaper publicity.

Uniformed inspectors stationed at the busy points to inform the public.

Several roads issue instructions that if passengers are waiting to board the car on the far crossing, motormen must motion to them to come across the street and also point to the sign as the reason for their doing so.

ANALYSIS AND SYMPOSIUM ON NEAR VS. FAR-SIDE STOPPING

The introductory summary of this chapter states that there were 15 affirmative and 21 negative answers to the question, "Is it expedient to stop only on the near side throughout all sections of the city?"

The analysis of this question and the one entitled "Is it feasible to eliminate the second or far stop in the congested area?" is presented separately under these sub-heads:

Effect on passengers; effect of changing established stops; the time element; power consumption; accident hazards; effect on street traffic. The analysis was based on a careful review of experience in other cities, an investigation of conditions in Chicago and an examination of opinions expressed by approximately 100 managers of electric railway properties in the United States.

The available testimony is so conflicting as to render it of little value in making a decision for any specific community. It appears that population, habits and customs of the people, arrangement of tracks, design of car, whether front platform is used for both entrance and exit, condition of pavement, width of streets, established direction and speed of car and vehicle traffic, relative location, with reference to street crossings, of traffic centers, *i.e.*, office buildings, department stores, theaters, depots etc., and other considerations are all important factors and will have a bearing on results obtained. The policies and methods followed in introducing the innovation will also influence the failure or success of the experiment. Therefore any attempt to forecast the results in any community can be little better than a guess. The effects of certain factors and combination of factors appear to be wholly different and sometimes at variance in different cities.

To illustrate: Detroit retains the far-side stop in the outlying districts but has eliminated the second or far stop in the downtown area. On the other hand, Salt Lake City has adopted the near-side stop in the outlying districts but insists on the second or far-side stop in the congested sections. Brooklyn and New York both tried changing to the hither stop, but the experiment was discontinued because of popular protest, though both John F. Calderwood, vice-president, and W. O. Wood, formerly general superintendent of the Brooklyn property, maintain that the "near stop only" is the correct principle and assert the experiments were not fair trials. Washington, D. C., has only the near-side stop at all streets, but the testimony of Mr. Todd, formerly associated with the Washington roads, is that the practice is more dangerous to pedestrians and vehicle traffic than the far stop.

QUESTION NO. 1.—IS IT FEASIBLE TO ELIMINATE THE SECOND OR FAR STOP IN THE CONGESTED AREA?

Conclusion.—Where safety stops are made on the hither side of the street intersections it is feasible in the downtown sections to load and discharge passengers at this one stop and discontinue the far-side stop.

Effect on Passengers.—The most serious obstacle to the complete success of this plan is, it compels passengers to walk in the street at least a car length to reach the rear platform. This feature will very likely arouse protest, but the criticism will probably gradually disappear as the public recognizes the saving in time achieved by doing away with the double stops. As a matter of fact, at many downtown intersections passengers now have to walk at least a car length beyond the crossing, as cars frequently go well beyond the crossing before making the stop.

Effect of Changing Established Stops.—There will be, at least for a time, considerable confusion in the minds of the public, and especially of strangers, until the new order is generally known and understood. People will continue to wait at the far crosswalks and will think they have a grievance when cars pass them by. The intensity and duration of this confusion and protest can be greatly modified if a campaign of notification is started well in advance of the date set for instituting the change. The degree of publicity given in advance will have a direct bearing on the success or failure of the innovation. It may be found expedient to make exceptions and continue the second stop on the far side to meet traffic conditions at certain curves, or to accommodate department stores, theaters and office buildings.

The Time Element.—There should be a net saving in time schedules by reducing the number of stops. But part of the gain made by eliminating one stop will be offset in some degree by vehicles cutting in ahead of cars, by longer time required for prospective passengers to walk to the rear step, and because of increased congestion at rear platform due to taking on a larger number of people at one stop, instead of dividing them between two stops as at present.

Power Consumption.—There will be economy in power consumption by reducing the number of stops, and a saving in brake shoes, wheels, track, etc.

Accident Hazards.—Opinions differ widely as to whether stopping only on the near side in the congested area increases or decreases accidents. One correspondent asserts that by eliminating the second stop, the hazard of boarding and alighting accidents will be reduced by half. Another manager testifies that boarding and alighting accidents have increased by discontinuing the second stop because passengers through habit, recklessness or ignorance attempt to board and leave cars in motion at the far crosswalk. The same conflict of opinion exists as to the hazard of collision with vehicles, pedestrians and cars. By stopping only on the near side there should be less accidents due to people running up from behind cars and grabbing the rear handle. Stopping at the near side would also have the tendency to make people face forward when

alighting, as they naturally face toward the crosswalk when leaving the car.

Effect on Street Traffic.—Eliminating the second stop will tend to expedite vehicular traffic because cars lining up behind a loading car will not block the intersecting street. On the other hand, it is quite possible car movements at busy intersections will not be so responsive to the signals of traffic police officers. For instance, if two cars approach at right angles simultaneously and both cars are required to wait to load and unload passengers at the near side stop, neither can respond immediately to the traffic officer's signals to come ahead and that intersection will be temporarily tied up until one or the other of the cars is free to proceed.

QUESTION NO. 2.—IS IT EXPEDIENT TO STOP ONLY ON THE NEAR SIDE THROUGHOUT ALL SECTIONS OF THE CITY?

Conclusion.—The conclusion is against adopting the near stop in outlying districts, based on a consideration of the type of cars now in use, prevailing condition of the paving and because of the general confusion that would follow. If a car could be designed having both entrance and exit at or near the front end, prospects would be better for successfully introducing the "near-side stop."

Effect on Passengers.—The necessity of passengers boarding and alighting in the mud applies with double force against the proposition of stopping only at the near side of all streets, because in the outlying sections streets are more apt to be badly paved, muddy and unsafe. There is a possibility that enforcement of the near side stop would give rise to popular demand for entrance at the front platform, and consequent nullification of the pay-as-you-enter idea.

Effect of Changing Established Stops.—The confusion in the minds of the public and especially of strangers caused by changing from the far-side to the near-side stop would be serious and could be justified only by very convincing arguments in favor of making the change. In the writer's judgment these arguments are lacking. The contention that if the far-side stop is abolished downtown it should, for the sake of uniformity, be abolished all over the system is not in itself conclusive.

The Time Element.—Changing from far-side to near-side stop in outlying districts would probably not affect the schedules materially either way. The tendency, if anything, would be to delay rather than to expedite, because of time lost at stops through teams and pedestrians cutting in ahead of cars and because of waiting for intending passengers to pick their way to the rear platform.

Power Consumption.—The effect on power consumption would be very slight, if any.

Accident Hazards.—Testimony conflicting. Some managers think the hither-side stop increases accidents and some believe it reduces the accident hazard. The probabilities are the net results would about balance, the increase in certain accidents offsetting the decrease in others.

Effect on Street Traffic.—Little, if any. Possibly the near-side stop would expedite vehicular traffic because it would give vehicles the right of way over cars at cross streets.

SUMMARY OF OPINIONS ARRANGED BY CITIES

Cities where far-side stop has been eliminated in congested areas only.—Boston (partially), Cincinnati, Cleveland, Detroit, Rochester, Savannah, Ga.; Seattle, Wash.; Toledo, Ohio.

Cities where far-side stop has been successfully eliminated throughout entire city.—Atlanta, Ga.; Charleroix, Pa.; Chattanooga, Tenn.; Columbus, Ohio; East Liverpool, Ohio; Ft. Wayne, Ind. (exceptions); Montreal, Canada; Norristown, Pa.; Philadelphia (exceptions); Pittsburgh (exceptions); Salt Lake City (exceptions); San Diego, Cal.; San Francisco; Stubenville, Ohio; Toronto, Ont.; Washington, D. C.

Cities where unsuccessful attempts have been made to change to near-side stop.—Baltimore, Brooklyn, Chicago, New York.

Special opinions unfavorable to near-side stop received from Duluth, Minn.; Indianapolis, Ind.; Minneapolis, Minn.; Vancouver, B. C., and others.

QUESTION NO. 1.—ELIMINATING SECOND STOP IN CONGESTED DISTRICTS WITH ABSTRACTS OF OPINIONS AND EXPERIENCE

Boston.—The general practice in this city is to stop on the far side of crossings. In some instances either as safety precautions or to accommodate the public the cars are stopped on the near side. When cars stop on the near side they do not also stop on the far side. A high Boston traction official in Boston believes it is safer to stop on the near side but thinks it is impracticable to adopt this as general practice because many of the streets are not suitably paved and are muddy in wet weather.

Cincinnati, Ohio.—Safety stop is made on near side at street intersections in congested districts. It is reported that passengers are becoming accustomed to the near-side stop and generally board cars at that side so that the second stop is not a frequent occurrence.

Cleveland, Ohio.—At a few extremely busy street intersections at which a traffic squad officer is stationed, and at all street intersections at which there is a crossing of another street railway line, cars stop at the near crossing only. It is reported that the result of this rule has been to expedite the railway service and it has not provoked public complaint. The effect as to increasing or decreasing accidents is believed to be very slight, if any. Eliminating the far-side stop has done away with the blockading of intersecting streets due to cars lining up behind a car that has stopped on the far side. In other words, with the near-side stop if the cars line up they do so without encroaching upon the intersecting crossing.

Detroit.—Police traffic regulations, adopted in July, 1909, provide that a compulsory stop be made at the near side of street railway crossings within the half-mile circle and the far stop has been eliminated at these points. In a few instances, where traffic requires, cars also stop at a distance of 100 ft. to 150 ft. beyond the crossing to accommodate passengers. The elimination of the stop on the far side has facilitated the movements of cars and reduced the chance of passengers getting on or off in front of approaching vehicles.

Rochester, N. Y.—The company has eliminated the second stop at principal intersections in the downtown district, but the company states it is too early to give results as to the effect on accidents, traffic, etc. However, the elimination of the second stop has lessened by about 45 per cent the time of movement of cars through the heavily congested streets.

Savannah, Ga.—The second stop has been eliminated in the congested area and the scheme is working satisfactorily. The company feels there is a decided gain both from the point of safety and in saving of power.

Seattle, Wash.—When safety stops are made on the near side of street intersections, the far-side stop is eliminated. Otherwise cars stops on far side. There is some confusion on the part of strangers, although sign-boards are posted conspicuously at the crossings, stating that cars stop on the near side only.

Toledo, Ohio.—In May, 1909, an ordinance was passed eliminating the stop on the far side in the downtown districts. In the outlying districts cars stop at the far side as formerly. The public seems better satisfied with the new arrangement and the company is enabled to give better schedules through the congested district. The management thinks the new rule does not affect the number of accidents one way or the other, nor that it either expedites or retards the movement of vehicle traffic.

QUESTION NO. 2.—CHANGING TO HITHER STOP IN ALL SECTIONS WITH ABSTRACTS OF AFFIRMATIVE OPINIONS AND EXPERIENCE

Philadelphia.—System seems somewhat mixed. Cars stop on the near side of all principal streets, i. e., streets that have car tracks on them or streets at which house numbering begins. Cars stop the second time on the far side of streets having double tracks and also at Broad Street; otherwise the far-side stop is eliminated. The company reports in effect: "The public for a while were confused but have at this time become thoroughly conversant with the methods and there is no trouble in controlling traffic. From the standpoint of the railway com-

pany it has saved us a great many collisions of cars, and a great many collisions with wagons. We consider it a very favorable method of operation. It expedites vehicular traffic. We can see no change in our schedules since we made the near-side stop from our former practice of far-side stop, hence it makes practically no change in the method of operation as regards speed."

As to the effect on strangers, this letter says: "The stranger does not concern us very much; he generally watches what the traveling public does and follows in its steps."

Washington, D. C.—This city has the near-side stop in accordance with legislation passed some eight years ago. There is, therefore, but one stop at all track and street intersections. The management says: "The near-side stop has been accepted practically without comment by the public and is therefore deemed to be satisfactory. We accept it because one stop is preferred to two and because we believe the number of car collisions and collisions with other vehicles and with pedestrians has been materially decreased. It seems to me that the practice expedites vehicle traffic because every driver on the intersecting street knows that at all track crossings and at all fire stops the cars will stop on the near side; therefore the drivers push ahead to take advantage of that stop. I believe the near-side practice expedites the movements of street cars because it renders unnecessary the passenger stop after making the necessary stop for intersecting line or fire runs."

However, in this same connection the testimony of a railway manager, formerly resident at Washington, is of interest. He states: "The experiment was tried in Washington and later in New York of stopping on the near side, and these trials seem to have demonstrated pretty conclusively the great advantage of stopping on the far side rather than on the near side of street intersections. From my own experience—especially while in Washington when the cars were stopped on the near side—I consider it very much more dangerous to pedestrians and vehicular traffic to stop on the near side rather than on the far side, except in the very congested downtown streets. It is possible to theorize to almost any extent in connection with this matter, but I think the actual results in New York give more data to base an opinion upon than any amount of theorizing would do. There can be no question that there are advantages in stopping on the near side of the street in thickly congested downtown districts, especially where there are intersections of different lines, but the disadvantages of the rule in parts of the city not thickly congested I believe more than offset the slight advantage there may be in stopping cars on the near side of street intersections in congested districts."

San Francisco.—Cars stop on the near side throughout the entire city and no second stop is made at the far side. The practice has been in vogue about five years. The management reports in effect: "No good reason exists why cars should not stop at near or first sidewalk, only, provided that weather or climatic conditions are such that rear end of car may be reached by passengers without wading through slush or snow. If pay-as-you-enter or pay-within cars are used, the above condition will undoubtedly cause serious inconvenience to patrons. The results from the standpoint of this company have been an appreciable saving in time required to make a round trip, due to the fact that San Francisco is gridironed with intersecting street railway tracks at which formerly it was necessary to come to a full stop before crossing and also after crossing, and passengers boarded and left cars at either stop to suit their convenience. It has also reduced the number of accidents due to the necessity of reducing speed of cars when approaching intersecting streets preparatory to stopping. Vehicular traffic is expedited by the near-side stop, particularly in the congested districts where police officers are stationed to regulate traffic—a standing car being more readily governed by the signal of officers than a moving car. We have found that one officer can render as efficient service in handling traffic as two could under the old conditions. Police regulations covering the movement of vehicles have been adopted to conform to the near-side stopping of cars. Vehicles which desire to diverge from a street on which cars are operated are required to proceed to the far side of the intersecting street, before crossing track."

Atlanta, Ga.—Cars in this city have always stopped only on the near side of all street crossings. Evidently the company and the public are satisfied with the rule. The management writes: "We have never been able to conceive any possible reason or invent an excuse for stopping cars on the far side of crossings."

Columbus, Ohio.—Cars stop on the near side only, in all parts of the city. Pay-as-you-enter cars are operated. P. P. Burington, secretary, believes that accidents to vehicles and pedestrians have been reduced by this practice. He states the public is fully satisfied. E. K. Stewart, first vice-president, says:

"We have stopped on the near side only, for 15 years. We find this rule is beneficial in that it reduces crossing accidents with vehicles to practically nothing and it is a protection against collision with fire department and also with pedestrians. With pay-as-you-enter cars in use in this city the stop on the near side puts passengers directly on cross-walk if the front exit is used."

Toronto, Ont.—Cars stop only on the near side except at one or two intersections in the downtown district where cars make the second stop on the far side to accommodate the employees and patrons of large departmental stores whose doors open opposite these points. The management believes the near-side stop reduces accidents, especially those due to boarding and alighting, because the number of stops is reduced. It also believes the elimination of the second stop in congested areas greatly facilitates the handling of cars and vehicular traffic by the traffic officers. The company makes the point that with the far-side stop, a driver of a vehicle in turning from a cross street cuts directly into the group of people who may be boarding or alighting from a car. If the car stops only at the near side this interference is avoided.

Salt Lake City.—Cars stop at the near side only in outlying districts and on both sides in the congested districts. This rule is explained by the fact that the streets are very wide, the distance from curb to curb being 92 ft. in most instances. Passengers load and unload from both platforms.

Montreal, Canada.—Cars stop only on the near side. There is now a popular agitation in the city to compel the company to change to the far-side stop.

Other Cities.—Other cities in which cars stop only at the near side are as follows: Charleroix, Pa., Steubenville, Ohio; East Liverpool, Ohio; Ft. Wayne, Ind. (Near side in paved streets; far side in unpaved streets); Chattanooga, Tenn. (Near-side stopping in effect two years. Superintendent states plan has worked very satisfactorily. Expedites vehicular traffic. Does not retard movement of cars. Reduces number of accidents); Pittsburg, Pa. (An endeavor has been made to adopt the near side stop in Pittsburg, but it is often necessary to violate the rule and stop on the far-side also); Norristown, Pa. (Near-side stop throughout the city); San Diego, Cal. (Near-side stop throughout the city). A number of important cities report they now stop on the far side but are considering changing to the near-side stop.

Question No. 2.—Changing to Hither Stop in All Sections with Abstracts of Negative Opinions and Experience

Minneapolis, Minn.—All passenger stops are made at the far side and at right-angle track intersections passenger stops are made at both the near and far crossings. The company says: "Our experience with the near-side stop has been such as to convince us that considerable confusion would inevitably result if the near-side stop were adopted. While regular patrons of the line might soon accustom themselves to the change, outsiders would be at a loss to know where they were expected to board a car. As far as we are concerned and with our local conditions we believe that our present practice with regard to stops is by far the most satisfactory."

Indianapolis, Ind.—Stops are made only on the far side. The company writes: "In the outlying districts under the plan of stopping cars on the near side, drivers of carriages, wagons, etc., and pedestrians crossing the street will take the chance of crossing directly in front of a car when they see it coming knowing that the car will stop on the near side if it stops at all, and will assume that it is going to stop; whereas if the car stops on the far side of the street they will not take these chances."

Duluth, Minn.—Cars stop at the far side and make both stops in congested area. The company writes: "One serious objection to stopping on the near side of intersections in this and other Northern cities is that passengers when alighting from or boarding cars at the rear end would be taken on or received at a point about 40 ft. from the crosswalk where no especial effort is made to keep the street free from snow, slush and dirt. Our reason for continuing the second stop is that it would be almost impossible to teach residents of the city, to say nothing of transients, at what streets cars stop on the near side to receive and discharge passengers, and at such points there would always be a few passengers waiting to board the car at the usual place on the further side of the intersection."

Vancouver, B. C.—Early in 1909 this city passed a resolution requesting the company to stop cars on the near side of street crossings on all paved streets and to continue stopping on the far side on streets not paved. The management says: "From our standpoint we find with the near-side stop that considerable time is lost, due to the fact that passengers very often stand in line with the street crossing and have to walk back the length of a car to mount the rear steps. We have had no serious accidents due to this new method of stopping which was begun May 15, but in the long run we are unable to say whether it will reduce or increase the number of serious accidents. In regard to vehicle traffic we find that teamsters and others when they see the car stop at the near side, proceed to cross the tracks, sometimes very slowly in front of the standing cars, which makes it necessary to stop long enough to allow them to pass. This time would not be lost if the cars stopped on the far side. The practice of stopping at the near side, we think, slightly retards the movements of cars as above stated, by passengers having to walk back the length of a car at the crossing. With regard to the street cars themselves, with the exception of the above mentioned delays, we would say the safety element is probably increased."

UNSUCCESSFUL EXPERIMENTS WITH NEAR-SIDE STOPS

Definite attempts previously have been made in four of the larger cities, Chicago, New York, Brooklyn and Baltimore, to change from the "far-side stop" to the "near-side stop." All four of these attempts are reported as failures. A brief review of these experiments and the explanations for their non-success will be appropriate.

Chicago.—Near-side ordinance passed in November, 1895. Amended in December to permit both far and near stop. Repealed in February, 1896. In regard to the experiment made in Chicago with the near-side stop, the following extract from a letter from a general manager, who was then connected with the Chicago City Railway Company, is interesting: "The only experience I have had in connection with stopping cars at the near crosswalk was while located in Chicago in the year 1895. Council passed an order requiring the street railway lines to stop all cars at the near crosswalks. This change, however, made suddenly and without sufficient notice to the public, caused considerable inconvenience to the patrons of the road and as a consequence, Council was called in special session for the purpose of considering the matter further and at that meeting the order previously passed was revoked and the old order of stopping at the far crosswalk was re-established. As I recollect, our experience during the time the cars stopped at the near crosswalks showed that the accident hazard was somewhat increased, particularly in connection with wagon collisions. If cars stop at the near crosswalk drivers of vehicles on streets intersecting with the traction line frequently take it for granted that an approaching car will stop at the near crosswalk and take chances on crossing the tracks that they would not take otherwise. In many cases the cars, failing to stop at the near crosswalk, collide with wagons. If it is not necessary at that particular point to stop to take on or let off passengers it becomes necessary to do so to avoid collisions with the wagons that would not have crossed the track had the driver not thought the car was to stop anyway. When the change in stopping was made in Chicago from the far side to the near side of the street intersections placards announcing the change were placed in all cars. Outside of this and the newspaper articles nothing was done. The trouble in having the public become accustomed to the change in the instance referred to was that not sufficient time was taken to educate the public to the practice before the same was put into effect. I believe the results might have been different had the practice not been changed on such short notice and more care taken to inform the public of the proposed change."

New York City.—An experiment with the near-side stopping was made in New York some years ago. It immediately aroused strong popular protest because passengers had to alight from cars at rear platforms and walk through the mud. The far-side stop was restored after a few days' trial with the near-side stop.

Brooklyn.—Concerning the results of the near-stop experiment in Brooklyn, the Brooklyn Rapid Transit Company writes as follows: "In 1903 an ordinance was passed changing stop to near side only. There were so many complaints from public (people having to alight in slush, etc., during bad weather account cars not stopping with step at crosswalk), that after a week's trial another ordinance was passed putting the stop back to the far side. There was a decrease in vehicle collisions but an increase in boarding and alighting cases account cars stopping with platform away from crosswalk. Streets, however, at this time were in poor condition. Stopping at near side expedites movement of traffic." A former Brooklyn official states that the experiment was ill-timed, as it began in slushy weather and failed for that reason. In his judgment the near side stop is practicable where paving is good. He thinks the experiments both in New York and in Brooklyn were not fair trials.

Baltimore.—In 1893 an ordinance was passed requiring all street cars in Baltimore to stop at the near side of street crossings and intersections. In 1905, in response to a general popular demand, the city council passed a rescinding ordinance requiring the company to stop on the far side of all streets. One of the arguments used at the time the change from the near stop to far stop was made was that passengers were obliged to alight in mud or snow when cars stopped on the near side. The company is opposed to the return to the near-side stop as it believes this would lead to popular agitation for an ordinance requiring the company to admit passengers by the front door. The company points out that if passengers are permitted to enter by the front door the very object of the pay-as-you-enter cars will be defeated. At crossings where safety stops have to be made on the near side the company is in favor of eliminating the second or far-side stop.

The report on the near and far-side stops was prepared for the officials of the Chicago City Railway Company by C. B. Fairchild, Jr.

An American consul in England has forwarded the names of seven towns in his district which have an electric car system, together with the total authorized mileage; mileage under operation, and the money invested. He states that much of the equipment of these lines was purchased in the United States, and as the companies are from time to time extending their service, making repairs and renewals, and linking up existing tracks, it is suggested that American firms follow these developments and endeavor to secure further orders in that district. The address of the consul can be obtained upon application to the Bureau of Manufactures, Washington, No. 4616.

ANNUAL CONVENTION OF MAINTENANCE OF WAY ASSOCIATION

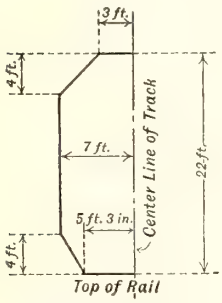
The eleventh annual convention of the American Railway Engineering & Maintenance of Way Association was held at Chicago on March 15, 16 and 17. The president of the association, William McNab, principal assistant engineer Grand Trunk Railway System, Montreal, Canada, was in the chair. During the week of the convention the Road & Track Supply Association held an exhibition of railway appliances and supplies at the Coliseum.

Those portions of the published committee reports presented before the Maintenance of Way Association which are of particular interest to electric railway officers are presented here in abstract.

IRON AND STEEL STRUCTURES

The committee on iron and steel structures submitted a number of suggested changes in the manual of recommended practice. Regarding clearances the committee suggested the following:

"When alignment is on tangent, clearances shall not be less than shown on the diagram. The width shall be increased so as to provide the same minimum clearances on curves for a car 80 ft. long, 14 ft. high, and 60 ft. center to center of trucks, allowance being made for curvature and superelevation of rails." Other recommended changes had to do with the character of materials and the manufacture of structural parts. This committee also suggested that a proper system of bridge inspection should generally include the following:



Standard Clearances Recommended

"(1) Inspection by the regular section forces, daily, or as often as they inspect the track under their supervision. The object of this inspection is to discover any damage to the structure from fire, flood, derailments or other accidents from traffic, or any displacement in the structure in whole or in part. This inspection, due to the lack of skill on the part of the section forces, must necessarily be superficial, and will rarely, if ever, do more than call attention to unsafe conditions arising from causes other than those of natural depreciation. No reports of such inspections need be made unless adverse conditions are discovered.

"(2) At periodic intervals of from one to six months there should be inspections by bridge foremen or others experienced in bridge repairs. These inspections should be more thorough than those of the section forces, and are intended to discover all the defects, arising from traffic, to which the bridge is subjected, and those due to natural depreciation or other causes. Reports of such inspections should be made to the one next in authority; preferably to the one most directly or primarily responsible for the safety of the structures.

"(3) Annual or semi-annual inspections are to be made by men experienced in the design and maintenance of bridges; preferably by those who are primarily responsible for their safe maintenance. The reports of these inspections should be filed, and in connection with an examination of office data will determine the safety of the structures, and be the basis for decisions as to repairs, reinforcements or renewals.

Regarding "Reinforced Concrete vs. Steel for Short Span Bridges," the committee held the opinion that reinforced concrete flat slabs or girders are not generally advisable for railway loads in spans exceeding 40 ft., but, as the great majority of structures carrying tracks over openings in the roadway are of spans less than 40 ft., the importance of these small structures is very great, and we believe the use of reinforced concrete for these small spans is desirable. The report of the committee included specifications for the erection of railroad bridges and a review of the development of metal bridge building in America.

COMMITTEE ON ELECTRICITY

Because of its recent appointment the committee on electricity did not present definite recommendations. During the year subcommittees had studied the subjects of clearances, transmission lines and crossings, maintenance organization, and relation of electric to track structures. In the discussion of the subject of clearances, "the sense of the sub-committee was that the clearances between the limiting lines of equipment and the limiting lines of third rail structures, which are shown as 1½-in. in the report referred to, are insufficient and that a greater clearance should be established. In order to determine the limiting clearance that could be established it was decided to secure data showing limiting lines of clearances of third rail conductor structures, the limiting lines of rolling equipment and the limiting lines of third rail structures with respect to maintenance of way structures from various railways. The sub-committee is also collecting data from various railways electrified or partly electrified and also interurban lines with heavy traffic which may possibly interchange with steam lines electrified or not electrified. This sub-committee is communicating direct with the representatives of the various railways, and a circular has also been issued by the secretary of the association requesting data pertinent to the subjects outlined." Sub-committees on insulation and electrolysis are expected to make a report shortly.

RAIL

During the year the committee on rail visited a number of rolling mills and observed tests on rail joints at the Watertown arsenal. The board of direction instructed this committee as follows:

"(1) Consider revision of Manual; if no changes are recommended, make statement accordingly.

"(2) Continue the investigation of the leakage and failure of rails and present summary of conclusions drawn from reports received.

"(3) Report on the results obtained from the use of open-hearth and special alloy steel rails, and chemical composition of such rails.

"(4) Present report showing diagrams or photographs of typical characteristic rail failures corresponding to the adopted classification of rail failures.

"(5) Report on any recommended changes in specifications for steel rails heretofore adopted, and prepare specifications for open-hearth steel rails.

"(6) Present recommendations on standard rail sections.

"(7) Consider the rail joint question and recommend design and specifications.

"(8) Reconsider and report any recommended change in standard drilling for rails as given in the Manual.

"The committee is arranging for a series of tests on rails of different sections and weights of both Bessemer and open-hearth steel, manufactured by different mills, with a uniform chemical composition for each kind of rail. The tests are to embrace drop tests, tests on revolving machine at Steelton, tests on reciprocating machine at Sparrows Point, and a service test in track, the work to be done under the supervision of a man working under the committee."

The rail committee offered a set of specifications for rail, both Bessemer and open hearth, for consideration and discussion.

WOODEN BRIDGES AND TRESTLES

The committee on wooden bridges and trestles considered the revision of specifications for structural timbers and studied the principles and methods of pile driving. Specifications for Southern yellow pine timber, Douglas fir and Western hemlock timbers were submitted. The report of this committee included 40 printed pages devoted to wooden and concrete piles and pile-driving methods.

OTHER COMMITTEES

Special committees reported on standard specifications for cement and on the question of co-operating with the national conservation committee.

The committee on rules and organization submitted typical rules for the government of employees of the maintenance of way department.

The ballast committee studied methods of making physical tests of stone ballast, proper thickness of ballast, methods of grading gravel ballast and treatment of foul ballast.

MASONRY AND BUILDINGS

The committee on masonry recommended changes in specifications for cement and presented new specifications for plain and reinforced concrete. It also presented a new "recommended practice" for designing reinforced concrete structures. A progress report on waterproofing masonry illustrated by a number of engravings showing ballasted floor bridges, was presented.

In the report of the committee on buildings specifications for five-ply tar and gravel or slag roofs over board or concrete were presented. Designs for tool houses were illustrated.

TRACK

The committee on track presented specifications for spring and rigid frogs, including requisites for switch stands.

RAILWAY LOCATION

A committee on the economics of railway location presented a report of 50 printed pages supplemented with tables and curves. The work of this committee, according to the report, "has been mostly toward presenting to the association a few conclusions which will give a practical base or foundation on which to establish a method of estimating the relative economic values of various locations. In some cases the committee's conclusions are radically different from accepted views of the past, but the conclusions are founded on practical tests and conditions as they exist, so far as possible.

"There are two fundamental points which must be considered in order to base deductions with reference to the various elements entering into the question of economic location, namely: Power and Resistance. In many different practical tests variations in results have occurred owing to differences in standards of maintenance of track and equipment, and differences in details of construction of equipment. Exact rules for determining the power and resistances, which will apply in all cases, cannot be deduced; but approximations can be made of sufficient practical value when applied for the purposes intended."

A report on the study of train and curve resistance was included. A part of the conclusions of this committee were as follows:

"Resistance of freight trains shows practically no change of resistance between 7 and 35 m.p.h.

"It is recommended that for freight train resistances between 7 and 35 miles per hour the formula $R = 2.2\,T + 121.6C$, be used for comparing freight train ratings on different lines and grades, in which R = total resistance on level tangent, T = total weight cars and contents in tons, C = total number of cars.

"In order to equalize resistance on curve and tangent, curves shall be compensated .035 per cent per degree of curvature. Effect of curve resistance is dispelled more slowly at slow speed than at high speed.

"Superelevation and depression should be equally divided between high and low rail of curve, in order to avoid shock in entering curve and exceeding maximum gradient on runoffs of curves.

"Condition of roadway maintenance has a great effect on train resistance.

"Condition of equipment has a great effect on train resistance.

"Train resistance is greater in cold weather than in warm. Per cent of rating on account of variation in temperature, as shown in body of report, is recommended for use.

"Resistance of individual cars of same weight but of different type shows considerable variation. Sufficient data are not yet available to determine just how much the difference is.

"Starting resistance varies from 10 to 40 lb. per ton, depending on loading, temperature and character of maintenance of roadway and equipment.

SIGNS, FENCES AND CROSSINGS

This committee reported on ways and means for securing a proper quality of fence wire to resist corrosion, continued an investigation of the use of concrete fence posts and investigated crossing flangeways. A proposed crossing specification included the following:

"At crossings where paving is required to conform to street specifications, treated ties should be used, laid on a bed of crushed rock, gravel or other suitable material not less than twelve (12) in. in depth, placed in three (3) in. layers, each thoroughly rammed to prevent settlement. Vitrified tile drains not less than six (6) in. in diameter, leading to nearest point from which efficient drainage may be obtained, should be laid on either side of and between tracks, parallel with ballast line and outside of ties. Where block paving of greater depth than the height of the rail is used, a substantial malleable iron or steel chair with base not less than 48 sq. in. should be provided, the rail to be fastened through the chair to the tie with screw-spikes. On long stretches of track, laid on streets paved with blocks, the use of a special rail section is advantageous to avoid the use of chairs. With such rail tie plates and screw-spikes should be used. Top of rail should be ¼ in. above the paving. A suitable form of rolled metal shape should be fitted into the space between the head and base of the track rail to provide a flangeway of not less than 2 in."

The following observations were presented regarding concrete fence posts:

"1. Concrete fence posts will heave very little and in most cases not at all; posts set from two to five years ago are still in almost perfect alignment.

"2. They appear sufficiently strong for all practical purposes after having been properly cured and set. A cedar post of dimensions identical with the average concrete post would weigh about one-fourth as much and is about four times as strong when new, but this only brings out the fact that the cedar post is stronger than necessary and that the concrete post with its lesser strength is yet strong enough to serve its purpose, and has a longer life.

"3. The claim that a concrete post reinforced with steel forms a lightning protector appears reasonable.

"4. They resist the action of fire and decay, and will not float and cannot be displaced as easily as wood.

"5. They must be handled carefully in loading and unloading, and be well cured before being set.

"6. They are much heavier than wood posts and the cost of distributing and setting is about 25 per cent greater."

TIES

The committee presented the replies to a circular letter, recommending that each railroad keep an accurate record of the life of its ties. Metal and composite ties were described and illustrated. The committee stated that: "The oldest steel ties in track (accessible to your committee), in any considerable quantity, are the inverted trough-section Carnegie ties Seven hundred and fifty of these ties were put in during the latter part of 1900, and 350 additional the following spring. These ties were placed in the track near Osgood, Pa., and have been in the track eight years. The trough-shaped ties weighed 199 lb. each. Ten of these ties taken from the track during July, 1908, weighed 1,790 lb., or an average weight of 179 lb. per tie—a loss of 20 lb. after eight years' service. These ties showed no appreciable wear under the rail."

USE OF STEEL TIES IN INTERURBAN AND STREET RAILWAY TRACKS

Individual reports from the engineers of electric railway lines using steel ties included the following:

Twin City Lines.—Report through Geo. L. Wilson, the chief engineer, as follows:

"We have in use about 1,000 Carnegie steel ties. These were all laid on straight line, about one-half of them being used on a street which had a macadam surface and the balance on a street paved with brick, where the ties were embedded in con-

crete. This work was all located in St. Paul. They have been in use about one year, all on tangent. The street grade is approximately 1 per cent. In paved street we have had no difficulty in regard to the ties holding the track. On the macadam street the ties did not seem at first to hold the track rigidly, but seemed to work somewhat in the stone ballast. We have had no notice of trouble from this cause recently."

Utica & Mohawk Valley Railway is using the steel ties quite extensively and Mr. French, engineer of maintenance of way, makes the following report:

"I would say that to date we have used 100 Carnegie steel ties having top flange 4½ in., bottom flange 8 in., height 5½ in., length 7 ft. We have used 4572 Carnegie steel ties having top flange, 4 in., bottom flange 6 in., height 4¼ in., length 7 ft. Of this number, 625 were used under 7-in. T-rail having 6-in. base and 3-in. head and weighing 95 lb. per yard; 297 were used under 7-in. T-rail having 5½-in. base, 2⅛-in. head and weighing 70 lb. per yard; 1062 ties were used under 100-lb. standard A.S.C.E. open-hearth T-rail; 2706 were used under 95-lb. 9-in. tramhead girder rail. All of these ties were used in our standard concrete construction, paved with standard vitrified block grouted with Portland cement."

Joliet & Southern Traction Company advises through L. D. Fisher, chief engineer, "that we have 300 of these ties in our road in paved streets. These ties are used with 7-in., 80-lb. T-rail, and are spaced 5 ft. center to center. The tie and the base of the rail are all embedded in Portland cement concrete, with 6 in. underneath the tie. Under these conditions our track maintains good surface and gage."

Boston Elevated Railway Company states, through A. L. Plimpton, civil engineer, "that our use of this form of tie has been very limited, we having used it only on a short length of track on Washington Street, city proper, in connection with relaying the tracks last season on concrete base. These ties are particularly well adapted to such work, as track is bonded much better to the concrete than in the case of wooden ties."

Syracuse Rapid Transit Company, E. P. Roundey, engineer maintenance of way, reports, "that we have several thousand in use, but they are all in paved streets, with concrete ballast. We have not used any in open track construction."

The Denver City Tramway Company, John Evans, chief engineer, reports:

"We have used 2,500 such ties, all laid in May, 1908, all in conjunction with concrete paving; on Arapahoe Street, Sixteenth to Eighteenth Streets, and on Eighteenth Street and Larimer to Broadway; all in straight track. To date, track held to perfect surface, gage and line. Wherever the steel tie has been used together with a concrete pavement, we have experienced trouble from cracking of such pavement."

Oklahoma Railway Company, W. A. Haller, general manager, writes:

"We have about 4 miles of 6-in. base Carnegie steel ties in use in concrete street railway construction. We have none of these ties in use in ballasted roadbed. We have found that the one bolt clip used for attaching the rail to the tie is inadequate, even in a paved street, and we judge it would be still less reliable when used in open track construction. We have experienced some trouble with joint ties working loose in the concrete, the primary cause of this being that the attachments and rail joints first become loose, and the vibration and jar then causing the tie to work loose in the concrete. In our recent construction, however, we are using a continuous rail joint and exercising more care in placing the concrete."

San Antonio Traction Company reports that it laid 500 ft. of double-track with Carnegie steel ties in 1908, spaced 5 ft. The ties were laid in concrete and are holding perfectly to date.

WOOD PRESERVATION

The committee suggested revisions in the Manual and presented revised specifications for treatment and for analysis of coal-tar creosote. Several reports on the life of ties and the condition of treated timbers were given.

STATEMENT OF J. F. CALDERWOOD REGARDING CONEY ISLAND FARE DECISION

J. T. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit Company, has made the following statement in relation to the decision of the New York Public Service Commission, First District, upholding the 10-cent fare to Coney Island:

"A city transportation company is a business organization and as such it cannot afford to sell its service at a loss any more than a merchant can afford to sell his stock at a loss. It may attempt such a state of affairs, but sooner or later, and most generally sooner, it is confronted with a necessity of increase of fare, a decrease in facilities or an application for a receiver.

"A merchant sells woolen goods and after a time an additional tax is placed upon the wool. A loud cry goes up against the increased wool tax by the ultimate consumer, and who pays this tax—the consumer. But the ultimate consumer of street car service makes no outcry against taxes or burdens that are imposed upon the merchandizing of transportation when the disposition is to reduce the fare. Instead the consumer may enjoy the distress of the very concern upon which he must place dependence for reasonable and constant daily transportation.

"The receiverships of all the transportation evils that follow in their wake mean nothing to the consumer—not until they have arrived.

"The recent decision of the commission specifically called attention to the difference in character between the riding on the Interborough's subway and the riding to and from Coney Island. Throughout the greater part of the length of the subway there is a heavy and constant local traffic of short riding—a profitable business and almost unknown to the lines that run in Brooklyn to the ocean.

"The commission's decision called attention to the expense to the railroad company of this specific Coney Island traffic by reason of its extreme fluctuations in volume, that the business provides no steady income; on the contrary, it requires the company to be prepared to handle excessive numbers of passengers in a single day or within a few hours at irregular intervals and during a short period of the summer months, thus requiring a large amount of extra equipment and power capacity. This calls for an investment of an abnormal amount of capital upon which the fixed charges must be paid, and this additional capacity is idle a large part of the year.

"Street car traffic, to bring not necessarily an adequate income, but any net income to the operating company, should, in the first place, have consistency day in and day out, its volume varying but slightly, and in the second place, a fairly generous mixture of short-haul traffic. These conditions do not pertain in Brooklyn. On the contrary, we carry a large portion of our traffic to Manhattan in the morning and take it home at night.

"Conditions on the Coney Island lines have never been comparable with those in Manhattan, where a man may ride from the South Ferry to City Hall, another will take his place from City Hall to Union Square, and from Union Square to Central Park another, and still another take his place to Harlem. Thus the particular car seat will earn several times the regular fare where the Coney Island passenger from Manhattan pays one fare. Moreover, the cars in Manhattan returning in the opposite direction, do quite as well. Long trains in the reverse direction from Coney Island during rushes are practically empty.

"These Manhattan conditions are the conditions that must be approached in Brooklyn before any of the transportation companies can regard its Coney Island lines as other than a drag on its revenue.

"The sale of transportation is a plain and sane business proposition and is subject to the same analysis as any commercial business.

"When traffic conditions change on the routes to Coney Island with increased density and regularity of traffic sufficient to make the net rate per passenger profitable, then a less rate per passenger than is now charged will be considered by this company, but not until then is any reduction consistent with good business

principles. You cannot buy something for 5 cents and sell it for 3 cents with a transfer and make money."

Commissioner Maltbie is quoted as follows regarding the decision:

"For my own part I believe that the establishment of a differential rate, charging 5 cents on the surface lines and 10 cents on the rapid transit lines would equalize the traffic. It is a well-known principle of railroad economics that by charging different rates for what is substantially the same service from different points you equalize the traffic in a manner that is profitable alike to railroads and shippers. This principle could well be applied to the Coney Island traffic.

"Thousands of people who are not on the ragged edge, and to whom an extra 10 cents is no object, would continue to travel to Coney Island on the rapid transit lines despite having to pay a higher fare. Since the establishment of places like Luna Park and Dreamland that class of patrons at the island has largely increased. Thousands of bathers who go down every day during the summer would continue to patronize the more expensive lines. If, at the same time, there was a 5-cent fare on the surface cars, much of the overcrowding of these rapid transit lines would be done away with, and the poorer people would have a chance to reach the seashore at the lower fare.

"As to the commission's majority opinion, I cannot help feeling that it is something of a Scotch verdict. We did not have before us all the evidence necessary to enable us to come to a general conclusion as to the justice or injustice of the 10-cent fare."

HEARING ON ELEVATED SERVICE IN NEW YORK

A hearing was held before Commissioner Eustis, of the Public Service Commission of the First District of New York, on March 11, 1910, to inquire into the service on the elevated lines of the Interborough Rapid Transit Company. H. H. Whitman, of counsel for the commission, and T. L. Waugh, of counsel for the company, were present. Mr. Whitman filed for record the statement showing the number of cars owned, the number of revenue passengers carried, and the miles of track operated on the elevated and subway lines from 1906 to 1909, published in the Electric Railway Journal of Feb. 26, 1910, page 356.

D. L. Turner, chief of the bureau of transit inspection of the commission, presented a series of charts showing observations which he had made on March 1, 1910, in conjunction with representatives of the company. Observations made on the Second Avenue line at Thirty-fourth Street, from 7 a. m. to 9 a. m., showed that 21,580 passengers passed Thirty-fourth Street in trains bound south which provided 17,000 seats. From 4:30 p. m. to 10:30 p. m., 30,930 passengers passed Thirty-fourth Street in trains bound north which provided 26,300 seats. The period of greatest overload southbound was from 7:30 a. m. to 8 a. m. when the passengers numbered 6380 against 4750 seats. Northbound, the period of greatest overload was between 6 p. m. and 6:30 p. m. with 6690 passengers against 5100 seats.

Observations made on the Third Avenue line at Thirty-fourth Street from 7 a. m. to 9 a. m. showed that 42,610 passengers passed Thirty-fourth Street in trains bound south which provided 35,350 seats. The period of greatest overload was between 7:30 a. m. and 8 a. m. with 11,400 passengers against 7000 seats. During the period of two hours mentioned, 94 seven-car trains passed south. Northbound travel on the Third Avenue line, observed at Forty-second Street, showed that between 4:30 p. m. and 10 p. m. 67,980 passengers passed in trains which provided 55,800 seats. The period of heaviest overload was between 6:30 p. m. and 7 p. m. when 10,360 passengers passed the point of observation in trains which provided 8750 seats. Between 5 p. m. and 7 p. m., 88 seven-car trains passed Forty-second Street bound north.

On the Sixth Avenue line, observations were made at Fiftieth Street. From 7 a. m. to 9 a. m., 18,680 passengers passed the point of observation in trains bound south which provided 16,700 seats. The period of greatest overload was between 8 a. m. and 8:30 a. m. with 6840 passengers against 5250 seats. From 4:30 p. m. to 7 p. m., 25,790 passengers were transported in trains bound north which provided 21,700 seats. The period of greatest overload was from 6 p. m. to 6:30 p. m. with 8430 passengers against 4550 seats.

On the Ninth Avenue line observations were made at Fiftieth Street. From 7 a. m. to 9:30 a. m., 24,920 passengers passed that point of obesrvation in trains bound south which provided 24,000 seats. The period of greatest overload was between 8:30 a. m. and 9 a. m. with 7440 passengers against 5950 seats. Between 4 :30 p. m. and 7 p. m., 25,230 passengers passed in trains bound north which provided 22,850 seats. The period of greatest overload was between 5:30 p. m. and 6 p. m. with 7440 passengers against 5250 seats.

Frank Hedley, vice-president and general manager of the company, said that he had been furnished with copies of the charts showing the observations, but that he had not had time to consider them carefully. He explained that the company had recently ordered 100 cars for service on the elevated lines and that it was in the market for 100 more cars. Of the order of 100 cars which had been placed 70 had been received, and of these 40 were in service and 30 were being equipped in the shops of the company and would be placed in operation shortly.

The elevated cars were 47 ft. in length as compared with 51-ft. cars for the subway. The only reason for installing side doors was the excessive length of the subway cars. Side doors reduced the seating capacity by eliminating the side seats in the center of the cars. Mr. Hedley did not favor equipping elevated cars with side doors. The company had platform men at all the principal stations. In some cases, there were as many as 8 or 10 men at a station, and this number would be increased, if, in the judgment of the representatives of the company and the engineers of the commission, that would facilitate train movement.

Mr. Eustis suggested that it might be advantageous to attach an extra car to each train during the rush hours for the use of through passengers. This car would overhang the station platforms, but it could be labeled and through passengers would soon become accustomed to it.

Mr. Hedley said that this plan had been tried a few years ago, but that it was not the success which Mr. Eustis seemed to think it could be made. He had conferred recently with officers of his company who were familiar with the results of this experiment, and they did not feel that such a plan would work better now than it did before. Mr. Hedley thought that the type of folding gate in use on the elevated lines in Brooklyn was not more efficient than the rigid gate with which the elevated cars of the Interborough company were equipped.

The company was very busy preparing for the installation on March 14, 1910, of the new schedule which had been prepared for the subway, and Mr. Hedley felt that the new schedule could be made a success by the co-operation of the officers of the company and the engineers of the commission. It was difficult to prepare and introduce a schedule of this kind at short notice, but by the latter part of the week commencing March 14, 1910, after the necessary adjustment had been made, and the crews were more familiar with the runs, the schedule would be carried out in full. For this reason Mr. Hedley asked the commission for a postponement so that he and the engineers of the commission could consider the charts in conjunction and evolve a plan for the operation of trains which would work to the betterment of the elevated service, particularly the service between 7 p. m. and 10 p. m. The hearing was then postponed until March 18, 1910.

The total mileage of electric railways in Canada in 1908 was 989. The gross earnings for the year were $14,828,936, and the net income was $4,716,308. The return of accidents on electric railways shows 68 persons killed and 2139 injured. Of the fatalities 11 were passengers, seven employees and 50 other persons. Of the injured 133 were passengers, 213 were employees and 618 were other persons.

THE PHILADELPHIA STRIKE

Monday, March 14, 1910, marked the tenth day of the general sympathetic strike in Philadelphia, and the twenty-fourth day of the strike of the motormen and conductors of the Philadelphia Rapid Transit Company. It was particularly significant because it was the beginning of a new week and showed many deflections from the ranks of the strikers. It also showed that the leaders of the unions were hard pressed because the committee of 10 in charge of the strike as a last resort appealed to the organized drivers of milk, meat and grocery wagons in the city to refuse to take out their wagons on Tuesday morning, March 15. Moreover, a set of resolutions was adopted declaring a boycott against the banks and urging "the working men and women of America and their sympathetic friends to withdraw all the funds they have on deposit with banks, thereby teaching the bankers that without the money of the workers their institution of finance must be a failure."

The return of so many men to work in the various trades was undoubtedly hastened by the public announcement of a number of large employers of labor that they would close their plants indefinitely unless the men returned to work by March 14. The movement for a general sympathetic strike also was hurt by employees of the shoe trade, numbering 5000, and paper box makers, numbering 2000, who refused, through their representatives, to join in the sympathetic strike. These men said that they intended to abide by the contracts which they had with the firms by which they were employed.

On March 10, the Merchants' and Manufacturers' Association inaugurated its campaign to minimize the effect upon business of exaggerated reports sent broadcast from Philadelphia concerning conditions prevailing in the city. The association reprinted 50,000 copies of an editorial which appeared in the Philadelphia *Public Ledger* of March 7, 1910, entitled "Mendacious Journalism," and has distributed these reprints far and wide. On the same day the State Federation of Labor in session at New Castle, Pa., adopted resolutions endorsing a State-wide sympathetic strike if necessary. Mayor Reyburn displayed to the newspaper men many letters indorsing his action in maintaining law and order during the strike.

On March 10, Director of Public Safety Clay advised J. Burwood Daly, counsel for the men on strike, that the proposed mass meeting at the Philadelphia Ball Park would tend to result in the disturbance of the public peace and would not be permitted. Despite this, however, the strikers congregated at the park and formed for parade with the City Hall as their destination. The congestion which resulted grew so great as the march was continued toward the city that the police dispersed the marchers between Mount Vernon and Spring Garden Streets by turning the crowds into the side streets.

On March 12, Seth Low, president of the National Civic Federation, announced that that organization could act only upon the request of both parties to a dispute, since it was not invested with authority to enforce its decisions. On the same day the Philadelphia Rapid Transit Company granted an extension until Wednesday, March 16, for its former employees to apply for reinstatement. It had been stated that the families of some of the men suffered because of the lack of ready cash, and Mr. Kruger announced that the company would advance all those who returned to work such sums as they might need to rescue their families from want, and collect the amount advanced from the pay of the men by retaining a small sum weekly from their wages. At the same time, Mr. Kruger pointed out that the company was fast filling its ranks, and that the company could not be held responsible if delay and disappointment should follow the filing of applications. On March 14 the company announced that it had employed a total of 4350 men, and as conditions were practically normal on its system the necessity did not exist for making public daily the number of cars operated and the number of passengers carried.

A conference was held in the office of George H. Earle, Jr., one of the representatives of the city on the board of directors of the Philadelphia Rapid Transit Company, on March 14, 1910, between Mr. Earle and the representatives of the men on strike, at which the men demanded that the company take back all the old men. When this proposition was submitted to Mr. Kruger, he replied that the plan was impossible on account of promises made by the company to the men who remained loyal and to those who have been employed since the strike. In explanation of this conference Mr. Earle said that it was at the request of a friend who had asked him if it would not be possible to settle the strike by an interview with the representatives of the former employees.

THE AUDITOR'S RELATION TO THE OPERATING EXECUTIVE*

BY A. J. LAMB, TOLEDO RAILWAYS & LIGHT COMPANY

Within the last few years there has been a marked change in the relations of the auditor with other departments and with the executive officer. Many of us can remember when in most companies the auditor was looked upon as the man who kept the books of the company and who watched out that the company collected all the money due it, and did not over-pay any of its creditors. With the purchase and consolidation of electric railway properties into large systems it became necessary to have some basis for comparing the different properties controlled by one company, and also to contrast their operation with that of other companies. This necessitated the formation and adoption of a uniform system of accounts.

In many cases it was the auditor who analyzed his own reports and brought to the attention of the executive officer the contrasts shown. This work has continued until at the present time the collection, tabulation and analysis of the details in our business is considered of great importance; and in most companies the auditor is regarded not only as one of the officers of the company, but in many cases is employed directly by the board of directors. The independence which such an arrangement gives him is of supreme importance, since it not only enables him to present a true and accurate statement of the operations of the company without regard to the results shown, but places him in a position where he can command the respect of the heads of other departments, and where his requests for information will be complied with. This last condition is essential; many of us can recall times when the request for special information from which certain deductions were to be made was considered by some operating officials as of no importance, with the result that the auditor was furnished with estimates and not with the correct data.

Now that the value of our reports is appreciated and the necessity for accurate details is known, we should strive to make our relations with other officers most cordial and co-operative. This is especially true in many companies where the clerks in various departments devote most of their time to the work of the operating department, but also make reports to the auditor. Since in most cases the auditor is unable to investigate such reports and to some extent must depend for their correctness upon the interest of the clerk in the work, such relationship will tend to secure prompt and accurate reports. The auditor should avoid throwing too much work upon the other departments by asking for information which may not be necessary. In other words, it is of more assistance to the executive officer to have information of especial importance furnished at times and to have his attention called by a report of especial condition, rather than to place upon his desk a large volume of statistics which will require too much of his time to analyze properly.

The auditor should keep in touch with what is done outside of his own department, should make frequent inspection of the company's properties, and should have a general knowledge of its operation, as such an understanding will be of great assistance to him in checking the information furnished to his department. It will enable him to tell at a glance whether or not

*Abstract of paper read before the Central Electric Accounting Conference, Fort Wayne, Ind., March 12, 1910.

large items of expenditure have been charged to the right accounts.

In very large companies the auditor should employ his own clerks in all departments; but in smaller companies this is not practicable, since one clerk can do the work for both the accounting and operating departments; but in all cases the auditor should have charge of the storeroom and should employ his own storekeeper. This is essential in order that a proper check may be had upon the storeroom and upon the proper distribution of supplies issued.

The auditor is keeping the history of the road for the benefit of those who own it, as well as for those who operate it. Therefore, he should be very careful that his reports show the true condition of the property, and his responsibility for the reports of the company, and particularly those furnished to the stockholders, is unquestionable. This is clearly recognized by the Interstate Commerce Commission, for the auditor is held personally responsible for the accuracy of the accounts.

In conclusion, I think that we should continue in the future what we have practiced in the past, which has been not to arrogate the importance of our position, but rather to make our position secure by the value of our services to those in control of our properties. Perhaps our greatest failing as a class is to study out a comprehensive form of monthly report and to rest content with furnishing this information month after month, depending upon the devotion of hours of the time of our executive in order that he may derive some benefit from the information. I think you will agree with me that if it is necessary to choose between the two the executive would much prefer that we should furnish fewer figures each month, but should study these figures ourselves with an intelligent knowledge of the condition and operations of the company, and call to his attention by a few pointed facts any unusual conditions. In other words, instead of being an accurate machine for the combination of figures we should place ourselves in the position of the one who is responsible for obtaining the best results, and then each month, after careful study of our own reports, ask ourselves what they contain of interest.

20,000-KW TURBO UNITS FOR CHICAGO

The Commonwealth Edison Company of Chicago, although working still on the second portion of the new Quarry Street generating station, which will have six 14,000-kw turbo-generators when completed, announces two entirely new generating stations. These are to have a rating of 120,000 kw each, are to be built in a new locality on the North Branch of the Chicago River near Roscoe Street and California Avenue about 6 miles northwest of the center of the downtown district. The present generating capacity of the Commonwealth Edison Company, including that portion of the Quarry Street station now under construction, is about 240,000 kw, divided as follows: Fisk Street, 120,000 kw; Quarry Street, 84,000 kw; miscellaneous plants and storage batteries, 36,000 kw. The addition will thus double the generating capacity of the company, making it 480,000 kw.

Only one of these 120,000-kw stations will be started at present. The salient feature of this power house will be an equipment of turbo-generator units of 20,000 kw rating. There will be six of these in each of the power houses, and the initial installation for the first station will be two units. These machines will be by far the largest electrical generating units ever built. When the Fisk Street station was designed about eight years ago, the company demanded from the manufacturers the largest electrical generating units made up to that time. These, which were also the first large power-house steam turbines, were 5000-kw machines. Later, with the rapid progress of the art, the Fisk Street station was rearranged, and again the company demanded machines of a greater rating than any previously existing, installing 12 000-kw units. When Quarry Street was designed the company made another step in advance, requiring 14,000-kw units. Now plans are well under way for a new generating station, and orders have been closed with the manufacturer—the General Electric Company in each case—for turbo-generators which will have a rating of 20,000 kw, for continuous service. The buildings will be designed by Messrs. Holabird & Roche, architects, while the general mechanical design is in the hands of Frederick Sargent, of Sargent & Lundy, consulting engineers. The electrical equipment is planned by the engineering staff of the Commonwealth Edison Company. The Curtis steam turbines and General Electric alternators will not differ greatly in appearance from the 14,000-kw units at the Quarry Street station. The generators will be 2300-volt, 25-cycle, three-phase, 750-r.p.m. machines. The dynamo potential will be raised in the transformer house to 9000 volts, 12,000 volts or 20,000 volts, as required. In the turbine room the units will be placed in a row and will be spaced 44 ft. between centers. This is only 3 ft. more than the corresponding distance in the Fisk Street station, with 12,000-kw units compared to the 20,000-kw machines in the new station under description. It is also noteworthy that the turbine room in the Northwest plant will be but 70 ft. wide, which is only 5 ft. greater than at Fisk Street. A rating of 120,000 kw is placed in the length of 276 ft.

It is extremely instructive to note the marked economy in boiler-room and engine-room area, particularly the latter, which is obtained by the 20,000-kw units of Northwest station compared with the 12,000-kw units of Fisk Street station. The comparison may be tabulated as follows:

COMPARATIVE BOILER-ROOM AND ENGINE-ROOM AREAS PER UNIT.

	12,000-kw Unit (Fisk St. Station), sq. ft.	20,000-kw Unit (Northwest Station), sq. ft.
Boiler-room area (per unit)	5,740	8,800
Engine-room area (per unit)	2,665	3,080
Total for both (per unit)	8,405	11,880
Boiler-room area (per kilowatt of rating)	0.478	0.440
Engine-room area (per kilowatt of rating)	0.222	0.154
Total for both (per kilowatt of rating)	0.700	0.594

These figures, it is to be remarked, include all auxiliaries, which are placed on the engine-room floor in each case. The net result is that at Fisk Street, with 12,000-kw units, a kilowatt of output is produced on 0.700 sq. ft. of area, while in the new Northwest station, with 20,000-kw units, a kilowatt of output will be produced on 0.594 sq. ft. of area. Naturally, the net saving of floor space is much more marked in the engine-room, where it is 30 per cent, but the net saving in the boiler-room and engine-room combined works out to the satisfactory figure of 15 per cent.

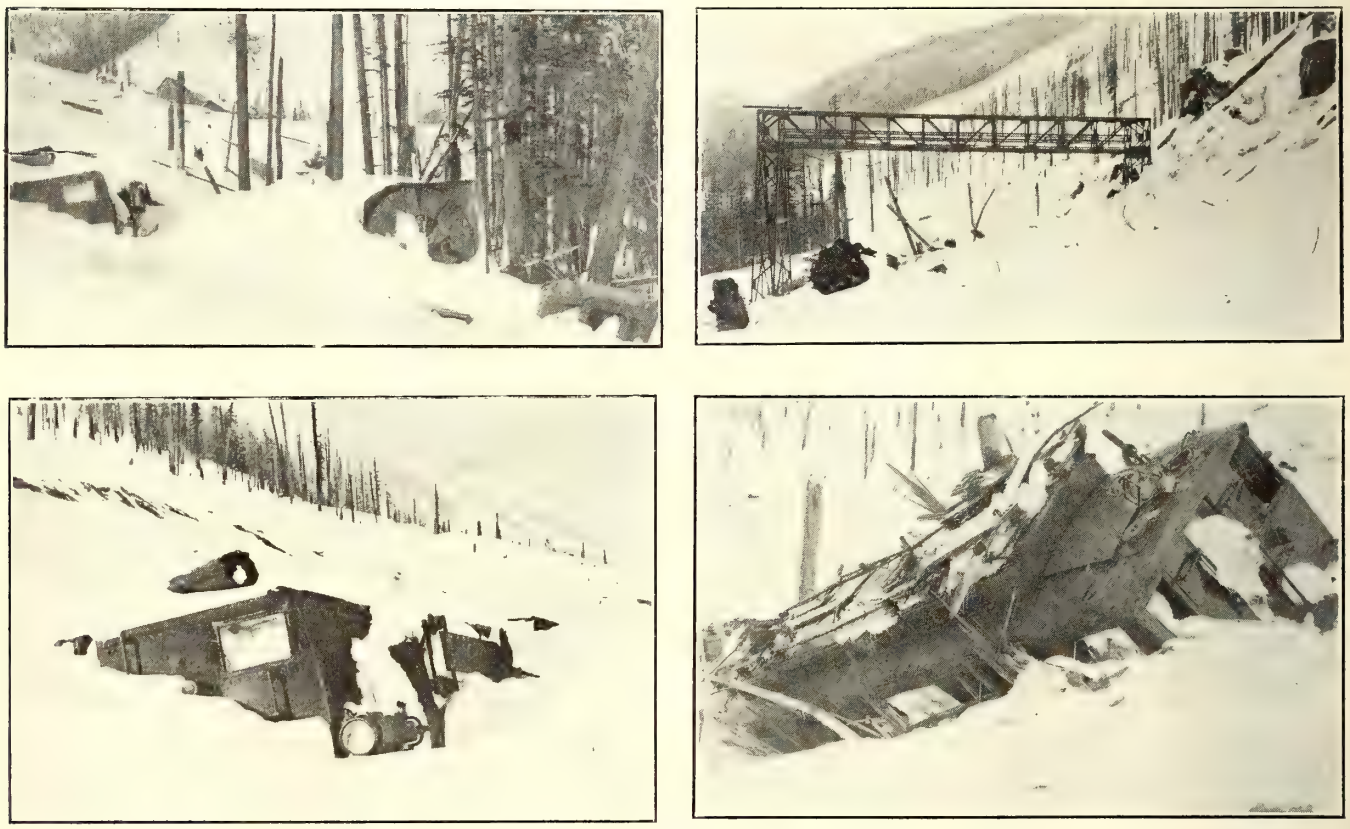
The 20,000-kw units stand 28 ft. above the floor line and are 15 ft. in diameter. The whole height of the unit above its condenser is 35 ft. 7 in. The condenser for each turbine is placed under it and extends out on either side. Each of these 20,000-kw units will take 260,000 lb. of steam an hour. The new plant is designed for a maximum boiler pressure of 250 lb. to the square inch. Heretofore the maximum pressure in stationary power-house practice has been from 200 lb. to 225 lb. The initial installation will consist of two generating units and about one-third of the ultimate boiler capacity, with two of the six stacks.

An international exposition of "Electricity as Applied to Railway Service" will be held in St. Petersburg during the month of August. It is stated that through this exposition the Russian Government desires to fix its ideas concerning the electrification of Russian railways. A special trial track has been provided, on which all exhibits of electric railway motor cars will be tested on the level and with varying grades and loads. The exhibitors will be permitted to sell an exhibit during the display or at the conclusion of the exposition. The president of the organizing committee is General Sitenko, 24 Sadovaja, St. Petersburg, to whom inquiries in English may be addressed by intending exhibitors.

THE ACCIDENT ON THE GREAT NORTHERN

Further particulars are now available of the accident from an avalanche which occurred to the electrical equipment of the Great Northern Railroad at the Cascade Tunnel, Washington. The slide which caused the disaster occurred at Wellington at the western end of the tunnel at 1:45 a. m. on March 1 and carried into the gulch south of the tracks all four of the electric locomotives, with two trains, three steam locomotives and a steam rotary snow plow. One of the electric locomotives was in the inspection shed which was also swept off by the avalanche. A considerable part of the overhead equipment, including one anchor bridge, was also destroyed.

It is impossible as yet to determine the extent of the damage to the electric locomotive, but as the distance which they were carried was not very great, it is thought that the injuries will consist more of that caused by the effect of the snow on the insulation of the motors, contactors, etc., rather than any mechanical damage. If much of the apparatus has to be rewound, it will probably be some six months before electric service can be resumed, owing to the fact that the locomotives will probably have to be taken to Seattle or some other city for repair. The accompanying photographic views of the disaster were obtained by this paper through the courtesy of Dr. Cary T. Hutchinson, consulting engineer for the electrical equipment of the Cascade Tunnel.



Views Showing the Disaster to the Three-Phase Equipment of the Cascade Tunnel—Great Northern Railroad

W. C. Brown, president of the New York Central & Hudson River Railroad, makes the following reference to the electric railway interests of the company in his annual report for the year 1909: "In pursuance of the plan outlined in last year's report for the consolidation and merger of several electric railway companies into a corporation to be known as the New York State Railways, various exchanges of capital stock have been made with the result that this company's holdings in electric railway corporations now stand as follows: New York State Railways, 133,650 shares; Ontario Light & Traction Company, 600 shares; Rochester Electric Railway, 1043 shares, and Rochester & Suburban Railway, 2404 shares."

DETROIT ORDINANCE

The Committee of Fifty appointed by Mayor Breitmeyer, of Detroit, a little over a year ago to study and prepare a solution of the street railway problem on the expiration of Detroit United Railway franchises, has completed its work and has submitted it to the Common Council in the form of an ordinance. The plan of settlement will be presented to the Detroit United Railway for its approval, if it may be secured, before submitting to the voters for approval in May, should the Council accept the plan of settlement proposed.

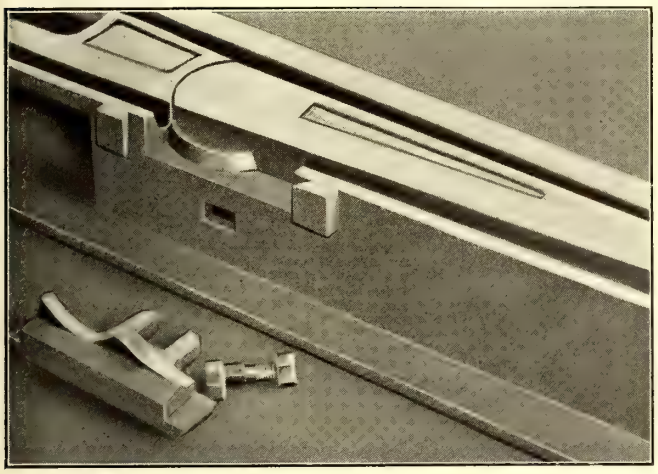
The ordinance follows in many respects the Tayler settlement adopted in Cleveland. It provides for an initial fare of eight tickets for a quarter for eight months after the acceptance of the franchise, but allows an increase or decrease of fares within prescribed limits, at stated intervals, to enable the company to pay a dividend of 6 per cent upon an appraised valuation of its property and upon the cost of future extensions. The ordinance provides the way in which the appraisal shall be made. A maximum fare of eight tickets for a quarter between 5 a. m. and 8 a. m. and between 4:30 p. m. and 6:30 p. m. and six tickets for a quarter the rest of the day, with universal transfers, is permitted if necessary to pay the dividend mentioned above. The minimum that may be required is 10 tickets for a quarter. The cash fare in all cases is to be 5 cents. The present fare shall be maintained on the present low-fare lines.

The company shall establish a depreciation, replacement and renewal fund which is to be credited with 3 cents for each car-mile run. Provision is made for purchase by the city at any time on two years' notice. A non-salaried commission of five is given power of supervision of the details of operating the systems. The expenses of this commission shall be paid by the company, but are not to exceed 1 per cent of the company's operating expenses except during the construction period when they may be higher.

The Tokyo Electric Railway has completed an electric railway between Shinagawa and Akabane, a distance of 20 miles.

PINLESS TONGUE SWITCH

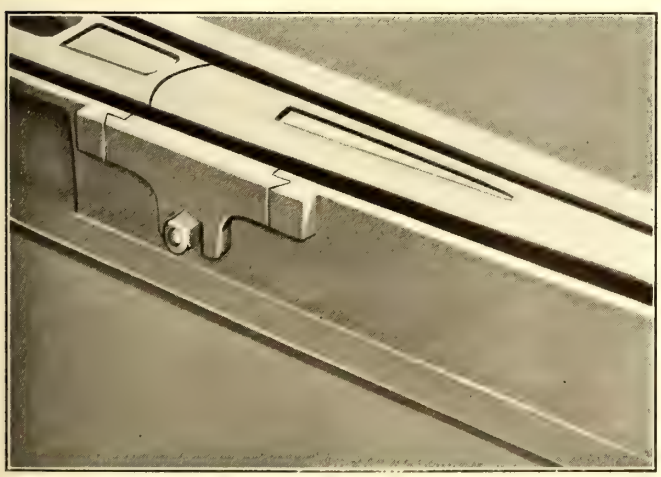
Hadfield's Steel Foundry Company, Ltd., the English manufacturers of special work at Sheffield, have recently brought out a type of tongue switch which eliminates the use of a pin at the heel of the switch. This is the point at which the tongues of switches, especially of trailing switches, receive a great deal of wear, and manufacturers contend that the rocking of the tongue on this point is due in large measure to the wear on the pin from the blow which it receives from the car wheel, and that the pin is necessarily subject to a great deal of wear



Switch with Check Piece Removed

because it is almost directly under the portion of the tongue which receives the blow of the wheel.

Of course, if no pin is used some method must be provided for preventing the heel from rising, and also to hold it on a center so that the tongue always has a radial movement. The former result is obtained by undercutting the body casting of the switch at the heel and giving a corresponding taper to the lower part of the heel of the tongue, as shown in the illustration. To prevent the tongue from creeping forward, the lower part of the heel has a projection on each side, so that it can be cast in circular form. A corresponding circular bearing is



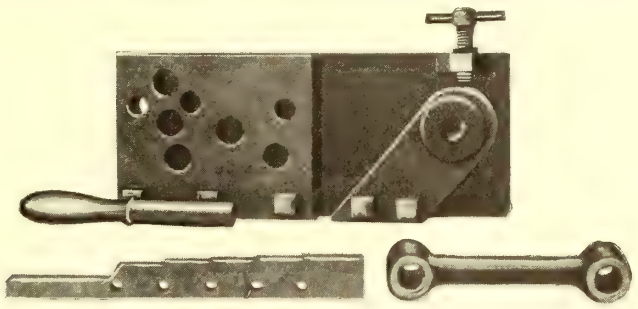
View of the Pinless Tongue Switch with the Check Piece Set in Position

arranged in the body casting to provide a bearing. This construction, of course, makes it necessary to have a removable piece on the check side of the body casting in order to place the tongue in position. This check piece is shown in place in one illustration and removed in another view. When in position it is held in place by a bolt and nut.

The switch is made of Era manganese steel, and all bearing parts of the body castings and tongues are ground carefully to provide a perfect surface.

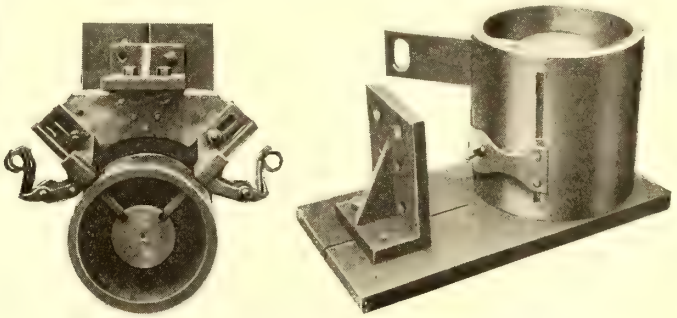
PRECISION TOOLS IN A RAILWAY SHOP

The accompanying cuts illustrate the details and the assemblies of a drilling jig for the accurate spacing of the holes in the brake hangers of various trucks; also a brush-holder



Details of Device for Accurate Drilling of Brake-Hanger Holes

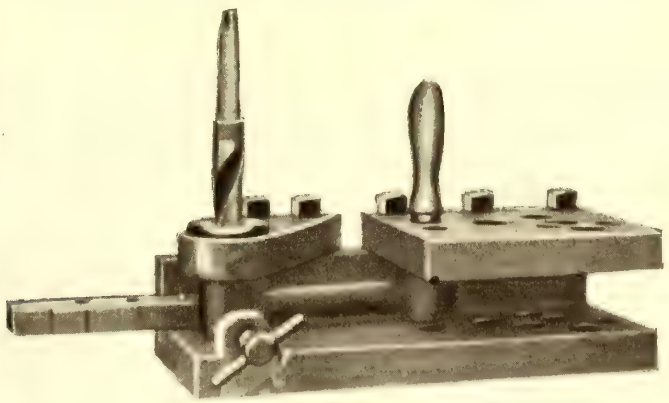
jig which avoids all necessity for counting the commutator bars to secure the correct mechanical and electrical assembly of the brush holder parts. These tools are of home design and have been found very useful in the shops of a large electric railway company. The brush holders when installed are set for a ten-



Assembly and Parts of Brush-Holder Jig

sion of 4 lb. per square inch on the brushes, and if one holder should break loose the entire yoke is returned to the shop to secure the most accurate adjustment.

The same company makes its armature bearing inspections twice a week and furnishes its inspectors with four knife-like



Brake Hanger Ready for Drilling—The Different Holes Correspond to the Various Hangers

gages about 12 in. long and, respectively ⅛ in., 3/32 in., 1/16 in. and 1/32 in. thick. The number of every motor which is found to have a pole clearance as low as 1/32 in. is placed on a list of "Danger" cars. This list is turned over to the day foreman, who orders in for new bearings all cars thus listed after he is through with the disabled cars of the day.

A new section, 11½ km long, of the Metropolitan Railway Company's subway system in Paris will soon be opened for traffic. It extends from the Porte Clignancourt to the Porte d'Orléans.

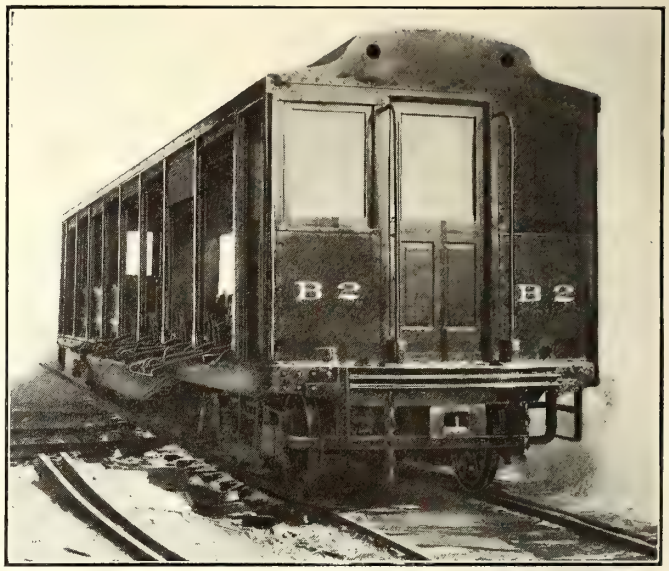
STEEL BAGGAGE CARS FOR THE HUDSON & MANHATTAN RAILROAD

Two all-steel baggage cars have recently been built by The J. G. Brill Company for the Hudson & Manhattan Railroad Company. The main dimensions follow:

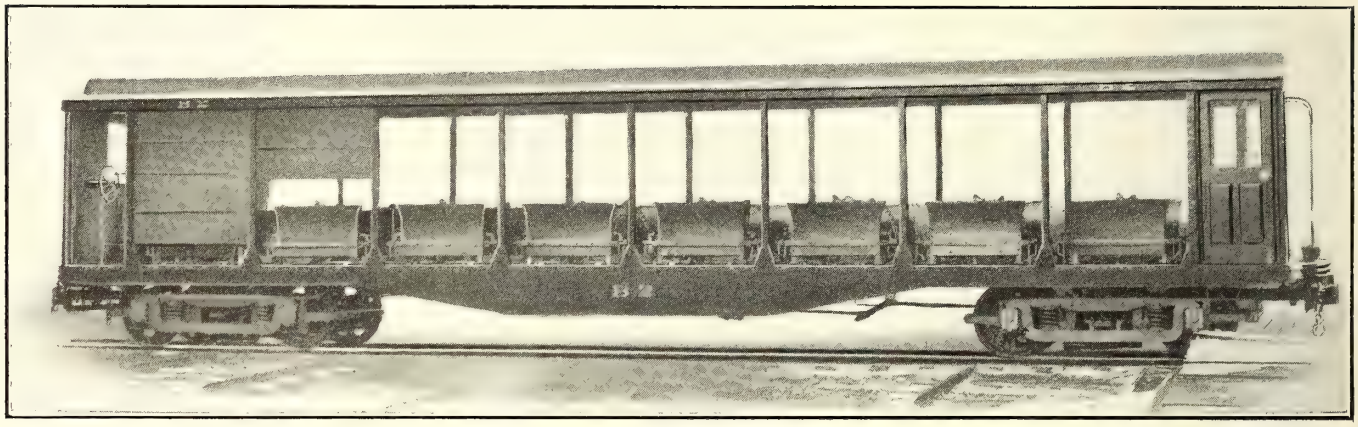
Length over platform end sills	49 ft. 7 in.
Length over anti-climbers	50 ft. 7 in.
Length between truck centers	34 ft. 6 in.
Width over side sills	8 ft. 6¾ in.
Width over side plates	8 ft. 7¼ in.
Height from top of rail to top of side sills	3 ft. 8⅛ in.
Height from top of rail to top of flooring	3 ft. 9⅞ in.
Height from top of rail to top of eaves	10 ft. 4 7/16 in.
Height from top of rail to top of roof	11 ft. 8 7/16 in.
Height clear from baggage tracks to side plates	6 ft. 3 in.
Height from top of rail to center of coupler	2 ft. 5⅜ in.

BAGGAGE OPENINGS

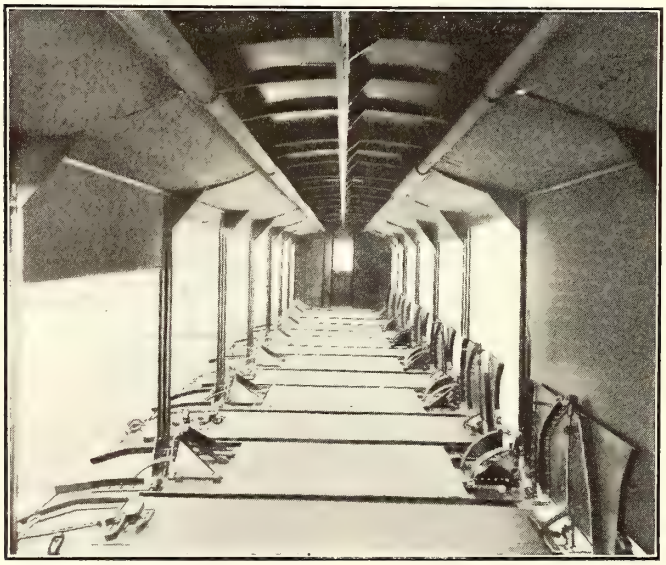
The special feature of these cars is the openings between the steel T side posts to permit the admission of baggage trucks. There are eight of these openings on each side of each car. Each opening is fitted with a pair of pressed channel guide tracks with flaring sides for the baggage trucks as well as an apron for bridging the distance between the car floor and the station platform. The baggage truck tracks are pressed out of ⅜-in. plate while the apron is pressed out of 3/16-in. plate. Each compartment is fitted with a holding device for locking the baggage trucks in position on the car as well as with a support to hold the apron in an upright position when the car is closed and loaded. Waterproof curtains close the upper part of each compartment. These curtains slide in guides provided for them in the side posts and are fitted with horizontal steel channel batons at intervals to maintain them in place. At the upper ends the curtains pass over spring rollers and when raised the lower part of the curtain is 6 ft. 3 in. above the baggage truck tracks.



Hudson & Manhattan Baggage Car—End View with Several Aprons Lowered



Hudson & Manhattan Baggage Car—Side View with Baggage Aprons Raised



Hudson & Manhattan Baggage Car—Interior View, Aprons Lowered on One Side, Raised on the Other

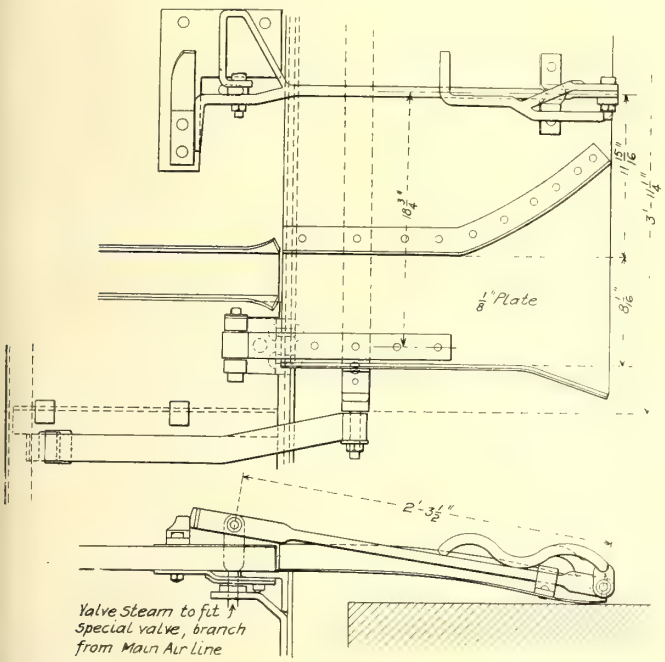
The locking device for holding the baggage trucks is ingenious and consists of the apron itself, two guide levers and two swinging hooks at each end of each truck compartment. These guide levers act upon the swinging hooks in such a manner that when the apron is raised the levers at either end force the swing hooks together and clamp the baggage trucks so as to secure them against any motion relative to the moving car. The locking device for the platform aprons consists of a central handle and bar, the latter extended to the flooring and having a foot and a hook so formed as to brace the apron in the vertical position when the handle is turned. The handle hooks over the top of the apron plate when in an upright position. The bottom ends of these bars interlock with the air brake system so as to exhaust the train line pressure and so keep brakes set unless all aprons are raised.

CAR CONSTRUCTION

The construction of the car itself is of interest. The load is carried on the side sills which are of the fish-belly type 22 in. deep at the center and 9 in. over the tracks. Each side sill is built up of 3½-in. x 3-in. x 7/16-in. rolled steel angles for top and bottom members, united by a 5/16-in. plate. The center sills are of 8-in. rolled steel channels weighing 11¼ lb. per foot, and braced at intervals to insure their safety resisting the buffing strains. These sills are reinforced at the bolsters where the top flange is cut away by a 7-in. steel channel weighing 9¾ lb. per foot and are also reinforced beyond the bolsters. The

center sills are bent outward between the bolster and the end sill to allow of a movement of the drawbar.

The end sills are built up of 3½-in. x 3½-in. x 7/16-in. rolled steel angles, with a ½-in. front plate and are secured to a Hedley anti-telescoping buffer. The angles are then returned at the ends to meet the side sills to which they are securely spliced. The bottom part of the end sill is also reinforced by a ½-in. pressed plate, forming a guide and support for the drawbar, which is of the Van Dorn pattern. Each car has two cross-beams built up of two 6-in. steel channels 8 lb. per foot, and fastened to the side sills by knees and supporting and bracing the center sills by ¼-in. gusset plates. Both body bolsters consist of ¾-in. x 9-in. wrought-iron top members and 1-in. x 9-in. wrought-iron bottom members connected to the side sills through malleable iron fillers. The body bolster center filler is of cast steel.



Hudson & Manhattan Baggage Car—Side Elevation and Plan of Aprons

The side posts consist of nine 3½-in. x 3-in. 8½-lb. rolled steel T-sections per side, fastened to the side sills by ¼-in. outside gussets and through the ⅛-in. floor plates by pressed pockets. The roof is built up of 1/16 leaded steel plates, riveted to roof framing and made water tight by soldering.

The side plates are of ¼-in. pressed angle section and to them are attached the side posts, carlines and roof sheets. The carlines in line with each pair of side posts are 3½-in. x 3-in. T-sections, 8½ lb. Between each of these carlines are two 1½-in. x 1½-in. x 3/16-in. rolled angle carlines which extend from side plate to side plate. The T-section carlines are braced to the T-posts by double gussets. A 2-in. x 3-in. x 3/16-in. rolled angle purlin extends throughout the length of the car and is secured to all carlines.

The flooring between baggage truck tracks is laid with 1¾-in. matched yellow pine.

THE MABCO POWER BRAKE

The Momentum Automatic Brake Company, New York, announces that it has made several important changes in the construction of its momentum brake, which was first described in the ELECTRIC RAILWAY JOURNAL of May 1, 1909, and which is now known as the Mabco power brake. The changes do not relate to the principle of the brake, but in the way of reducing the space required for the braking equipment. In part this result has been obtained by building most of the metal parts of the highest grade of crucible steel. A further saving in space has been made by redesigning the wooden clutch blocks whereby an increased friction surface is obtained in less than half the former dimensions. Experience has shown that the clutch blocks have an average life of 30,000 miles. The company claims that the new design makes use of 90 per cent of the total tractive effort of the car by converting it into braking power on the momentum principle when an application is made, and that braking the car in this manner gives the maximum braking efficiency without skidding the wheels.

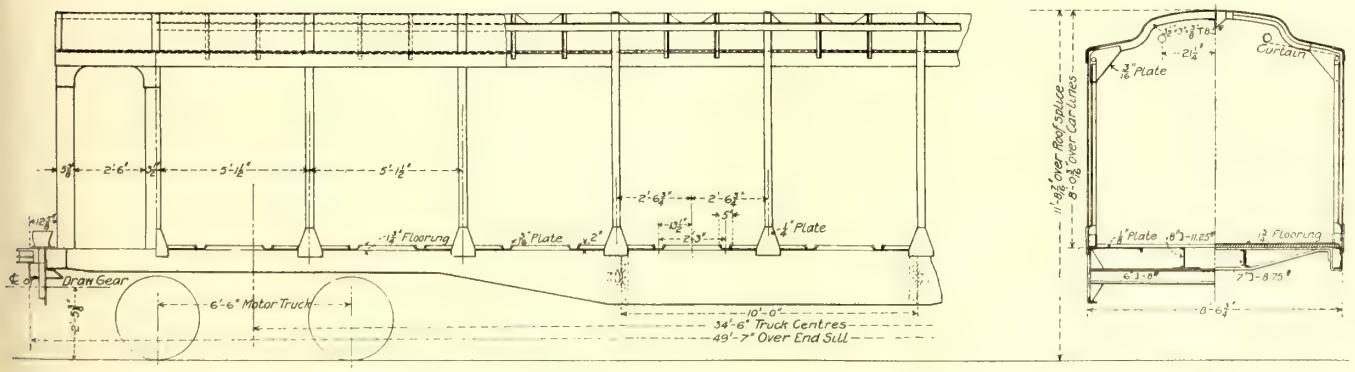
The company has eliminated the old method of winding a chain or cable around the drum on the axle to apply the brake shoes. The drum is now direct-connected to any standard brake rigging which is in use on the car. One-sixth of a revolution of the drum is all that is necessary to apply the brake for the emergency stop and about one-tenth of a turn for ordinary stops. Several other improvements have been made on this brake.

MEETING OF THE CENTRAL ELECTRIC TRAFFIC ASSOCIATION

The Central Electric Traffic Association met in the office of the chairman, A. L. Neereamer, at Indianapolis, on March 11.

The greater part of the day was used in checking weights for a table of estimated weights on standard commodities which will be published later by the chairman. The question of issuing the proposed tariff on milk and cream was postponed in order to give the lines which are interested time to investigate the subject thoroughly. Consideration of the proposed Merchants' Despatch Freight Tariff was also postponed for the purpose of allowing the roads interested an opportunity to prepare full data on the subject. There was some discussion on the subject of issuing a distance table for the association, but action was postponed for the present.

Owing to the fact that the Central Electric Accounting Conference had a meeting on March 12 at Ft. Wayne and several of the members of the Traffic Association desired to be present, the traffic meeting was shortened to one day. The next meeting of the Traffic Association will be held at Lima, Ohio, on April 16.



Hudson & Manhattan Baggage Car—Side Elevation and Cross Sections Showing Framing

EXHIBITS AT MAINTENANCE OF WAY CONVENTION IN CHICAGO

The following is a summary of the principal exhibits of electric railway interest at the Coliseum in Chicago this week, made in connection with the convention of the American Railway Maintenance of Way Association:

American Steel & Wire Company, Chicago: Right of way fencing, rail bonds, triangle mesh concrete reinforcement, nails and wire, electrical wires, W. & M. telephone wire. Represented by J. M. Holloway, L. P. Shanahan, H. A. Parks, B. H. Rider, H. S. Durant, R. C. Moeller, C. S. Knight.

American Valve & Meter Company, Cincinnati, Ohio: Water service supplies, float valves, Economy switch stands, Anderson's safety switch lock. Represented by J. T. McGarry, F. C. Anderson, Burton W. Mudge.

American Vulcanized Fiber Company, Pittsburgh, Pa.: Vulcanized fiber for general electrical insulating purposes. Represented by John Barron, manager railway department.

Adams & Westlake Company, Chicago, Philadelphia, New York: Signal lamps, lanterns, electric railway tail lamps, pressed steel street car headlights, railway specialties. Represented by W. H. Baldwin, assistant general manager; G. L. Walters, railway sales manager; H. G. Turney, A. S. Anderson, C. B. Carson, W. J. Pierson.

Adreon Manufacturing Company, St. Louis and Chicago: Clarke tension set tie plate, Security rail brace and tie plate. Represented by E. L. Adreon, Jr., president, and William Miller, vice-president.

American Rail Joint Company, Toronto, Can.: Reinforced angle bars. Represented by T. D. Beddoe.

American Railway Signal Company, Cleveland, Ohio: Electric automatic signals, electric switch locks, electric dwarf signals, power and switch indicators, relays and electric interlocking apparatus. Represented by G. L. Weiss, H. M. Abernethy, H. D. Abernethy, J. L. Burrows.

American Rolling Mill Company, Middletown, Ohio: American ingot iron corrugated culverts. Represented by G. H. Charls, Ray Frazer, Jos. De Frees, F. M. Beach, J. Aupperte, G. Ahlbrandt, A. B. Nilder, Howard O'Neal, C. C. Fouts.

American Well Works, Chicago, Aurora, Ill.: Deep well and centrifugal pumping machinery with any style of power, air compressors, well drilling and prospecting machinery. Represented by Geo. W. Igo, C. O. McLean and A. W. McLean.

Barrett Manufacturing Company: Roofing, bridge water proofing with bituminous binder protection, floor construction particularly adapted for repair shops and freight houses. Represented by W. S. Babcock, L. P. Sibley, H. B. Nichols, C. T. Bilyea.

Bausch & Lomb Optical Company, Rochester, N. Y.: Engineering and surveying instruments, transits, levels, etc. Represented by W. Louis Johnson and F. M. Storr.

Beaver Dam Malleable Iron Company, Beaver Dam, Wis.: Tie plates and rail braces. Represented by Lawrence Fitch, J. V. Cowling, F. S. McNamara, E. A. Hawks, W. L. Douglas and D. P. Lamoreux.

J. A. & W. Bird & Company, Chicago, Ill.: Rex Flinkota roofing, signal railroad roofing, Concrex roofing, Zolium tile roofing, Paradux canvas top roofing, Tunaloid waterproofing felt, insulating papers, roof and damp proof paints, Ripolin enamel paint. Represented by F. E. Cooper, H. W. Benedict, Howard Schofield, Paul L. Griffiths, C. E. Rahr, G. J. Gross.

S. F. Bowser & Company, Inc., Fort Wayne, Ind.: Oil storage systems, Bowser self-measuring pumps. Represented by C. A. Dunkleberg, W. T. Simpson.

Buda Company, Chicago: Railroad motor cars and velocipedes, track drills, drills, grinders, switch stands, ratchet jacks, ball-bearing jacks, adjustable switch rods, solid manganese crossing, replacers, electric crossing gates. Represented by H. K. Gilbert, vice-president; L. M. Viles, vice-president and treasurer of manufacturing; Wm. P. Hunt, Jr., vice-president and secretary of sales; C. H. Delano, assistant to vice-president and secretary of sales; and the following salesmen: W. B. Paulson, J. T. Harahan, Jr., Geo. B. Shaw, L. Hamill, A. R. Dyer, J. J. Gard, W. S. Weston and H. S. Evans.

Card & McArdle, Waukegan, Ill.: Zinc and creosote timber preservative processes according to Card patents for agitating zinc and creosote oils. Represented by Frank McArdle, J. B. Card.

Philip Carey Company, Cincinnati, Ohio: Roofing, asbestos and magnesia products, insulating materials. Represented by R. B. Murdock, E. S. Main, C. L. Cockrell.

Carnegie Steel Company, Pittsburgh, Pa.: Section of railroad track, constructed with steel cross ties, Duquesne joints and 100-lb. American Society rail, with various types of fastenings, including wedge fastenings illustrated in Bulletin No. 108, general assortment of Duquesne rail joints for principal sections of standard rails; Schoen steel wheels, including a wheel having been worn in service representing 301,374 miles; electric railway wheel, 34 in. dia., 2½-in. rim, nickel-plated samples, showing various types of U. S. and Friestedt sheet piling. Represented by N. M. Hench, Edwin S. Mills, C. B. Friday and D. B. Coey, W. A. Bostwick, P. W. O'Brien, H. C. Griswold, Robert Coe, H. R. Archer.

H. Channon Company, Chicago: Shovels, pumps, blocks, wheelbarrows, Buckeye torches and other railway supplies. Represented by O. W. Youngquist, Harry Keegan and B. Berntsen.

Chicago Steel Tape Company, Chicago, Ill.: Steel tapes, leveling rods, lining poles, etc., for field use. Represented by L. A. Nichols and J. Levinson.

Cleveland Frog & Crossing Company, Cleveland: "Hard Service" manganese frogs and crossings, improved spring rail frogs, switches, switch stands, guard rail clamps, Prentice anti-rail creepers, electric railway special track work. Represented by G. C. Lucas, Geo. Stanton, Geo. A. Peabody, L. G. Parker, Geo. Arnold, Jr.

James B. Clow & Sons, Chicago: Plumbing, steam, water and foundry products. Represented by W. E. Clow, Jr., Yates A. Adams, W. T. Brace, J. L. Ponic, W. R. Plum, L. J. Elliott.

Cook Standard Tool Company, Kalamazoo, Mich.: Track drills, bits, tool grinders and chucks. Represented by E. Cook and E. Edelmann.

The Coulter-Paxton Company, Hammond, Ind.: Track wrench, rail drill and bonding rail drill. Represented by W. G. Paxton, J. W. Paxton, C. J. Coulter.

Crerar, Adams & Company, Chicago: Hercules angle steel warehouse trucks for handling freight packages, barrels, boxes, etc. Represented by C. A. Roberts, vice-president; F. R. Sheperd, secretary; G. D. Bassett, Russell Wallace, J. A. Martin, C. W. Gregory, T. W. Barratt, P. F. Ford.

Detroit Graphite Company, Detroit, Mich.: Paint for bridges, buildings, structural steel, etc. Represented by T. R. Wyles, L. D. Mitchell, Edwin Booth and A. H. Kuerst.

Dilworth, Porter & Company, Ltd., Pittsburgh, Pa.: Railroad spikes, tie plates. Represented by W. F. Schleiter, secretary.

Joseph Dixon Crucible Company, Jersey City, N. J.: Silica, graphite paint; lubricating graphite crucibles and plumbago. Represented by E. R. Smith, H. W. Chase.

Dressel Railway Lamp Works, New York and Chicago: Switch lamps, semaphone lamps, tower lamps, station lamps, engine lamps, tail marker lamps, caboose lamps, crossing gate lamps. Represented by F. W. Dressel, president; Robert Black, vice-president; E. W. Hodgkins, western sales manager; F. W. Edmunds, sales agent; A. P. Grenier, W. H. Dayton.

G. Drouve Company, Bridgeport, Conn.: Anti-Pluvius puttyless skylights and sash operators, "Lovell" and "Straight Push." Represented by William V. Dee, George J. Adam, R. S. Adam, A. H. Bates.

Duntley Manufacturing Company, Chicago, Ill.: Rockford gasoline section and inspection cars, Rockford track weeder and Duntley pneumatic cleaner. Represented by L. C. Thompson, H. F. Worden, J. G. Minert, E. J. Cornish, R. A. Paterson, B. L. Winchell, Jr., George M. Kenyon.

Duplex Metals Company, New York: Copper-clad steel, model of coating process and material in various stages of manufacture, samples of wire. Represented by Frank R. Chambers, Jr., vice-president; James F. Kinder, secretary; James A. Waugh, George B. Muldaur, George Wolf, W. T. Kyle, Wirt Tassin.

Eastern Granite Roofing Company, Chicago: Granite roofing, Everite crushed stone roofing, Tisbest smooth surface roofing. Represented by H. Henning, P. G. Kennett, A. W. Turner, C. F. Barstow.

Economy Separable Switch Point Company, Inc., Louisville, Ky.: Mitchell and Palmer types separable switch points, Economy separable claw bars, tie plates and rail anchors. Represented by W. M. Mitchell, W. M. Mitchell, Jr., and B. B. Betts.

O. M. Edwards Company, Syracuse, N. Y.: Railroad padlocks, self-lifting step traps, window and sash fixtures and railway devices. Represented by C. H. Rockwell, Russell Hotchkiss.

Electric Storage Battery Company, Philadelphia, Pa.: Chloride accumulator batteries for drawbridge operation, and Chloride, Tudor and Exide types for car lighting, signal, interlocking and automatic block signal work. ET couple types for small lighting plants and telegraph service. Represented by G. H. Atkin, manager; T. Milton, district engineer; R. I. Baird and T. A. Cressey, salesmen.

Fairbanks, Morse & Company, Chicago, Ill.: Motor cars, standpipes, pumping machinery, dynamos, drills, scales, gasoline engine-driven hand car, etc. Represented by A. A. Taylor, C. W. Kelly, R. E. Derby, L. H. Matthews, F. M. Condit, F. H. Clarke, C. D. Walworth, R. D. Head, F. F. French, F. E. Church, H. C. McClary, S. F. Forbes, F. Hibbs, J. G. Jones, J. A. Steele, E. M. Fisher, L. Norvell, F. B. Roy, A. F. Young, H. D. Smith, A. C. Dodge and F. H. Douglas.

Ford & Johnson Company, Chicago, Ill.: Perfection railroad seats and chairs for parlor and buffet cars. Also rattan seating. Represented by Benjamin H. Forsyth, Walter J. Bennet, Clarence A. Van Derveer.

Frank M. Foster, Columbus, Ohio: Foster interlocking switch stands, with independent facing point lock and distant signal operated with one movement of one lever. Represented by Frank M. Foster, George E. Kalb.

General Railway Signal Company, Rochester, N. Y.: Eight signal mechanisms, one of which is operated on a.c. including towers, with both visible and audible indication. Also relays, indicators, battery charging switch, interlocking machine and descriptive matter. Represented by W. W. Salmon, president; Geo. D. Morgan, vice-president and treasurer; M. Wuerpel, assistant general manager; H. M. Sperry, sales manager; L. Thomas, resident manager, Chicago; F. H. Jones, assistant resident manager, Chicago; M. R. Briney, resident manager, New York; W. K. Howe, chief engineer; F. L. Dodgson, consulting engineer; C. C. Poor, general superintendent; W. R. Young, J. B. Evans and J. L. Langdon.

Goheen Manufacturing Company, Canton, Ohio: Preservative coatings for iron and steel. Represented by A. W. Price, G. L. Clapper.

Peter Gray & Sons, Inc., Boston and Chicago: Railroad lamps and lanterns. Represented by Geo. M. Gray, J. M. Brown.

Grip Nut Company, Chicago and New York: Grip nuts, special grip holding nuts and patented windows and window fixtures. Represented by E. R. Hibbard, Herbert Green, B. L. McClellan, W. G. Wilcoxson, B. C. Wilt, R. A. Flum, B. J. Bernhard, J. W. Hibbard.

Handlan-Buck Manufacturing Company, St. Louis, Mo.: Lamps, lanterns, long-time burners, Cairncross train indicators, track tools, McPartland rail clutches, metallic slow flags and metallic train flags. Represented by A. H. Handlan, Jr., and R. L. Cairncross.

Hart Steel Company, Elyria, Ohio: Railroad tie plates and standard spikes. Represented by W. S. Miller, W. T. Bentz, Willis McKee, G. S. Wood, A. W. DeRocher, H. W. Davis, J. M. Van Harlingen.

Hayes Track Appliance Company, Geneva, N. Y.: Hayes derails and attachments. Represented by S. W. Hayes, G. E. Ellis, W. Harding Davis, Wellington B. Lee and Arthur Gemunder.

Heath & Milligan Manufacturing Company, Chicago, Ill.: Siding finished with way and station paint and panels decorated with "Duroware," a new and unique paint which dries flat, with a soft finish, which is sanitary and waterproof, and possesses unusual wearing qualities. Also a brine proof paint and rust inhibitive; paints and finishes for all railway purposes. Represented by A. M. Heath, B. H. Pinkerton, J. H. Vance, C. R. Arnold, J. B. Campbell.

Hobart-Allfree Company, Chicago, Ill.: Smyth and Freeland derailers, Newton car replacers. Represented by E. H. Allfree, W. H. England, Frank P. Smith.

Indianapolis Switch & Frog Company, Springfield, Ohio: Manganese frogs, crossings, switches, etc. A special showing of I. Sw. & F. Co. Model R-N-R manganese frogs and tests. Represented by E. C. Price, secretary and treasurer; W. H. Thomas, chief engineer; W. L. Walker, assistant engineer; T. D. Hanley, engineer manganese department; G. S. Shaw, superintendent; J. A. Foulks, Eastern representative.

H. W. Johns-Manville Company, New York and Chicago: Asbestos and magnesia materials, electrical supplies, roofings, smoke jacks. Represented by J. E. Meek, manager railroad department; J. C. Younglove, assistant manager; F. M. Gilmore, C. E. Murphy, H. A. Waldron, J. H. Trent, P. C. Jacobs, G. W. Ristine, Jr., R. A. Hamaker, H. G. Newman.

Joyce-Cridland Company, Dayton, Ohio: Hydraulic and all other types of jacks. Represented by F. I. Joyce, George W. Lewellyn, N. Kohl, Chas. F. Palmer and Edwin Romeiser.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.: Manufacturers of hand, push and velocipede cars, improved track drills, jacks, pressed steel wheels, crossing gates and other track appliances. Represented by John McKinnon, Chas. B. Hays, Frank B. Lay, C. A. Wallace, Donald A. Stewart, Geo. W. Mingus, W. I. Clock, H. C. Wilson.

W. K. Kenly Company, Chicago, Ill.: Security anchor tie plate, Gump car replacer, Latimer switch point lock, Universal carrier base, Arctic water box, Manhattan compromise joint, Moore track drills, Kalamazoo velocipedes. Represented by A. P. Van Schaick, W. J. Fauth, Gerard Van Schaick.

Kennicott Water Softener Company, Chicago Heights, Ill.: Water softening machinery. Represented by Cass L. Kennicott, Edwin J. Flemming, Frank S. Dunham and T. G. Windes.

Kerite Insulated Wire & Cable Company, New York City: Kerite insulated wires and cables. Represented by R. D. Brixey, president; Azel Ames, P. W. Miller and J. A. Renton. Western representatives: Watson Insulated Wire Company, Chicago, Ill.; J. V. Watson, B. L. Winchell, Jr., R. A. Paterson and E. B. Price.

Kerlin Automatic Post Machine Company, Delphi, Ind.: Cement post machine, reinforcement for concrete post and concrete railroad tie. Represented by Wm. F. Kerlin, E. W. Bowen, E. R. Smock, Rega Porter, Wm. Donlin, Wm. M. May, N. Schrader, C. M. Thomson, R. C. O'Connor.

Kueffel & Esser Company, New York and Chicago: Drawing materials, surveying instruments, drawing instruments, measuring tapes, etc. Represented by Rudolph Link.

Lackawanna Steel Company, New York: Rails, rail joints, structural and bridge material, reinforced concrete bars, steel sheet piling and track supplies. Represented by C. R. Robinson, G. A. Hagar, Blythe Harper and C. H. Hobbs.

Lufkin Rule Company, Saginaw, Mich.: Measuring tapes of all descriptions, steel rules, etc. Represented by Theo. Huss, S. B. McGee, B. F. Gould and F. G. Brown.

David Lupton's Sons Company, Philadelphia, Pa.: Lupton steel sash, Lupton rolled steel skylight, Pond operating device, Pond continuous sash. Represented by Clarke P. Pond, sales manager, and George P. Heinz, Western selling agent.

Manganese Steel Rail Company, New York: Rolled rails, perforated screens, conveyor buckets, shovels, forgings. Represented by W. S. Potter, Fred W. Snow, O. W. Cook, Payson Cook, S. T. McCall, A. A. Aigeltinger.

W. N. Matthews & Brother, St. Louis: Matthews guy anchors, telephone jack boxes and plugs for dispatching systems, cable clamps, cable splicing joints, lamp guards, and other specialties. Represented by Claude L. Matthews, W. N. Matthews, Victor L. Crawford and Walter E. Bissell.

Miracle Pressed Stone Company, Minneapolis, Minn.: Collapsible steel forms for concrete culvert and sewer construction. Represented by O. U. Miracle, president.

Morden Frog & Crossing Works, Chicago: Unity switch stand operating distant signal and facing point switch with

positive point lock, manganese rigid frog, automatic and rigid manganese steel frogs, guard rail clamps, switch adjustments, rail braces, slide plates, track jack, compromise joints, etc. Represented by Arthur C. Smith, H. M. Macke and D. H. Cusic.

Burton W. Mudge & Company, Chicago: Adams motor car, safety mail crane. Represented by Burton W. Mudge, C. M. Mudge, Geo. E. Simmons, Otto P. Hennig, W. E. Adams.

Municipal Engineering & Contracting Company, Chicago, Ill.: Chicago improved cube concrete mixer. Represented by C. E. Bathrick.

National Lock Washer Company, Newark, N. J., and Chicago, Ill.: Nut locks. Represented by F. B. Archibald, G. E. Bake, F. B. Buss and John B. Seymour.

National Malleable Castings Company, Chicago: Malleable track specialties. Represented by F. R. Angell, H. I. Hiatt and J. J. Byers.

National Roofing Company, Tonawanda, N. Y.: Mineral asphalt roofing, gravel and feldspar surfaced, asphalt roof coating, asphalt paints, graphite paints, stack paint and metal protecting paints. Represented by O. H. Dean, manager railroad and paint departments; A. E. Arbuckle and D. A. Bonitz, railroad department.

Okonite Company, The, New York: Central Electric Company, Western agent. Rubber insulated wires and cables, Candee potheads, Okonite & Manson tapes. Represented by Lewis G. Marten, F. J. White, J. M. Lorenz, M. Cox, W. D. Dunsmore and D. M. Ayers.

Pacific Timber Preservative Company, Spokane, Wash.: Treated cross ties, telephone and telegraph poles and fence posts. Comparison of results in actual track service. Represented by Robert E. Allen.

W. W. Patterson Company, Pittsburg, Pa.: Double extra heavy wood tackle blocks for manila rope, double extra heavy steel tackle blocks for wire cable. Represented by W. W. Patterson, Jr., secretary and treasurer.

Pennsylvania Steel Company, Steelton, Pa., and **Maryland Steel Company, Sparrows Point, Md.:** Solid Manard crossing, No. 10, Manard anvil face frog, design 160, section No. 235, No. 10 solid Manard frog, design 164, section No. 235, No. 10 Manard anvil face spring rail frog, design 278, section No. 235, sample Never-Turn split bolt, Never-Slip switch plate, intermediate main line safety switch stand, Model 56-B, low New Century switch stand, Model 51-A, low Steelton positive switch stand, Model 52-A, Manard switch point and housed stock rail, intermediate New Century switch stand, Model 50-E, with semaphore attachment, rolled Manard (improved manganese) rails. Represented by C. W. Reinoehl, superintendent frog and switch department; B. L. Weaver, assistant to superintendent, F. & S. department; H. F. Martin, general manager of sales; G. S. Vickery, Wm. H. Henderson, N. E. Salsich, Robert E. Belknap, W. H. Allen, Drew Allen, H. G. Barbee, M. W. Long, Jno. C. Jay, Jr., Chas. S. Clark.

Pittsburg Steel Company, Pittsburg, Pa.: "Pittsburg Perfect" fencing for railroad right-of-way. Represented by W. R. Marsh, F. D. Findlay, E. Steytler, manager wire fence department.

D. & A. Post Mold Company, Three Rivers, Mich.: "D. & A." concrete post machinery and molds, specimens of reinforced cement posts, also sections of same showing construction, materials used, also different methods of reinforcement, as applied to the farm, vineyard and railway use. Represented by G. H. Dougherty, secretary and treasurer

Q. & C. Company, New York and Chicago, Ill.: Bonzano joints, steel joints, insulated joints, anti-rail creepers, rail saws, rail benders, guard rail clamps, guard rail braces, rail braces, castings, bolts and nuts, cement and metal ties. Represented by C. F. Quincy, G. C. Isbester, Geo. L. Hall, T. B. Bowman, J. V. Wescott, H. E. McCormick, J. A. Bodkin, C. C. Rossire, Jr.

Railroad Fence Works: Railroad fencing. Represented by E. G. Fisher.

Railway & Traction Supply Company, Chicago: Hercules bumping posts, manufactured by J. M. Scott & Sons, Racine, Wis., automatic lock nuts, manufactured by Automatic Lock Nut Company, Rockford, Ill. Represented by J. M. Scott, E. E. Scott, Chas. Rystrom, and Cortlandt F. Ames, vice-president and general manager.

Railway Specialty & Supply Company, Chicago, Ill.: P. & M. rail anchors, arc damp lightning arresters; photographs showing effect of rail creeping, signal accessories. Represented by Philip W. Moore, L. W. Kent, A. G. Rockwell, F. A. Preston.

Rail Joint Company, New York, N. Y.: Continuous, Weber & Wolhaupter types, base supporting rail joints. Represented by V. C. Armstrong, L. F. Braine, W. E. Clark, J. A. Greer, Percy Holbrook, H. C. Holloway, J. G. Miller, F. A. Poor, E. L. VanDresar, B. Wolhaupter, F. C. Webb, E. A. Condit, Jr.

Ramapo Iron Works, Hillburn, N. Y.: Automatic safety switch stands; manganese pointed switches; manganese center frogs; rolled manganese steel rail; guard rail clamps; special switch slide plates, etc. Represented by F. W. Snow, Arthur Gemunder, W. B. Lee, W. C. Kidd, F. C. Stowell, Jas. B. Strong.

Scherzer Rolling Lift Bridge Company, Chicago, Ill.: Models, photographs, designs, plans, drawings and literature. Represented by A. H. Scherzer, C. L. Keller, J. I. Vincent, J. T. Dickerson, W. F. Martin, H. D. Harting, R. W. Flowers.

Sellers Manufacturing Company, Chicago: Tie plates, angle bars, "Sellers' Anchor Bottom Tie Plate." Represented by J. M. Sellers, J. T. Markham and L. S. Gordon.

Spencer Otis Company, Chicago: Economy railway tie plates. Represented by W. L. DeRemer, H. H. Hart and Carter Blatchford.

St. Louis Steel Foundry, St. Louis, Mo.: Solid manganese streel frogs, crossings and inserts for steam and electric railways. Represented by J. H. Steedman and J. N. Maher.

The Strauss Bascule & Concrete Bridge Company: Drawings and models of Strauss trunnion bascule bridges, self-balancing window. Represented by J. B. Strauss, president and chief engineer; G. Jeppsen, P. Orum, J. R. Hall.

Streeter-Amet Weighing & Recording Company, Chicago, Ill.: Automatic weight recording machine for railroad track scales for weighing carload shipments, and automatic quick-weighing dial attachment for freight warehouse and baggage scales for weighing L. C. L. freight. Represented by Fred Cruikshank, H. A. Streeter, R. C. Burkholder, George Goetz, George A. Man, C. M. Gordon, A. L. McLaren, F. Nemitz.

Templeton, Kenly & Company, Chicago: Simplex track and car jacks. Represented by A. E. Barron, J. H. Hummel and W. B. Templeton.

Union Switch & Signal Company, Swissvale, Pa.; Chicago, Ill.; New York, N. Y.; Montreal, Can.: Interlocking and signaling apparatus for steam and electric railways, including electro-pneumatic and electric interlockings in operation; signals; relays and other apparatus for a. c. or d. c. automatic block signaling; staff system and other controlled manual apparatus; electric crossing gates and bells; Keystone insulated rail joints; mechanical interlocking details, etc. Represented by H. G. Prout, J. G. Schreuder, J. S. Hobson, S. G. Johnson, J. P. Coleman, M. D. Hanlon, L. F. Howard, T. H. Patenall, W. H. Cadwallader, J. D. Taylor, H. McCready, W. E. Foster, George Blackmore, H. S. Beaker, E. T. Barnes, W. M. Vandersluis, C. C. White.

U. S. Metal & Manufacturing Company, New York City: "Diamond" square-tapered steel trolley and transmission poles; Wolfe automatic rail joint lock; Columbia lock nuts. Represented by F. C. Dunham, H. A. Hegeman and Arthur Masters.

U. S. Wind Engine & Pump Company, Batavia, Ill.: Water columns, tanks, tank fixtures, steel substructures (all in model); switch stands. Represented by L. E. Wolcott, A. J. Anderson and C. E. Ward.

William Wharton, Jr., & Company, Inc., Philadelphia and Jenkintown, Pa.: Manganese steel switches, frogs, crossings and movable points; switch stands, guard rail clamps, anti-creepers, models, photographs, etc. Represented by V. Angerer, vice-president; L. R. Ashhurst, Jr., manager of Philadelphia works; R. C. McCloy, sales agent; W. B. Cooke, manager Jenkintown works; W. McLain, sales agent, and Arthur S. Partridge, sales agent.

Winans Improved Patent Rail Joint Company, Portland, Ore.: A base-supported rail joint. Represented by Audubon Winans.

Winters-Coleman Scale Company, Springfield, Ohio: Automatic weighing machinery; Osgood Sonander systems.

Represented by Randolph Coleman, H. B. Osgood and C. F. Byerly.

Yale & Towne Manufacturing Company, Stamford, Conn., and Chicago: Triplex block, electric hoists, padlocks, door checks. Represented by D. A. Wright, C. H. Van Winkle, R. E. Gedney and H. R. Butler.

EMPLOYEES' WELFARE WORK IN COLUMBUS, OHIO

A number of novel features of employees' welfare work has been introduced and fostered by the management of the Columbus (Ohio) Railway & Light Company, which believes its policy in this respect to be of mutual advantage both to the employees and the company. Some of these are the paying of "dividends" on wages, opening of savings accounts by Christmas present deposits, allowances to old men for uniforms, establishment of savings clubs and an annual employees' outing.

For several years past, in addition to their regular wages, the company has paid to its employees a bonus in the form of the same percentage on their wages as is paid by the company in dividends upon each of its various issues of stock. The Columbus Railway & Light Company is a holding or leasing company and has taken over the properties of the Columbus Railway Company. The latter company has outstanding issues of preferred and common stock, on each of which the leasing company guarantees dividends at the rate of 5 per cent per annum, payable quarterly. The preferred stock dividends are payable on the first days of February, May, August and November. Dividends on the common stock are payable on the first days of March, June, September and December. The leasing company has also been paying dividends for the past four years on its own stock, which is all common stock, and pays these dividends on the first days of January, April, July and October. In this way dividends on some one of the three classes of stock are paid every month. The bonus payments to the employees are also made monthly, and are calculated upon the amount of wages each received for the past three months' work. For example, if an employee received $50 per month for the previous three months, his wages would aggregate $150. If, then, a dividend on one of the three issues of stock should be declared at the rate of 5 per cent per annum, the employee receives as his bonus 5 per cent of his wages of $150, or $7.50. As dividends are paid on each class of stock at the rate of 5 per cent per annum, quarterly, each employee earning $50 per month receives as his bonus each month of the year 15 per cent of his wages during the same time, or $7.50; that is, he receives $90 during the 12 months. In the year ending Dec. 31, 1909, the company paid out a total of $75,877 in dividends on wages to its 1100 employees, an average of nearly $70 to each man.

For a number of years the company at Christmas time distributed to its married employees a turkey, and to the single employees a silver dollar. For the past three years, however, on account of having so much trouble in securing a sufficient number of turkeys and their proper distribution, the company has substituted a plan of depositing $2 to the credit of each of the married men and $1 to the credit of each single man in one of the local savings banks. This plan has proved very satisfactory, and it has been surprising to the management to what extent these savings accounts have increased by subsequent deposits made by the employees. The plan has started many of the men in keeping a savings account. The system of opening savings accounts was started in December, 1906, and one of the trust companies with which accounts were opened for about three-fourths of the company's employees reported Jan. 1, 1909, as follows:

Total number of accounts opened up to Jan. 1, 1909..	1,581
Total deposits made by company for employees.....	$2,809
Number of accounts remaining on books Jan. 1, 1909.	315
Total balance, Jan. 1, 1909, to credit of accounts....	$13,816.87

This shows that the employees have added a considerable sum to the original deposits.

Through the efforts of E. K. Stewart, vice-president and general manager of the Columbus Railway & Light Company, who conceived the details of the plan, about 50 of the company's employees some time ago organized themselves into a group of ten savings clubs, each composed of five members. Each member paid in $10 as an entrance fee and signed an agreement designating one of the local banks to act as treasurer of the savings fund. With the $50 of entrance fees as a margin the bank purchased for each club 10 shares of the Columbus Railway Company's preferred stock, paying 5 per cent dividends, at a price of about 68. The five members of each club executed in favor of the bank a joint note of $630, payable in six months and bearing 6 per cent interest, and deposited the 10 shares of stock as collateral on the note. Each member had two shares of the club's stock transferred to his own name, and was entitled to receive the dividends on these two shares as paid. At the end of every month each member paid in to the savings fund $5, so that at the end of six months when the original note came due the club had $150 to its credit, against which was an interest charge of $18.90. The net assets of $131.10 were applied to the face of the original note and a new note made for $498.90, which extended the loan for another six months. At the end of about two years and four months the entire purchase loan was paid off and two shares of stock were owned outright by each of the members of the ten clubs. The formation of these clubs was experimental and while the result was gratifying to the management of the company and very satisfactory to the members no effort has been made to extend the plan generally among the men.

The company furnishes conductors and motormen who have been in its employ for five years one uniform suit each year, and to those having been in its employ 10 years or longer two uniform suits each year. In some instances the men have taken good care of their uniforms and instead of drawing the second uniform, have had paid to them in cash the cost of a uniform. This has been done only where the men made a satisfactory showing that they had plenty of good uniforms on hand.

Each year the company is the host at an employees' picnic, and at this time it furnishes the employees and their families free transportation over the lines of the company and an outing for themselves and their families. This generally takes place in one of the pleasure parks of the city, to which the company's lines run, but the management of the park, which is not owned by the railway, generously admits the employees and their families free to the park and the amusements therein.

CONGRESS OF THE TRAMWAYS & LIGHT RAILWAYS ASSOCIATION

The annual congress of the Tramways & Light Railways Association will be held at Dublin, Ireland, on May 12 and 13, 1910. Members and their friends will be officially received by W. M. Murphy, chairman, and Wm. Anderson, managing director of the Dublin United Tramways, at 10 a. m. on May 12. The morning will be devoted to reading papers, discussions, etc. Members will be the guests of the Dublin United Tramways at a dinner to be given on the evening of May 12. On May 13, weather permitting, members and their friends will be conveyed to Dalkey, round Killiney, and lunch will be served at the Marine Hotel, Kingstown. After lunch they will return to Dublin and be conveyed to Howth and Hill of Howth by the Great Northern Tramway to the Claremont Hotel for tea and thence back to Dublin. Should the weather be unfavorable, it is proposed to devote the morning of May 13 to reading papers, etc., and to confine the trip to Dalkey to the afternoon. Arrangements will be made with the Imperial Hotel, Dublin, for special terms for members and their friends.

The President of the Republic of Ecuador has submitted a bill to the National Congress providing for the construction of an electric railway 106 miles long to connect Quito and Ibarra. The cost of construction of the track is estimated at $10,000 per km, and the rolling stock will cost approximately $900,000.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES

New York.—Eminent Domain—Power of Elevated Roads.

The term "railroad corporation," as used in General Railroad Act, Laws 1890, p. 1083, c. 565, sec. 4, includes elevated railroads; and such railroads have power to acquire land necessary for their maintenance and accommodation.—(Manhattan Ry. Co. v. Astor et al., 107 N. Y. Sup., 666.)

New York.—Street Railroads—Operation—Right of Way.

A driver of a wagon, rightfully driving on car tracks in the street, owes the street railway company the duty to leave the track, on the approach of a car, as soon as he reasonably can; but where he is prevented from leaving the track, on one side, by deep snow and on the other side by the approach of a car from the opposite direction, the right of way of the car on the same track coming in his rear is not paramount.—(Dietrich v. Brooklyn Heights R. Co., 108 N. Y. Sup. 158.)

New York.—Street Railroads—Easements—Prescription—Interruption—Acquiescence.

A user of an elevated railroad with two tracks, one on each side of the street, with an open space between them, for 17 years, is interrupted where a third track is constructed between the original tracks, where the original user began under legislative authority to maintain two original tracks, and the third track was so built that the original tracks helped to support it, and it enabled the company to run more trains and carry more passengers than was possible before the third track was constructed, whereby the burden on the servient estate was increased before the expiration of 20 years.

Where an owner of property acquiesced in the use of two original tracks of an elevated road for 17 years, it did not affect his right to object where a third track was built which increased the traffic capacity of the road.—(Roosevelt et al. v. New York Elevated R. Co. et al., 111 N. Y. Sup., 440.)

New York.—Carriers—Street Railways—Transfers—Route—Statutory Provisions—Construction—"Continuous" Trip—"Intersection"—Rights of Carriers—Reasonable Rules—Ejection of Passengers—Civil Liability—Actions for Assault.

Under Railroad Law, Laws 1892, p. 1406, c. 676, sec. 104, requiring every surface street railroad corporation entering into a contract for the use of another road to give each passenger paying a single fare a transfer entitling him without extra charge to one continuous trip to any point or portion of such other railroad, etc., to the end that the public convenience may be promoted, etc., a passenger has a right to take the nearest and most convenient route; hence, where a passenger on a street car passing along a certain street called for and received a transfer to a second line, he had a right to take a car on that line at the point where it started from the street along which the first line continued, when by so doing he could reach his destination more conveniently than by continuing on the first line to a point where it crossed the second line, and it was unlawful to refuse him passage without the payment of a second fare.

The word "continuous," as used in the statute, must be construed to mean direct, whenever it can be so applied.

A provision of the transfer directing that it be tendered "at the intersection of the issuing line" means any point on the issuing line where a passenger can continue his direct journey by taking another car, and the fact that the point is at an intersection of tracks merely, and not an intersection of lines, is immaterial.

Though a street railway company has a right to make and enforce such rules as are reasonable for the conduct of its business, a rule which is contrary to law or whose enforcement would invalidate the provisions of a statute cannot be upheld.

Where a street car passenger, having a transfer entitling him to ride on the car, is ejected therefrom by employees of the company for failure to pay another fare, they commit an unlawful assault, for which he may maintain an action.

That a penalty is imposed by statute on the carrier for violation of the law requiring the giving of transfers does not deprive a passenger, presenting a transfer valid on its face, who is summarily ejected, of a remedy by action for damages.—(Charbonneau v. Nassau Electric R. Co., 108 N. Y. Sup. 105.)

New York.—Carriers—Transportation of Passengers—Continuous Ride—Transfers—Fares—Regulation.

Railroad Law (Laws 1890, p. 1113, c. 565) § 101, provides that no corporation operating a street surface railroad under such act, or under Laws 1884, p. 309, c. 252, shall charge more than five cents for one continuous ride from any point on its road, or on any line or branch operated by it or under its control, to any other point thereof or any connecting branch thereof, within the limits of any incorporated village or city. Held, that such section does not provide for a change by a passenger from one line to another, but only for a continuous ride on the same car.

Railroad Law (Laws 1890, p. 1114) c. 565, § 104, provides that any street surface railroad corporation which acquires the use of the roads of other companies by a contract shall carry between any two points on the railroads, or portions thereof, embraced in such contract, any passenger desiring to make one continuous trip between any such points for a single fare, and on demand, without extra fare, shall give to each passenger paying a fare a transfer entitling him to one continuous trip to any point or portion of any railroad embraced in such contract, etc. Held, that the section relates only to a continuous trip made by change from the line of one of such companies to that of another, both lines being operated by one company under a lease or other contract, and does not apply to different lines owned by the same company.

A street railway company, which voluntarily gives a passenger a transfer from one line to another, when legally entitled to the payment of another fare on the second line, is not, because of the exaction of another fare on the second line, liable to the penalty provided by Railroad Law (Laws 1890, p. 1096, c. 565) § 39, declaring that any railroad which shall ask or receive more than the lawful rate of fare, unless by inadvertence or mistake not amounting to gross negligence, shall forfeit $50 to the party aggrieved.—(King v. Nassau Electric R. Co., 112 N. Y. Sup., 589.)

New York.—Street Railroads—Establishment—Determination as to Location—Authority of Municipality—Notice to Occupants—Eminent Domain—Title Acquired—Easement—Compensation.

Where the certificate of the rapid transit commissioners authorized a rapid transit railroad to construct and operate a double-track road on a certain route, and also authorized it to acquire private property for a terminal and station, and to occupy for said terminal and station any of the underground portions of D. street, etc., contiguous to the terminal station, and to operate therein such tracks and connections as may be convenient for the operation of the road, the authority to acquire and maintain a terminal and station was in addition to that to construct and operate a double-track road, and it could occupy the ground under D. street for its terminal as well as for its tracks.

Under the Rapid Transit Act (Laws 1891, p. 14, c. 4) § 23, as amended by Laws 1902, p. 1610, c. 584, the rapid transit railroad commissioners, now the board of public service commissions, fixed the route and location of tunnel roads, and the provisions of the act relating to the location of the route are independent of the railroad law, so that section 6 thereof, requiring written notice of filing a map profile of the route designated to be given to the actual occupants of the land included within such route, has not application to proceedings to establish a tunnel road.

The Railroad Law (Laws 1890, p. 1083, c. 565), art. 1, § 4, gives every railroad corporation power to acquire by condemnation such property as may be necessary for the construction and maintenance of its road, but the property so acquired shall be held and used only for corporate purposes during the continuance of the corporate existence. The Rapid Transit Act (Laws 1891, p. 14, c. 4) § 23, as amended by Laws 1902, p. 1610, c. 584, gives a corporation organized thereunder the right to acquire such real property, or easement, or other interest therein, as may be necessary to enable it to construct its road, stations, etc., and, in case it cannot agree with the owner, it may acquire title pursuant to the condemnation law; and section 24,

as amended by Laws 1892, p. 1089, c. 556, gives such corporation power to take and hold voluntary grants to aid in the construction, etc., of its road, but such real estate shall be held only for the purposes of the grant; and to purchase, lease, and hold all real estate necessary for the construction of its roads, stations, etc., necessary to accomplish the objects of its incorporation. Plaintiff tunnel railroad company was organized under the general railroad law by obtaining a certificate from the board of rapid transit railroad commissioners, so as to give it all the powers of the corporations organized under the rapid transit act. Held that, construing the rapid transit act and the general railroad law, real property condemned under the former act is held only during the continuance of the corporate existence, in the nature of a permanent easement; a fee not being expressly granted, and not being necessary to accomplish the purposes of the corporation in acquiring the land.

A possible reverter of the land taken by railroad corporations by eminent domain is not contemplated in the assessment of compensation therefor, even though only an easement passes, the appropriation being regarded as permanent, and the damages being awarded on that basis.

An unqualified fee in land cannot be taken by condemnation by a private corporation without express authority to take such an estate.—(Hudson & M. R. Co. v. Wendel et al., 85 N. E. Rep., 1020.)

New York.—Statutes—Construction—Special Acts—Subject and Title—Constitutional Law—Presumption of Validity — Discretion of Legislature — Constitutional Provisions—Subjects and Titles—General and Special Franchises—Municipal Corporations—Streets—Title of Municipality — Eminent Domain — Fee in Abutting Owner—Power of City to Prevent Interference with Rights—Injunction—Decree—Terms Imposed.

An act to incorporate the Enonomic Power & Construction Company (Laws 1893, p. 949, c. 459), creating a corporation and giving it power to transmit and utilize power between any points in the State, is a private bill within Const. art. 3, § 16, providing that no private or local bill passed by the Legislature shall embrace more than one subject, which shall be expressed in the title, though the bill specifically states that the powers thereby conferred are expressly declared to be a public purpose, and their use by the corporation a public use.

Every presumption is in favor of the validity of legislative acts which are to be upheld, unless there is a substantial departure from the organic law, and their propriety and wisdom are matters with which the courts have no concern.

Const. art. 8, § 1, providing that corporations shall not be created by special act, except in cases where in the judgment of the Legislature the object of the incorporation cannot be attained by general laws, vests in the absolute discretion of the Legislature the determination whether a special act of incorporation in a given case is necessary, and its decision is not reviewable by the courts.

The subject of a special act to create a corporation is the creation of the corporation for the purposes and with the powers stated in the act, and all the details as to its powers and authority are objects of the corporation, and not subjects of the act; and hence "An act to incorporate the Economic Power & Construction Company" (Laws 1893, p. 949, c. 459), which provides in detail for the organization of the corporation, enumerates the objects for which it is formed, the amount of capital stock, location of principal office, and describes certain powers and privileges granted, etc., which relate directly to the particular corporation created, and its organization, purposes, and powers, embraces only one subject, and is not violative of Const. art. 3, § 16, providing that no private or local bill shall embrace more than one subject, which shall be expressed in the title.

The fact that a special act of incorporation includes both a general franchise to exist as a corporation, and also among the powers which it may possess a special franchise to occupy the streets and highways of the State which is not mentioned in the title does not render the act violative of Const. art. 3, § 16, providing that no private or local bill shall embrace more than one subject, which shall be expressed in the title, since the special franchise is simply a power granted by the act.

The power to use and regulate the use of city streets is vested absolutely in the Legislature, and may not be delegated to the municipality, and, even where it holds the fee to its streets, it holds them as the State's agent for the public use of the people of the State, and not as corporate property.

Where additional burdens have been imposed upon streets the fee of which remains in abutting owners, the owners themselves may seek redress if they choose, but the city is not a trustee for them as regards the enforcement of their private rights, and has no power to interfere.

Where injunctive relief is sought against a city by a company entitled to use its streets, the court in giving relief may in its discretion impose terms for the protection of the city.—(Economic Power & Construction Co. v. City of Buffalo et al., 111 N. Y. Sup., 443.)

Texas.—Street Railroads—Franchises—Construction.

A street railroad company, having a franchise which requires the consent of the city council with reference to the construction of "switches" generally, but expressly confers "or any portion thereof,'" without limitation upon their use, the right to construct "double tracks" on a particular street may construct double tracks on such street without the council's consent, though they are to be used as passing tracks in connection with the single track thereon.—(Denison & S. Ry. Co. v. City of Denison, 119 S. W. Rep., 115.)

Wisconsin.— Eminent Domain — Compensation — Special Benefits—Appropriation to Additional Use.

Where a franchise to place street railway tracks, poles, wires and appliances in a street, and binding the railway company to maintain the same until the expiration of the franchise, was granted prior to a taking for interurban purposes, the operation of the street railway was not a special benefit, within St. 1898, sec. 1848, to be offset against damages for the taking for interurban purposes, since a special benefit within that section must be such as is due to the construction of a public work for the installation of which it is sought to condemn.

In estimating damages in proceedings to condemn a right of way for an interurban railway, the existence of a street railway, with its roadbed, poles, wires and appliances in the street wherein it is sought to condemn, and the fact that the street is subject to that burden without compensation to the lot owner, and to other like burdens which the municipal authorities may in their discretion impose, are to be considered as conditions existing at the time of the taking by the interurban railway of the street railway tracks, poles, wires and appliances for interurban tracks, poles, wires and appliances.

In proceedings to condemn a right of way for an interurban railway, the fact that the obligation to continue the street railway service established in the street under a franchise previously granted will remain for some years to come may be considered in mitigation of damages; but, on the other hand, the perpetual nature of the right acquired by the condemnation extending beyond the expiration of the railway franchise is also to be considered.—(Gosa v. Milwaukee Light, Heat & Traction Co., 114 N. W. Rep., 815.)

LIABILITY FOR NEGLIGENCE

Massachusetts. — Carriers — Electric Railroad — Injury to Passenger—Stopping Places—Action—Proof of Negligent Operation of Car.

Unless an electric railway company has by its practice waived its established rule that passengers shall alight only at the designated stopping places the slowing up of a car before crossing another track, at a place not designated as a stopping place, is not an invitation to passengers to alight, and evidence that passengers have been in the habit of taking advantage of such slowing up or stopping to alight there does not establish such waiver.

Evidence in an action by a passenger on a street car who was thrown from the car by a sudden increase of speed while preparing to alight held not sufficient to show that the motorman was negligent in the manner of starting up.—(Stevens v. Boston Elevated Ry. Co., 85 N. E. Rep., 571.)

Missouri.—Damages—Personal Injuries.

A $6,500 verdict for personal injuries to a woman 75 years old was excessive by $1,500, where, at the time of the injury, she was not very strong, and none of her bones

were broken, though for some months after the accident she suffered from pain in the left leg, which was in a dropsical condition, and she suffered from mental fear or further injury, and was painfully bruised and hurt, and confined to her bed about two weeks, and her face so swollen that the left eye could not be seen the day following the accident, and about five weeks afterward she was able to use crutches for a time, but afterward grew worse, and again became bedridden.—(Waddell v. Metropolitan St. Ry. Co., 111 S. W. Rep., 542.)

Missouri.—Personal Injuries—Degree of Care—Wilful Injuries.

Where a child six years old is injured by being struck by a street car while crossing the track, it is not necessary that the acts of the company's servants should have been wanton or wilful to hold it liable for injuries.

In an action for injuries to plaintiff while crossing defendant's street car track, the only issues of negligence submitted to the jury were: First, negligence in failing to discover plaintiff approaching and going upon defendant's track in time to have checked the speed of its cars; second, in failing to keep a vigilant and reasonable lookout for children upon the track or approaching the same, and whether the motorman could have discovered plaintiff in the act of approaching its tracks; and, third, in failing to approach said crossing with said car under reasonable control. Held, that each of said acts was consistent with the others, as each might have contributed to the injury of the plaintiff, and therefore an objection that the various acts of negligence alleged in the petition are contradictory of each other is untenable.—(Heinzle v. Metropolitan St. Ry Co., 111 S. W. Rep., 536.)

Missouri.—Street Railroads—Maintenance—Personal Injuries—Actions for—Pleading—Evidence Admissible—Evidence—Materiality — Instructions—Trial—Cure of Error by Other Instruction—Appeal and Error—Review—Harmless Error—Operation—Sufficiency.

Where, in an action against a street railroad company for injuries received by tripping over a rail, alleged to have extended several inches above the surface of the street, the petition alleged that the defendant was a corporation, organized and existing under the laws of the State, and was a common carrier of passengers, and that it maintained tracks upon the streets, at the intersection of which the accident was alleged to have occurred, but did not allege that the street railway was a trespasser upon such streets, or that it was occupying them without authority from the city, evidence that it had no license or authority from the city to maintain its car tracks at the place where the accident occurred was inadmissible.

In an action against a street railroad company for injuries received by tripping over a rail, alleged to have extended several inches above the surface of a street, an instruction that defendant was not required to keep its tracks in a reasonably safe condition, and was not required to keep the space between the rails filled with "dirt, cinders, or any other materials," so that the surface between the rails would be flush with the top of the rails, but that it was only required to use ordinary care to keep the space between the rails in a reasonably safe condition, was misleading and erroneous, since the law requires that the track be kept flush with the street, or so nearly level as not to materially interfere with travel, and it would by a physical impossibility to fulfill this requirement without filling the spaces between the tracks with dirt, cinders, or other materials.

In an action against a city and a street railway company for injuries caused by tripping over a rail, alleged to have extended several inches above the surface of a street, there was evidence that the track extended about a foot above the surface of the street outside of the rails, and from three to four inches between them, and that while plaintiff was rushing across the track to avoid a runaway team, her foot slipped under one of the rails, in consequence of which she was thrown down and seriously injured. Held, that the evidence made out a prima facie case of negligence against both the city and the railway company. (Huff vs. St. Joseph Ry., Light, Heat & Power Co. et al., 111 S. W. Rep., 1145.)

Missouri. — Street Railroads — Establishment — Right in Bridge—Operation—Duty to Public—Warning to Pedestrian—Duty to Keep Lookout—Negligence—Duty to Pedestrians—Contributory Negligence—"Due Care" — Care Required — Degree of Care — Injuries — Last Chance—Injury Actions—Weight of Evidence—Demonstrative Evidence—Experiments—Burhden of Proof—Similarity of Demonstrative Evidence—Admissions—Admissions by Employee—Sufficiency.

A bridge over which a street car track ran, being a continuation of the street, the primary user in it, as in the street, is in the public, the easement of street railways in the streets being somewhat servient to the public user.

That a street railway placed slats similar to railroad cattle guards across its track on a public bridge did not constitute a warning to pedestrians of the railroad's exclusive use of that part of the bridge so as to relieve it of the duty of keeping a lookout.

A street railroad was bound to keep a lookout for pedestrians on a bridge, which was a part of the public street, over which its track ran, even in the nightime, and though there were slats similar to cattle guards across its tracks, and iron columns and railings to show the railroad section of the bridge.

The right of a street railway to use a street must be exercised with due care to prevent accident.

Pedestrians, as well as a street railroad, have the right to use a street, but they must use due care to prevent injury in doing so.

Due care is care according to time and circumstances, and the degree of care required increases as the danger increases.

That the place where plaintiff was injured was darkened either by the absence of sunlight or shadows of the bridge columns, and a curve in the street prevented the headlight from illuminating plaintiff's position, did not obviate the company's duty to keep a lookout, but would rather increase that duty.

Whether plaintiff was drunk on a street car track when he was injured or had negligently crossed the track so close to a car that he was knocked unconscious and run over by another car, in either event the company would be liable if it afterward negligently ran over him.

In an injury action against a street car company, evidence held to show that defendant's motorman did not testify that the dummy figures in pictures introduced to illustrate plaintiff's position when injured were a true representation of his position at that time.

While the admissions of a motorman made before trial as to details of an accident might discredit him as a witness if they contradicted his testimony at trial, such admissions would not prove the fact admitted or bind the company.

Where a witness stated generally that a picture clearly represented the scene of the accident, but stated specifically that the position of the person in the picture was different from that of the person injured, his general answer must be construed with reference to his specific denial of its correctness in important details.

Where photographs of a street car accident showed the person injured as sitting upright close to the rails at a place where the headlight could be thrown on him in time to stop, but at the time of the injury the person injured was in the shadow of a bridge column and lying down so that he could not be as easily seen, the difference between the photograph and the actual conditions rendered it inadmissible as evidence.

In an action for injuries to one lying on a street car track on a bridge by being run over by a car, evidence held to show that the motorman acted with due diligence in stopping the car when he saw plaintiff's danger.—(Riggs v. Metropolitan St. Ry. Co., 115 S. W. Rep., 969.)

New York.—Carriers—Injury to Passenger—Proximate Cause.

Where, in an action for injuries to a passenger, the only allegation of negligence submitted was defendant's failure to have the guard chains in place across the edge of the platforms of the cars, between which plaintiff's foot was caught and crushed, and there was no evidence as to the purpose of the chains nor how they could have prevented the accident had they been in place, such negligence was not shown to be the proximate cause of the injury. (Coady vs. Brooklyn Heights R. Co., 113 N. Y. Sup., 100.)

News of Electric Railways

Program for Meeting of the Central Electric Railway Association

The following program has been announced for the regular meeting of the Central Electric Railway Association, to be held at the Hotel Oliver, South Bend, Ind., on March 24, 1910:

MORNING SESSION

Business session and reports of committees.

Address by Geo. Whysall, president of the Central Electric Railway Association.

"Soliciting Business," by C. O. Warfel, general agent of the traffic department of the Indianapolis & Cincinnati Traction Company.

AFTERNOON SESSION

"Prevention of Accidents," by E. F. Schneider, general manager of the Cleveland Southwestern & Columbus Railway, Cleveland, Ohio. Discussion.

"Permanent City Construction for Interurbans," by H. L. Weber, chief engineer of the Columbus, Marion & Bucyrus Railroad, Marion, Ohio.

Discussion: "Public Utilities and Their Relations to the Public in General."

A meeting of the executive committee of the association has been called for 7:30 p. m. on March 23, 1910, at the Hotel Oliver, to discuss the business of the association.

Strike in Trenton Settled Quickly

The motormen and conductors in the employ of the Trenton (N. J.) Street Railway went on strike on March 9, 1910, but returned to work on March 12, 1910. They claimed that a number of the employees had been discharged because of their activity in trying to organize a union among the men and demanded a flat rate of pay of 23 cents an hour. A committee of citizens immediately intervened, and the company, through P. E. Hurley, general manager, agreed to meet a committee of the men to adjust differences, provided the men returned to work. As an increase in wages had been voluntarily granted by the American Railways to the employees of systems which it controls in other cities, the Trenton Street Railway agreed to increase wages to 23 cents an hour. The men were willing to return to work under these conditions, and a committee representing the employees agreed to the following conditions stipulated by the company in its communication to the committee of citizens:

"The Trenton Street Railway, with a view to settling the strike now pending in Trenton, and in consideration of the employees of said company now on strike returning to work, agrees with reference to what is known as 'swing runs' that that matter will be taken up by the employees and the manager of the company.

"Second. That the wages of the motormen and conductors shall be 23 cents per hour.

"Third. That the company will treat with its employees with reference to all grievances arising between the company and the men at any time.

"Fourth. That all employees and those who have recently been discharged will be reinstated in their proper places."

New Schedule in New York Subway

The new schedule for the New York subway which it was agreed between the Interborough Rapid Transit Company and the Public Service Commission of the First District of New York should be substituted for the order of the Commission dated Feb. 18, 1910, and published in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910, page 356, was placed in effect on March 14, 1910. It added 128 express and local trains, and provides briefly the following headway for express trains:

From 7 a. m. to 10 a. m., 1 min. and 48 sec.; from 10 a. m. to 10:30 a. m., 2 min.; from 10:30 a. m. to 2:53 p. m., 2½ min.; from 2:56 p. m. to 3:40 p. m., 2 min.; from 3:40 p. m. to 6:10 p. m., 1 min and 48 sec.; from 6:10 p. m. to 6:40 p. m., 2 min.; from 6:40 p. m. to 12 o'clock midnight, 3 min. Between 10:30 a. m. and 2:56 p. m., under the 2½-min. headway, the company proposes to run eight-car trains on the Lenox Avenue branch and five or six-car trains on the Broadway branch.

In a statement which he made public regarding the new service, Frank Hedley, vice-president and general manager of the company, said:

"The estimates prepared by the engineers prior to the subway being placed in operation stated its capacity for handling per day about 450,000 people. However, since the subway was placed in operation the people have shown their appreciation of this much-desired system of transportation until the passenger business has grown in numbers far in excess of any estimate that was prepared. The passengers now using the subway several days in each week have exceeded 800,000, and on some days have exceeded 1,000,000 per day.

"The Public Service Commission and the Interborough Rapid Transit Company have from time to time caused improvements to be made to the car equipment, to the signal system and to the operation of trains. A recent joint inspection was made by the Public Service Commission and the company, and an estimate made at several station points of the number of passengers riding in each car. This joint observation indicated that still further improvements could be made and the number of cars operated increased. The latter is possible because new cars are now being received by the company and placed in operation.

"This unparalleled frequent operation of heavy electric trains can only be accomplished by careful attention to the duties of each one of the company's employees, and their troubles would be very largely relieved if the passengers during the rush-hour periods would refrain from crowding into the trains and uncomfortably loading them. The passengers would receive a better character of transportation, and faster, if they would not crowd into the trains in such numbers that they become indecently loaded.

"During the middle of the day the West Farms express trains will carry eight cars and the Broadway express trains will carry five and six cars. Passengers will usually find seats in the car in the rear or forward end of the express trains during the non-rush hours."

Addresses at Mid-Year A. S. & I. R. A. Conference Reprinted.—The American Street & Interurban Railway Association has reprinted in pamphlet form the addresses presented at the mid-year conference, held at the headquarters of the association in New York on Jan. 26, 27 and 28, 1910. These addresses were published in the ELECTRIC RAILWAY JOURNAL of Feb. 12, 1910. As H. C. Donecker, secretary of the association, says in a short introduction, the subjects are all of vital importance. The addresses in the order of their presentation follow: "The Association, Public Opinion and General Conditions," by J. F. Shaw; "Public Service Commissions," by P. F. Sullivan; "The Fare Question," by Wm. J. Clark; "A Fair Return Upon the Investment," by C. S. Sergeant; "The Treatment of Depreciation," by Frank R. Ford.

Meeting of Electrical Engineers at Charlotte, N. C.—A meeting of the American Institute of Electrical Engineers will be held at Charlotte, N. C., on March 31 and April 1, 1910. The official headquarters of the Institute will be at the Selwyn Hotel, and the sessions of the association will be held at the hotel. Among the papers of interest to those connected with electric railways to be presented before the Institute are "Gas Engines in City Railway and Light Service," by E. D. Latta, Jr.; "Economics of Hydroelectric Plants," by W. S. Lee, and "Method of Protecting Insulators from Lightning and Power Arc Effects, with Results of Its Installation on the Lines of the Niagara & Lockport Power Company," by L. C. Nicholson. Members of the Institute who propose to attend the meeting are requested

to arrange with the Selwyn Hotel, the Stonewall Hotel, the Burford Hotel or the Central Hotel at Charlotte for their own hotel accommodations. Those in attendance at the meeting will be afforded an opportunity on April 1 to inspect the Southern Power Company's stations at Great Falls and Rocky Creek and the company's substations. A barbecue will be held at Great Falls.

Sixth Annual Electrical Night of the New York Railroad Club.—For the past five years the New York Railroad Club has devoted one of its winter meetings to a discussion of the subject of the application of electricity to steam railroad conditions. This meeting is known as "electrical night." The sixth annual meeting of this kind occurred on March 18, at 29 West Thirty-ninth Street, New York. The topic was introduced by a report of the committee on electrification of the club which was appointed about a year ago. This committee consists of W. J. Harahan, assistant to the president, Erie Railroad, chairman; L. C. Fritch, consulting engineer, Illinois Central Railroad, Chicago; H. M. Warren, electrical engineer, Delaware, Lackawanna & Western Railroad, Scranton, Pa.; H. H. Vaughan, assistant to the vice-president, Canadian Pacific Railway, Montreal, Can.; J. H. Davis, electrical engineer, Baltimore & Ohio Railroad, Baltimore, Md.; George W. Wildin, mechanical superintendent, New York, New Haven & Hartford Railroad, New Haven, Conn.; William McClellan, consulting engineer, New York; C. O. Mailloux, consulting engineer, New York, and E. B. Katte, chief engineer of electric traction, New York Central & Hudson River Railroad, New York.

Supreme Court Decision in Coney Island Fare Case.—Judges Burr, Jenks, Thomas, Woodward and Rich, of the Appellate Division of the Supreme Court, have concurred in affirming, with costs, the decision of the Municipal Court dismissing the suit brought by Louis B. Enton to recover $50 penalty because he was forced to pay a 10-cent fare over the Coney Island & Brooklyn Railroad to Coney Island in June, 1909. The opinion was written by Justice Burr who, in recommending the dismissal of the suit, said: "When the road had been constructed and operated for a long period of years, a presumption will arise that such construction and operation was in accordance with some lawful consent. When, as in this case, there are two acts or ordinances under which the defendant may operate within the city limits, one of which imposes no restrictions as to the rate of fare, and the other of which contains no such restrictions, if an action is brought to recover penalty for excessive fare charged the burden of proof rests on the plaintiff, who asserts the charge to be illegal to establish by a fair preponderance of evidence under which authority the defendant is operating. This case is barren of such evidence. The judgment appealed from should therefore be affirmed with costs."

Brooklyn Employees' Entertainment.—The employees of the Brooklyn (N. Y.) Rapid Transit Company were entertained by the Brooklyn Rapid Transit Employees' Benefit Association on the evening of March 10, 1910, in the theater of the association at its main building on Jamaica Avenue. The program for the evening included a number of vaudeville acts, several selections by the band composed of employees of the company, and an illustrated lecture by Edward Hungerford, of the company, entitled "A Day with the B. R. T.," which was delivered in two short parts. As Mr. Hungerford concluded his remarks he had thrown on the screen a likeness of Geo. W. Edwards, secretary of the association, and a group picture of about 30 of the oldest employees of the company, taken at the bottom of the steps leading to the club house. The lantern slides shown by Mr. Hungerford covered all departments of the company's activities, and will be used by him later in a series of public lectures which he proposes to give before various civic bodies to show the magnitude of the problems which confront street railway managers. In this way Mr. Hungerford will start his audience out with the men in the morning as they report for duty, and carry them by easy, progressive stages through the offices, shops and power houses, and show them a thousand and one details. Mr. Hungerford contrasted the reciprocating engine with the new turbines of the company, and explained briefly the care and attention that are required in painting and varnishing cars and in completely overhauling the equipment from time to time so as to discover the weak link in the chain. The trying work of handling snow was illustrated by means of a number of particularly striking views taken in the city proper and on the lines of the company in outlying sections.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—The Democratic floor leader of the Maryland House of Delegates has announced that the committee would in all probability report the utilities act to the House during the latter part of the week ended on March 19, 1910. Chairman Benson said that he was in favor of the passage of a public utilities act applicable to all public service corporations, but it is not known whether or not he will support the bill which is pending before the committee, of which he is a member. After a number of conferences with Attorney-General Straus, the act which he drew was reported favorably, with about 40 amendments. The bill for a utilities act favored by the Republicans is also before the ways and means committee. This bill leaves the commission free to treat conditions as they arise. It provides that the members of the commission shall be elected by the people. On March 11 Mr. Main, Baltimore, introduced a public utility measure drafted by the Reform League. This bill was referred to the judiciary committee.

Massachusetts.—The bill to provide a free transfer station at Massachusetts and Huntington Avenues, Boston, on the Boston Elevated Railway, has been referred to the next Legislature by the committee on street railways so the petitioners can bring the matter before the Railroad Commission. The Senate has accepted the adverse report of the committee on street railways upon the bill to provide for State and city ownership of street railways. The bill increasing the salaries of the Railroad Commissioners and railroad and railway inspectors has been referred to the next Legislature. Permission has been granted to withdraw the bill prohibiting the granting of street railway locations at the side of a highway within one mile of the center of any town of more than 5000 inhabitants or within one-half mile of the center of any smaller community. The bills taking away the enforcement of the existing car-heating statute from the district police and providing that any municipality may direct a street railway using its streets to establish as many waiting stations as it deemed the public convenience required have been reported adversely. An adverse report has also been presented upon the bill to substitute two public service commissions for Boston and the rest of the State for the present utility commissions. The bill prohibiting further construction of elevated railways in Boston was heard by the committee on metropolitan affairs on March 14.

New York.—A bill prepared by the Public Service Commission of the First District has been introduced which proposes to amend the Rapid Transit Act of New York City, particularly in regard to the operations of subways. It permits moving platforms in subways and operators of rapid transit routes to secure their motive power by purchase instead of by building power houses, provided the contract for the purchase of the power is approved by the Public Service Commission. It will be recalled that the New York Edison Company several months ago addressed a communication to the commission in which it offered to furnish power for operating subway extensions. The Public Service Commission has prepared for introduction a bill which will give the commission power to compel the New York Central & Hudson River Railroad to change the grade of its tracks in Eleventh Avenue.

Ohio.—Senator Duval has introduced a bill which provides that street railway conductors who unlawfully give away transfers and passengers who misuse transfers shall be fined $50 and imprisoned for 30 days. The Langdon bill, which provides for a tax commission to assess public utility corporations, has been reported to the House by the tax committee with recommendation for its passage as amended by the author. The amendments provide a more definite means of distributing the assessed values of public service corporations among the townships and municipalities in which the companies operate and a closer supervision by the proposed commission of the local taxing authorities. The requirement that the names of the stockholders be listed has been omitted. The Woods public utilities bill was taken up on March 14.

Financial and Corporate

New York Stock and Money Markets

March 15, 1910.

After several weeks of improvement in tone, accompanied by considerable advance in price, the Wall Street stock market has shown a tendency for the last two days to sell off sharply. The immediate reason assigned is the threatening attitude assumed by Western railroad firemen. The recession has, however, done little to lessen the general sentiment of optimism.

During the past fortnight there has been a distinct improvement in the bond market. Many important bond issues, especially of public utility corporations, have been advertised, and the vendors declare that the investing public has responded liberally. The money market continues easy. Quotations to-day were: Call, 2¾@3¼ per cent; 90 days, 3⅞@4 per cent.

Other Markets

In spite of the strong financial support accorded it the Philadelphia market for traction shares has continued to weaken. Rapid Transit and Philadelphia Traction have been weaker than Union Traction. The trading in Rapid Transit has been quite heavy.

In the Chicago market there has been practically no trading in tractions. A few shares of Chicago Raiways, Series 1, have been sold at slightly better prices and there has been some Subway stock in the market at about 3.

In Boston there has been a limited amount of dealing during the past week in the issues of Massachusetts Electric and in Boston Elevated, but prices have not been changed.

Only the bonds of the United Railways Company have been in evidence in the Baltimore market. In these transactions have been liberal at former prices.

Quotations of various traction securities as compared with last week follow:

	Mar. 8.	Mar. 15.
American Railways Company	a45¾	45¼
Aurora, Elgin & Chicago Railroad (common)	a57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	a94¼	*94¼
Boston Elevated Railway	130¾	130½
Boston & Suburban Electric Companies	a16½	a16½
Boston & Suburban Electric Companies (preferred)	a76	a76
Boston & Worcester Electric Companies (common)	a11	a10½
Boston & Worcester Electric Companies (preferred)	a44	a46
Brooklyn Rapid Transit Company	77¾	76
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84	84
Capital Traction Company, Washington	a133½	a133
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*2	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*10	*7½
Chicago Railways, ptcptg., ctf. 1	a106	a106
Chicago Railways, ptcptg., ctf. 2	a33	a33
Chicago Railways, ptcptg., ctf. 3	a18	a18
Chicago Railways, ptcptg., ctf. 4s	a9⅛	a9⅛
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76½	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a105¼
Detroit United Railway	*62	*62
General Electric Company	157	154
Georgia Railway & Electric Company (common)	a107½	106½
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	23⅛	22
Interborough-Metropolitan Company (preferred)	58¼	55¾
Interborough-Metropolitan Company (4½s)	82⅛	81⅝
Kansas City Railway & Light Company (common)	a30	a34
Kansas City Railway & Light Company (preferred)	a71	a75
Manhattan Railway	139	*139
Massachusetts Electric Companies (common)	a18½	a18
Massachusetts Electric Companies (preferred)	a84½	a84
Metropolitan West Side, Chicago (common)	a16	a16
Metropolitan West Side, Chicago (preferred)	a55	a55
Metropolitan Street Railway	15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	81¼	*81¼
Northwestern Elevated Railroad (common)	a17	a16
Northwestern Elevated Railroad (preferred)	a70	a68
Philadelphia Company, Pittsburg (common)	a51¼	a51
Philadelphia Company, Pittsburg (preferred)	a44½	a44½
Philadelphia Rapid Transit Company	a23⅜	a21¼
Philadelphia Traction Company	*89	86
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a105	a105½
Seattle Electric Company (common)	a115	a115
Seattle Electric Company (preferred)	a106	a102
South Side Elevated Railroad (Chicago)	a54	a53¼
Third Avenue Railroad, New York	8⅛	*8⅜
Toledo Railways & Light Company	*11¾	*11¾
Twin City Rapid Transit, Minneapolis (common)	114	*114
Union Traction Company, Philadelphia	a50½	a48¾
United Rys. & Electric Company, Baltimore	*14	a14
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*67	*67
Washington Ry. & Electric Company (common)	38	38
Washington Ry. & Electric Company (preferred)	a89⅛	a90⅝
West End Street Railway, Boston (common)	105	105
West End Street Railway, Boston (preferred)	a105	a105½
Westinghouse Elec. & Mfg. Company	75⅞	68½
Westinghouse Elec. & Mfg. Company (1st pref.)	125	*125

a Asked. * Last Sale

Annual Report of London Street Railway

Gross earnings of the London (Ont.) Street Railway in the year ended December 31, 1909, were $243,359 as compared with $235,032 in 1908. Operating expenses and taxes were $169,830 or 69.8 per cent of gross earnings. Maintenance expenditures aggregated $46,479 of the total operating expense. The sum of $21,736 was expended on maintenance of way and structures and $24,743 on maintenance of equipment. These amounts are, respectively, 8.9 per cent and 10.2 per cent of gross earnings, a total of 19.1 per cent. Earnings for three years compare as follows:

Earnings:	1909.	1908.	1907.
Passengers	$238,267	$230,866	$226,510
Miscellaneous	5,092	4,166	5,867
Gross earnings	$243,359	$235,032	$232,377
Expenses:			
Maintenance:			
Way and structures	$21,736	$13,574	$17,295
Equipment	24,743	28,128	24,279
Transportation:			
Power plant	$27,796	$30,125	$32,883
Car service	67,866	68,845	65,865
General	27,689	26,894	27,703
Total operating expense	$169,830	$167,566	$168,025
Net earnings	$73,529	$67,466	$64,352
Deductions:			
Interest on bonds	$28,346	$25,006	$25,000
Interest on overdrafts	542	3,449	2,229
Total deductions	$28,888	$28,455	$27,229
Net Income	$44,641	$39,011	$37,123

President Henry A. Everett says in his statement to shareholders:

"The expenditure for track purposes and the general maintenance of the entire system was noticeably increased and considerable reconstruction was accomplished at a minimum cost, owing to favorable conditions affecting both material and labor.

"The general adoption of the pay-enter system throughout the country has caused us to make some changes along these lines, but owing to local conditions, a pay-leave system was considered more desirable; consequently a number of cars were adapted to this plan and are being tried out at the present time.

"As a result of the favorable vote on Sunday cars this matter was referred to the Legislature, which passed an act requiring a population of 50,000, but as the committee could not give a satisfactory return, the matter was laid over until this year.

"The new stock authorized at the last meeting is entirely subscribed and 50 shares have been paid in full, although no calls have yet been made. Your directors have seen fit to dispose of $25,000 of bonds at a fraction over par, the proceeds being used to pay our overdraft and to provide for other requirements, so that our present condition is excellent.

"It is with pleasure that we draw your attention to the increases in the gross earnings and surplus for the past year, which under the existing conditions were very good, and we confidently expect the coming year will also prove satisfactory.

"No suits of consequence are pending against the company. There were 64 shareholders of record on Dec. 31, 1909."

A statistical statement compiled by George H. Bentson, secretary and treasurer, includes the following:

Year ended Dec. 31.	1909.	1908.	1907.
Gross earnings	$243,359.39	$235,032.40	$232,376.59
Operating expenses	169,830.44	167,566.72	168,024.88
Expenses, p. ct. of earnings	69.8	71.3	72.3
Net earnings	75,528.95	67,465.68	64,351.71
Net income, p. ct. of capital	8.08	7.10	6.88
Passengers carried	6,673,709	6,442,998	6,321,994
Car earnings, per rev. pass.	3.62c	3.64c	3.63c
Transfers	1,915,164	1,662,306	1,039,362
Total passengers	7,688,873	7,505,304	7,361,356
Car earnings per passenger	3.09c	3.07c	3.07c
Car mileage	1,422,223	1,427,353	1,435,993
Gross earnings per car-mile	17.11c	16.47c	16.18c
Operating exp. per car mile	11.93c	11.74c	11.70c
Net earnings per car-mile	5.17c	4.73c	4.48c
Number of miles of track	33.25	33.25	33.25
Gross earnings per mile of track	7,310.07	7,068.64	6,988.77
Population (city estimate)	49,397	49,431	47,769

Ardmore (Okla.) Traction Company.—C. L. Byrne, receiver of the Ardmore Traction Company, will sell at private sale to the highest bidder on May 2, 1910, the property of the

Ardmore Traction Company, including 4.7 miles of railroad in operation, two new single-truck, semi-convertible cars, two double-truck cars, a convertible car, a summer car and an amusement park. Bids must be sealed and be accompanied with a certified check for 10 per cent of the bid, payable to the receiver. The remainder is payable at the confirmation of the sale. The minimum price fixed by the court for the property is $60,000.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—TheRailroad Commission of Wisconsin has authorized the Chippewa Valley Railway, Light & Power Company to issue $150,000 of first mortgage 5 per cent bonds, $50,000 of preferred stock and $200,000 of common stock, to finance the construction of a 2000-kw hydroelectric power plant and other improvements.

Coney Island & Brooklyn Railroad, Brooklyn, N. Y.—The Public Service Commission of the First District of New York authorized the Coney Island & Brooklyn Railroad on March 9, 1910, to issue $151,000 of consolidated mortgage 4 per cent bonds for improvements. The bonds just authorized take the place of the $107,000 of bonds authorized in October, 1909, the total of bonds having been increased after further hearing before the commission. The bonds are to be sold at not less than 80. The order of the commission provides for the amortization of the discount and expenses in connection with the sale of the bonds out of the company's income before Jan. 1, 1955.

Denver & Inter-Mountain Railroad, Denver, Col.—The stockholders of the Denver & Inter-Mountain Railroad will vote on April 4, 1910, on the question of dissolving the company and transferring the property to a successor company which it is said will be known as the Intermountain Railway.

Galveston-Houston Electric Railway, Houston, Tex.—Lee, Higginson & Company, Boston, New York and Chicago, and Higginson & Company, London, Eng., offer for subscription at 95 and interest the unsold portion of $2,750,000 of first mortgage 5 per cent sinking fund gold bonds of the Galveston-Houston Electric Railway, dated Oct. 1, 1909, and due Oct. 1, 1954, but callable as a whole or in part for sinking fund only on any interest date at 105 and interest.

Janesville (Wis.) Street Railway.—W. H. Lemons and William Murphy have been appointed receivers of the Janesville Street Railway by Judge Grimm in the Circuit Court, on application of the Finance Company, Philadelphia, Pa., trustees of a mortgage made by the Janesville Street Railway in 1892 to secure $75,000 of 6 per cent bonds.

Public Service Corporation, Newark, N. J.—J. P. Morgan & Company, New York, N. Y., and Drexel & Company, Philadelphia, Pa., offer for subscription at 97 and interest less than $1,000,000 of a block of $8,000,000 of general mortgage 5 per cent sinking fund 50-year gold bonds of the Public Service Corporation. The bonds are dated Oct. 1, 1909, and due Oct. 1, 1955, but are callable when drawn for the sinking fund on or after Oct. 1, 1913, at 105 and interest and redeemable at the option of the company on Oct. 1, 1919, or any interest date thereafter at 105 and interest.

Putnam & Westchester Traction Company, Peekskill, N. Y.—The Public Service Commission of the Second District of New York has authorized the Putnam & Westchester Traction Company to issue $11,000 of 30-year 5 per cent gold bonds to discharge outstanding obligations.

Rhode Island Company, Providence, R. I.—The Rhode Island Company paid from the earnings for the year ended June 30, 1909, an initial dividend of 5 per cent on the $8,510,400 stock of the company.

Stark Electric Railroad, Alliance, Ohio.—The stockholders of the Stark Electric Railroad have voted to increase the capital stock of the company from $1,000,000 to $1,500,000 and to declare a stock dividend of 25 per cent, payable on April 1, 1910.

Toledo Railways & Light Company.—The annual report for the year ended Dec. 31, 1909, states that the gross earnings were $2,733,177. Operating expenses were $1,627,337, or 59.54 per cent of gross receipts. Net earnings were $1,105,840, and interest charges $778,286, leaving a surplus of $327,554, or 2.36 per cent on the capital stock.

Traffic and Transportation

Decision in Seattle-Tacoma Fare Case

The Railroad Commission of Washington has rendered its findings in the appeal by residents along the Puget Sound Electric Railway for an order for a reduction in the fare between Seattle and Tacoma and intervening cities as fixed by the company on Oct. 17, 1909, in accordance with the announcement published in the Electric Railway Journal of Nov. 6, 1909, page 1000. The schedule adopted in October increased the regular rates to practically 2 cents per mile. The through rate of $1 for the round trip between Seattle and Tacoma was also increased to $1.50. The commission has refused to order a reduction in the round trip fare between Seattle and Tacoma or in the one-way fare between the cities, but certain readjustments have been ordered between Seattle and points south of Englewood and between Tacoma and points on the branch line between Willow Junction and Puyallup. The order of the commission follows:

"It is now ordered that the present round trip fares, being twice the single published rate from Seattle to points south of Englewood and as far south as and including Renton Junction, and from Tacoma to points north of Tidehaven and as far north as and including Algona, be and the same are hereby declared to be unjust, unreasonable and excessive, and it is ordered that the same be not hereafter charged to persons desiring round trip tickets between such points, and in lieu thereof and to take the place of such charges it is ordered that the round trip rates in force prior to Oct. 17, 1909, to such points be reinstated, published and charged in the future.

"That the present round trip rates between Tacoma and points on the branch line between Willow Junction and Puyallup be and the same are hereby declared to be unjust, unreasonable and excessive and that the same be not charged in the future, and to take the place of such round trip rates between Tacoma and the points on such branch line the round trip rates and fares charged prior to Oct. 17, 1909, be reinstated, published and charged in the future.

"That the present round trip rates, being twice the single published rate, from Seattle to Earlington and Renton, be and the same are hereby declared to be unjust, unreasonable and excessive, and that the same be not charged in the future, and that to take the place of such round trip rates between Seattle and such points, there be charged in the future a round trip rate between such points not to exceed 30 cents between Seattle and Earlington and 35 cents between Seattle and Renton.

"That the round trip rates between Seattle and points other than those above named and between Tacoma and said last-named points charged prior to Oct. 17, 1909, be reinstated, published and charged in the future, unless the defendant company agrees to issue commutation tickets good between Seattle and Tacoma and such points requiring not to exceed 32 rides in one month at rates for single rides not to exceed one-half the charge for round trip tickets prior to Oct. 17, 1909, and in the event of the defendant company filing with the commission within 20 days from this date its tariff providing for such commutation books between such points, then and in that event that portion of this order providing for round trip tickets between Seattle and points on the main line south of Renton Junction and between Tacoma and points on the main line north of Algona shall not be effective.

"It is further ordered that that portion of the complaint asking for a reduction of the single fare, and that portion asking for a reduction between local stations and not touching Seattle or Tacoma and that portion asking for a reduction between Seattle and Tacoma be and the same is hereby denied.

"It is further ordered that in view of the fact that if the rates herein established be published in conjunction with the rates now existing and not affected by this order, that the tariff so published will be inharmonious and will result in the combined sum of two or more local rates between terminals being less than the through published rates as well as being less from points near the suburban limits mentioned, and the commission feeling that a harmonious

tariff consistent with this order can be prepared, and believing that under the circumstances the defendant company should be permitted to prepare and submit such tariff to the commission, it is further ordered that the defendant company have and it is hereby given 10 days from the date of the service of this order upon it to prepare and file with the commission a new complete tariff consistent with this order, and in case of its neglect or failure so to do the commission will at the expiration of such time issue a supplemental order providing for a new and complete tariff and the rates to be hereafter charged between all points on its line."

Increase in Wages in Brooklyn

The Brooklyn Rapid Transit Company, which in January, 1910, announced an increase in the wages of its trainmen, as noted in the Electric Railway Journal of Jan. 15, 1910, page 126, has announced the following rates of pay effective on April 1, 1910, to apply to the positions indicated:

	First year.	Second year.	After two years.
Day despatcher	$2.85 per day	$2.85 per day	$3.00 per day
Despatchers, night and swing	2.65 per day	2.65 per day	2.75 per day
Inspector (line)	2.85 per day	2.85 per day	3.00 per day
Starter	2.65 per day	2.65 per day	2.75 per day
Register inspector	2.65 per day	2.65 per day	2.75 per day
Register taker	2.50 per day	2.50 per day	2.60 per day
Transfer clerk	2.35 per day	2.35 per day	2.40 per day
Instructor of motormen (line)	2.80 per day	2.80 per day	2.90 per day
Foreman car cleaner	1.85 per day	2.00 per day	2.00 per day
Car houseman	1.60 per day	1.75 per day	1.75 per day
Car cleaner	1.60 per day	1.70 per day	1.70 per day
Helper (Twenty-third Street)	.17½ hour	.17½ hour	.18½ hour

The company has also announced that hereafter all vacancies in the positions of transfer clerk, register taker, starter, register inspector, line inspector, night and swing despatcher, and day despatcher, will be filled, as far as possible, by promotion of conductors and motormen and from the ranks. For the purpose of making promotions from the ranks of conductors and motormen according to their seniority, service record, and general qualifications, there will be maintained at each depot a list of eligibles for the positions previously mentioned which will be based upon the following: First, a record free from demerits. Second, at least one year of service as conductor or motorman for positions of transfer clerk and register taker, and at least two years of such service for all other positions. Service as transfer clerk or register taker will be counted the same as service as conductor or motorman, to make up the requisite two years.

Any eligible motorman or conductor desiring promotion or transfer to one of the postions referred to may submit his name to the assistant superintendent for consideration. There is no objection to a man applying to have his name entered on several lists of eligibles. Such names will be referred to the superintendent of surface lines, together with the recommendations of the assistant superintendent. Favorable and unfavorable recommendations will alike be submitted to the superintendent of surface lines for his consideration, and the employee will be advised of the action taken. Positions as despatchers will be filled only by promotion from starter or line inspector.

Increase in Fare on Syracuse & Suburban Railroad.—On April 1, 1910, the Syracuse & Suburban Railroad, Syracuse, N. Y., will cancel the 15-cent round-trip ticket fare between Orville and Manlius, or Edwards Falls, and charge 10 cents in either direction between these places.

Train Service Over Electric Railway in West Virginia.—The Fairmont & Clarksburg Traction Company, Fairmont, W. Va., has begun a service with trains of two cars over its line between Fairmont and Clarksburg. This is said to be the first service with trains which has been given over an electric railway in West Virginia.

Bonus to New Men in New Jersey.—The Public Service Railway, Newark, N. J., has adopted a rule which requires a new motorman to spend seven days breaking-in. As an inducement for new men to remain with the company indefinitely each new man who serves the company more than a year is awarded a bonus of $10.

New Buttons Adopted by Interurban.—The Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has adopted a new button and has substituted it on all the clothing of its employees for the button formerly in use. The new button bears the diamond-shaped seal of the company, in which are inscribed the letters " T. H., I. & E." in gold.

New York Central Electric Service Extended.—The New York Central & Hudson River Railroad began service with electric trains over its Harlem division to White Plains on March 16, 1910. As stated in the Electric Railway Journal of March 19, 1910, page 466, the new service practically doubles the mileage served by the electrified lines of the company.

Traffic Agreement in Oakland.—The East Shore & Suburban Railway has arranged with the Oakland (Cal.) Transit Company for operating into Oakland over the lines of that company from Point Richmond to Seventh street and Broadway. The cars of the East Shore & Suburban Railway will be manned by crews of the Oakland Transit Company while in Oakland.

Pay-as-You-Enter Service in Los Angeles.—On May 1, 1910, the Los Angeles (Cal.) Railway will place in operation on its Central Avenue line the first of 30 cars now being reconstructed in the shops of the company for pay-as-you-enter operation. The cars will be equipped with wire gates, and push-buttons will be installed for the convenience of passengers who desire to signal the conductor from the center of the car to stop.

New York & Queens County Railway's Cars to New York.—On March 14, 1910, the New York & Queens County Railway began operating all of its through cars over the Queensboro Bridge to New York. The company has established a shuttle service between the bridge plaza in Long Island City and the Long Island Railroad's ferry from the foot of Borden Avenue, Long Island City, to Thirty-fourth Street, New York.

Express Rights Asked in Massachusetts.—The Milford, Attleboro & Woonsocket Street Railway, Milford, Mass, has petitioned the Massachusetts Railroad Commission for the right to carry baggage, express matter and freight in Milford, Hopedale, Franklin, Plainville, Wrentham, Mendon and Bellingham. The Interstate Consolidated Street Railway has petitioned the Commission for the right to carry baggage, freight and express matter in the towns of Attleboro and Seekonk.

Interstate Railway Increases Wages.—The Interstate Railways has made the maximum wage of motormen and conductors employed on the systems which it controls in Reading, Chester, Trenton, Wilmington,, Norristown and Lebanon 23 cents an hour. The men formerly received a maximum wage of 20 cents an hour. It is stated that the company is considering the advisability of charging a straight 5-cent fare on all its lines hereafter.

Extension in Schenectady to Increase Facilities.—The Public Service Commission of the Second District of New York has approved the extension of the Schenectady (N. Y.) Railway on Edison Avenue from Washington Avenue to South Center Street, Schenectady, to facilitate and improve conditions for handling traffic in Schenectady in accordance with one of the suggestions in the report on transit conditions in the city made to the commission by C. R. Barnes, electric railroad inspector of the commission.

Illuminated Station Indicators in Hudson & Manhattan Tunnel.—The Hudson & Manhattan Railroad, New York, N. Y., on March 14, 1910, placed in operation an experimental train of three cars equipped with illuminated station indicators. The first trip of the train equipped with the device was made from the Twenty-third Street station, in Manhattan, at 11:15 a. m. The passengers comprised a party of 50 invited guests of the company, to whom the new signs were demonstrated. Among those who made the trip were Mrs. R. F. Cartwright, chairman of the public safety committee of the City League; Thomas Small, inventor of the device; Major C. W. Johnson; representatives of various women's clubs of the city and reporters from the daily papers. The company was represented by Wilbur C. Fisk, vice-president, in charge of operation; E. T. Munger, general superintendent, and Oliver T. Boyd, general passenger agent. Ten cars in addition to those on the first experimental train are being equipped with the signs. If the experiment proves successful, the station indicators will be installed in all the trains operated in the tunnel.

Personal Mention

Mr. Lowe Brown has been appointed resident engineer for the construction of the subway which the Ferro-Carril Oeste de Buenos Ayres, Traction Department, proposes to build through Buenos Ayres. Mr. Brown was resident engineer for the Pennsylvania Railroad tunnels in New York before going to Buenos Ayres.

Mr. N. C. McCoy, formerly master mechanic of the Pittsfield (Mass.) Electric Street Railway, has been appointed assistant to Mr. W. P. Ripple, mechanical and electrical engineer of the New England Investment & Security Company, Springfield, Mass., with the title of general inspector of rolling stock equipment for the lines controlled by the company.

Mr. C. E. Hubbard has been appointed purchasing agent of the Mahoning & Shenango Railway & Light Company, New Castle, Pa. Mr. Hubbard retired as secretary, general manager and purchasing agent of the Farmington Street Railway, Hartford, Conn., following the recent absorption of the company by the New York, New Haven & Hartford Railroad in the interest of the Connecticut company.

Mr. R. H. Vansant has been appointed traffic manager of the Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Ind., to succeed Mr. W. O. Woodard, whose appointment as traffic manager of the Chicago, Lake Shore & South Bend Railway was announced in the Electric Railway Journal of Feb. 29, 1910. Mr. Vansant was formerly chief clerk in the operating department of the Indianapolis, Crawfordsville & Western Traction Company. He will have charge of all freight and passenger business, with headquarters at Crawfordsville.

Mr. R. P. Stevens, president of the Lehigh Valley Transit Company, Allentown, Pa., recently addressed the Bethlehem branch of the American Institute of Electrical Engineers at Lehigh University. Mr. Stevens referred to the magnitude of the electric railway industry, and gave the number of cars, the capitalization and the mileage of these properties in the United States and showed the possibilities that the interurban lines now offer for through travel. The industry must look to the colleges for the men qualified technically to carry on the work already begun. Mr. Stevens also referred to the question of fares and the proper return on the investment. In closing his remarks, Mr. Stevens said that it paid to be frank with the newspapers and the public.

Mr. C. A. Greenidge has been appointed an engineer with the operating department of the J. G. White & Company, Inc., New York, N. Y. Mr. Greenidge was born in Barbadoes, West Indies, and was graduated from Stevens Institute of Technology in 1895 as a mechanical engineer. Since then he has been connected with the Mount Morris Electric Light Company; New York Edison Company, as resident engineer in charge of steam-electric plant construction for the Equitable Gas & Electric Company of Utica, N. Y.; superintendent of the electric department of the Utica Gas & Electric Company, and general manager of the electric department of the Utica Gas & Electric Company. He is a member of the American Institute of Electrical Engineers and a member of the National Electric Light Association.

Mr. Edward Hammett, Jr., has been appointed superintendent and purchasing agent of the Sheboygan Light, Power & Railway Company, Sheboygan, Wis., to succeed Mr. H. J. Pagel, who resigned these offices on account of ill health, but who has been retained in the service of the company. Mr. Hammett was born in Wheaton, Ill., and entered railway work with the Aurora, Elgin & Chicago Railroad under Mr. Ernest Gonzenbach, who now is president and general manager of the Sheboygan Light, Power & Railway Company. Mr. Hammett was promoted rapidly while with the Aurora, Elgin & Chicago Railroad, and finally entered the selling field as district manager of the Electric Service Supplies Company at Pittsburgh, Pa., from which position he resigned to become connected with the Sheboygan Light, Power & Railway Company.

Mr. A. W. Hargett has resigned as manager of the Meadville & Cambridge Springs Street Railway, Meadville, Pa., and proposes to take a vacation of several months before resuming work. Mr. Hargett began his railway career as shop foreman with the McKeesport & Reynoldton Passenger Railway in 1889, and resigned from that position to become master mechanic of the Monongahela Street Railway, Braddock, Pa., with which he continued until 1900, when he accepted an appointment as division superintendent of the Pittsburgh & Birmingham Traction Company. During 1902 and 1903 Mr. Hargett was engaged in the construction of the Pittsburgh & Charleroi Railway, the Wilkinsburg & Verona Street Railway and the Wilmerding, Pitcairn & Trafford City Street Railway. On Jan. 1, 1904, he assumed charge of the Allegheny Valley Street Railway, Tarentum, Pa. On July 1, 1908, Mr. Hargett was appointed manager of the Meadville & Cambridge Springs Railway.

OBITUARY

Morey B. Harper, formerly connected with the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, Cincinnati, Ohio, is dead. Mr. Harper was at one time connected with the Tennis Construction Company and was agent of the Baltimore & Ohio Railroad at Delhi, Ohio.

Eugene L. Crawford, recently appointed superintendent of the Northwest division of the Chicago (Ill.) Railways, died in Chicago on March 14, 1910. Mr. Crawford had served with the company and its predecessors for more than 35 years. He was born at Dowagiac, Mich., 57 years ago, and began street railway service in Chicago as a conductor on the North Side lines. His death was due to pneumonia.

NEW PUBLICATIONS

Corrosion of Iron and Steel. By Alfred Sang. New York, 1910: McGraw-Hill Book Company. Cloth, 101 pages. Price, $1.00 net.

The author has tried to compile in one handy volume all information available on the corrosion of iron and steel, particularly with regard to the different theories covering rust formation. Separate chapters are devoted to the effect of stress and to the corrosion of rails.

The Prevention of Accidents. By F. W. Johnson, superintendent Bureau for Prevention of Accidents, Philadelphia Rapid Transit Company; third edition, entirely rewritten. New York: McGraw-Hill Book Company; 50 pages; illustrated; cloth. Price, 25 cents, with discount in large quantities.

The first edition of this pamphlet was prepared by Mr. Johnson for use in his own work while claim agent of the Connecticut Railway & Lighting Company at Bridgeport, where he aimed to give in brief form the most valuable suggestions to motormen and conductors to reduce accidents. The book proved so successful that it was put on general sale and ran through two large editions, 16,000 having been sold since April, 1907. The third edition is now from the press of the same publishers. The pamphlet has been entirely rewritten by Mr. Johnson in the light of subsequent experience, both in the prevention of accidents and in the best way of clearly instructing motormen and conductors in the safe operation of cars. The pamphlet is not intended in any way to supersede the ordinary rule book. It is more of a text book in which the reasons for the standard operating rules are made evident to the thoughtful conductors and motormen, and many of the copies heretofore sold have been purchased by companies in large lots for distribution among their platform men. The purpose of the author is perhaps most clearly indicated by an anecdote related in the closing pages. A railway superintendent who places safety in operation above every other consideration had before him three applicants for the position of motorman for the one vacancy existing on the road. He asked each of them the same question: "If you were operating your car at a speed of 20 m.p.h., following another car, on straight rail, in broad daylight, and you suddenly found yourself within three car lengths of your leader, who was at a standstill receiving passengers, how quickly could you stop?" The first prospective motorman made a guess and said 30 ft. The second thought that he could make the stop in 20 ft. The third thought a moment and then asked how the motorman of the car ever got in such a fix. The superintendent recognized in this last speaker the kind of employee he wanted. He was anxious to engage the man who exercised enough forethought not to get into such a position. The book is illustrated with several engravings to show dangerous situations.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***East Washington Suburban Railway, Washington, D. C.**—Application has been made by this company for a charter to build an electric railway in the District of Columbia on Nichols Avenue, Good Hope Road, Bowen Road and Surtland Road to the boundary line of the District, and there connect with the Anacostia & Potomac River Railroad. Incorporators: Samuel E. Cox, William A. Harrison and A. W. Thomas, Maryland; Albert Carry, O. A. Emmons, John Kuhn and Maurice Otterback, Washington; Reese Carpenter, New York; R. H. Phillips and J. S. Sims, Virginia.

Griffin City & Suburban Railway, Griffin, Ga.—Application for a charter has been made in Georgia to build an electric railway in Griffin, Atlanta, Macon, Jackson, Barnesville, McDonough, Fayetteville, Williamson and Zebulon. The line in Griffin will be 5 miles long. Capital stock, $25,000. Incorporators: H. H. Bass, J. P. Nichols, B. R. Blakely, Frank Flynt, Joseph D. Bayd, Thomas J. Brooks, J. C. Brooks, R. F. Strickland, A. D. Akin and J. M. Preston. [E. R. J., Feb. 19, '10.]

***Eastern Illinois Railway, Chicago, Ill.**—Incorporated in Illinois to build a 16-mile surface railway from West Hammond to Riverdale through Harvey. When completed the line will connect at East Hammond with the Hammond, Whiting & East Chicago Elevated Railway, and at Riverdale with an extension of the Calumet & South Chicago Railway, which extension is yet to be built. Nominal incorporators: Warner H. Robinson, Edgar H. Pank and Samuel Blumenthal, Chicago, and John Cox, Joliet. Ira M. Cobe is quoted as having said that the Eastern Illinois Railway may be absorbed by the Chicago City & Connecting Railway, which is financing the enterprise. The territory to be tapped by the new line is at present unoccupied. Most of the right of way has been secured and franchise negotiations are under way.

***Iowa & Illinois Railway Terminal Company, Clinton, Ia.**—Application for a charter has been made in Iowa by this company to construct and operate railways by electricity or other motive power through Iowa. Capital stock, $25,000. Officers: F. W. Ellis, president and treasurer; Henry Huenen, Jr., vice-president, and P. P. Crafts, secretary.

***North Maryland Railway, Baltimore, Md.**—Application will shortly be made in Maryland for a charter to build an electric railway in Baltimore, Hartford and Cecil Counties. Incorporators: Thomas H. Robinson, Michael H. Fahey, Omar D. Crothers, Richard Dallam, Samuel C. Rowland, Murray Vandiver and Clarence C. Pusey, Baltimore.

FRANCHISES

Brighton, Mich.—The electors of Brighton have been asked to grant a franchise to the Detroit, Lansing & Grand Rapids Railway, Detroit, to build an electric railway over the principal streets in Brighton. [E. R. J., Feb. 5, '10.]

Chatham, N. J.—The Morris County Traction Company, Morristown, will soon apply to the Council for a franchise to build a line in Chatham. Surveyors are at work and nearly all the right of way has been secured.

Long Branch, N. J.—The City Council has granted a 20-year franchise to the Atlantic Coast Electric Railroad, Asbury Park, to extend its street railway from Florence Avenue and Atlantic Avenue to the southerly boundary of Monmouth Beach.

Mt. Airy, N. C.—Francis Jegiers has secured a franchise from the authorities of Mt. Airy to construct an electric railway on Main Street in Mt. Airy. This is part of a plan to build a 75-mile electric railway from Leadville to Mt. Airy through Rockingham and Stokes Counties. [E. R. J., Feb. 12, '10.]

***Springfield, Ore.**—The City Council has granted a franchise to the Sano County Asset Company to operate an electric railway over certain streets in Springfield.

Chattanooga, Tenn.—The City Council has granted a franchise to the Chattanooga Railway & Light Company to construct additional tracks and cross-overs on some of the municipal streets in Chattanooga.

Brigham City, Utah.—The Board of Commissioners has granted a franchise to the Ogden & Northwestern Railroad, Ogden, to build an electric railway in Brigham City, provided the company will have the railway built within one year from acceptance or forfeit a given sum.

Renton, Wash.—The Council has granted the Valley Railway & Power Company, Seattle, a franchise to build an electric railway over some of the principal streets in Renton. The proposed railway will connect Kent and Renton. The Council of Kent has granted a 35-year franchise to Thos. Chapman for the Valley Railway & Power Company, to construct an electric railway over certain streets in Kent. [E. R. J., Feb. 19, '10.]

Snohomish, Wash.—The Seattle Snohomish & Everett Railway, Seattle, has applied for a 50-year franchise to construct an electric railway over certain streets in Snohomish. This proposed 32-mile railway will connect Seattle, Bothell, Snohomish and Everett. Charles W. Kimball, secretary, 443 New York Block, Seattle. [E. R. J., Feb. 13, '09.]

Oconomowoc, Wis.—Application has been made to the City Council by the Milwaukee Light, Heat & Traction Company, Milwaukee, for a franchise to build lines over certain streets in Oconomowoc.

Portage, Wis.—The City Council has granted the Chicago & Wisconsin Valley Railway, Madison, a franchise to construct an electric railway in Portage. Material has been ordered and construction will commence as soon as the weather permits. This is part of a plan to build an electric railway from Janesville to Merrill via Friendship, Easton, Buggsville, Portage, Lodi, Middleton and Madison. [E. R. J., Dec. 4, '09.]

TRACK AND ROADWAY

Pacific Electric Railway, Los Angeles, Cal.—This company expects to extend its electric railway from Glendora to San Dimas and from there a line will run direct to Claremont and join the railway now being constructed from Pomona to Claremont. At San Dimas the local line will join with an extension from Conna.

San José & Santa Clara Railroad, San José, Cal.—This company has acquired the property of the San José Railway, a narrow 3-ft. gage track, covering 13 miles of streets in San José. It is the intention to standardize this line.

Indiana Union Traction Company, Anderson, Ind.—It is stated this company is planning to double-track its line between Indianapolis and Muncie.

Fort Wayne & Toledo Electric Railway, Harlan, Ind.—This company has resumed work on its 42-mile railway between Fort Wayne, Ind., and Bryan, Ohio. This railway, when completed, will give Fort Wayne a direct route to Toledo. R. T. Bastress, Harlan, general manager. [E. R. J., Sept. 23, '09.]

Clinton (Okla.) Street Railway.—This company is planning to adopt electricity as motive power instead of operating gasoline motor cars. It is stated that the company will soon purchase the necessary material for the construction of the line. H. Smith, Arapahoe, Okla., is interested [E. R. J., April 24, '09.]

Lawton & Fort Sill Electric Railway, Lawton, Okla.—This company has been granted right of way by the Government to build an electric railway through the military reservation in Lawton. Construction will commence at once. D. L. Sleeper, vice-president. [E. R. J., Jan. 1, '10.]

***Tahlequah, Okla.**—Press reports state that J. B. Moore and associates are promoting an interurban electric railway from Tahlequah to Muskogee and are considering the building of a dam in the Illinois River east of Tahlequah for the purpose of establishing a power plant.

Portland Railway, Light & Power Company, Portland, Ore.—This company states that it expects to reconstruct about 20 miles of city track with paving. The company will do its own work.

Montreal (Que.) Street Railway.—This company has applied to the City Council for permission to double-track

certain sections where there has previously been but a single line, to widen certain streets, so as to allow double-tracking, to permit the laying of rails on thoroughfares which have hitherto been without tracks, and to inaugurate a number of changes in the present routing system. About 13 miles of track will be constructed.

Slippery Rock & Grove City Railway, Slippery Rock, Pa.—This company has completed surveys, and is securing rights of way preparatory to awarding the contract for the construction of the railway within the next month. H. B. Graves, Butler, chief engineer.

Corpus Christi & Interurban Railway, Corpus Christi, Tex.—This company has completed its street railway in Corpus Christi and the line is now in operation. Power is rented from the People's Light Company. V. S. Heinly, Corpus Christi, secretary and treasurer.

Galveston-Houston Interurban Electric Railway, Galveston, Tex.—The Stone & Webster Engineering Corporation has awarded a contract for building 2.6 miles of this projected line from the causeway on Galveston Island to the city limits. Other contracts will soon be let.

Utah Light & Railway Company, Salt Lake City, Utah.—This company has completed its extension from the business district in Murray to Lovendale on the southern limits of Salt Lake City. The line will be extended on to Midvale and Sandy.

Whatcom County Railway & Light Company, Bellingham, Wash.—This company has succeeded in raising stock subscriptions to the amount of $400,000 in aid of the construction of the proposed 33-mile railway from Bellingham south to Skagit County. The estimated cost is $1,500,000. Construction will begin at once. [E. R. J., Feb. 12, '10.]

Wenatchee Valley Railway & Power Company, Wenatchee, Wash.—This company advises that construction will begin on its proposed railway as soon as all the franchises are obtained from the cities along the route. It will extend from Wenatchee to Monitor, Cashmere, Peshastin and Leavenworth, a distance of 50 miles. Capital stock, $1,500,000. Power for railway and lighting purposes will be obtained from a plant to be built on the Wenatchee River. Contracts have not yet been awarded. Officers: A. J. Linnlle, Wenatchee, president; H. A. Chapin, Wenatchee, vice-president; John Godfrey, Wenatchee, secretary; C. A. Battles, Wenatchee, treasurer. [E. R. J., Feb. 29, '10.]

Fairmont & Pittsburg Railway, Fairmont, W. Va.—This company, recently chartered, has organized by the election of the following officers: M. W. Laws, Jersey City, N. J., president; Harry F. Smith, vice-president; S. E. Miller, secretary; J. R. Linn, treasurer, and J. Fred Seatty, general manager. It is intended to build two electric railway, one from Fairmont to Blacksville, Waynesburg and Pittsburg, the other from Fairmont to Mannington, Blacksville, Morgantown and along the Monongahela River back to Fairmont. [E. R. J., March 12, '10.]

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—This company is reported to be surveying for the 20-mile extension of its electric railway from Clarksburg to Mount Clair, Lost Creek, Janelew and Weston. S. B. Miller, Fairmont, chief engineer.

Union Utilities Company, Morgantown, W. Va.—During the next four weeks this company expects to place contracts for building 2 miles of new track with 60 or 65-lb. rails. It will also build a small single span girder bridge. H. R. Warfield, Morgantown, general manager.

Sparta-Melrose Electric Railway & Power Company, Sparta, Wis.—This company advises that during this summer it will place contracts for building its proposed 30-mile railway from Sparta to Melrose. An 800-ft. bridge will be built across the Black River, near Melrose. A. B. Karns, 401-402 American National Bank Building, St. Paul, secretary. [E. R. J., July 17, '09.]

SHOPS AND BUILDINGS

Centerville Light & Traction Company, Centerville, Ia.—This company has purchased a site 500 ft. x 100 ft., on which it expects to build a car house, repair shop and freight yards. Frank S. Payne, Centerville, president and general manager.

Union Street Railway, New Bedford, Mass.—It is reported that this company has completed plans for a new car house to be erected in New Bedford on its property north of Weld Street, between Purchase Street and Clark Street. Henry H. Crapo, New Bedford, president. [E. R. J., Sept. 11, '09.]

Wahpeton-Breckenridge Street Railway, Breckenridge, Minn.—This company has purchased a site in Breckenridge on which it proposes to build a car house. F. L. Sturm, Wahpeton, general manager.

Portland Railway, Light & Power Company, Portland, Ore.—This company states that it intends to build during the year two new car houses with a capacity of 40 cars each.

Sparta-Melrose Electric Railway & Power Company, Sparta, Wis.—This company will place contracts during the summer for apparatus for the repair shops which it expects to erect at Sparta. A. B. Karns, 401-402 American National Bank Building, St. Paul.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company is installing a 4000-horse-power turbine at its new steam auxiliary plant at False Creek in Vancouver. A 250-ft. chimney will be built of reinforced concrete. [E. R. J., Jan. 22, '10.]

Middle Georgia Interurban Railway, Atlanta, Ga.—This company expects to build a power plant at Smith's Mills, on the Okmulgee River, Jackson, about 4 miles below the site of the Central Georgia Power Company's plant.

Fort Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.—This company is having a portable substation equipped by the Westinghouse Electric & Manufacturing Company for early delivery for use at Lafayette, Ind., while changes are being made to the permanent power station of the company in Ft. Wayne.

Citizens' Railway & Light Company, Muscatine, Ia.—This company has recently installed a 750-kw Westinghouse turbo-generator set in its power plant at Muscatine. [E. R. J., Sept. 25, '09.]

Hudson Valley Railway, Glens Falls, N. Y.—This company has applied to the Public Service Commission of the Second District for approval of the construction of a high-tension transmission line from Half Moon to Troy.

Interborough Rapid Transit Company, New York, N. Y.—This company closed a contract with the Westinghouse Electric & Manufacturing Company for four 3000-kw rotary converters and twelve 1100-kva. air blast transformers. The rotaries are duplicates of the two sold to this company in June, 1909.

Columbus Railway & Light Company, Columbus, Ohio.—This company has contracted with the Allis-Chalmers Company for a 4000-kw, 4150-volt, 3-phase, 60-cycle, 1800 r.p.m., steam turbo-generator set.

Portland Railway, Light & Power Company, Portland, Ore.—This company advises that it expects to build during the year a steam power station having a capacity of 6000 kw. In addition the company will build foundations and dam for a 16,000-kw hydroelectric plant; also preliminaries for a storage dam.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—The Waynesboro Electric Light & Power Company, which is owned by the Chambersburg, Greencastle & Waynesboro Street Railway, is having specifications prepared for a 600-kw 3-phase generator, direct-connected to either a Corliss cross-compound non-condensing engine operating at 100 r.p.m., or a 4-valve simple engine operating at about 150 r.p.m. R. D. Sefton, Waynesboro, general manager.

Winchester & Washington City Railway, Winchester, Va.—This company has recently purchased from the American Ship Windlass Company four 3-retort Taylor gravity underfeed stokers which are to be installed in pairs under 750-horsepower Stirling boilers at its power station at Millville, W. Va.

Union Utilities Company, Morgantown, W. Va.—This company expects to purchase a 500-kw, low-pressure steam turbine during the next month. H. R. Warfield, Morgantown, general manager.

Manufactures & Supplies

ROLLING STOCK

Clinton (Okla.) Street Railway, a proposed electric railway, is asking prices on new or second-hand cars.

West India Electric Company, Kingston, Jamaica, has ordered a 9-bench open car from The J. G. Brill Company.

Portland Railway, Light & Power Company, Portland, Ore., is in the market for about 35 flat cars and 10 ballast cars.

Bucharest (Roumania) Tramway has placed an order with The J. G. Brill Company for two 17-ft. closed car bodies.

Asheville (N. C.) Electric Railway has contracted with The J. G. Brill Company for four 10-bench open cars and two semi-convertible cars to be mounted on Brill No. 21-E trucks.

Springfield (Mass.) Street Railway has remodeled six of its cars for pay-as-you-enter operation and will equip the rest of its rolling stock for pay-as-you-enter service as rapidly as possible.

Schuylkill & Dauphin Traction Company, Pottsville, Pa., reported in the ELECTRIC RAILWAY JOURNAL of Nov. 27, 1909, to contemplate the purchase of five cars, will order three gasoline motor cars soon.

Peoria (Ill.) Terminal Railway has placed an order with the McGuire-Cummings Manufacturing Company, Chicago, Ill., for the five interurban cars for which it was reported to be in the market in the ELECTRIC RAILWAY JOURNAL of Aug. 21, 1909.

Sparta-Melrose Electric Railway & Power Company, Sparta, Wis., a proposed road, expects to order two locomotives, four gasoline motor cars and some freight cars during the coming summer. The general offices of the company are located in the National Bank Building, St. Paul, Minn.

Winona Interurban Railway, Warsaw, Ind., reported in the ELECTRIC RAILWAY JOURNAL of Feb. 19, 1910, to have ordered a number of cars, has not placed this rolling stock order, but contemplates buying 5 interurban passenger cars, 2 closed and 6 13-bench open city cars, 1 60-ft. baggage car, 5 freight and 4 stock cars.

Virginia Railway & Power Company, Richmond, Va., recorded in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, as having ordered 20 pay-as-you-enter cars from The J. G. Brill Company, has specified that these cars be mounted on Brill No. 39-E trucks. The company also purchased 40 additional trucks of the same type.

Interborough Rapid Transit Company, New York, N. Y., mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 19, 1910, as contemplating the purchase of 75 all-steel subway cars, expects to place the order for these cars at once. The company is also in the market for 100 cars for elevated service.

Athens (Ga.) Electric Railway, noted in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, to have ordered six cars, will have three cars of the 12-bench open Narragansett type built by the American Car Company and three 25-ft. cars of the semi-convertible type built by the John Stephenson Company. The cars will be mounted on Brill No. 27G-1 trucks.

Louisville & Eastern Railroad, Louisville, Ky., mentioned in the ELECTRIC RAILWAY JOURNAL of July 31, 1909, as having ordered five interurban cars from the American Car & Foundry Company and as contemplating the purchase of three express cars, has received all of this rolling stock from the Jeffersonville plant of the American Car & Foundry Company. The interurban cars are equipped with four GE-204 motors, mounted on Baldwin trucks, are 56 ft. over all, divided into passenger, baggage and smoking compartments, finished in mahogany throughout, and have rattan seats with arm rests. The baggage cars are 46 ft. over all, equipped with four GE-57 motors and are mounted on Baldwin trucks.

Compania Electrica y de Ferrocarriles de Chihuahua, Chihuahua, Mexico, has ordered four pay-as-you-enter motor cars and four trail cars from the American Car Company, St. Louis. The motor cars will be of the semi-convertible type, single truck, and will seat 32 passengers. Other details follow:

Weight.....11 tons	Motors GE-80
Wheel base..... 6 ft. 6 in.	Roofs.....Monitor Deck
Length of body....20 ft. 8 in.	Sanders.....2 Brill
Length over all....32 ft. 1 in.	Sash fixtures....cherry, glass
Width inside.....7 ft. 9½ in.	Seats.....7 transverse, reversible; one long. Sty. corner seats each side aisle
Width over all....8 ft. 2 in.	
Body .....wood	
Underframe ..... metal	
Couplers....Brill's improved	Trolley catcher.....Ideal
Curtain fixt....Spring rollers	Trolley poles, General Electric
Curtain material...Pantasote	Trolley wheels, Holland Trolley Supply "A"
Destination signs.....Hunter	Trucks.....Brill 21-E
Fare boxes, 2-A, 4 compartments	Varnish (manufacturer), American Varnish
Gongs.....20-in. Dedenda	Ventilators, White Florentine Glass
Hand brakes, Ackley adjustable	
Headlights .....Incandescent	
Journal boxes.....Brill	

The specifications for the four trail cars are:

Seating capacity 60	Fenders ..... Brill
Length over all...28 ft. 8 in.	Gears and pinions.....Brill
Width inside.....6 ft. 3 in.	Hand brakes....Brill vertical
Width over all.....7 ft.	Motors GE-80
Body ..... wood	Roofs..Mon. deck, vent sash
Underframe ..... wood	Seats..6 reversible and 4 stationary.
Curtain fix.....Striped duck	

TRADE NOTES

Galena-Signal Oil Company, New York, N. Y., has moved from 43 Water Street to the Battery Park Building, 24 State Street.

George D. Cook & Company, New York, N. Y., have removed their offices to Rooms 717-721 Empire Bldg., 71 Broadway, New York.

Griffin Wheel Company, Chicago, Ill., contemplates building a new plant in Salt Lake City, where about 17 acres of land have been purchased.

MacArthur Brothers Company, New York, N. Y., have appointed David Sloan consulting engineer and W. G. Sloan chief engineer of the company.

Walter H. Cottingham, president of the Sherwin-Williams Company, Cleveland, Ohio, has accepted the position of executive member of the Railway Business Association.

Railway Steel Spring Company, New York, N. Y., announces that A. S. Henry has been elected vice-president of the company and that Scott R. Hayes has been appointed general sales manager.

United States Metal & Manufacturing Company, New York, N. Y., announces the appointment of Harold A. Hegeman as salesman in the railroad department to succeed John Wolfe, resigned.

National Lock Washer Company, Newark, N. J., has taken J. H. Horn, formerly with the American Locomotive Company, New York, N. Y., into its sales department to handle both curtain fixtures and lock washers.

Ackley Brake Company, New York, N. Y., has received an order from the Seville (Spain) Tramways for Ackley adjustable brakes. When these brakes are installed the Seville Tramways will have 10 cars equipped with the Ackley brake.

Heywood Brothers & Wakefield Company, Wakefield, Mass., are erecting a 10-story fireproof office building and warehouse at Thirty-fourth Street and Eleventh Avenue, New York, N. Y., which will be ready for occupancy by Jan. 1, 1911.

C. H. Whall & Company, Boston, Mass., announce that John B. Given, formerly assistant to the vice-president of the Duplex Metals Company, New York, N. Y., has become associated with Whall & Company, which make fiber insulators and fuses.

Allis-Chalmers Company, Milwaukee, Wis., has received an order from the Public Service Railway to equip the 100 cars recently ordered from the Cincinnati Car Company

with air brake equipment which will include its Standard AA-6 compressors.

Hicks Locomotive & Car Works, Chicago, Ill., announce the resignation of H. F. Wardwell to become connected with the Chicago & Western Indiana Railway. F. O. Bailey was made sales manager of the company, with offices in the Fisher Building.

J. C. Ward, director of Edgar Allen & Company, Ltd., in charge of the American branches, with an office at Chicago, Ill., has returned from a visit to the company's Imperial steel works at Sheffield. Mr. Ward arrived on the *Lusitania* during the week ended March 12, 1910.

Holland Trolley Supply Company, Cleveland, Ohio, has shipped to the Cincinnati (Ohio) Traction Company, for high-speed service, 18 No. 3 Holland ball-bearing trolley bases. Practically all of the cars used in this company's high-speed service are equipped with these bases.

Cleveland Frog & Crossing Company, Cleveland, Ohio, announces that L. G. Parker has become connected with its sales department. Mr. Parker was formerly with the engineering department of the Lake Shore & Michigan Southern Railroad at Cleveland and Toledo and the Chicago Terminal Transfer Railroad at Chicago.

J. G. Brill Company, Philadelphia, Pa., has secured the services of Henry Pearson, president of the Wason Manufacturing Company, as general consulting engineer. Mr. Pearson will remain a director of the Wason Manufacturing Company, but S. M. Curwen, vice-president and general manager of The J. G. Brill Company, will become president of the Wason Manufacturing Company.

Vulcan Steam Shovel Company, Toledo, Ohio, advises that Alexander Backus has disposed of his entire holdings in the company and has retired as president of the company after 20 years of active service. The new officers are: H. P. Eells, president, and G. F. Steedman, vice-president. Carl Horix, who has been acting as general manager for some time, will continue in this capacity.

Consolidated Car Heating Company, New York, N. Y., received an order to equip the 100 new cars being built for the Public Service Railway with its trolley voltage buzzer system, which has been made standard on the Public Service Railway. The battery type of buzzer installed on the 200 cars now being rebuilt by the John Stephenson Company for this company will be replaced by the Consolidated trolley voltage buzzer.

American Locomotive Company, New York, N. Y., has elected Lewis L. Clarke, president of the American Exchange National Bank, a director of the company to succeed his father, the late Dumont Clarke. C. B. Denny, formerly treasurer of the company, has been elected secretary and treasurer of the company, and J. O. Hobby, assistant to Mr. Denny, has been elected assistant secretary and treasurer of the company.

Western Electric Company, New York, N. Y., reports that the Santa Fé system has extended the use of the telephone for train dispatching over its road from Denver to Pueblo, Col. Telephones have now been installed over approximately 1950 miles of the lines of this company, which is planning to extend the equipment on other sections of the road as rapidly as possible. It is estimated that the installation of telephones on the Denver-Pueblo division will enable the dispatchers to handle the same amount of work as previously in about 60 per cent of the time.

Dearborn Drug & Chemical Works, Chicago, Ill., on May 1 will move their general offices and chemical laboratories from the Postal Telegraph Building, where they have been located since the organization of the company more than 20 years ago, to the new McCormick Building, on Michigan Avenue and Van Buren Street. The extensive growth of the business of the company has made necessary this removal to its new headquarters, where the general offices and laboratories will occupy the greater portion of the top floor, with a total floor space of more than 5000 sq. ft.

American Ship Windlass Company, Providence, R. I., built the Taylor gravity underfeed stokers which have been installed in connection with the three new 600-hp Edgemoor boilers in the West Albany power station which furnishes light and power for the shops of the New York Central & Hudson River Railroad. The mechanical draft for the stokers in this power plant is furnished by two turbo-blower units, each consisting of a Bliss turbine and double width "squirrel cage" fans manufactured by the Massachusetts Fan Company, Watertown, Mass.

ADVERTISING LITERATURE

Frank Ridlon Company, Boston, Mass., has issued its list of second-hand electrical machinery for March, 1910.

Ohmer Fare Register Company, Dayton, Ohio, has issued a folder in which is discussed the importance of the Ohmer merit system.

Shanahan Trolley Specialty Company, Little Falls, N. Y., has printed an illustrated 12-page booklet descriptive of its automatic trolley retrievers, which gives directions for attaching and operating the apparatus.

Arnold Company, Chicago, Ill., is mailing an illustrated postal card showing the progress made by the Arnold Company in the construction of the locomotive terminal plants of the Kansas City Southern Railway at Heavener, Okla., and De Queen, Ark.

Fairbanks, Morse & Company, Chicago, Ill., have issued Catalog No. 113, in which the company's 1910 2-cycle marine engines are described and illustrated. The catalog is on coated paper. Another catalog, No. 112B, contains descriptions of the company's 4-cycle, heavy-duty engines.

Chain Belt Company, Milwaukee, Wis., has issued a 48-page catalog on its chain-belt concrete mixer. The various parts of the mixer and its appurtenances are described in detail. This is supplemented by a table giving the sizes and capacities of concrete mixers. The catalog is profusely illustrated and contains several testimonials from users of the company's product.

Ingersoll Engineering & Construction Company, Pittsburgh, Pa., has issued a booklet in which are shown views of roller coasters and racer dips built by the company and installed in various amusement parks in the country. Testimonials from the owners of these resorts accompany the views. The racer dip, a new amusement device, which is constructed on the same general plan as the roller coaster, is also described.

Ohio Brass Company, Mansfield, Ohio, prints in its February *Bulletin* an interesting description of its chemical laboratory. The *Bulletin* also contains a paper by E. J. Dunne on the "Standardization of Construction," read before the American Street & Interurban Railway Association at the Denver convention, and an article which describes a campaign against accidents made by the Cleveland, Southwestern & Columbus Railway.

Duplex Metals Company, New York, N. Y., has issued a 22-page booklet in which its home office and works at Chester, Pa., are described and illustrated. The illustrations also include several interesting views of lower Manhattan taken from the offices of the company in the tower of the Singer Building. The company has also printed a booklet, dated February, 1910, which contains standard specifications for hard-drawn, copper-clad steel wire and for copper-clad steel bond wires.

J. A. & W. Bird & Company, Boston, Mass., have published a treatise on "Waterproofing of Structures." The question is discussed in its general aspects and some interesting facts are presented regarding waterproof felt. Special reference is made to sublevel construction, the envelope method and the application of Tunaloid. Views are presented which show the application of Tunaloid in the improvements being made by the Pennsylvania Tunnel & Terminal Railroad at New York and Sunnyside.

Western Electric Company, New York, N. Y., has issued an attractive booklet showing a complete line of lighting fixtures known as Hawthorn Mazdaliers. The anti-jar link suspension, a protective device which adds to the life of the tungsten filament by eliminating all vibration and jar, is shown in detail. The booklet is well illustrated with cuts which show the construction of the different parts of the Mazdaliers. The text gives details regarding those parts and features of installation.. "How to Figure Illumination" is the title of a bulletin issued by the company which treats the lighting of interiors and gives useful information in connection with Sunbeam Mazda lamps.

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Reconstruction of the Metropolitan Street Railway

The changes that have been made in the property of the Metropolitan Street Railway of New York during the two and a half years of receivership through which the lines have passed furnish an interesting part of the history of transportation on Manhattan Island. Monopoly of the surface railway facilities on the Island was one of the strongest distinguishing characteristics of the system which was abolished. Where one company previously operated all the surface lines, there are now five separate operating systems and another company which has discontinued operation. By the policy of segregation of various lines, the Metropolitan system has been changed radically. The causes underlying the segregation of various properties are explained in another part of this issue. Other aspects of the work of reconstruction of the present system, showing the results of the introduction of new and more economical methods, will be described in a series of articles to be published in subsequent issues.

The Dollar Bill Club of Yonkers

It is said that when railroads were first built in China the natives manifested such great hostility to the new method of transportation that they tore up the rails, demolished the locomotives and did everything which they could to block the introduction of improvements. We are accustomed to regard such evidences of unreasonable antipathy as characteristic exclusively of the benighted heathen, but the same process or lack of process of reasoning has been manifested by those inhabitants of Yonkers who endeavored to stop the use of prepayment cars in that city. Undoubtedly if a large number of the residents of Yonkers prefer the old style of car, an effective way of blocking the use of the prepayment car is for many of them to present one dollar bills to the conductor and require change of him. This may be within their legal rights, but it seems strange that a type of car which possesses such undeniable advantages from the viewpoint of the passenger should be regarded with such disfavor. There are undoubtedly advantages to the company in the operation of prepayment cars but in the most important of them, its safety, the public benefits in as equal if not greater degree.

Lectures to Shop Foremen

It is quite the fashion nowadays for the larger electric railways to have a shop foremen's organization for the comparison and discussion of practices and records. Some of these bodies have profitably broadened their scope by inviting the representatives of manufacturers to address them on special topics. Many of these lectures are of great value to both the maker and the user of the equipment, for each is made better acquainted with the reasons for the other party's point of view. While this practice is no longer novel, it cannot be said that the

lecturer always understands just what kind of a discourse will do the most good. The practical men who attend these meetings are not particularly interested in hearing the praises of a certain make of apparatus. On the contrary, they want to learn only how they can minimize, if not entirely eradicate, the defects of the equipment in their charge. Consequently, the lecturer should not hesitate to devote himself to a frank consideration of the troubles which the audience calls to his attention, whether before or during the meeting. A recent talk on wheels, which aroused considerable interest among the auditors, was based entirely on questions which had been propounded long enough before the meeting to permit a comprehensive reply. This method is much better than reading a diffusive, general paper for an hour and then starting a more or less desultory discussion. When the lecture is to deal with some new apparatus about which the audience has little knowledge, it is a good plan to send as a lecturer a man who has practical knowledge of operating matters as well as of the details of manufacture. The designer is too apt to dwell on some favorite detail at wearisome length, whereas the man who has handled the apparatus under actual service conditions will be better prepared to answer the questions of both shop and transportation men. The suggestion can pertinently be made here of another direction in which the value of a shop organization can often be increased. It frequently happens that at one shop of a large system some new equipment is in use or some new methods have proved successful. The beneficial results of an experiment by one foreman will be multiplied if his confréres have the opportunity of examining his practice directly for themselves.

Railroad Club Report on Trunk Line Electrification

For a number of years the annual "Electrical Night" has been a feature of the New York Railroad Club's program of monthly meetings. Several of these past occasions have served largely as an opportunity for engineers representing electrical manufacturing interests to place before railroad officials a summary of the systems and apparatus they were offering, to solve this or that railroad electrification problem, sometimes with the element of commercial rivalry so much in evidence that the campaign of education defeated its own purpose by giving the impression that electrical men could not agree among themselves on the best system to recommend to the railroads. The meeting of March 18, however, was in several ways a striking change from previous meetings in its development of the subject. Instead of the contrary and confusing statements of interested partisans, the interpretation of the topic was taken up by a committee of the club itself, consisting of one superintendent of motive power, five representatives of the construction or electrical departments of several leading steam railroad companies and two independent consulting electrical engineers. This plan insured a treatment of the subject from the standpoint of the professional railroad man.

In the text of the report, electrical engineers familiar with the subject will not find much that is new. It sums up the past history and present development of steam railroad electrification and discusses at length and quite fairly the characteristic features, the reasons for considering electrification, its cost, and its advantages and disadvantages. The only new feature of the report is the fact that it is practically the first carefully prepared statement of the details of the problem with full recognition of their relative importance from a committee of railroad men, who are to be complimented on the thoroughness with which they covered the field. In fact, as one of the speakers remarked, it is indeed worthy of note that a committee so constituted could find six advantages and only two disadvantages in the final summing up on trunk line electrification.

Throughout the report, the committee avoided a comparison of "systems," but did not do so entirely in the fifth conclusion, which was to the effect that "the electrification for passenger terminal and suburban service is now more or less settled as to method, but for freight and trunk line service, it is in the experimental stage." It was upon this conclusion that the principal part of the dissent of the evening was expressed, as the natural inference from the first part of it is that the committee believe future terminal work should continue to be done on past lines, that is, with direct current, but this can hardly be the case because, in subdivision "b" of the conclusion, the third-rail is condemned as being unsuitable for complicated switch work. The second part of the main statement, namely, that trunk line electrification is in an experimental stage, was combated by Mr. Murray on the strength of the performance of the New Haven system. He based his views on his practical and operative experience with a real trunk line equipped with electric power and registered his opinion without hesitation that the single-phase system was the most economical for trunk line purposes, including freight and passenger traffic, terminal and suburban operation.

Of course, any attempt to summarize a broad situation must be expressed in terms so general in their character as to be capable of different interpretations. It is easy to understand how the expression "trunk line" might convey different meanings to different persons. We agree with Mr. Murray, however, that the New Haven system should now be considered as having passed the experimental stage, especially as the decision has been reached by the company to equip both the Harlem division and the extension to New Haven along practically the present lines.

In this connection it is interesting to consider the history of steam railroad electrification, as cited by the committee. Beginning with 1895, the report mentions nine examples of this work (counting the Pennsylvania Terminal and the Long Island Railroad as one system) and omits a tenth instance—the Denver & Interurban 11,000-volt, single-phase installation, which is a division of the Colorado & Southern Railroad. Of these 10 examples, six are alternating current, and four direct current. All of the direct-current lines were installed in 1906, or prior to that date, with the exception of the Pennsylvania, which might not be considered an exception, as it is tied both electrically and from a traffic standpoint with the Long Island. On the other hand, all of the alternating-current lines have been installed subsequent to 1906. Even as a coincidence this is interesting.

Finally, the report of the committee should be accepted as possessing all of the advantages and subject to all of the limitations of the report of any committee. As Mr. McClellan explained, it represents the maximum which all of the members could agree upon, but that individual members undoubtedly would have gone very much further. Viewed in the light of what a similar committee about two or three years ago would have stated, the opinions given in it are extremely encouraging and between its lines it is not difficult to read a forecast of the

coming alliance between steam railroad men and electrical engineers to develop the heavy traction work of the future.

The Long Island and West Jersey

The discussion of the report of the committee of the New York Railroad Club outside of that relating to the fifth conclusion contained many notable features. One of the most important was the announcement by George Gibbs, chief engineer of the Pennsylvania Tunnel & Terminal Company, that the Long Island Railroad electrification, which went into service five years ago, was operating at sufficiently low cost below steam operation to pay fixed charges and a handsome surplus besides. This network of about 120 miles of track was the first large steam railroad division to be changed from steam to electric power, and the public acknowledgment that it is now fulfilling its economic mission, fixed charges and all, is most important at this juncture. Coming from one who has had longer experience and more responsibility than any other railroad engineer in this country, both in deciding on and carrying out designs, and in judging of results in steam railroad electrification, this statement is a signal offset to some of the published decisions not to electrify, made during the past few years by such roads as the Boston & Maine, Boston & Albany and the Illinois Central. Mr. Gibbs' reference to the impossibility of working the Flatbush Terminal up to its full capacity by steam power (entirely apart from the tunnel situation there involved) should be convincing to any railroad with a congested city terminal, if at this late date any more argument on that point is necessary.

The less favorable results obtained on the West Jersey & Seashore installation emphasize the economical distinction between a cross-country express service only moderately frequent and service of a local or suburban character. Another factor in the West Jersey situation undoubtedly is that although a third of the road's traffic is through business between Philadelphia and Atlantic City, the road is considerably longer both in time and distance than either of the other two routes between those cities. This condition suggests the inquiry: To what extent would the results have been different if the shortest instead of the longest line between Philadelphia and Atlantic City had been electrified? Another query is equally pertinent: Suppose it would have been feasible at the time that the West Jersey & Seashore was electrified to have installed a single phase installation of this magnitude, would not the operating expenses have shown an even greater decrease over the cost of steam operation than is now shown by the direct current equipment?

Some comment was also made on the lack of instances of the application of electric power to freight transportation on trunk lines. It is true that comparatively little attention has yet been given to this subject but Mr. Stillwell summed this situation up ably when he declared that the same methods of reasoning which have brought electric passenger service to its present high degree of development are applicable in settling the question of the most economical power to apply to freight transportation. It is not reasonable to suppose that there are any very deep mysteries in this matter which cannot be comprehended by the electrical engineer, who is accustomed to careful analysis and whose success in making deductions from known facts has been so well exemplified in the results shown by the existing electrifications of passenger service on steam railroads.

Non-College Men in Railway Work

Considerable attention has been given during the past two years, both at association meetings and by individual companies, to the enrollment of technical graduates among the employees of electric railway systems. Courses for post-graduate education in the work of the different departments of the railway companies have been devised, all leading up to prospective positions of responsibility in the operating department, assuming, of course, that the apprentice has the ability and the aptitude requisite for the work. The subject has been discussed from many points of view, but there is one phase which should receive consideration. This relates to the effect which the establishment of courses of this kind is likely to have upon the great majority of employees of the company who have not enjoyed the privilege of any other education than that taught in the school of experience. We do not refer to any question of assumed intellectual superiority of the college men on account of their scholastic training. If any of them should be imbued with a feeling of this kind when he enters the service, the chances are that it would be thoroughly dispelled during an apprenticeship course of two years or more on an electric road. If it is not, the man is unsuited for the business and would undoubtedly be dropped by the management, or at least he would not be promoted. The serious problems in electric railway work are pre-eminently those calling for executive ability, the power of application and common-sense, and it is only when the college graduate possesses these qualities in as great a degree as the man who has not been to college, that the other qualities and the knowledge gained during his college course will be of value in railway work.

The danger to be guarded against with courses of this kind is dissatisfaction among the other employees unless the management indicates clearly that promotion is equally open to all. The prizes in the electric railway work, as those in other industries, are comparatively few in number, but they are enough to insure the loyalty of the men in the ranks as long as there is a feeling that advancement will be based solely on merit. If a company should pursue the plan of giving undue preference to college-bred men when appointing new foremen or division superintendents or in filling other places of responsibility, the discipline of a railway organization might become seriously affected. Such a policy as this, however, we feel confident, is entirely foreign to the program recommended by the committee on education and is equally absent from the minds of the managements which have established courses of this kind. The years spent by a man at college should not count any more than if he had been engaged on the property for an equal length of time. On the other hand, they should be given some credit and this, as we understand it, is the underlying purpose of the apprenticeship courses.

It is also perfectly proper to assume that the introduction into any force of employees of a few broadly trained, ambitious young men should be an incentive to the other employees to equal or surpass in performance the newcomers, and also to secure a better education by night study. The railway employee who has not had the advantage of a college training, but has studied the theoretical principles which underly electric railway operation by taking a night school or correspondence course, while giving faithful service to the company in the daytime, is the type of man who deserves encouragement. "A fair field and few favors" should be the motto of every manager who is confronted with this delicate problem.

MULTIPLE UNIT TRAINS ON THE NEW HAVEN RAILROAD

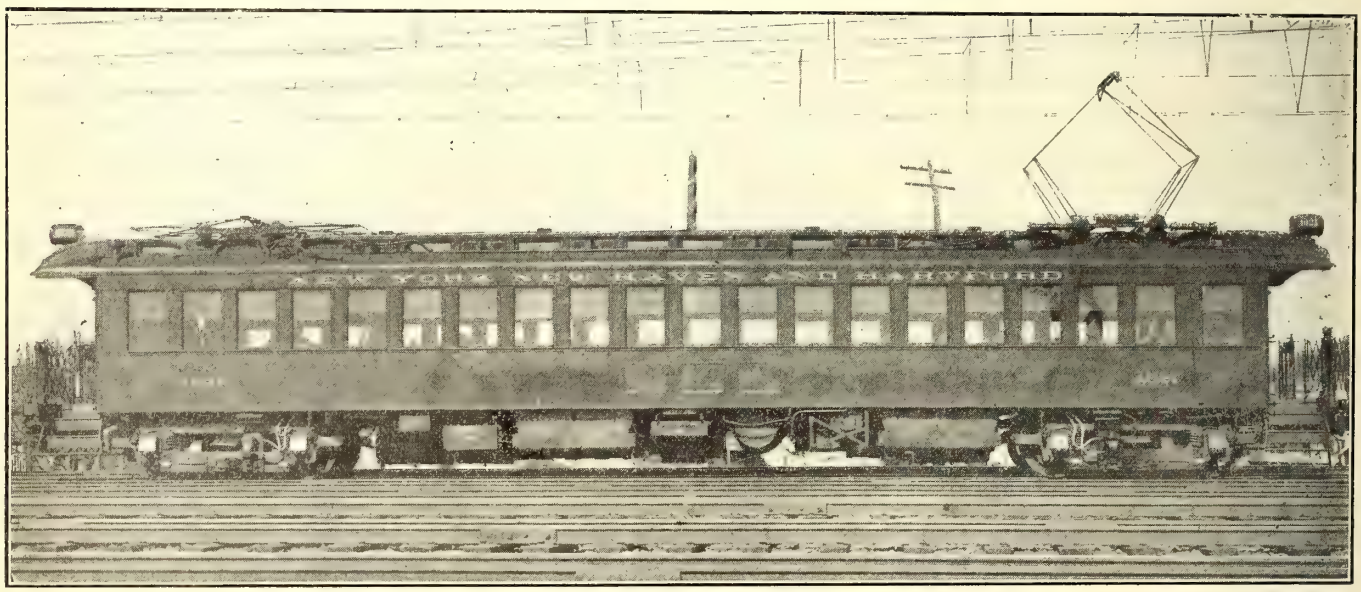
On Feb. 28 the New York, New Haven & Hartford Railroad put into operation the first regular multiple unit train service between Port Chester and New York. The present equipment consists of four motor cars and six trailer cars. The car bodies were supplied by the Standard Steel Car Company, and are 70 ft. long. Each has a seating capacity of 76 people. No wood is used in the construction of these cars. The floor is of cement and the metal walls are finished to imitate mahogany. The trucks were furnished by the Standard Motor Truck Company and were described in the Electric Railway Journal for Dec. 12, 1908.

Each motor car weighs 173,400 lb. complete, and is intended to haul two trailers, each of which weighs 99,000 lb. All cars are provided with quick-acting automatic air brakes. The cars operate on 11,000 volts alternating current overhead and 600 volts direct current third-rail.

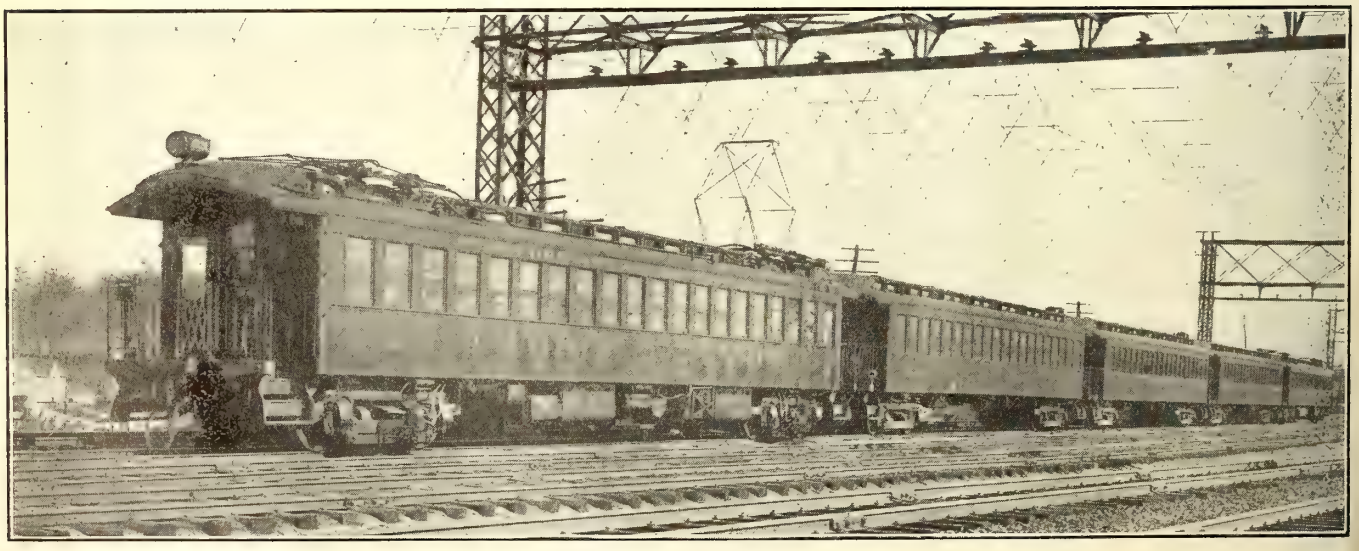
The electrical equipment of each car consists of four Westinghouse 6-pole, 150-hp single phase series motors, which are geared to spring-supported quills, as described in the previous article mentioned. The quills are connected to the driving wheels in the same way as are the quills on the New Haven gearless locomotive. The motors are connected four in series, or two in series and two in parallel when operating 600 volts direct current. On alternating current they are permanently connected two in series and two in parallel. The multiple unit system is used and a complete motorman's equipment is placed in both ends of every car, trailers as well as motor cars, so that the train can be operated with trail cars in front if so desired.



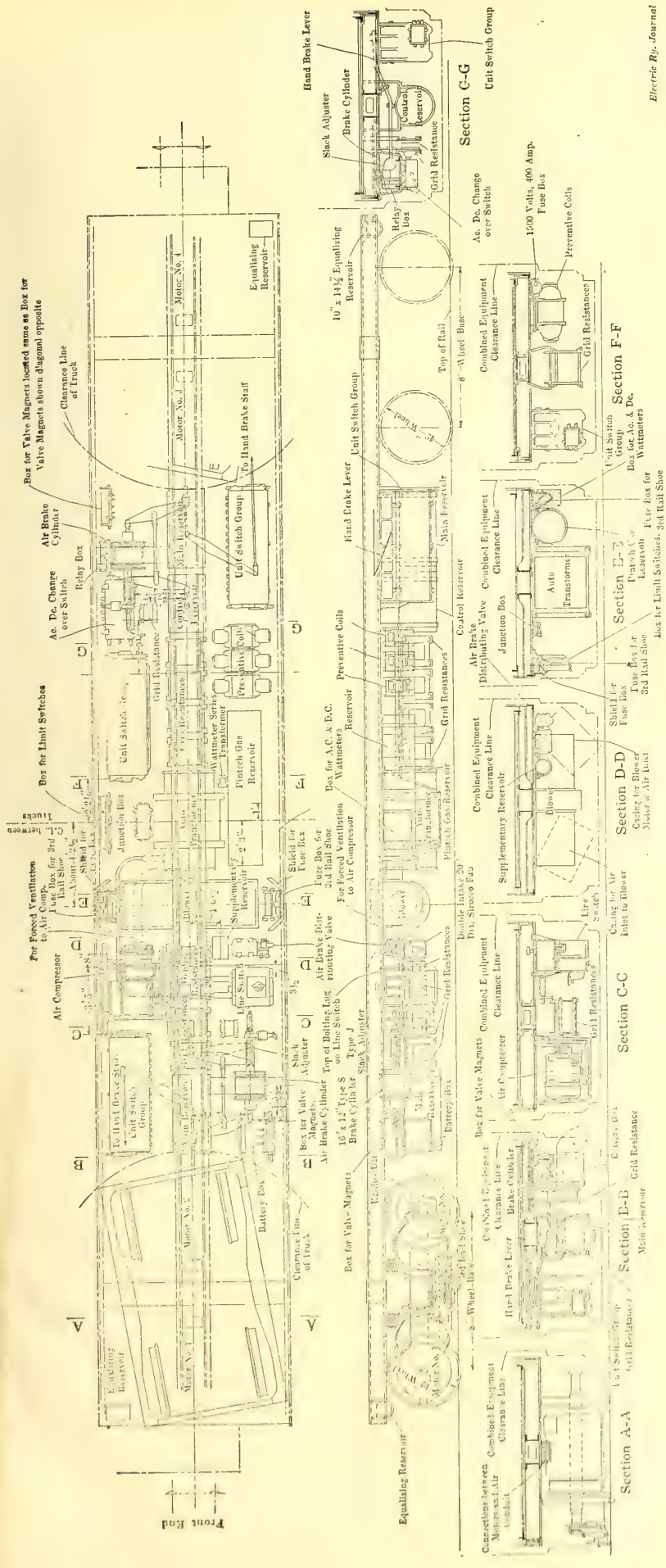
New Haven Multiple Unit Car—Interior View



New Haven Multiple Unit Car—Side View



New Haven Multiple Unit Car—Side View of Five-Car Train



New Haven Multiple Unit Car—Plan, Side Elevation and Sections of Car Flooring and Trucks

A step-down air-blast transformer is placed under the floor at the middle of each motor car. The air for cooling the transformers and motors and for operating the brakes, whistles, pantograph and third-rail shoes is supplied by a motor-driven compressor, which is capable of delivering 35 cu. ft. of free air per minute. The air intakes are located in the side of the car, as shown in the side view of the car.

The overhead current collector is of the pneumatically operated pantograph type, similar in construction to those used on the New Haven locomotives. This collector has been thoroughly tried out, and seems to be well adapted to railroad work, where the height of the contact wire varies over a large range. The upward pressure ranges from 15 to 20 lb., and with the steel contact wire, which has now been in service long enough to demonstrate its value, this high pressure does not produce the excessive wear that occurred when a copper contact wire was used. When running, the forward pantograph is usually down, and the rear one up. In this way, in case of any accident to the collector which might drag it off the car, the forward one is still intact, whereas were the forward collector to be torn off it would probably take the rear one with it.

In passing from the alternating current section to the direct current third-rail system, or vice versa, the necessary change of connections is accomplished by an automatic air-operated change-over switch.

These cars have been under test on the New Haven Railroad for the last few months, and the results have been very satisfactory. A motor car with two trailer cars, having a total weight of 371,400 lb., accelerating up to 25 m.p.h., had an average acceleration of 0.5 mile per hour per second.

REPORT OF MUNICIPAL TRAMWAYS TRUST, OF ADELAIDE, SOUTH AUSTRALIA

The report of the Municipal Tramways Trust of Adelaide, South Australia, for the six months ended July 31, 1909, shows a total revenue of £72,669, including £71,645 traffic receipts, of which £33,863 was earned by the electric railway and £37,782 by the horse system. W. G. T. Goodman, chief engineer and general manager, reports that the total expenditure was £63,193, including £23,577 in connection with the electric service and £39,616 in connection with the horse service. Mr. Goodman states:

"The total working expenses of the electric traction system aggregate 10.82d. per mile. I would point out, however, that this includes all management and supervision charges, which, as the system increases, will be distributed over a greater number of car miles; it also includes the very great and varied expenditure incurred in the inauguration of the electric traction system.

"The loss in connection with the working of the horse-car system amounts to £911, which is due to high cost of operating isolated terminal lines by horse traction."

DEVELOPMENT OF THE NEW METROPOLITAN STREET RAILWAY

An account of the methods by which the Metropolitan Street Railway of New York has been reconstructed is of especial interest for two reasons: First, the unusual division of the property into five separate operating systems; second, the comprehensive plan upon which the development of the lines retained by the receivers has been conducted. Insolvency of the New York City Railway Company, lessee of the Metropolitan Company, was announced on Sept. 24, 1907. The receivership was extended to the Metropolitan Company on Oct. 1, 1907. Prior to that time, strong public sentiment had been aroused against the property as a result of the investigation and subsequent disclosures before the New York Public Service Commission, First District.

All conditions appeared adverse to the operating organization in the closing months of 1907. That physical rehabilitation and operating reconstruction were essential was evident. Pending the financial reorganization, which was foreseen to be remote because of the complexity of the problems, steps were taken to effect a complete physical and operating reorganization. Acting under the general direction of the receivers, Oren Root, the general manager, and the staff of department officials began the work of creating a new property. The new structure was developed notwithstanding the public hostility, newspaper adverse criticism and the orders of the Public Service Commission affecting service. The management proceeded to develop, so far as could be determined with all the handicaps that had to be encountered, a basis for a successful and workable system.

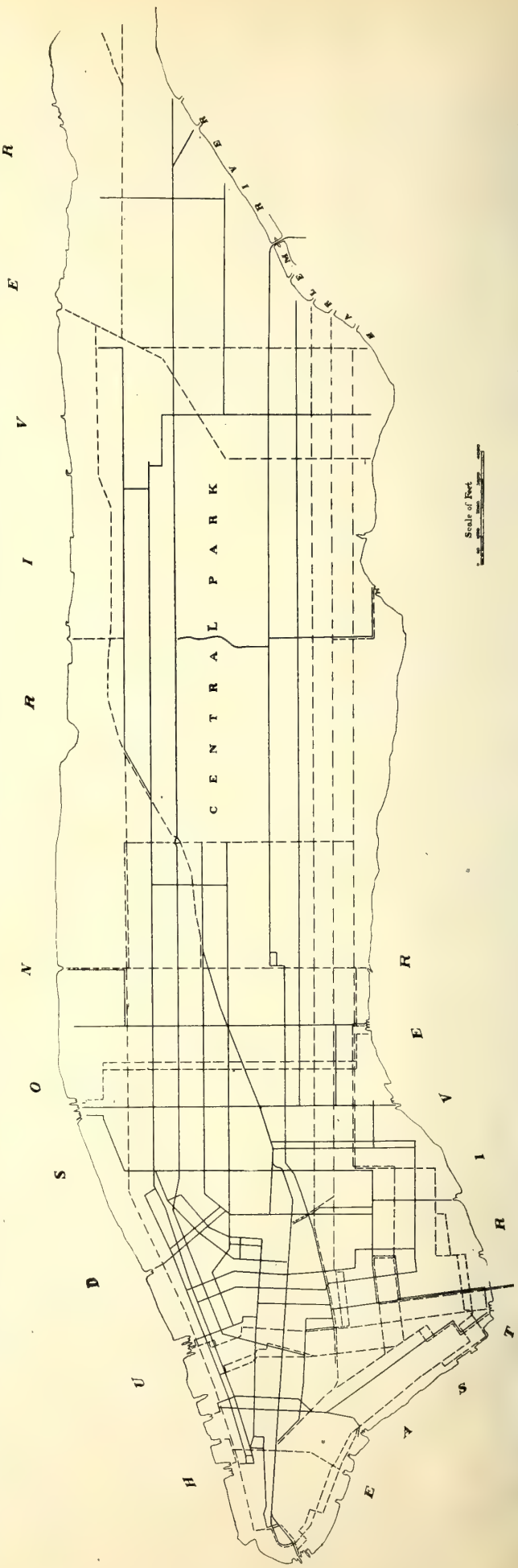
The principal effect of the changes that have been made is found in the improved condition of the property. So far as the ultimate financial effect is concerned, it is clear that the solution is still incomplete. A valuation of the property of the present Metropolitan Street Railway indicates that the revenues remaining after deduction of the operating expenses are insufficient to yield a fair return on the value of the physical property. The percentage of return is much smaller if allowance is made in a valuation for the expense of development arising from supercession of the horse and cable systems which preceded the introduction of electricity as a motive power.

Since the appointment of receivers for the Metropolitan Street Railway Company, a new system, more compact than the old and with fewer financial and transfer obligations, has been demonstrated to be a necessity. The disintegration of the street railway monopoly in the largest city of the country has been accomplished by the complete segregation of various important lines until to-day the Metropolitan lines comprise only about 55 per cent of the mileage of the old system. With the exception of lines which cross the Williamsburgh bridge and terminate at the Brooklyn end of that structure and of a line which crosses the Harlem River and terminates at Mott Haven, the property is confined now to Manhattan Island.

Accompanying the segregation of lines comprising substantially 45 per cent of the mileage of the old system, a step which has solved part of the problems affecting the property, other changes have been made. The scope and important nature of these changes, affecting all the departments concerned with the maintenance and operation of the property, will be described in subsequent articles in the Electric Railway Journal. Application of scientific methods in the solution of the problems of maintenance and operation has effected both a material saving and a substantial increase in efficiency.

CONDITIONS ON MANHATTAN ISLAND

The fact that most of the problems which confront electric railways at the present time exist on Manhattan Island in greater degree than in other cities is due to inherent conditions. Among these may be mentioned the compulsory operation by underground conduit system, the great and increasing congestion due to vehicular and other traffic, the expense of employment arising from the high cost of living in New York and the competition of the most successful rapid



Map Showing Surface Railways on Manhattan Island—Solid Lines Indicate Present Metropolitan Street Railway, Dotted Lines Show Segregated Roads

transit railways in the world, those of the Interborough Rapid Transit Company.

For some time prior to the appointment of the receivers the operation of the Metropolitan Street Railway had been beset with increasing difficulties due to the heavy financial requirements of the system and the unparalleled and unbusinesslike development of the transfer system as a result of legal requirements. There was also a recognition of the fact that the system was too large and complicated to be operated economically at a 5-cent fare with universal transfer privileges. The Metropolitan Street Railway serves the greatest density of population of any property of this character in the world and has an advantageous short haul traffic as a result of the remarkable development of various centers of business and population on Manhattan Island. The probability of profitable operation was supposed generally, however, to be greater than investigations conducted in the last two years and a half showed were justified. As it was found to be wholly impossible to operate profitably the Metropolitan system as it existed at the time of their appointment, the receivers defaulted the interest on the outstanding $29,104,000 Metropolitan Street Railway bonds and the dividends on the $52,000.000 of capital stock. The somewhat spectacular work of segregation of the various properties was then commenced. The problem which lay before the management was that of conserving and upbuilding, so far as possible, the Metropolitan Street Railway system so as to develop a compact property which could be established on a basis that would permit a reasonable earning power and return of the lines to their security holders.

The policy of segregation, involving the creation of four operating systems in addition to that formed by the Metropolitan lines which were retained, attracted more attention than it would otherwise have received because it reversed the popular conception of coporations and the tendency of business in this country, both of which have been toward the acceptance and formation of monopolies as natural and inevitable.

Before a decision could be made as to which lines should be retained and which should be segregated, it was necessary to make a detailed investigation of the complicated and intercorporate relationships of the Metropolitan main and underlying lines and subsidiary properties. A number of lines which, in themselves, are unprofitable burdens upon the rest of the system, had to be retained for the reason that they were direct parts of the Metropolitan Street Railway. Various horse-power lines are of this character. Where it was possible to segregate other lines because of the existence of leases in which provisions were made for return of the properties in case of default, an investigation of the value of the leases to the existing and the future Metropolitan Street Railway was made. In this investigation, the subject was considered in all its aspects, including the rental or interest charges involved, the probable saving as a result of the elimination of transfers and the part which certain lines might take in the new Metropolitan property which will follow the re-organization. The problem of segregation had to be considered, therefore, both from the financial and the physical standpoints in order that the courses which should yield the best results might be determined.

SEGREGATION OF PROPERTIES

As the first step in the segregation, it was decided to separate the Third Avenue Railroad. The lease of this property by the Metropolitan Street Railway was manifestly unprofitable on account of the heavy fixed charges. This company and its important constituent properties comprised the largest single interest which it was possible to segregate from the Metropolitan system. The investigation of the results of operation under the lease of the Third Avenue Railroad was undertaken shortly after the appointment of the receivers. This included a legal, engineering and accounting study of the relation of the properties. As the investigation demonstrated clearly the unprofitableness of the lease, the property of the Third Avenue Railroad Company was surrendered on Jan. 12, 1908, to a separate receiver, F. W. Whitridge, in accordance with the instructions of Judge Lacombe of the United States Circuit Court for the Southern District of New York. While this was the most important property that could be segregated, because it involved valuable north and south lines and crosstown lines that commanded central points and accommodated traffic of great density, it was demonstrated that whatever the Third Avenue system might accomplish as an independent property, its usefulness to the Metropolitan system, in view of the heavy fixed charges and the necessity imposed under the law of continuing the exchange of transfers, was at an end.

Segregation of other properties followed more slowly. A careful study was made of all existing leases and agreements with surface properties and as a result of the extended investigation, four other properties were segregated during the calendar year 1908. The first of these was the property of the Fulton Street Railroad Company. The Metropolitan receivers ceased to operate this line on June 1, 1908, and defaulted on the interest of 4 per cent per annum which had been guaranteed on the $500,000 of first mortgage bonds. This line had been operated under a contract. A separate receiver, Gilbert H. Montague, was appointed. He has not operated the line. The Fulton Street line was operated by the Metropolitan company, from the East River to the North River on streets in the southern business section of Manhattan Island. Horse cars were operated during the day for many years, although very little traffic was secured.

The next distinct property to be segregated was that of the Central Park, North & East River Railroad Company for which a separate receiver, George W. Linch, was appointed on Aug. 5, 1908. The property of this company had been operated under a lease by the Metropolitan Railway. This company operates the Fifty-ninth Street line extending across Manhattan Island, which is equipped electrically, and also the so-called belt lines which are operated by horse power and reach the ferries and shipping districts located on the East River and the North River from Fifty-ninth Street to South Ferry.

On Sept. 30, 1908, operation of the property of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad Company, which had been conducted under a contract, was terminated. Joseph B. Mayer was appointed receiver. This company operates horse cars between the West Twenty-third Street Ferry and the East Thirty-fourth Street Ferry. Its route is via substantially, Twenty-eighth and Twenty-ninth Streets across the Island and for its other trackage it is dependent on joint track arrangements with other companies. The company has recently placed in service one storage battery car.

The receivers ceased operating the property of the Second

RENTALS, ETC., ON WHICH DEFAULT HAS BEEN MADE BY RECEIVERS OF METROPOLITAN STREET RAILWAY COMPANY.

		Rate per cent.	Annual interest.
Metropolitan Street Railway Company:			
General and collateral trust mortgage bonds.	$12,500,000	5	$625,000
Four per cent refunding mortgage bonds...	16,604,000	4	664,160
Dividend rental on capital stock.....	52,000,000	7	3,640,000
Metropolitan Crosstown Railway Company, first mortgage bonds.....	600,000	5	30,000
Third Avenue Railroad Company:			
First mortgage bonds.....	5,000,000	5	250,000
First consolidated mortgage bonds.....	37,560,000	4	1,502,400
Dividend rental on capital stock.....	15,995,800	6	959,748
Central Crosstown Railroad Company:			
Dividend rental on capital stock.....	600,000	15	90,000
Three-year notes.....	2,250,000	5	112,500
Fulton Street Railroad Company:			
First mortgage bonds.....	500,000	4	20,000
Central Park, North & East River Railroad Company:			
Dividend rental on capital stock.....	1,800,000	9	162,000
Twenty-eighth & Twenty-ninth Streets Crosstown Railroad Company:			
First mortgage bonds.....	1,500,000	5	75,000
Second Avenue Railroad Company:			
General consolidated mortgage bonds.....	1,280,000	5	64,000
First consolidated mortgage bonds.....	5,631,000	5	281,550
Dividend rental on capital stock.....	1,862,000	9	167,580
Debenture bonds.....	89,000	5	4,450
Totals.....	$155,771,800		$8,648,388

Avenue Railroad Company after Nov. 12, 1908, and George W. Linch was appointed receiver. This company operates lines on Second and Third Avenues. The property had been leased by the Metropolitan Street Railway.

Default was also made on the dividend rental and interest on notes of the Central Crosstown Railroad Company, but an agreement was made whereby operation is continued by the Metropolitan system, which meets the interest on the other outstanding securities.

PROTECTION FOR INVESTED FUNDS

A statement of the rentals on which default was made by the Metropolitan receivers is contained in an accompanying table. The total amount of stocks and bonds involved is $155,771,800 and the annual interest thereon is $8,648,388.

Apart from the reasons outlined above for the segregation of these properties, another controlling reason was the fact that the Metropolitan Street Railway Company had invested comparatively little money in the five properties mentioned. With the exception of a relatively small amount which was borrowed from the Metropolitan Street Railway Company, the Third Avenue Railroad Company had developed its property from funds raised by issues of its own securities. As both the Fulton Street and the Twenty-eighth and Twenty-ninth Street lines were operated by horse power, and their traffic constituted relatively a small part of the total travel on the Island, little money had been expended on these properties except to meet the current expenses of operation of the cars and the requirements of ordinary maintenance. The portion of the Central Park North & East River Railroad property which had been electrified was relatively small, comprising only the Fifty-ninth Street crosstown line, and the investment of the Metropolitan Company, therefore, was considered to be of less importance than the probable financial advantage that would result from segregation of the property and the discontinuance of the rental. The Second Avenue Railroad, although a property of small traffic as compared with the heavy lines of the Metropolitan and the Third Avenue systems, had not required the expenditure of much money on behalf of the Metropolitan system. This line had been electrified before the lease to the Metropolitan Street Railway became effective.

FRANCHISE CONSIDERATIONS

Another question for consideration was that of the franchises held by the companies which it was desired to segregate. No franchise that seemed to be of relatively great or of sufficient future importance to the Metropolitan system to justify the adoption and retention of these leases and contracts was concerned. The operation of all of the lines of the five companies was plainly unprofitable as constituent parts of the Metropolitan system and their retention would mean a financial sacrifice. As separate properties the operating segregated lines have opportunities to develop an independent business.

Close investigation in the light of present and probable future conditions has been made in order to disclose, if possible, the existence of any further leases or operating contracts which could be abrogated in the endeavor to make the Metropolitan Street Railway a complete operating successful system. Where the margin of profit or loss shown by analysis has been small and some question has arisen as to the wisest ultimate course to follow, some lines have been retained. It was supposed that these lines could be operated with curtailed service with sufficient financial advantage to justify their inclusion in the reconstructed system. Orders of the public regulating body requiring increases in service on some of these lines have increased the doubt as to the advantage of retaining these lines.

One of the most important of the lines of lessor companies that have been retained in the system up to the present time is that of the city line of the New York & Harlem Railroad Company, generally known as the Fourth & Madison Avenue line. The Metropolitan Street Railway Company has invested almost $4,000,000 in this line and this large amount would be lost to the Metropolitan Company if it should surrender the lease.

Franchise conditions of some of the lessor companies have necessarily entered into the consideration of this aspect of the question, as, for instance, with the Broadway & Seventh Avenue Railroad Company. This company operates a line extending on Broadway from South Ferry to Forty-Fourth Street and thence on Seventh Avenue to Fifty-ninth Street. This route affords much less traffic than some of the other lines but it furnishes a link in the Broadway & Columbus Avenue line, which is one of the most important surface routes in New York City.

Another consideration that was borne in mind was the fact that such lines as might be segregated could be purchased by competitive systems or used as the basis for new competitive systems. For instance, the Third Avenue Railroad, which is now under an independent and aggressive management, might purchase control of the line of the Eighth Avenue Railroad Company, if that should be segregated. Acquisition of the Eighth Avenue line would give the Third Avenue Railroad Company a north and south route extending the entire length of Manhattan Island.

Although sufficient time has now elapsed to permit fair judgment in the light of the steps taken regarding the wisdom of segregation of the five properties mentioned and the failure to separate other properties, it is plain from the fact that other measures have not followed that nothing has occurred to cause a modification of views concerning the various properties involved. Representatives of the committee of bondholders of the Metropolitan Street Railway in proceedings instituted before Judge Lacombe by the Eighth Avenue Railroad Company, the Ninth Avenue Railroad Company, and the New York & Harlem Railroad Company respectively, to regain possession of their respective properties, have evidently approved of the action of the receivers in deciding to continue the lease of the properties of the three companies.

OPERATING SEGREGATION NOT COMPLETE

The foregoing information relates mainly to the financial segregation of the lines. Financial segregation, however, does not mean complete operating segregation. Although a separate receiver for the Third Avenue Railroad was appointed on Jan. 12, 1908, it was not until April 11 of the same year that transfers were discontinued between the Metropolitan Street Railway and the principal lines of the Third Avenue Railroad, except at points where joint trackage arrangements compel, under the law, the grant of transfer privileges. Later, however, transfers were discontinued with the segregated lines at all points but those at which the statute enforces the issue of transfers, by reason of the joint use of 1000 ft. or more of track.

The most important use of joint facilities by the surface lines, affecting materially the economy of operation, is involved in continuation of the unit system in the production and distribution of power. Financial segregation of the lines has not required any new power house construction such as would have been inevitable if complete segregation of all relations between the systems had been effected. Acquisition of property by the individual systems would have necessitated large investments because of the high values of real estate on Manhattan Island; and separate power houses and sub-stations would have made the costs of power much greater than under the unit system which has been continued.

One power station owned by the Metropolitan Street Railway is located at Ninety-sixth Street and First Avenue and the other, owned by the Third Avenue Railroad, is at 216th Street and the Harlem River. The Metropolitan Company operates six sub-stations and the Third Avenue Company three on Manhattan Island. Two sub-stations receive alternating current from the Kingsbridge power station at 216th Street and the Harlem River and the others are fed from the Ninety-sixth Street station. Irrespective of the ownership of lines Manhattan Island is divided into sections to facilitate the economical distribution of power.

Several cars are rented by the Metropolitan system to segregated lines, but no arrangements for joint equipment or for the interchange of equipment exist.

EFFECTS OF SEGREGATION

The most significant effect of segregation of the various lines from the Metropolitan system is evident in the increase in the average rate of fare received. An accompanying statement compares some of the results of operation for the fiscal year ended June 30, 1907, and the calendar year 1909. These periods were taken because they represented complete years preceding and following the principal changes made in the property. Although the improvement shown in the average fare per passenger, namely, from 3.29 cents to 3.40 cents, indicates a saving which is material when applied to the heavy traffic of the Metropolitan system, the lower figure fails to reveal the state of affairs which existed just prior to the withdrawal of transfers with the principal lines of the Third Avenue road. The average fare per passenger of 3.29 cents in the year ended June 30, 1907, declined in the six months ended Dec. 31, 1907, to 3.16 cents and in the 70 days preceding April 11, 1908, when transfers were discontinued with the main part of the Third Avenue system, the average was 3.09 cents per passenger. From this figure to 3.40 cents the gain is 0.31 cent or 10.3 per cent.

METROPOLITAN STREET RAILWAY

	Year ended Dec. 31, 1909.	Year ended June 30, 1907.
Gross earnings	*$12,766,000	*$18,789,000
Miles electric track	121	205
Miles horse track	35	87
Total miles track, excluding car	156	292
Gross earnings per mile of track	$81,833	$64,346
Revenue passengers	255,320,000	376,550,000
Transfer passengers	120,080,000	194,765,000
Total passengers	375,400,000	571,315,000
Percentage of revenue passenger taking transfers	47	52
Revenue passengers per mile of track	1,636,700	1,289,600
Transfer passengers per mile of track	769,700	667,000
Total revenue and transfer passengers per mile of track	2,406,400	1,956,600
Average fare per total passenger, cents	†3.40	†3.29

* Excluding revenue from bridge local traffic, mail and express.
† The much greater discrepancy between the average rate of fare in 1909 and that which was shown immediately prior to the receivership is explained in the text of this article.

From an average of 1,289,300 revenue passengers per mile of track in the 1907 fiscal year the number has increased on the Metropolitan system until in the calendar year 1909 the average was 1,636,700. This indicates an average increase of 347,100 or 26.9 per cent. During the same interval the number of transfer passengers per mile of track increased from 667,000 to 769,700, a total of 102,700. This is equivalent to 15.4 per cent, or more than one-half as much as the percentage of increase in revenue pasengers per mile of track.

INSIGNIA CONTEST AT OKLAHOMA CITY

The Oklahoma (Okla.) Railway has just adopted a new monogram, reproduced herewith, which was chosen from over 700 designs submitted in contest. It will be used on all stationery, advertising folders and publicity literature issued by the company. In order to encourage interest, the Oklahoma Railway, in announcing the trade-mark contest, published advertisements in the daily papers offering a cash prize of $10 and the use of a chartered car over the company's lines to the person submitting the most satisfactory design. The contest was carried out by H. C. Martin, the company's passenger and freight agent.



The Congress of Ecuador, S. A., has before it a bill providing for the construction of an electric railway between Quito and Ibarra, a distance of about 106 miles.

PITTSBURGH ORDINANCES VETOED

Mayor Magee, of Pittsburgh, has vetoed three ordinances passed by the City Council in relation to the street railway situation. One of the measures provided for "a seat for every passenger from whom a fare is demanded," another proposed to fine the company if the cars were overcrowded 50 per cent above seating capacity, and the third prescribed universal transfers. The veto message indicated that Mayor Magee considered that action should be postponed pending the completion of the report of Bion J. Arnold, who is making an investigation of the situation. Mayor Magee said, in part:

"I always regret when matters arising in municipal legislation are in such form or are incorrect in principle that I cannot join with you in enacting them into law, and particularly when the matters have been unanimously agreed upon by you, but when bills presented to you for your consideration are so drawn as to bear upon their face defects so gross as to raise a doubt in the mind whether or not they were offered with the intention to effect a serious purpose, I cannot give them my official sanction.

"With all due respect to your honorable bodies, I must express the opinion that neither spasmodic and hysterical public outcry nor the nostrums of a quack publicist can effect a cure to the most grievous and complex evil from which the people of this city, as well as most other American cities suffer. The condition of affairs brought about and gradually growing more acute during many years of legislative improvidence cannot be corrected in a day by an offhand, made-to-order remedy.

"Some time ago you authorized me to employ competent persons to study the subject and report a program of action. The investigation was begun and has been pursued unremittingly, and is now being concluded by the most eminent authority in this country. I consider it unwise and inopportune to pass ordinances of the nature mentioned for the reason that legislation of this kind prepared by unskilled draughtsmen not qualified to investigate causes and to reach logical conclusions on this intricate subject is certain not to be upheld by the courts and may, therefore, prejudice the cause of the people after the investigations I speak of shall have been concluded and proper bills prepared by competent authority.

"If these crude productions should ever be submitted to the courts for enforcement, an adverse decision might accidentally go beyond the mere form. The principles underlying them might suffer in the judicial mind, and in their consideration some expression of authority may be utterly against the very right of the city to enact ordinances upon this subject. I consider it my duty in this case, holding a commission from the people, to make no false steps, to guard against impulsive action, and to proceed most carefully upon the delicate ground which we are traversing. The enforcement of the rights of the public as a party to the controversy with the street railways companies is still in pioneer stages; whatever right we have can only be enforced with the aid of the courts of law. The street railway companies have buttressed themselves about with the aid of the best legal talent, have foreseen and anticipated every method of attack and are prepared to contest every step. There is every reason why bills of this character, if it is advisable at all to proceed along these lines, should be drawn with care from the legal point of view, and only after all the facts regarding the case are fully known, and that they should be put into force at the logical moment."

ASSOCIATION CIRCULARS

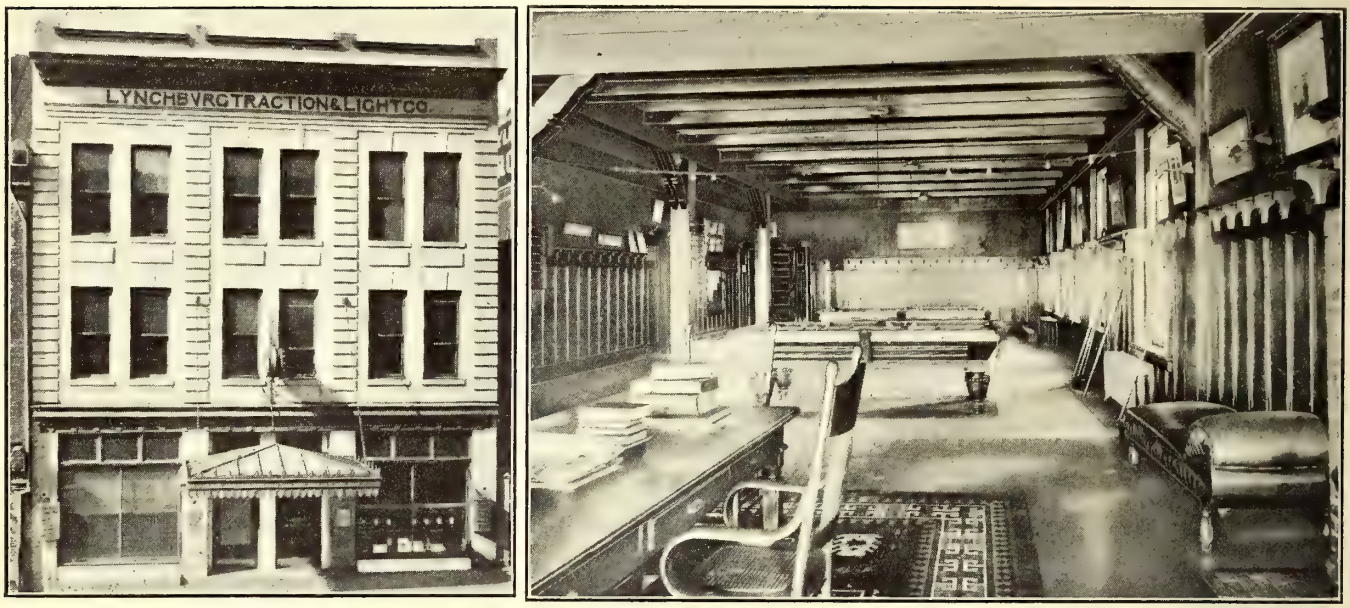
Secretary H. C. Donecker of the American Street & Interurban Railway Association has issued a circular to member companies enclosing copies of the amended railroad rate bill pending before Congress and of reports from the Committee on Interstate Commerce of the Senate, relating to the bill.

A list of active and associate members of the association has been published for distribution to all members of the association.

Secretary John W. Corning of the Engineering Association has issued an index of the rules of the National Electrical Code relating to car and car-house wiring.

EMPLOYEES' BENEFIT ASSOCIATION CLUB ROOMS IN LYNCHBURG, VA.

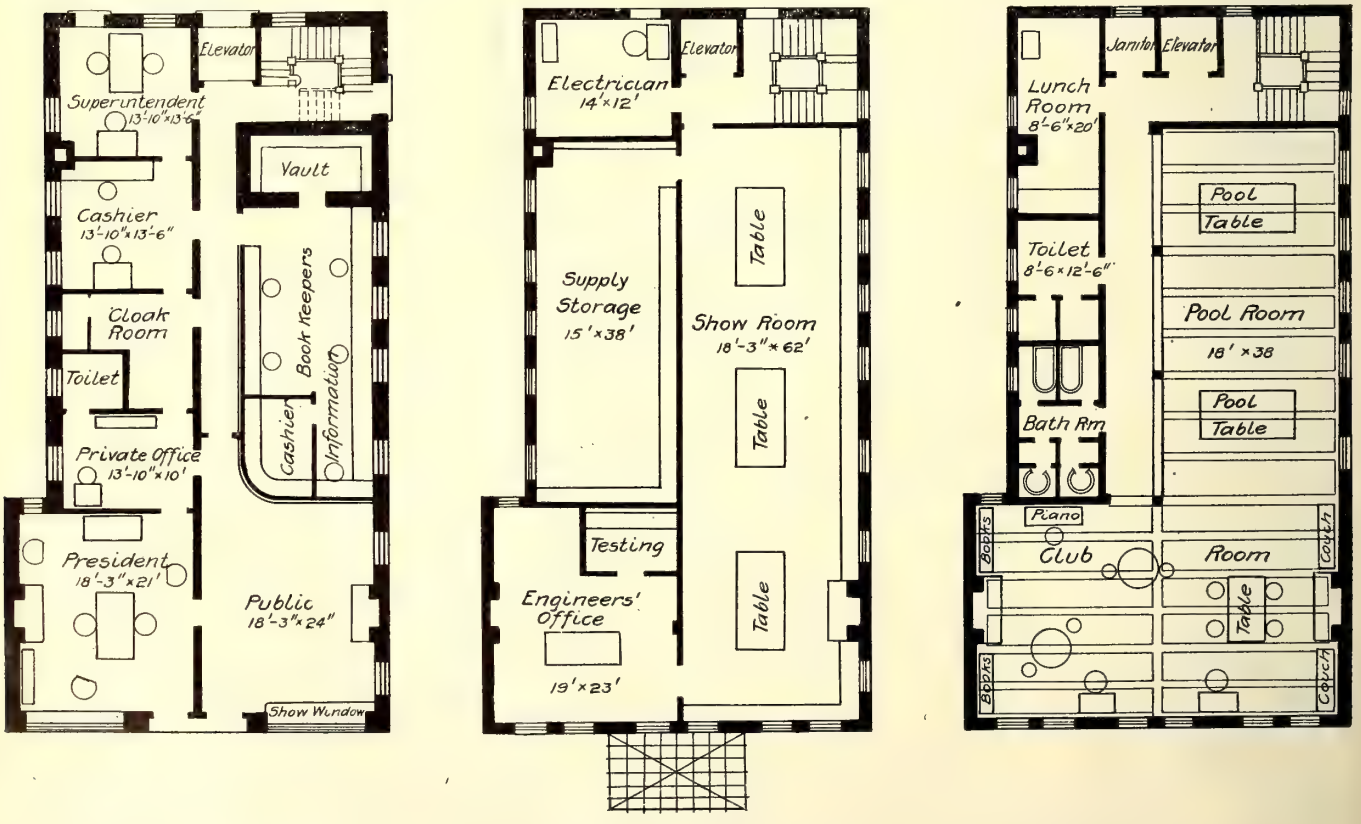
For the past eight years the employees of the Lynchburg (Virginia) Traction & Light Company have been conducting a sick and death benefit association which has been eminently successful.



Lynchburg Traction & Light Company—Office and Club Building, with General View of Employees' Clubroom When Looking Toward the Rear

As shown by the treasurer's report at its last annual meeting, the benefits paid out since the date of organization have amounted to $9,052.47, the amount of money deposited in the bank was $1,434.57, and the assets exceeded the liabilities by $5,216.09. Ninety per cent of the employees of the Traction Company are members of the association. Each pays monthly dues of $1. Sick benefits are paid at the rate of $1 a day and are limited to $90 per annum. In case of death of a member, $100 is paid to his heirs. The association has a physician who gives free medical attention to the members and their families. The physician is paid at the rate of 50 cents per month per member by the association. Bowling alleys are operated in the city and at the company's amusement park, the proceeds of which are applied to the association. No assessment has ever been levied on its members.

The association holds monthly and annual meetings on the third floor of the company's magnificent private office building, which adjoins the car houses and shops. At the annual meeting and banquet prominent citizens are invited, and men of national reputation are frequently present as orators.



Lynchburg Traction & Light Company—Floor Plans of the Office and Club Building

Although many companies have been liberal in providing recreation centers for their men, it is safe to say that few have equaled the beautiful quarters provided in Lynchburg. This is due chiefly to the efforts of R. D. Apperson, president of the company, who is a strong believer in the doctrine that cheerful surroundings make cheerful men. It will be seen from the accompanying illustrations that the Lynchburg club rooms are more like those of a high-class club than a railway men's retiring room. The walls of the room are handsomely wainscoted, and the ceilings finished in the exposed-beam style of the old English country homes, while large, handsome rugs complete the homelike effect of coziness. That the men appreciate the beauty of their surroundings is shown by the excellent condition of all the furniture after several years of use.

As is shown on the plan of the Lynchburg quarters, room is provided for shower baths, kitchen, library, etc. At present the association owns several hundred popular and technical books, a piano, pool and billiard tables and facilities for various games of cards, checkers and chess. The association furnishes the library and furniture out of its own funds, but the room and the caretaker's services are given free by the company. The association is now preparing to add gymnasium features to the club rooms at an early date. A similar club room is provided for the employees of the Roanoke Railway & Electric Company, of which Mr. Apperson also is president.



Lynchburg Traction & Light Company—Library and Music Section of Employees' Clubroom

The men of the association hold their organization in high esteem, regarding it as the best arrangement that has ever been made for the solution of the labor problem. The Lynchburg Employees Benefit Association has many commendable features, and it is felt that should these become more universal with employers and employees, both would derive great benefit from them through their tendency to eliminate many of the differences that exist between them.

When Mr. Apperson took charge of these properties eight years ago the wage rate for motormen and conductors was 12½ cents per hour. As Mr. Apperson believes in the policy that the employees should share in the prosperity of the company, he has voluntarily advanced the wages from time to time, until at present they are 21 cents per hour. This rate is one of the highest in the South. Mr. Apperson now has under consideration a system of pensioning the disabled employees, which he will put into immediate operation.

THROUGH ROUTES BETWEEN ELECTRIC AND STEAM LINES

Many communications have been received by the Committee on Interstate and Foreign Commerce of the House of Representatives in relation to the railroad rate bill now under consideration. They relate mostly to provisions affecting steam railroads, but in addition to those regarding electric lines which have been published in previous issues of the Electric Railway Journal the following, addressed to Congressman Palmer, of Pennsylvania, by Thomas A. H. Hay, president of the Northampton Traction Company, of Easton, Pa., was presented to the committee:

"I am very much obliged to you for your letter, in reference to the bill prepared by the Attorney-General, known as the railroad-rate bill. We street railway men have been at a disadvantage so long that the Government now should not give the steam roads a club to injure us.

"May I suggest an additional clause to go into the bill, that street railways having terminals in towns and cities and doing an interstate business should be compelled to permit the use of their terminals to non-competing lines just the same as steam roads are compelled to permit the cars of their competitors the right to use their tracks.

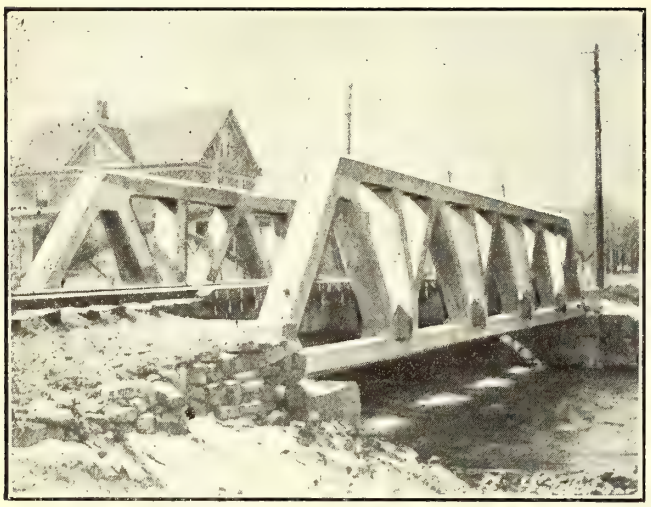
"The Easton Transit Company, which owns all the entrances into Easton and Philipsburg, will not permit the use of its tracks by the Northampton Traction Company, the Easton & Washington Traction Company and the Philadelphia & Easton Railway Company, all of which are interurban and non-competing lines, to bring passengers into the center of Easton.

"The Easton Transit Company has the right to use these terminals by reason of taxation locally and the ægis of the interstate commerce laws, yet that same law cannot compel it to permit other trolley companies, non-competitive, to use the terminals except at whatever price it sets, which price is very prohibitive and proscriptive."

A 6000-volt single-phase line, 35 km long, has been completed connecting Padua, Italy, with Fusina. Ten motor cars and five trailers are in operation. The motor cars are each equipped with two 80-hp Winter-Eichberg motors. In the city of Padua the trolley voltage is reduced to 600.

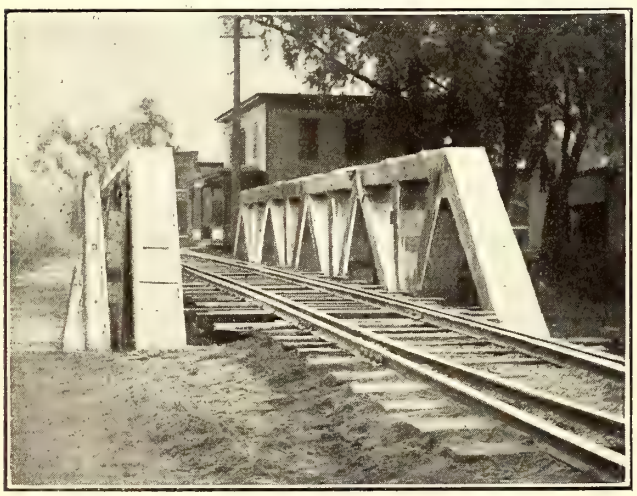
REINFORCEMENT OF FULMER CREEK BRIDGE WITH STEEL AND CONCRETE

With the development of suburban electric railways into interurban lines and the replacement of light single track, slow-speed cars by heavy double track high-speed cars, the tendency has been to disregard the heavy duty placed upon the track and bridge structures so long as the schedule could be maintained. Appreciating the necessity for exact data of bridge capacities, the Utica & Mohawk Valley Railway Company has employed an experienced bridge engineer who makes a specialty of inspecting and reporting upon the condition of old bridges. Among the bridges upon which heavier equipment has gradually been imposed is the Fulmer Creek bridge at Mohawk, N. Y., on the division formerly known as the Herkimer, Mohawk, Ilion & Frankfort Railway.



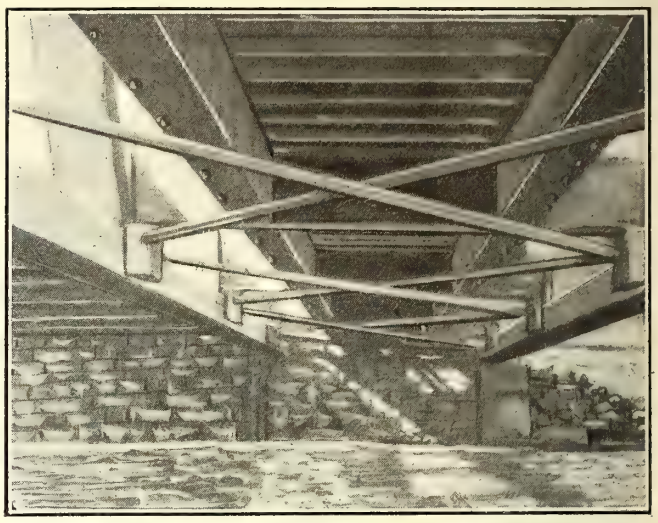
Fulmer Creek Bridge

The old single track bridge, furnished by the Berlin Iron Bridge Company in 1895, was of the half through riveted truss type, length over all 70 ft. 10 in., consisting of five panels, 13 ft. center to center of trusses, 8 ft. 6 in. center to center of chords, angle 90 deg. The stringers are 12-in. 40-lb. I-beams and floor beams 15-in. 42-lb. I-beams; upper chord of truss, two 6-in. x ¼-in. channels with one 12-in. x ¼-in. plate; lower chord of truss, two 7-in. channels, ¼ in., 5/16 in. and ⅜ in. thick. The diagonals are made of two 3-in. x 3 x ⅜-in., two 3½-in. x 2½-in. x 5/16-in., two 2½-in. x 2½-in. x ¼-in. and two 3-in. x 2½-in. x ¼-in. The bridge rested on stone masonry abutments and was designed for 32-ton cars. The lower chords and the diagonals were reinforced in 1908 to make the bridge safe for loaded cars having 45 tons total weight. This reinforcement was not considered sufficient to make the bridge safe for the express cars weighing 45 tons and carrying 20 tons additional weight as now operated over it by both the Utica & Mohawk Valley Railway and the Ot-sego & Herkimer Railway.



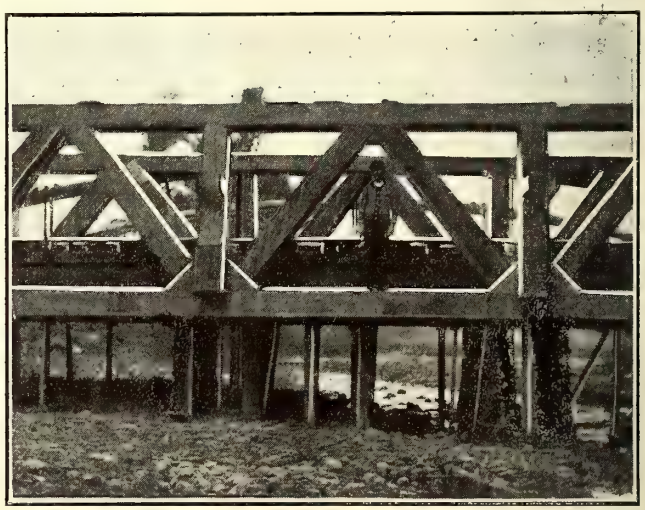
End View of Bridge, Showing Forms in Place After Concreting

A temporary wooden bent was placed under the center of the bridge for a time and during the fall of 1909 the structure was reinforced with steel and concrete in a unique and satisfactory manner, according to plans and specifications prepared by Wilbur J. Watson, bridge engineer, of Cleveland, Ohio.



View of Floor System

In order to maintain traffic and at the same time allow room for forms, the track and bridge ties were raised about 6 in. on temporary wooden stringers supported on timber bents bedded in the channel of the stream. The bottom chords were then reinforced with 1-in. round steel bars, four bars being placed in a vertical row between the channels of each panel with four additional bars placed in all except the shore panels, one additional bar being placed at each flange of the channels.



Side View of Bridge, Showing Forms in Place After Concreting

The top chords were reinforced by two bars placed between the channels and four bars just below the bottom flanges of channels. The batter posts and diagonals were reinforced with four bars each and two bars were placed in each intermediate post. The bars in each of these cases were curved at the ends to extend into the recesses around the top and bottom chords and floor beams at the connections. Two bars were also placed on either side of the webs of all stringers and

cross beams, just above the lower flanges. Considerable skill was required to bend the bars and place them in position. The bars were all securely fastened in place with No. 10 steel wire. The chords of trusses, floor-beams and stringers were then wrapped with No. 16 standard 3-in. mesh expanded metal securely wired in place. All other members were wrapped spirally with No. 10 steel wire spaced 6 in. between coils. Forms of dressed yellow pine lumber were then built about the floor system and bottom chords and the concreting was carried from the bottom upward, the forms being built up along the posts and diagonals just ahead of the concrete so as to give all possible room for thorough tamping. It was necessary to cut holes through the cover plates of the top chords in order to insure complete filling of all parts of the chords and connections. The tamping was done through the holes with a stick of small diameter and continued until the concrete oozed out of adjoining holes.

The concrete was made of one part American Portland cement, two parts clean, sharp quartz sand and four parts crushed limestone of size to pass a ½-in. ring. As only a small quantity of concrete could be used at a time the mixing was done entirely by hand. It was found necessary to make it quite wet in order to fill all of the angles and pockets of the steel work at the connections.

The freezing weather came just as the concreting was finished and so the forms were left in place about two weeks. The faces were then brushed with a mixture of one part cement and one part sand and rubbed with a cement brick. The load was not placed upon the structure until a full month after the work was completed. In the mean time a full set of new bridge ties and guard timbers of long leaf yellow pine was prepared and treated with two coats of Avenarious Carbolineum applied hot with hand brushes.

Pieces of ¾-in. wrought-iron gas pipe were set in the forms for the stringers to receive the ⅝-in. bolts used to fasten the ties in place. Two bolts with cast washers at both ends were used for each 8-in. x 10-in. x 9-ft. tie, and the ties were spaced 16 in. center to center.

On account of the original character of the work, it was considered best to select a reliable bridge contractor, familiar with concrete work, and pay him on a percentage basis for superintendence and labor. He was paid 15 per cent on all wages paid to men furnished by him. Time was kept and men were paid by the company. All materials were furnished by the company.

The approximate total cost was as follows:

Reinforcing steel	$192.64
Lumber for forms	291.10
Concrete materials	171.52
Nails, wire, staging, etc	18.24
Engineering	77.90
Contractor's labor	732.43
Contractor's 15 per cent	109.86
Delivering materials	13.36
Company labor raising tracks, etc	30.00
Total	$1,637.05

The bridge seats and pedestals were also rebuilt, the cost being included in the total given above. As the lumber from forms was saved for future use, a credit for half value or $145.55 should be given, also a credit for 4000 ft. B.M. tie framing at $9.20 paid to contractor, amounting to $36.80, thus making the net cost of bridge reinforcement $1,454.70. The engineer's estimate for a new steel bridge of the required capacity was $2,500.

The cross-section areas of the various members after reinforcement were: Bottom and top chords, diagonals and batter posts 12-in. x 15-in.; intermediate posts tapering from 12-in. x 24-in. at top of floor beams to 12-in. x 15-in. at top chords; stringers 16-in. x 12-in.; cross beams 19-in. x 12-in. Vertical distances are given first.

The reinforcing bars were furnished by the Carnegie Steel Company, the expanded metal was purchased from the Corrugated Bar Company, of St. Louis. Measurements taken at center of bridge showed a deflection of less than ⅛-in. under heaviest cars operated over it immediately after placing it in service. The estimated safe load of the structure is 66 tons.

ELECTRIFICATION OF STEAM RAILROADS DISCUSSED BY NEW YORK RAILROAD CLUB

The committee appointed by the New York Railroad Club to examine into the subject of the electrification of steam railroads presented its report to the club on the evening of Friday, March 18. Those composing the committee were: W. J. Harahan, assistant to the president, Erie Railroad, chairman; L. C. Fritch, consulting engineer, Illinois Central Railroad, Chicago; H. M. Warren, electrical engineer, Delaware, Lackawanna & Western Railroad, Scranton, Pa.; H. H. Vaughan, assistant to the vice-president, Canadian Pacific Railway, Montreal, Can.; J. H. Davis, electrical engineer, Baltimore & Ohio Railroad, Baltimore, Md.; George W. Wildin, mechanical superintendent, New York, New Haven & Hartford Railroad, New Haven, Conn.; William McClellan, consulting engineer, New York; C. O. Mailloux, consulting engineer, New York, and E. B. Katte, chief engineer of electric traction, New York Central & Hudson River Railroad, New York. The report was presented by Mr. Harahan.

It first cited in chronological order a number of the most important events in the history of the electric railway. It then took up the "characteristic features of electrification" and referring to the subject of flexibility, stated among the advantages of electricity, that "locomotives or motor cars may be coupled in a variety of ways, and operated by means of the multiple-unit system, from one point in the train. Public streets and highways may be occupied, if necessary, and operation in tunnels ceases to be objectionable. Trains may be shorter and more frequent, or they may be of any size that business conditions dictate, consistent with mechanical considerations. A distribution of driving wheels throughout the whole train permits high acceleration, which in turn permits increased schedule speed without excessive increase in maximum speed.

"All of these features have a varying weight according to the circumstances of the particular problem at hand."

Referring to weather conditions, the report declared that electric service has been found to be but slightly affected by snow or other weather conditions, and that in cold weather the steam locomotive is at a disadvantage, but not an electric locomotive or motor car.

The committee believed that the electric locomotive would have much less idle time under the same conditions than steam locomotives and can be designed for practically continuous operation over any length of run. It has also a very much larger power capacity and is much more cleanly.

The principal reasons for considering electrification, in the opinion of the committee, are an increase of station and track facilities, an increase in gross earnings due to more frequent trains and legislative enactment. In referring to the increase in gross earnings, however, the report states that "the mere substitution of electricity for steam will not accomplish a very great increase in gross earnings, but by changes in schedule and stops, the service must be made more convenient and attractive to the desired patrons. Inattention to this feature is preventing some roads at present from realizing the full possible returns upon their electrification."

Upon legislative enactment requiring the substitution of electricity for steam the committee says:

"The operation of a steam railroad in the heart of a large city is of necessity attended by features not always ideal. On account of the cost of land, and other conditions, the amount of space for roadway is likely to be cramped, and closely pressed by city and private property. The emission of smoke and gases from the locomotives, especially if a subway or tunnel is involved, often leads the community to demand that the railroad abolish the objectionable features. This demand, in its essentials, may be reasonable enough, and if by calm and considerate discussion it can be shown that conditions are unnecessarily bad, the public has a right to expect the railroads to provide a reasonable remedy. Unfortunately, however, the discussion is sometimes fanned into a condition where hos-

tility and acrimony become the chief features. As a consequence, the public may make demands, the difficulty, expense and result of which it has no conception, and the railroad is compelled to refuse anything like the full extent of the demands because it knows it cannot afford to do otherwise.

"In this connection, the following are a few broad considerations which common sense and equity present:

"1. A railroad has a charter franchise or special privilege from the commonwealth, and, therefore, belongs to a class of activities which must especially consider the interest of the public.

"2. A railroad is also a business venture organized to make money, and those responsible to the stockholders must conduct its affairs so as to serve their best ultimate interest.

"3. A nuisance, for example, smoke, incident to the operation of a property, whether factory, railroad, store, or what not, may be deplored, but all sources of such nuisances must be treated alike, and it should also be determined how far a removal of the nuisance might endanger the industry itself and cause its failure.

"4. It is only fair to assume that men who have worked in the public eye, at any particular business, for a number of years, are men of integrity and well informed as to their business. Action should be taken, therefore, by the community only when advised by well-informed persons, and after comprehensive consideration.

"5. There are not two sides to this problem. The interests of the railroads and those of the public are one.

The committee made an effort to secure operating data for publication for the existing electrified steam railroads, but this attempt met with little favorable response, because, almost without exception, the men who are responsible for the operation of these properties did not think the conditions were sufficiently settled to permit them to publish data that would be just to either steam or electric operation.

The report concludes as follows:

"To sum up, the following may be stated as the advantages and disadvantages of electrification:

ADVANTAGES

"1. Increasing the capacity of a given terminal by the elimination of switching movements, where multiple units are used, and increasing the scheduled speed of trains without increasing maximum speed by the higher acceleration possible with electric power; also increasing the capacity of the line and permitting shorter block signal spacing.

"2. Avoidance of smoke and steam nuisance, making unobjectionable tunnels, subways, and underground stations, and reclaiming the aerial space above track for offices, stores, warehouses, hotels, or other buildings; also a saving in deterioration of metallic structures because of the corrosive products of combustion in steam locomotives.

"3. Uniform power over grades and greater tractive power of electric locomotives of equal weight with steam locomotives including tender, making heavier trains possible over mountain divisions. Locomotives may be used in multiple without increasing the cost for enginemen.

"4. Economy of operation under conditions favorable to electric traction, such as frequent multiple-unit train service or cheap electric power as compared with the higher cost of locomotive coal.

"5. Electrical operation has proved itself reliable.

"6. Electric power is not a source of danger to the traveling or general public.

DISADVANTAGES

"1. A large investment for re-equipping the railroads with the new power which can only be justified by definite financial or economic results.

"2. Increased danger to employees or the railroad due to the presence of the third rail or the overhead conductor, especially in yards or terminals.

FEATURES TO BE CONSIDERED FOR FUTURE ELECTRIFICATION.

"The following features with reference to present conditions should be considered, having in view future electrification:

"1. The signal systems should be designed with a view of meeting the restrictions involved in electrification work.

"2. Bridges, yards and terminal platforms should be designed to conform to the clearances necessary for the installation of working conductors.

"3. Locomotives and cars should be designed to conform to electrification clearances.

"4. The lighting system of cars should be designed for economical use on electrified roads. This applies also to the heating systems.

"5. Steam, water, air and gas-pipes, in yards and at stations, should be laid out to avoid current collectors on future electric equipment and working conductors, also bonded to avoid electrolysis.

CONCLUSIONS

"1. No general information is available on the basis of which steam railroads, as a whole, would be justified in electrifying terminals or main lines, solely on the grounds of economy.

"2. Careful investigation is necessary to decide if electrification of terminals and suburban districts would be warranted in order to increase earnings.

"3. More attention should be given to the possibilities of electrification in connection with heavy grades, and at other places where an increase in facilities is needed.

"4. It is not likely that conclusive data on the economy of electrification will be available until electrification is extended over a complete steam locomotive stage.

"5. The electrification for passenger terminal and suburban service is now more or less settled as to method, but for freight and general trunk line service it is in the experimental stage.

"a. The types of locomotives for various service have not been determined, though progress is being made.

"b. The method of secondary distribution (working conductors), needs much development. The third rail is thoroughly reliable and efficient, but unsuitable for complicated switch work. In its present form it has only been used for voltage up to 1200.

"c. The overhead system for high voltage working conductors also needs much development. Few, if any, are satisfied with present designs, and many changes are proposed.

"6. The steam railroad men and electrical engineers should work together in as close harmony as is possible so as to produce results that will be as free from mistakes and experiments as is possible in any developing art.

"7. Each problem must be studied on its merits and a decision can only be made after careful study of the conditions pertaining to each situation.

"8. The electrification of large freight terminals has not as yet been attempted, nor satisfactorily worked out, therefore it is necessary to proceed with caution in this matter and the problem must be exhaustively studied and new developments made before it would be justifiable to make such an installation. The electrification of any large freight terminal would involve a number of roads, and cannot be undertaken independently, without the co-operation of all the railroads affected, on account of the relations existing among the various roads in the interchange of freight traffic."

DISCUSSION

Upon the conclusion of the reading of the report by Mr. Harahan, George Gibbs, chief engineer, Pennsylvania Railroad & Terminal Company, moved a vote of thanks to the committee. This resolution was seconded and unanimously adopted. A communication was read from the president of the club, W. G. Besler, regretting his absence; and one from C. L. Muralt, in which he stated that he did not agree with the committee's assertion that the three-phase motor cannot be operated on direct current. In his opinion, if a mixed system was considered desirable, the three-phase motor was just as applicable for the purpose as any other.

Mr. Gibbs opened the discussion with the statement that now the most important factor in relation to electrifying steam railroads is the question of cost. Two years ago, when he dis-

cussed this matter before the New York Railroad Club, he had had no figures to present but he had predicted that electric operation could not be considered as a commercial proposition unless the economy which it effected was sufficient to pay the interest on the added investment. Electrification would not be able to do this except where the traffic was very dense. In his experience, this statement still held good. He had had the opportunity of studying the operation of two important electrified systems, namely, the Long Island Railroad and the West Jersey & Seashore Railroad. He was now preparing a report for the International Railway Congress meeting to be held in Switzerland this summer before which he will present some operating figures for both of the properties named to cover two and possibly three years' service. The Long Island case deals with a system of 120 miles of electrified track consisting principally of local service with multiple unit trains over a complicated network. The operating results, all things considered, show a very large saving over the same car mileage or ton mileage by steam The Long Island Railroad installation not only pays the interest on the extra investment but it yields a handsome surplus besides. The West Jersey & Seashore Railroad, however, presents a different situation. One might compare it to a trunk line of moderate length having freight and passenger service at rather frequent intervals the entire length and a heavy local service at one end of the line. This installation has also produced a saving but not enough to pay the interest on the investment. In this instance, electrical operation is combating the most economical type of steam operation, namely, long distance high-speed trains with few stops.

In the case of the Long Island work, the electrification greatly increased the capacity of the line, especially at the Brooklyn terminal which could not possibly be operated by steam up to its present capacity. The West Jersey electrification has proved popular but it is obvious that, in cross-country service, the advantages of electricity over steam are not so apparent as in local service. One point mentioned by Mr. Harahan was the question of system. The d.c. multiple unit system used on Long Island was giving entire satisfaction and very little trouble had been experienced beyond routine maintenance. However, there were other systems which might be used under other conditions. In some previous electrical discussions, the argument had drifted into a question of relative advantages of one system over another, some taking the position that one system was the best for all cases and thereby confusing the minds of the steam railroad men. This method of arguing was very unfortunate for those who wish to promote electric traction. Happily, that state of mind was being dispelled, but for the good of the profession it could not be entirely eradicated too soon.

L. B. Stillwell, consulting engineer, said that the report of the committee was well considered and a very fair statement of the art of electrification. A few years ago, it would hardly have been anticipated that in the year 1910 a committee of steam railroad men studying and reporting on this subject would have found six advantages for electricity and only two disadvantages. The fact that we have to-day no electric trunk line service operating freight as well as passengers is impressive but not discouraging. The same kind of reasoning and the same deductions from known facts that have lead to the successful electrification of terminals and of electric zones where traffic is congested are applicable with the same certainty to the conditions governing freight and other transportation on trunk lines. The problem must be worked out by co-operation between the operating men and electrical engineers. There is no reason, however, why the man who begins the study of engineering problems as a specialist in electrification and moves on to the study of broad problems of railroad operation may not come to know and be able to analyze the problems of railway operation as well as the man who has the disadvantage of having his nose held continually to the grindstone of operation. The reports of steam railroads present no mysteries that cannot be traced, and can be understood quite as aptly by the outside man as by the inside man. There would be no progress in the art if some men were not able and willing at times to stick to the deductions made from a careful reasoning of facts and analyses. The determination as to whether it would pay to electrify any given trunk line can be made with a very close approximation to the results which would be realized in practice three to five years later. The available data for such computations had been greatly increased in the past two years. It is a comparatively short step now to figure from the known to the comparatively unknown. For example, the grand average cost of fuel consumption for a locomotive mile in the United States is 11.2 cents. It is quite a simple problem to work out a figure for electrical operation to within 5 per cent. In the case of the New York, New Haven & Hartford Railroad, he had been informed that actual experience had shown a cost figure within 2 per cent of the estimate made by Mr. Putnam and himself from theory two years ago. One of the most important questions was that of developing standards of electric railway practice as rapidly as the progress of the art will permit. In adopting special methods of solution, we are laying up vexation, expense and criticism. The German method is different but we cannot adopt it here. Nevertheless, through the engineering associations, we ought to be able to approximate to the German idea of standardization more rapidly than we are now doing.

Two years ago, in the paper prepared by Mr. Putnam and himself for the American Institute of Electrical Engineers, he had suggested a standardization of at least three things, as follows: Location of third rail; location of overhead trolley; frequency on a.c. systems. The third rail is not yet standardized but some day it will have to be. Some special solutions have been made but one does not fit the other. Thus, the subway in New York has the third rail located 26 in. from the gage line and 4 in. above the top of the rail, whereas the corresponding dimensions on the Long Island Railroad are 27½ in. and 3½ in. The New York Central & Hudson River Railroad made an important step in inverting the current rail and locating it approximately 28¼ in. from the gage line, but even that dimension does not fit all conditions for on this road it is necessary to keep out certain kinds of rolling stock in the electric zone. On the West Shore Railroad's electrified division between Utica and Syracuse, it is about 32 in. from the gage line. Mr. Stillwell suggested that the New York Railroad club should co-operate with other railway bodies and endeavor to agree upon recommended standards for adoption by electrified steam railroads. Such standards may not be adopted in all cases owing to the influence, perhaps, of local conditions but still they will give something to which they can work forward. The position of the overhead trolley had been located by the New York, New Haven & Hartford Railroad and he hoped that other roads which would adopt the overhead construction would use the same clearance, if at all possible. The possibility of the interchange of rolling stock as affected by overhead conditions might some day be as important as the question of gage is now. Progress had been made with regard to the question of frequency. The Prussian State Railroads, for instance, had adopted as standard for single phase work a frequency of 15 cycles and a trolley potential of 10,000 volts. When Mr. Putnam and he suggested 15 cycles there was a great diversity of opinion, but he was glad to see that engineers of both the great companies making a.c. apparatus now advise that 15 cycles and 11,000 volts should be used on all long lines. A potential of 11,000 volts at the power house of course means anything between 10,000 volts and 11,000 volts on the trolley and so does not differ materially from the German standard. The reason for recommending a low frequency was that, as a.c. motors are now made, two 15-cycle machines will do the work of three machines at 25 cycles. As it is the railroad company which spends the money, its interest should be the controlling one because it is buying draw-bar pull and is entitled to the maximum for its money. One strong reason which existed for 25 cycles was that the manufacturing companies had the patterns for that frequency and therefore were disinclined to change.

As a matter of fact, however, they will have to build additional factories anyway when the steam railroad electrification field really has developed its possibilities. As to the statement in the report that the management of steam railroad companies, in general, should anticipate the construction of parallel electric lines, he thought that if there is a good economic reason for building a new line, there is a better reason for electrifying the old steam line. The established railroad has everything in its favor for lower costs and by electrifying will avoid the loss of business from competition.

W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, said that he was glad to have the opportunity of saying something about trunk line railroads. He had prepared some comments on the committee's report but before reading them, he would show some lantern slides of the very latest catenary construction installed by his company. He said that the new designs were cheaper and better than the original construction which as everybody knew had to be installed under great pressure of time. Mr. Murray then took up the committee's chapter on "Power Capacity" where it is stated that an electric locomotive can draw all the current necessary to produce a maximum tractive effort but that this feature is somewhat counterbalanced by the fact that the amount of power deliverable at a given point depends upon the carrying capacity of the distribution system. The speaker said that the mechanical conditions involved in the overhead suspension of conductor and contact wires in the high voltage system allow such large carrying capacity that there is every provision against any such contingency in the limitation of power transmitted. Notwithstanding that the copper in the single phase system of the New Haven installation is but a small per cent of the equivalent copper for the same line efficiency of a d.c. third rail system, there has never been a moment when the distributing system installed has not been able to furnish strong voltage over its complete line. There has never been a complaint that schedules could not be made on account of low voltage even when it has been necessary to keep in motion simultaneously trains totaling about 10,000 tons. Under peak conditions, the actual voltage drop of the system, based on voltmeter readings at Woodlawn tower, the farthest signal tower from the power station and 18 miles distant, showed a minimum potential of 9800 volts while the general operating voltage of the line was 11,000 volts. The average loss throughout the day for the line was less than 5 per cent.

Under the chapter headed "Collateral Advantages," the committee stated that schedule conditions usually will allow switching and perhaps some other portion of the traffic to be done at times of light load. Mr. Murray said that, while this is given as an advantage, the condition that it carries seemed to imply the opposite. The New Haven experience showed that on a commercial basis switching requires from 6 per cent to 10 per cent of the total power. Therefore, the power and transmission system as a whole should be able easily to handle, say an extra 10 per cent above the regular main line requirements at any time. It was interesting to note, however, that generally speaking, the power house equipment will not have to be increased for the transportation of freight, as this particular schedule can be handled at night as is now customary. This combination will give a much better load factor to the system. One of the greatest fields in which economy could be practiced, however, was the electrical handling of freight with longer and faster trains, thereby materially reducing the aggregate train miles. It should also be borne in mind that 100 per cent in steam engine units can be replaced by 60 per cent in electric engine units. Mr. Murray disagreed with the committee's statement under "Contingent Costs." He did not deny that there were not expenditures other than the direct cost of electrification, but perhaps the experience of the New Haven Company might cast some light on the subject. For example, the right of way of the company, except for a few pier rights which had to be purchased, was to-day just as it existed before the trains were electrically operated. There were few railroads whose right-of-way limits are not entirely sufficient to cover the erection of structures for carrying the transmission system. Of course, the New Haven Company did not have to buy land for substations. It did not have to make any important changes in bridges and buildings, but on the contrary they have become more valuable. Overhead crossings have added nothing to the list of expenses. While it is true that the signal system was changed, the alterations increased the track capacity and reduced the original operating expense to such a degree that the money saved in operation practically has offset the investment charge. It is true that the telephone and telegraph have been affected by the single-phase service, but the correction of the troubles has not proved a serious expense. The company had not been subjected to claims from patrons on account of accidents due either to temporary or permanent construction. Electrification cannot be applied economically to trunk lines except where the density of traffic is great enough to bring a return for the capital outlay. He agreed with the committee that the amortization of equipment such as locomotives and cars is taken care of by their being placed in other service. Coal, wood, and water stations are too insignificant for consideration. On the whole, it seemed to Mr. Murray that one should be cautious in making an array of costs if the complementary credits were not given at the same time.

Referring to the chapter on "Systems of Electrification," in the report, Mr. Murray said that as it considered the matter of trunk line electrification exclusively, it was well to understand just what was meant by a trunk line. He would define a trunk line as one connecting large cities which are separated by considerable distance. That portion of a trunk line which lies in the immediate vicinity and outlying districts of the terminal cities will carry a suburban traffic. The companies which are considering electrification of their trunk lines, have been brought to this point by the public desire, mandate of law or economical reasons. For the present, electrification of steam roads about or between small cities with light traffic, cannot be considered, except where tunnels or grades are concerned. Hence, as the problem of electrification is limited to the heavier type of traffic between large cities and to their suburbs, it follows that large power generation and large train unit service is the desideratum. In the small city interurban zone, d.c., third-rail electrification may be more economical than the a.c. system, but in his opinion the former cannot be applied to any trunk line, considered either in part or whole, connecting the larger cities of this country. The reason for his belief was that the fixed charges and attendant operating expense over the mileage necessary to cover the suburban radius of large cities, taken in connection with density of traffic common to these lines, are less for the single phase system.

So far as the inter-rural trunk line territory was concerned, it seemed to be the committee's concession that single-phase was the logical solution. Referring to the committee's statement that "The d.c. railway motor is better than the single phase railway motor of to-day, but for long-distance work the distribution system for single-phase system is simpler than the d.c. system," Mr. Murray said that he thought it would come closer to the situation if the word "cheaper" were substituted for both the words "better" and "simpler." He then read an extract from a recent article by Philip Dawson, the well-known English engineer, in which Mr. Dawson criticizes the American practice of using the a.c-d.c. combination. He said that he agreed with Mr. Dawson that a single system such as used in Europe was better even though his own road was involved in the condemned arrangement. Mr. Dawson had written that the apparent intention of the American engineers was to make a very good d.c. motor capable of operating on alternating current. In Europe, not a single main line railway is operated over both a.c. and d.c. systems. With reference to the committee's statement that the difference in the estimated cost between the d.c. and high potential single phase systems, considering both first cost and cost of operation is so slight that the decision cannot be made on the cost basis alone, Mr. Murray said that while this statement might be correct for interurban railways, five years of engineering, construction and operating experi-

ence on a trunk line property, permitted him to present a firm but respectful disagreement. Mr. Murray did not think that the danger to employees from the overhead conductors was very great if due care was exercised. He thought there was no necessity for employees to be on the top of cars and the many accidents that had been due to their being there could be eliminated by enforcing a regulation to keep the men off the roof.

In conclusion, Mr. Murray said that his firm belief in the single phase system as the proper agent for freight and passenger trunk line operation including such a line's terminal and suburban traffic was based upon a conscientious effort to secure the facts within a situation that actually exists. It had been shown that the high voltage conductor out of reach is safer than the low voltage contact conductor within reach.

George M. Basford, assistant to the president, American Locomotive Company, said that the interest and value of the report was increased by the fact that the committee included railroad officials who have direct responsibility in connection with railway installations. The conclusion that each problem on electrification would have to be settled on its own merits was a truth which illuminated the entire situation. Electrification on the grounds of economy can be justified in but very few cases. A few years ago it seemed very economical to use it on mountain divisions, but the development of the Mallet compound locomotive had changed conditions, even in cases where water power is available. There is less heard now-a-days concerning the electrification of long distance main trunk lines. The possibilities of the steam locomotive have not yet been exhausted. Hitherto, the development of the steam machine has been toward plain, rugged types with little attention to securing refinements of economy. These refinements are now being taken up and will produce the desired reductions in expense for less than electrification. He questioned any statement that the limit of capacity had been reached in the steam locomotive. However, there will be other cases like that of the New York Central, and great freight terminals particularly will present difficult problems for study.

Mr. Gibbs discussed the question of standards brought up by Mr. Stillwell. He said that the American Railway Association had had in existence for over four years a committee on standard locations of third-rail and overhead conductors. He was a member of this committee which had made a report on standardizing these locations and he hoped that the railway members of the club would live up to the standards set. Mr. Stillwell replied that he knew of the existence of the committee, but did not know that a report had been made. As a member of the Erie Railroad Commission some years ago, he had found that a third-rail with enough clearance for all classes of rolling stock could not be installed without making very expensive changes in bridges and other structures. Referring to Mr. Basford's remark about the steam locomotive, Mr. Stillwell quoted a statement by E. H. McHenry, vice-president of the New York, New Haven & Hartford Railroad, to the effect that the electric locomotives on that railroad had run 19,000 miles per delay as against 6000 miles per delay by the "sturdy" steam locomotives.

C. O. Mailloux, consulting engineer, said that if any fault was to be found with the algebra or other mathematics of the electrical engineers, it has been due more to the ignorance of those who tried to interpret it than those who formulated it or with mathematics themselves. He did not deny that some electrical engineers could get mixed up in their analyses, but if anything is known about the real economies of electric and steam traction, we owe it very largely to the electrical engineer. In lecturing to students on electric railway engineering, he had been in the habit of prefacing his remarks by a dissertation on financial feasibility. He used in this connection a simple yet far-reaching formula in discussing the question of the almighty dollar, and one which showed that the electrical engineer has gone into things thoroughly without using any very misleading algebra. The following is the formula quoted by Mr. Mailloux:

$$\frac{R-E}{C}\times 100 = F$$

This formula simply means receipts (R) less expenditures (E) divided by cost (C) and multiplied by 100 will represent the financial ratio of feasibility (F). That equation was the one which showed clearly the important fact that it was not necessary to decrease the cost of operation in order to increase the financial returns of a road. It is the difference between the receipts and the expenditures which determines the financial condition. Each of the terms in practice can be subdivided; for instance: $R = R_1 + R_2 + R_3$, etc., in which R_1 is the receipts from passengers; R_2 the receipts from freight, etc. E can also be subvidived into E_1, E_2, etc., and C can be divided in $C_1 + C_w +$ etc. The subscript w indicated the capital which was water.

William McClellan closed the discussion as a member of the committee. He said it was not his intention to defend the report. It represented what all the members could agree upon as one and not what the individuals thought. Some of the individuals, he knew, would have gone further. If this point had been understood by some of the speakers many criticisms would have been unnecessary. Had the committee been able to decide at the beginning that there was no practical system except the single phase system, the report would have been somewhat different; but, as this was not the case, all the committee could do in justice, without straddling and still speak as one, was to present a report embodying the maximum to which all members could agree and trust to the discussion to bring out individual opinions. Following the line of Mr. Stillwell's remarks, on the success of past work, Mr. McClellan said that, 'inasmuch as we have succeeded in terminal and heavy subway work and our predictions have been so nearly correct, we should be perfectly willing to stake our reputations that the same results will ensue if the same efforts are applied to the trunk lines problems. As to the question of contingent costs, he said that directors of a railroad could not help including certain items in the expenditure account, even if they were not caused directly by the electrical work. On some lines, it would be necessary to rebuild every bridge for the overhead wires and there are systems where it would not be easy to take care of the amortization of steam locomotives and rolling stock by using them elsewhere. To sum up the matter of systems, he said that there is no uncertainty about the system except when the conditions themselves are uncertain.

MEETING OF THE COMMITTEE ON TRANSFERS

A meeting of the committee on transfers and transfers information of the American Street & Interurban Railway Transportation and Traffic Association was held at the headquarters of the association, 29 West Thirty-ninth Street, New York, on March 21. Those present were: M. R. Boylan, chairman, general auditor, Public Service Railway Company, Newark, N. J.; F. T. Wood, assistant to general manager, Metropolitan Street Railway Company, New York; R. E. Lee, general superintendent, Cincinnati Traction Company; T. C. Cherry, superintendent, Utica & Mohawk Valley Railway Company.

The discussion developed a variety of practices among those present in regard to the type of transfers used. Thus in New York direction is indicated by color and the date and a. m. and p. m. designation by being printed on the ticket. No effort is made to mark the junction. The only punch mark is the time limit. The Cincinnati Traction Company has an a. m. and p. m. coupon, with the date printed in red letters on the face of the transfer, and shows the direction by a punch. The Public Service Railway Company uses the a. m. and p. m. coupon, while the Utica & Mohawk Valley Railway uses different colors for morning and afternoon transfers. Transfers are registered on the Public Service system and in Utica, but not in New York. In Cincinnati they are registered except on P. A. Y. E. cars. The committee decided to prepare a data sheet asking for samples of the different forms of transfer tickets used by member-companies and for other data on transfers.

OPERATING STATISTICS OF THE LONG ISLAND AND WEST JERSEY & SEASHORE RAILROAD

George Gibbs, chief engineer of electric traction, Long Island Railroad, and chief engineer of electric traction Pennsylvania Tunnel & Terminal Railroad, has prepared a very interesting report on electric traction to be presented at the 1910 meeting of the International Railway Congress. The report appears in full in the January issue of the *Bulletin* of the congress, issued in Brussels.

After giving a short account of the history of electric traction in America, Mr. Gibbs describes the systems and the character of equipment employed on different railroads in the United States. He then presents the following tables on the cost and other data of operation on the Long Island and West Jersey & Seashore Railroads. Mr. Gibbs comments on these tables are presented below:

"Table I gives a concise statement of the comparative physical characteristics of the electric installations on the two roads, from which a general idea of the magnitude of the operation may be gathered.

Table I.—Statistics

	Long Island Railroad.		West Jersey & Seashore Railroad.
	1907	1908	1907-1908
Route miles of track	37.6	43.9	74.6
Miles of single track	90.0	98.69	152.5
Miles of high-tension pole line	41.0	42.0	69.59
" " " circuit (3-phase)	70.24	80.03	417.54
" " " " (1-phase)	14.1	9.7	None.
" of conduit	9.09	9.09	....
High-tension transmission voltage	11,000	11,000	33,000
Number of substations	6	6	8
" of portable substations	2	2	None.
Capacity of substations	19,500	19,500	17,000
" of portable substations	2,000	2,000	None.
" of power house	16,500	16,500	8,000
Number of motor cars	130	132	80
" of trailer cars	84	82	None.
" of baggage and mail cars	5	5	8

"Table II gives the average number of cars in trains and the average weight per car. It will be noted that the average weight per car changes slightly in the two years, due to a change in the ratio of the motor to trailer cars.

Table II.—Weight of Cars and Make-Up of Trains

	Long Island Railroad.		West Jersey & Seashore Railroad.	
	1907.	1908.	1907.	1908.
Average car per train	3.70	3.94	2.95	3.45
Average tons per car (1 ton equals 2000 lb.)	37.8	36.5	47.9	47.4

"Table III gives comparative figures for electrical quantities and efficiencies and is of interest in showing the distribution of the various losses in electrical energy from the power house to the cars. The figures for power consumption per ton-mile and per car-mile represent fair averages for electric installations of the character in question and in a climate which requires a considerable consumption of energy in winter for heating the cars. Electric heating adds very largely to power consumption, as will be illustrated when it is stated that, in summer months, the watt-hours per ton-mile at substations on the West Jersey & Seashore Railroad were about 63, while in midwinter months this figure rose to 100; the larger part of this difference is due to the additional energy required to light and heat the cars in winter. It is interesting to note also that the efficiency of the electric system from the power station to the point where the current leaves the substation for feeding into the third-rail is from 70 per cent to 80 per cent, depending upon the loading during the various months; in the busy months the efficiency will at times run as high as 85 per cent. The losses from the substation to the cars in the direct-current feeder system cannot be accurately measured, but in the cases cited it is estimated to be between 5 per cent and 10 per cent. The figures given for 'current used for other purposes' illustrate the considerable and useful consumption of power for running shop motors, lighting stations and operating the signal system.

Table III.—Energy Consumption

	Long Island Railroad.	West Jersey & Seashore Railroad.	Long Island Railroad.	West Jersey & Seashore Railroad.
	1907		1908	
1. A. c. kw-hours received at substations	20,341,826	....	21,899,739	....
2. Efficiency of h. t. Transmission	96.2	....	97.7	....
3. D. c. kw-hours delivered from substations	16,138,965	14,585,900	18,138,515	16,088,300
4. D. c. kw-hours used for electric traction	13,466,995	13,530,659	16,201,962	14,780,145
5. D. c. kw-hours used for other purposes.	896,075	389,672	901,934	731,771
6. Kw-hours lost in conversion from a. c. to d. c.	4,202,861	5,882,510	3,761,224	5,997,020
7. Efficiency from power house to substation bus-bars	78.52%	72.15%	81.3%	73.8%
8. Total ton-miles, passenger	141,541,106	184,615,535	180,129,860	192,472,541
9. Car-miles, passenger.	3,808,479	3,855,580	4,945,719	4,044,025
10. Train-miles, passenger	1,021,102	1,305,663	1,251,877	1,172,894
11. Watt-hours per ton-mile at substations.	95.2	73.29	90.0	76.8
12. Watt-hours per ton-mile at power house	121.2	101.58	110.6	104.0
13. Kw-hours per car-mile at power house	4.51	4.86	4.028	4.95
14. Kw-hours per car-mile at substation	3.54	3.51	3.276	3.66

"Table IV gives the cost of generating current at the power house and cost of the current when delivered at the cars. The former figures include all power-house operating and maintenance expenses, but no fixed charges, taxes or depreciation charges. The 'delivered cost' includes the operating and maintenance cost for transmission lines, third-rail, track bonding and substations and allowances for losses in transmission of the current and its conversion to direct current delivered at the car contact shoes. It should be noted, however, that the above figures do not include any maintenance expenses other than for electrical apparatus, and no portion of the general expenses of the railroad.

Table IV.—Current and Maintenance Costs

	Long Island Railroad.		West Jersey and Seashore Railroad.	
	1907	1908	1907	1908
Cost per kw-hour at power house	0.804 cent.	0.697 cent.	0.680 cent.	0.592 cent.
Cost per kw-hour at cars	1.705 cents.	1.461 cents.	1.302 cents.	1.151 cents.
Cost per car-mile for maintenance of electrical equipment on cars	0.71 cent.	0.76 cent.	....	....
Net output in kw-hrs. at power house	....	31,517,200	....	22,887,800
Lb. of coal per kw-hour	....	3.29	....	3.36
Cost of coal per ton: 2000 lb.	....	2.512 dollars.	....	2.1814 dollars.
Number and capacity of units	....	Three: 5500 kw.	....	Four: 2000 kw.
Total kw. capacity of power house	....	16,500 kw.	....	8000 kw.

"Table V gives the monthly car-mileage and cost per car-mile; the total yearly mileage and the average car-mile cost, and average yearly cost per 1000 ton-miles moved. The cost per car-mile includes the following: The cost of power, maintenance of third-rail and track bonding, maintenance of car bodies and trucks, maintenance of way and equipment expenses, conducting transportation and traffic expenses, general expenses, wages of motormen and train crews; in fact, all operating expenses of the railroad. In comparing the costs per car-mile the difference in weight of cars, given in Table II, should be noted; it should furthermore be explained that in the case of the Long Island Railroad all trains may be termed 'local,' as the average length of the run on the so-called express service is only about 2½ miles, whereas on the West Jersey & Seashore Railroad about one-third of the total train-miles are made in cross-country express service with an average length of run of about 25 miles between stops, and the remaining service, termed 'local,' averages 2½ miles between stops, or about the same as express service on the Long Island Railroad. In other words, the Long Island installation may be considered purely local service in a densely populated district, whereas the West Jersey service approximates main-line railway conditions with long runs.

TABLE V.—CAR-MILE COSTS

Month.	Car-miles. West Jersey & Seashore Railroad. 1907	1908	Car-miles. Long Island Railroad. 1907	1908	Cost per Car-mile. West Jersey & Seashore Railroad. 1907 Cts.	1908 Cts.	Cost per Car-mile. Long Island Railroad. 1907 Cts.	1908 Cts.
Jan. ...	294,672	281,723	235,828	201,128	27.50	29.29	28.16	26.97
Feb. ...	255,344	271,542	214,242	186,256	30.90	28.53	30.04	27.87
March...	270.286	291,959	241,024	224,919	23.90	26.57	28.05	24.77
April ..	244,431	331,224	281,509	271,224	24.30	21.34	24.05	23.94
May ...	267,317	323,584	347,211	382,195	21.50	19.97	21.39	20.90
June ..	292,767	344,523	349,133	478,793	22.50	18.92	22.32	18.00
July ...	435,860	451,149	392,514	628,511	15.30	16.17	15.73	13.53
Aug. ..	478,041	485,565	400,880	632,388	14.90	13.71	15.59	13.26
Sept. ..	411,359	369,204	299,798	509,213	15.85	17.17	19.87	14.79
Oct. ...	317,141	312,833	306,138	441,638	23.50	19.55	22.37	17.21
Nov. ..	292,349	282,322	245,748	345,640	21.40	20.42	25.93	22.29
Dec. ...	295,097	292,397	212,144	360,325	22.60	22.68	27.48	22.45
Total ..	3,854,664	4,044,025	3,526,227	4,662,230	21.30	20.46	22.45	17.80
Cost per 1000 ton-miles					$4.406	$4.307	$5.94	$4.86

"Table VI gives a list of the principal defects reported, and is of interest in showing which portions of train equipment require the largest amount of attention. The item for blown fuses appears excessively large, but it should be remembered that the purpose of these fuses is to guard against excessive current in the various critical portions of the equipment, and the fuses are purposely adjusted so as to be blown under exceptionally severe conditions; they are easily and quickly replaced by the train crews and cause little delay to service. The excessive number of fuses blown on the Long Island Railroad in 1908 was partly due to the use of stock fuses which were found somewhat too small for the increased requirements due to heavy loads and increased severity of service in that year. The considerable number of flash-overs of motors on the Long Island Railroad was also largely due to very severe local service. Breakage of contact shoes is almost entirely due to striking material left by trackmen in the path of the shoes, but occasionally shoes are broken in striking the approach blocks where the third-rail is interrupted at street crossings. It will be noted that there were a large number of defective trolley poles reported on the West Jersey & Seashore Railroad; this is due to the use of wheel trolleys and the ordinary type of cross-span overhead trolley wire; it illustrates, that while this type of construction was installed in the best manner, it is not suitable in practical service with trains of three or more cars operating at fairly high speed.

TABLE VI.—DEFECTS OF TRAIN EQUIPMENT

	1907 Long Island Railroad.	1907 West Jersey & Seashore Railroad.	1908 Long Island Railroad.	1908 West Jersey & Seashore Railroad.
Flash-overs	23	None.	42	1
Main fuses blown	50	...	60	...
Shoe fuses blown	1169	844	4812	1934
Trolley fuses blown	None.	358	None.	711
Bus fuses blown	158	51	182	169
Controller fuses blown	None.	138	None.	118
Heater and pump fuses blown	379	359	590	383
Total fuses blown	2023	1955	6028	3504
Hot motor axle bearings	6	8	25	2
Hot journal bearings	6	44	34	28
Grounded armatures	9	6	27	6
Short circuited armatures	1	In above.	9	In above.
Grounded fields	1	2	2	1
Commutators	5	None.	16	None.
Contact shoes replaced	500	925	672	564
Pump motor armatures	10	1	15	2
Control	86	180	139	99
Brake equipment	15	40	26	15
Short circuits (miscl.)	5	...	9	...
Trolley poles	Not used.	981	Not used.	469

"Table VII classifies the principal detentions of all kinds due to electric equipment and gives the total train-minutes of delay due to same. It also gives the totals reduced to figures of 'car-miles per detention' and 'car-miles per minute of detention.' In compiling this table detentions due to collisions and derailments have been omitted, as having no direct bearing upon the behavior of electric equipment.

GENERAL REMARKS UPON TABLES

"The two roads have been in operation for a sufficiently long time to rather definitely establish the behavior of all apparatus in practical service; there is no indication that in subsequent years of operation there will develop cause for extraordinary maintenance in any particular items due to the accumulative effect of service. It should be noted, however, that no account is taken of possible advances in the electric art, which might make the equipment obsolete; in other words, no 'depreciation' account has been kept. In a rapidly advancing art replacements on account of 'change of type' are quite possible contingencies, but much difference of opinion exists upon this whole subject in America and its pros and cons cannot be entered into in this general report.

"Of the total cost per car-mile one-third is due to cost of supplying power to the car, including maintenance of all parts of the electric system on the car, and of this figure about one-half is the cost of the power alone. In both roads, the load conditions at the power houses are not favorable, nor is the quantity of power turned out as large as it is expected to be in the near future, so that the item for cost of power at the car

TABLE VII.—DELAYS DUE TO ELECTRIC EQUIPMENT

	1907 Long Island R. R. No.	1907 Long Island R. R. Train Minutes.	1907 West Jersey & Seashore R. R. No.	1907 West Jersey & Seashore R. R. Train Minutes.	1908 Long Island R. R. No.	1908 Long Island R. R. Train Minutes.	1908 West Jersey & Seashore R. R. No.	1908 West Jersey & Seashore R. R. Train Minutes.
Motors	13	197	21	404	35	270	20	134
Control equipment	21	286	180	2,209	72	644	99	509
Air brakes	8	84	40	247	38	428	14	54
Miscellaneous mechanical equip't.	7	74	80	1,073	57	964	45	427
Miscellaneous electrical equipment	58	1,006	316	1,564	44	781	183	693
Failures of power due to third rail	17	218	8	103	36	792	3	47
Failures of power due to trolley	...	...	86	1,122	...	...	223	3,498
Failures of power due to s.-s. and Trans.	5	25	13	80	31	190	36	284
Track troubles	7	263	7	146	1	15	1	18
Snow and ice on third rail	8	161	72	1,751	16	244	9	69
Shoe fuses blown	...	...	...	...	107	1,881	...	...
Unclassified and unknown	15	179	120	844	53	552	27	108
Total	159	2,493	943	9,543	490	6,761	661	5,841
Car-miles (passenger and baggage)		3,526,227		3,855,580		4,662,230		4,044,025
Car-miles per detention		22,177		4,088		9,514		6,118
Car-miles per minute of detention		1,414		404		689		692

should come down considerably as the magnitude of the operation increases. Other items also in the total cost per car-mile, namely, general expenses of various kinds and wages of motormen and train crews, are largely affected by density of traffic and have a downward tendency.

"The list of detentions looks quite formidable, but when analyzed the general result is found to be good. Motors, as before stated, have been brought to a high state of perfection and detentions caused by their failure on the road are rare and largely due to overloading. The temptation in electric service is constantly to overload, either quickening the schedule, increasing the number of stops or adding trailer cars; this is due to the fact that the apparent limit of capacity of railway motors is their ability to make schedule and it is often not remembered by the railway superintendent that this is far beyond the heating capacity of the motors.

"Where all cars in a train are motor-cars, overloading cannot be as readily accomplished as where trailers are hauled, especially if the motors have been designed to take care of a continuous-running condition with the minimum number of stops, as is generally the case.

The multiple-unit control system is a very complicated assemblage of delicate apparatus, but works surprisingly well and when properly maintained, it will be noted, gives very little trouble.

"Table VI is confined to the statement of delays and troubles on the train equipment, but in Table VII the troubles due to the other parts of the electric installation, namely, the third-rail, transmission lines, substations and power house, are included, and it is interesting to note the unavoidable delay caused by these features of an electric installation.

COST COMPARED WITH STEAM

"Considering the figures for the year 1908, it is seen that the Long Island road operated its electric mileage at a cost of 17.80 cents per car-mile; the steam-train mileage cost 27.95 cents, a difference in favor of electric traction of 10.15 cents per car-mile. On the West Jersey & Seashore Railroad the electric mileage cost 20.46 cents per car-mile as against 22.30 cents for the steam mileage, or a saving for the electric service of 1.94 cents per car-mile.

"The relative unfavorable showing on the West Jersey for electric saving is in part accounted for by the difference in character of the service on the two roads, as before explained, and by the fact that on the Long Island road the average length of train in steam service was about the same as in the electric and the stops frequent; it was, therefore, costly service. On the West Jersey the average cars per steam train was twice that of the electric and much of the service was long-distance express with few stops and of an exceptionally economical character.

OPERATING COSTS OF A. C.-D. C. VS. A. C.

"A comparison of this kind must at present writing be based on estimates and opinion, as no operating figures for the a.c. systems are obtainable. It is the opinion of the writer that the maintenance costs of the single-phase system, as at present developed, will be somewhat higher than for the a.c.-d.c., but not by an important amount; eventually the maintenance costs should be about the same for either system. The total operating cost figure, however, will probably be in favor of the single-phase system, because of the higher average efficiency of this system and the lower operating cost of substations. The importance of the savings possible for the single-phase will depend upon the character and extent of the traction scheme, becoming greater as the length of line increases and the density of traffic decreases. It is impossible, however, to generalize safely and each case should be considered upon its own merits.

"An estimate may be given for the particular case referred to under the 'first cost' heading, in which it was figured that about 13 per cent less energy at the power house would be required for the single-phase than for the a.c.-d.c. system. This together with the saving in substation operation, would show an operating saving of about 1 cent per car-mile, or, say, between 4 per cent and 5 per cent, of the total operating cost."

MEETING OF RAILWAY SIGNAL ASSOCIATION

The March meeting of the Railway Signal Association was held on March 14 at the Congress Hotel, Chicago. Vice-President C. E. Denney, of the Lake Shore & Michigan Southern Railway, presided. Among the subjects considered were the reports of standing committees on signal practice, details of signal masts and ladders, three-arm signals, mechanical interlocking, power interlocking, lightning protection, primary cells and the portable storage battery in automatic block signal service. The latter subject was presented in a paper by H. M. Beck, of the Electric Storage Battery Company. A paper on "The General Control and Transmission of A.C. Railway Signals" was presented by Frank R. Rhea and E. E. Kimball, both of the General Electric Company.

In the discussion of lightning arresters a paper on "Lightning Protection," by Otto Holstein, chief train dispatcher of the Central Railroad of Peru, was read. The author described a novel type of arrester which had given satisfactory service under very trying conditions. The principal parts of the arrester were made of cast iron and it was of what is known as the two-line type.

The author's description follows:

"The ground plate measures 7¾ in. x 6 5/16 in. and stands on four legs cast with the plate. The whole upper surface of this plate is furrowed and sharply ridged. The line plates are likewise furrowed. The arrester, when assembled, has these sharp ridges at right angles, making every point of intersection (of which there are thousands) a spark-gap with an air space of but 1/32 in. to break down, which imposes but a negligible resistance to a static discharge of any intensity.

"The line plates and ground plate are separated by hard rubber or ebonite washers 1/32 in. thick. The plates to which the line is connected can be lifted from the ground plate for inspection or for cleaning without interfering with the working of the wires.

"The only fault that can be found with these arresters is that they are rather heavy, the weight of the two-line type being about 15 lb. The records of this road show excellent performance for this type. There are records of some violent storms where office and ground leads have been fused by static electricity, but no instruments have been lost.

"The original manner of connecting the arresters was to connect them in series with the line and instruments and, inasmuch as they appear to have done their work so connected, it might seem best to let well enough alone, but I have put choke coils in series with the line plates of the arresters and the instruments with a view of still further retarding the passage of the high-frequency discharge, causing the charge to bank up and break down the resistance of the arrester sooner than it would otherwise, thereby offering greater protection to the instruments. Good ground leads have also been sought and both binding posts of the ground plate have been connected with separate grounds. A flat copper ribbon being used for the ground conductor, this form of conductor appears to embody qualities not possessed by round conductors."

MEETING OF THE CENTRAL ELECTRIC ACCOUNTING CONFERENCE

The twelfth meeting of the Central Electric Accounting Conference was held at the Hotel Anthony, Ft. Wayne, Ind., on March 12:

A paper on the subject, "The Auditor's Relation to the Operating Executive," was read by A. J. Lamb, chief clerk, Toledo Railways & Light Company. An abstract of this paper was published in last week's issue.

A discussion in regard to methods of passenger fare collection followed. W. B. Wright, auditor of the Indianapolis & Cincinnati Traction Company, and E. L. Kasemier, auditor of the Ohio Electric Railway, explained in detail the methods used by their companies, and submitted forms for inspection.

Before discussion of the question of affiliation with the Central Electric Railway Association, the president, W. H. Forse, Jr., announced that the conference would go into executive session, in order that there might be a free and full expression of opinion on this subject.

The next meeting of the conference will be held at Toledo, Ohio, on June 25.

It is probable that the meetings hereafter will consist of a morning and afternoon session, in order that more time may be given to the subjects under consideration.

The Public Service Commission, Second District, New York, report of passenger train delays for January, 1910, shows that during that month 59,583 trains were run in the State of New York. Of these, notwithstanding the severe weather conditions, 73 per cent were on time. The average delay of each late train was 39.9 minutes; average delay for each train run was 10.8 minutes. The principal causes of delay were waiting for trains on other divisions, 39.6 per cent; waiting for train connections with other railroads, 14.2 per cent; train work at stations, 9.6 per cent; storms, 6.1 per cent; engine failures, 5.5 per cent; and wrecks, 3.1 per cent.

The Anglo-Argentina Tramway Company, of Buenos Ayres, Argentine, has 1200 motor cars and 600 trailers in service and will soon receive in addition 125 motor cars and 80 trailers. During the first 10 months of 1909 the company's cars carried 231,000,000 passengers as compared with 208,000,000 passengers during the corresponding period of 1908.

AIR BRAKE INSTRUCTION IN BROOKLYN

As previously announced in these columns the Brooklyn Rapid Transit System recently adopted the Westinghouse AML and ATL graduated release, quick-recharge brake for all passenger elevated and service cars. As a part of its program to educate the motormen in the most efficient handling of this improved equipment, the company has remodeled its instruction car as described in the Electric Railway Journal of Feb. 5, 1910, and has prepared an air-brake catechism especially suited for Brooklyn train-operating conditions. For a fitting preliminary, arrangements were also made to have Walter V. Turner, mechanical engineer of the Westinghouse Traction Brake Company, deliver to the elevated motormen a simple lecture on the principles and constructional features of different types of air-brakes. Mr. Turner delivered his lecture twice on Tuesday, March 8, at 11 a. m. and 9 p. m., so that all the men would have an opportunity to be present. The lecture was given in the auditorium of the employees' club building at East New York.

The lecturer was introduced by W. G. Gove, superintendent of equipment, Brooklyn Rapid Transit System. Mr. Gove said that the principal reason which had governed the company in adoping the new brake was the necessity for obtaining one which would give maximum braking power at any and all times, irrespective of the frequency of application, together with extreme flexibility, thereby insuring the maintenance of schedules, with the constantly decreasing headway necessary in the Brooklyn elevated service. The change first was contemplated about two years ago; many careful tests were made in December, 1908, and the contract was awarded shortly thereafter. Installation of the new equipments could not begin until the autumn of 1909, but now some 600 passenger cars are equipped and the balance will be ready on Decoration Day. A week after this the work on the service cars will be started for completion by June 10. Mr. Gove in referring to the brake itself added that it covered a design which, with a single application and graduated release, will give the quickest and smoothest stop possible, and because of having a low air pressure in the brake cylinders when the train comes to a stop, permits of a rapid acceleration of the train without the brake-dragging characteristic of the older designs. In conclusion he said that one great advantage of the new brake was the ability to obtain in an emergency application within but 3 lb. of the train line pressure; another advantage was the ability to obtain efficient braking power at all times, within limits set only by the ultimate capacity of the pump.

MR. TURNER'S REMARKS ON AIR BRAKES

Mr. Turner prefaced his explanation of the lantern slides by an apology for the brief time he would necessarily have to allot in discussing each detail of a modern braking system. He said that the improvement of the air brake was largely due to the designer's contact with the men who operated it. Of brakes it could always be said that the best is not good enough. When a motorman looks under a car he sees that the space occupied by the braking apparatus is insignificant in comparison with the electrical equipment. Nevertheless, not only must the brake do in seconds what the motors do in minutes, but it must also be operative every time or something is going to happen. If you cannot start, it is merely an inconvenience; if you cannot stop, it is a tragedy. In short, the brake system must be operative under all conditions as long as there is air in the reservoirs. This want is met only by the quick-action brake.

Mr. Turner pointed out that the brake formerly was considered as a safety device for emergencies. A great deal of money was spent for accelerating machinery but it took a long while to realize that a minute saved in braking is the same kind of a minute that is saved in accelerating. When emergency stops only are considered the shortest kind of a stop is desirable even if the passengers are thrown from their seats; but when one must make the far more numerous service stops without sliding the wheels and without subjecting cars and passengers to shock, it is necessary to have a brake which has a wide division between the emergency and service applications.

There are other points involved in making a stop. Every motorman knows that when he is crowded for time he can save it by keeping the power on to the last instant to attain the maximum inter-station speed and then by putting the brakes on full. There are three considerations involved in making a stop: the first is the time element, which is the most profitable to the railway; the second is the accuracy of the stop; the third is the smoothness of the stop, the consideration which is the most important to the public.

Of course, the best way to make a smooth stop is to shut off the power and drift to a standstill, but this method would not save running time or insure accuracy. There must be some means for controlling the train to accomplish a smooth, accurate stop within a given distance for known conditions of speed, track and grades. The power applied in braking should be in proportion to the power used in running. In general, to secure a proper stop, the brakes should be applied so the train would stop a car length short of the spot desired, then by gradually reducing the air pressure in the brake cylinder as the speed decreases, the train will smoothly come to rest, in the shortest practicable time and at the place required. Mr. Turner wished to impress his hearers with these points as strongly as possible. It was useless for a railway company to go to the expense of purchasing the best apparatus if the motormen did not get the improved results possible from the new design. The motormen should understand that they were paid for using their brains and individuality to save money and not simply for moving cars back and forth. If the other fellow did not take this view of his duties so much the better for the man who did. He hoped that what he could tell the hearers would only whet their minds for a keener study of the subject of air brakes.

Taking up the descriptions of the numerous lantern slides, Mr. Turner began with sections of the straight air brake. The latter he defined as the acme of simplicity but also of danger. It was all right from the standpoints of flexibility and power but if the hose bursts there would be no braking power, nor was it possible for an application to be made anywhere else than at the motorman's valve. Hence, arose the necessity for an automatic brake including the triple valve. The auxiliary reservoir and the triple valve represented the only important items added to the straight air brake to enable each car to carry its own brake pressure. The original automatic brake, however, made it possible for the motorman to lose his air by too many applications back and forth.

Mr. Turner gave particular attention to the equalizing piston. This device was necessary on long trains, due to the differences in the release of air throughout the train pipe, thereby causing surges. The equalizing piston gives the same reduction on one car as on 20 cars, but a greater length of time is required for the reduction of the brake pipe pressure.

The quick recharge feature of the new air brake not only avoids any shortage of air supply but it also gives the flexibility of the straight air brake. Nevertheless, the degree of flexibility depends upon the motorman. The brake is not automatic in its manual operation nor can it be kept operative without maintenance.

With the old brake, the motorman could make only one full service application and he was helpless if any emergency arose between that application and the stop. Now he can stop within a shorter distance than he calculated and brake again. Mr. Turner stated that the emergency application after full service was developed at the request of the Brooklyn Rapid Transit System. Lack of space forbids any reference to the details of the apparatus shown on Mr. Turner's slides. It may be stated, however, that the audience had no difficulty in following the course of the air in the various kinds of applications, because the air passages were shown projected on one plane instead of appearing in part on a large number of sections as is usually the case.

PRELIMINARY INSTRUCTION BOOK

Pending the completion of an elaborate text book on the new brakes, including the use of colored charts, the company has prepared a preliminary catechism covering the most important points in 98 questions and answers. There are chapters on the different types of air brakes, the main reservoir, the triple valve and train operation. It is mentioned in this book that no part of the air brake or electrical equipment is to be adjusted or tampered with by employees of the transportation department.

HEARING ON ELEVATED SERVICE IN NEW YORK

The hearing before William R. Willcox, chairman of the Public Service Commission of the First District of New York, and Commissioner John E. Eustis, regarding service on the elevated lines of the Interborough Rapid Transit Company was continued on March 17, 1910.

Frank Hedley, vice-president and general manager of the company, said that since the hearing on March 11, 1910, he had inspected the charts prepared by D. L. Turner, chief of the bureau of transit inspection of the commission, and that they indicated that more cars were needed at certain times during the non-rush hours. Whereas 94 trains were operated past Thirty-fourth Street southbound over the Third Avenue line between 7 a. m. and 9 a. m., Mr. Hedley suggested that 104 trains be scheduled to cover this period and proposed a schedule of 115 trains northbound past Forty-second Street between 4.30 p. m. and 7 p. m. as compared with 103 trains at present. Between 7 p. m. and 10 p. m. Mr. Hedley suggested that 74 trains be operated past Forty-second Street northbound, an increase over the present schedule of six or seven trains.

On the Second Avenue line, between 7 a. m. and 9 a. m. Mr. Hedley proposed to run 59 trains south as against 24 at present, and between 4.30 p. m. and 10.30 p. m. he proposed to run 96 trains northbound or about 580 cars as compared with 526 cars at present. During the other hours of the day the investigation showed that the service more than fulfilled the requirements.

On the Sixth Avenue line between 7 a. m. and 9 a. m. southbound at Fiftieth Street, Mr. Hedley proposed a schedule of 50 7-car trains, as compared with 44 trains at present. Between 9 a. m. and 4.30 p. m. the schedule exceeded the demands. Between 4.30 p. m. and 7 p. m. northbound past Fiftieth Street he proposed that 62 trains be run instead of 59 as at present.

On the Ninth Avenue line passing Fiftieth Street southbound between 7 a. m. and 9.30 a. m. Mr. Hedley proposed to operate 37 local trains and the same number northbound between 4.30 p. m. and 7 p. m. and 40 express trains southbound, as compared with 37 at present between 7 a. m. and 9.30 p. m., and 34 express trains southbound between 4.30 p. m. and 7 p. m., as compared with 33 at present. As both the local and the express trains of the Ninth Avenue line use the local tracks north of 116th Street, it was impossible to add any more trains than the number suggested by Mr. Hedley, as his proposal called for a headway of only 55 seconds.

Mr. Hedley reiterated that he was decidedly opposed to the suggested plan of adding a car to each train, this car to overhang the station platform.

Mr. Eustis announced that the commission would draw an order in accordance with the suggestions made by Mr. Hedley, but Mr. Hedley said that he did not feel that the necessity existed for a formal order. The hearing was then adjourned until March 28.

The operation of trains in accordance with the schedule suggested by Mr. Hedley was begun on March 21, 1910.

The electrification of the Vienna Metropolitan Railway, Vienna, Austria, is to be taken in hand by Messrs. Siemens-Schuckert, with the financial assistance of the Austrian Länderbank.

ANNUAL REPORT OF THE WISCONSIN RAILROAD COMMISSION

The first section of the annual report of the Railroad Commission of Wisconsin for the year ended June 30, 1909, has been issued. During the year 67 formal and 496 informal complaints relative to public utilities have been filed, as against 83 formal and 246 informal complaints in the preceding year. The total number of utility cases in which the commisison was involved numbered 623.

On June 30, 1909, the files of the commission showed 27 electric urban and interurban railways in the State.

The report states that since the passage of the public utilities law a portion of the facilities of the statistical department has been devoted to obtaining data concerning conditions fundamentally affecting rates and services in connection with those plants which have come before the commission. To the statistical department has been assigned the preparation of the uniform classification of accounts for utilities as provided for in the public utilities law. During the year this classification has been completed and ordered by the commission to take effect on July 1, 1909. Generally speaking, the larger utilities, with the exception of many municipally owned plants, have prepared excellent reports. Municipal plants, as a rule, have been exceedingly delinquent in filing their statements and have shown an almost general lack of accounting system. Much the same conditions were found to exist in the smaller plants.

The report discusses in some detail the methods and principles followed in the preparation of the uniform classification of accounts and comments upon the results obtained as follows: "It is believed that this scheme is logical, correct in principle, comprehensive in its scope, sufficiently elastic to cover all conditions of size and methods of operation and that it is based upon pratical considerations. The experience of the utilities with this system during the period in which it has been followed has already proved the value of the requirements and demonstrated the technical correctness of the classifications. Recognition of this fact is still further shown by the endorsement of the classifications at utility association conventions and by large number of instances where the principles and forms have since been adopted by utilities outside of Wisconsin."

The statistical department has acted in an advisory capacity in all matters concerning the proper keeping of the utility books and accounts and it frequently has been found necessary for employees of the department to audit the books of the utilities and to secure various financial and statistical data from the original books of entry.

In commenting on the "indeterminate permit," the commission says: "Much to the surprise of those who conceived the plan, less than 10 per cent of the public service corporations availed themselves of the privilege."

The distinctive feature of the development of the work of the engineering department is found in the increased emphasis given to investigations relating to the quality of service rendered to the public.

The commission feels that the public has more to gain in the way of improved service than through reduction in rates. Complaints of service are discussed in the report.

The report contains digests of three special reports prepared by the engineering staff in relation to investigations, viz: (1) upon the service rendered by the Milwaukee street railway system; (2) upon the damage caused to telephone service by the sleet storm of Jan. 27-29, 1909; (3) on the inspection of the Wells Street viaduct, Milwaukee.

The result of the investigation of storm loss showed that the total reported damage caused by this storm would range approximately from $60,000 to $75,000, and that, furthermore, the damage was confined to a limited area in the southern part of the State.

During the year 38 public utility properties were valued upon order of the commission. The total amount of property valued, including railroads, was $310,440,868.

PERMANENT CITY TRACK CONSTRUCTION FOR INTERURBANS*

BY H. L. WEBER, CHIEF ENGINEER, COLUMBUS, MARION & BUCYRUS RAILROAD

Interurban cars generally enter cities over the tracks of the local traction companies, but if they are to enter over their own tracks and the streets are paved, it is well to construct the permanent way before commencing operations. It is always better to build the track when the street is being paved. In Northern latitudes, where the ground freezes more than 6 in. in depth, the track is apt to lose its alignment and grade if the whole street is not improved at the same time.

There are two plans that have proved very satisfactory for permanent way construction in city streets, namely: a sheet concrete foundation for both track and street pavement, and, second, a crushed-stone foundation, grouted, for the track foundation and a concrete foundation for the street pavement. With the former, traffic has to be suspended for one week at least on all new work to allow the cement to set or else the cars must run over a temporary track. The latter plan cannot always be followed without a great deal of expense to the railway company and inconvenience to the public. If there is a double track the service can be handled on one track while the other is being reconstructed. With a sufficiently large number of cross-overs, still a third plan is to shunt the traffic around the new work.

If new track has to be built in a city street before the service is installed, I would recommend a sheet concrete foundation for the track and roadway foundations, built at one operation. The track should first be laid, blocked up to grade and lined. The concrete, made very soft, can be then well puddled under the rails and under and around the ties with tamping bars. This part of the work must be done very faithfully by competent men who fully understand the object sought, for upon their proper manipulation of the concrete at this stage depends the success of the work, whether steel or wood ties or anchors are used. The purpose, of course, is to have the concrete one homogeneous mass when finished, and this end can be accomplished only by having the concrete of such consistency that every particle of sand shall be coated with cement and every particle of the aggregate with mortar, all so mixed that the mixture will readily flow with slight agitation with the tamping bars in the desired direction to find the voids. When the concrete has set there, it should be close up to the base of the rails, under and around the ties, forming a bearing for both.

In all concrete work, the art of proper mixing and depositing comprises the secret of good work. These two things must be done correctly and at the proper time to make the work a success. This is especially the case with street construction, for no class of work receives greater shocks and is more liable to failure from fatigue. The subbase can be reinforced when necessary by using a rail section No. 90 S. Carnegie Steel Company. This has a ball 2¾ in. wide, a base of 5⅜ in. wide and height of 5¾ in., all very desirable dimensions, the ball especially. This rail costs no more per yard than the 6-in., 73-lb. rail, although it weighs 20 per cent more, and with the extra steel which it possesses no rail brace is necessary.

If paving bricks, wooden block or asphalt are to be used for paving it will not be necessary to have a greater depth of rail than 5¾ in. or 6 in. If the steam railroads find such a rail of sufficient strength, why should street railways use a deeper rail, unless the street paving requires it? I believe much money has been unnecessarily spent in providing too deep a rail and foundation, and in too deep a rail with too shallow a foundation, and that too little attention has been given to the proper draining of the subgrade foundation. It is far better to have a fairly heavy rail with a good foundation under the ties, than a rail of greater weight on a poor foundation.

All agree that in ballasted track the rail first receives the shock, transmits it to the ties, and the tie to the foundation, but is this true with concrete foundation, where the rails rest directly upon the concrete as well as on the tie? If the work of concreting has been properly done, the rails will have a bearing throughout their length, therefore a lighter rail could be used successfully than on ballasted track. On the other hand, if a rail should be adopted that will sustain the load without deflection, when supported in ties, say, 4-ft. centers, it will be strong enough, with a concrete foundation, for a great increase in the traffic loading. With a base 7 ft. to 8 ft. wide and sheet concrete 11 in. to 12 in. thick below the base of the rail and 6 in. under the tie, there are few subgrades, when properly prepared, which will not sustain any load which either a steam or electric road has. If greater strength is necessary the concrete can be reinforced.

A machine mixture of concrete 1 in 10 is preferable to a hand mixture of 1 in 8. All wet subgrades should be subdrained and all trenches thoroughly rolled or tamped before the track is laid so that the concrete laid may meet the maximum resistance. Sheet concrete when placed and made in the way specified, except that the mixture should be richer, can carry from 25 per cent to 35 per cent of rubble, boulders or old brick bats. In most localities in Ohio and Indiana concrete costs about $5 per cubic yard, so if from 25 per cent to 35 per cent of this rubble, boulders or brick bats are added the cost of the concrete is reduced to that extent. Concrete of this kind was used in Fort Wayne, Ind., on East Washington Street and cost only $3.07 per cubic yard in place.

A track constructed as shown in Fig. 1 with 90-lb. rails 6-in. x 8-in. x 7 ft. white oak ties, 35 in. centers, with suspended joints 21 in. centers, sheet concrete 7½ ft. wide and 6 in. deep under the tie, standard angle splice bars, brazed rail bonds on the ball of rails, brick paving and 1¾-in. sand cushions, will cost complete per linear foot of track about as follows:

Track work material	$1.41
Track foundation and one-half excavation	.57
Pavement foundation and one-half excavation	.53
Brick paving complete	.79
Total cost per foot of track	$3.30

Fig. 2 shows a section of reconstructed track with a grouted, crushed-stone foundation. It illustrates work actually performed on Taylor Street, Fort Wayne, Ind., in 1908, and I am informed by Frank M. Randall, city civil engineer, that the work is holding up well. The track was a single line, laid with 73-lb., 6-in. rail. During reconstruction it was necessary to excavate the street from 1 ft. to 3 ft., remove the old ties and rails and install the new material. During this work 50-ton interurban cars used the track under a 1½-hour schedule. There were also extra limited and express cars and a small city car service under a 15-minute headway. The city car service was at times delayed a few minutes, but the interurban cars had simply to operate under a slow order. A sufficient number of the old ties were removed so the excavation could be expeditiously done, and enough new ties were added to hold the rails to gage and make it safe under slow running. The tracks were then let down to the subgrade. A trunk sewer had previously been constructed through a portion of the street. This portion was subdrained with a 3-in. drain tile as the section shows. All trenches were examined and if soft places were found or developed after a rain, they were filled with suitable material and rammed with the ordinary 45-lb. paver's rammer, manipulated by two laborers.

The outside of the rail from the web from the outside of the ball to the base of rail was filled in advance of the paving with a stiff concrete, made of sand and cement, in the proportions of one part cement and four of sand. This plan is much cheaper and more durable than to use wood. Eight inches of crushed stone were put under the track in two 4-in. lifts. When the stone was in place all the old ties were removed and the new ones were put in position. New rails were then substituted for the old. The track was then thoroughly tamped to grade four times. The men commenced at one end and continued through the entire length of the line, and a close watch kept on all portions for apparently soft places. When the tamping was com-

* Abstract of paper presented at meeting of Central Electric Railway Association, South Bend, Ind., March 24.

pleted the crushed-stone foundation was thoroughly grouted for a distance of 15 in. on each side of each rail, with a Portland cement grout of one part cement and four parts good sharp sand. Over the sewer trench 6-in. x 8-in. x 8-ft. ties were used, for the rest of the track 6-in. x 8-in. x 7-ft. ties. At the

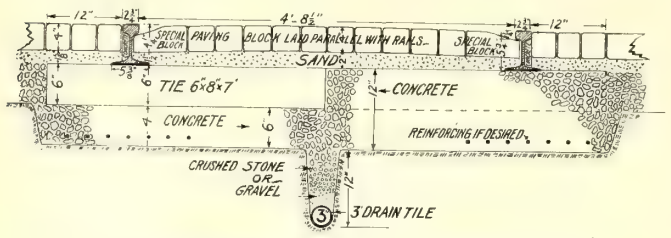


Fig. 1—Section of Track on Concrete Base

suspended joints the ties were placed 20 in. centers. Thirty ties were used to each 60-ft. rail, making the spacing practically 24 in. It will be noticed that one-third more ties, but less concrete, are required by this method of construction. The space between the ties, from the base of the rail to the bottom of the ties, was filled with a very soft concrete, consisting of one part Portland cement, 2½ parts sand, 2½ parts gravel, the gravel containing the sand and 5 parts crushed stone. The concrete was thoroughly puddled so as to fill under the base of the

	Per linear foot of track.	
Track work and material:		
Labor laying track and one-half excavation	$0.413	
Ties	0.274	
6-in., 74-lb. steel rails	0.700	
Rail and cross bonds (compressed)	0.012	
Belts	0.004	
Spikes	0.004	
Splice bars	0.055	
Total cost of track work per linear foot		$1.462
Track foundation, 8-in. crushed stone, grouted:		
Labor	$0.129	
Stone delivered	0.231	
Draintile	0.011	
Cement and sand for grouting	0.035	
Total cost of foundation per linear foot		0.406
Paving:		
Concrete foundation	....	
Labor, including one-half of the excavation	$0.336	
Stone delivered	0.114	
Cement	0.114	
Sand	0.028	
For use of tools	0.013	
Total cost of paving, linear foot		0.605
Brick pavement:		
Labor	$0.114	
Metropolitan paving block	0.505	
Metropolitan special shops	0.180	
Cement	0.028	
Sand	0.021	
Track drains	0.005	
Mixing boxes, etc	0.004	
Total cost per linear foot		0.857
Grand total cost per linear foot		$3.328

Cost of concrete per cubic yard, $4.34.
Cost per square yard of brick paving, including foundation complete, $1.946.
Length of track constructed, 2332 lin. ft.
Brick pavement, 1794 sq. yds.

rails and around the ties, thus giving a bearing surface equal to twice that of the ties. The space between the rails and for

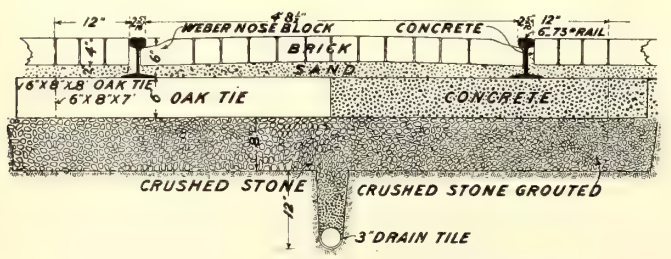


Fig. 2—Section of Track on Crushed Stone

a distance of 1 ft. outside the rails was paved with Metropolitan paving brick, with a special shaped block on the inside of the rail, to form the flange way shown in Fig. 1. An itemized cost of the work follows:

A comparison of the work done on Columbia Avenue with sheet concrete and no traffic while the track was being built with the work done on Taylor Street with crushed-stone grouted and traffic maintained, shows that the work on the latter street cost 6.4 per cent, or 21 cents, per linear foot more. The cases are very few where a temporary track could be built and maintained for 21 cents per linear foot.

ADDRESS OF PRESIDENT OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION *

BY GEORGE WHYSALL, GENERAL MANAGER, COLUMBUS, MARION & BUCYRUS RAILWAY

It is with some hestitation that I ask for your attention for a short time, because of an opinion formed some years ago that the president of an association similar to this should confine himself strictly during sessions to presiding over the deliberations of its members.

I cannot, however, permit the opportunity to pass of calling to your attention some matters which it is hoped will create discussion, leading to better service to our patrons, and consequently improved conditions from an operating viewpoint.

Upon inquiry I find there is still a feeling on the part of some of the companies indicating a lack of confidence in each other. This prevents that co-operation which is so necessary in undertakings of this character. Let us continue our differences of opinion, but in such a way as not to interfere with the duty we owe to the patrons of our various lines.

Our Traffic Association has been the means, undoubtedly, of doing more to create new conditions for interline travel than has any other work of this association, and it now behooves the operating departments to make some radical changes, if we are to take advantage of the wonderful progress already made. For instance, there is much difficulty on practically all roads in securing necessary information covering the time of trains and connections at junction points, and some method should be introduced which will cultivate courtesy on the part of those having to deal directly with our patrons.

Much legislation unfavorable to public utilities is due to the fact that many of our employees perform their duties grudgingly, and in many instances lead our patrons to believe that the accommodation is that of the patron rather than the company represented. Naturally, the management is censured and, possibly, such censure is just. Possibly a charitable view is that this situation is due to the rapid increase in the interurban business, and that when we have been operating as long as the steam roads, our employees also will become imbued with the idea that it is to their advantage, as well as that of their employers, to do all in their power in the way of making patronage of the roads a pleasure rather than a necessity.

I do not wish to criticise unnecessarily, as the "beam is not gone from my own eye." There are some exceptions, even in the matter of dirty and poorly ventilated cars and waiting-rooms, but how often do we hear our particular patrons, especially the ladies, complain of dirty car seats and filthy floors; and why is it that when a car becomes dingy on the outside, the inside and the windows do not receive the same care and attention given a car just out of the shops? Recently I made a trip over one of the large interurban roads in a car which from its appearance inside led me to believe it had been out of the shop 60 or 90 days, and to my surprise I learned later that this car had been out for 18 months and received no more care and attention than the other cars of its class on the same property. If this condition can be maintained on one property, it would appear that other properties can do likewise unless it is the general opinion that clean cars entail an unnecessary expense, and that we have as much business as we care to handle.

It has been suggested that this association publish an official interurban map to show impartially all the companies members of this association in heavy red lines, and that non-member

* Abstract of address read before the meeting at South Bend, Ind., on March 24, 1910.

companies have their lines shown in light red lines. These maps could be made with the space for the company name blank, if desirable, and purchasers might have any desired name inserted. This would not only enable the companies to purchase maps at a minimum price, but give outside interests an opportunity to purchase reliable maps for advertising purposes. Many of the maps now in the hands of the public are not only out of date, but inaccurate. I think that properly handled, the official map would be of great assistance to all interested in interurban railways, and at the same time prove a source of revenue to the association.

Your attention is also directed to the large amount of promiscuous advertising matter scattered broadcast containing time cards long since annulled. Much annoyance to the public is thereby caused, due no doubt to lack of attention on the part of advertising solicitors who frequently secure a time card as a basis for an advertising scheme, and then spend three or four months securing advertising matter, by which time the card originally secured is out of date. The result is that the innocent and unsophisticated patron places the responsibility upon the interurban road, condemns the service, and not content at that, goes out of his way to tell his friends and neighbors his troubles.

While it is no doubt true that anyone can publish a time card gratuitously, there should be some method devised to prevent this imposition on the unsuspecting public.

The claim index bureau started 18 months ago is receiving reports with a degree of regularity from some of the roads, while other roads have not a single report to their credit. It is to be hoped in the case of the latter roads that nothing worth reporting has occurred, but we should all bear in mind that every report filed adds to the value of the index and that if but one fakir is located in five years, the labor of running the bureau will have yielded a profit.

In a communication received recently from the secretary he states that "many matters referred to committees are allowed to die even when they are of real importance." This appears to be due largely to the failure of our members to furnish information when requested to do so, and I therefore ask in the name of each committee of the association that you give them every assistance in your power in the way of data and information.

My attention has been called recently to the fact that 65 per cent of the companies members of this association are also members of the American Street & Interurban Railway Association, thereby indicating that the interest in association work is more than local, and that a large number of our companies feel the need of information obtainable only through the American Association because it covers the entire country. I therefore recommend some action, through a committee or otherwise, which will bring the members of this association in closer touch with the national organization.

Few of us are in a position to realize the vast amount of work involved in securing and compiling the data sent out by the secretaries of the various associations, to say nothing of the difficulties encountered due to lack of attention or interest on the part of those from whom information is asked. Our secretary is always on duty and prompt in sending out information. Our part, therefore, is to assist him to the utmost, and do away, if possible, with the use of the rubber stamps, second and third requests.

I recently asked a gentleman well versed in electric railway matters, but not an operating official, for his views on some of the problems confronting the interurban industry, and from his reply I quote in part the following:

"To intelligently decide the expenditures which are justified in order to develop any particular branch of the service, it is necessary to know accurately what each branch of the service costs, and what it produces in revenue. The handling of United States mail is the case in point. How many managers are prepared to say exactly what it costs them to handle mail, and what would they consider a fair and reasonable remuneration for the service given?"

The proposition advanced is doubly interesting in view of our standing committee appointed to co-operate with a similar committee of the American Association for the purpose of securing a more equitable rate for this class of service. The above criticism applies with equal force to freight, express and package business.

As the work of this association is largely educational, I suggest that all papers and subjects presented be thoroughly discussed, if not referred to committees for investigation. However, in order to get the full benefit it is necessary to use all the time at our command, and even then, doubtless, many important points will have to be passed by unless some steps are taken in the way of two-day sessions, and many of the supply men feel that they are at a disadvantage in having to talk business during the meeting, instead of being able to hear the papers and their discussion. It might be well, therefore, to consider the advisability of having two-day sessions once or twice each year.

SUBJECTS FOR DISCUSSION

Those having had to do with association work are well aware of the difficulties encountered in securing papers for our meetings, and as their preparation requires much time, I believe it is not an infringement on the subject committee's rights to suggest a few subjects, to the end that some of the members may volunteer the preparation of papers for some future meeting. For instance:

"The Reduction of Unnecessary Accommodation or Contract Stops."

"The Advantages of Interurban Belt Lines Connecting Industrial Plants."

"The Future Effects on High-Speed Service of Private Rights-of-Way Adjoining Highways Near Large Cities."

"Possibility of a Standard Practice for the Collection of Tickets and Fares on Interurban Cars."

"The Necessity for a Reserve Depreciation Fund."

"Methods of Handling Passenger Traffic During Rush Hours; Additional Trains or Trailers."

"Unaccounted-for Current; How to Determine It and What Is Reasonable."

"The Advantages of Large Motor Wheels with Low Gear Ratio Over Small Wheels with High Gear Ratio."

"Automatic Versus Straight Air Brake Equipment for Single Car Operation."

"Methods of Preventing the Use of Interurban Cars by Local Passengers in Municipalities."

The above subjects would, I think, form live topics for discussion.

In conclusion, I would call your attention to the unusual activity during the past winter of the many legislative bodies pertaining to transportation companies, and urge you strongly to keep in close touch, in season as well as out of season, with all who may have to do in any way with proposed legislation.

The necessity of such action on our part was recently brought to my attention at a hearing before a legislative committee when a bill of vital interest to all utilities in the State of Ohio was under consideration. At that time it developed that the author of the bill was unfamiliar with all of its provisions, and upon the proof being submitted he became much provoked and more antagonistic than ever to the people who were there to speak against the unjust measures contained in the bill. I believe it is due our patrons, as well as our stockholders, to keep thoroughly advised and fight every measure which tends to increase the burden, which is already greater than it should be.

A municipality in Latin America, according to the report of an American consular officer, is considering the electrification of its three tramway lines. The city has an electric light plant already. Communications, in Spanish, should be addressed to an official whose name is given in the report. The address of this official can be obtained upon application to the Bureau of Manufactures, Washington, D. C., No. 4544.

SOLICITING BUSINESS*

BY C. O. WARFEL, GENERAL AGENT TRAFFIC DEPARTMENT, INDIANAPOLIS & CINCINNATI TRACTION COMPANY.

Methods of soliciting business for an interurban railway vary in different localities. Methods that are the most successful in one section of the country are utterly useless in another. Their success or failure depends upon the ability of the road to meet requirements, the class of people to be dealt with and the kinds of business to be solicited.

Soliciting business for an interurban road was unknown until a few years ago. The interurban roads then existing were kept too busy extending their lines and caring for what local business naturally came to them to give much attention to more. But with the completion of the roads and the decrease in the rush of enthusiastic patronage, came the necessity for seeking more business. The interurban companies began to realize that before they could expect success they must inform the public of the service they could offer.

In competition with long established steam roads with experienced solicitors, it is necessary that the interurban lines make the public fully acquainted with any advantage they can offer. Although there are three classes of traffic—passenger, non-delivery express and freight—all desired and solicited by an electric railway, the freight and express business is increasing most rapidly and making the interurban more the competitor of the steam road. The passenger business presents less opportunity for work because the solicitor is limited almost entirely to chartered cars, theatrical troupes (not always desirable on acount of excessive baggage and scenery), excursions and occasional long-haul parties.

Freight rates as a rule are the same on both steam and electric roads, therefore the solicitor for the latter must rely upon his own personality and tactfulness and the advantages offered by his road, such as frequency of service, quick time, difference in drayage, changes at various junctions, and like points. These are the arguments upon which he must secure business.

A capable solicitor is always wide-awake to the best interests of his road. He watches the newspapers for any items which might place him in touch with a shipper. He visits manufacturing establishments of all kinds, wholesale houses, retail merchants, and in fact anyone who might become a shipper.

For every shipment there are two persons to be influenced. Remember that it is not always the man who pays the freight that controls the routing. First, there is the consignor to be canvassed. If he cannot be influenced or persuaded the solicitor is not discouraged, but goes to the consignee. Perhaps, through some means of argument, he may be persuaded to order his goods shipped via the line represented. The solicitor exerts a very good influence for his road by keeping in close touch with shippers and consignees, finding out what they need in the way of service and getting it for them. He is often able to go to shippers and point out markets, or to give them information of sources of supply. But the best argument in the hands of the traffic man is the frequency of service and short time which he can offer. To the shipper whose goods have been delayed for a considerable time by the freight congestion on some steam line, this is an important asset.

The solicitor should be thoroughly familiar with the facilities, time tables, rates, etc., not only of his own line, but with those of connecting lines, but should not give any information unless he is quite sure it is correct. He should have a general knowledge of prices and costs of different commodities, so as to be able to talk intelligently with shippers.

The method of approaching a business man largely determines your success with him. Remember your previous conversations with him, if any, and if they have not produced results approach him in a different manner. Go straight to the point and state your business in as few words as possible; such methods appeal to the business man.

One of the most difficult things in the work of the solicitor is a diplomatic refusal to requests for concessions that cannot be granted. The reply must be firm and leave no doubt as to the impossibility of granting the request, yet it must be couched in such words as to arouse no ill feeling. If there is some possibility of granting the request, the solicitor must not arouse false hopes, but rather leave the impression that it cannot be granted. Then if it is granted, it is appreciated more fully, and if it is not granted, he has broken no promises. He should keep in close touch with the head of his department and of the transportation department, know just what his authority is, and how much he can offer in the way of special rates, cars, etc.

The solicitor may become discouraged if he cannot at once see the result of his work, but he must consider the fact that many results of his work will show themselves in the future and that much of his time is taken up calling on men who are too busy to see him. It takes many visits and much argument to convince a man that your road is the one he should patronize.

Perseverance, tactfulness, good general knowledge of the work and all around good fellowship, are characteristics of a successful solicitor.

The fact that great difficulties still confront the interurban lines and that their deficiencies are realized by the public, makes the solicitor work all the harder. The average electric railway is still unable to compete with the steam roads on car-load business. The reason for this is obvious. Furthermore, there is need for better facilities for handling bulky and heavy articles, such as vehicles, vehicle bodies, showcases, agricultural implements, machinery, lumber, general building material, etc. This class of business is at present considered undesirable, because there are not sufficient facilities to handle it.

Another of the difficulties with which the solicitor contends is the need of a more uniform exception sheet. Such articles as inflammable oils, pipe over a certain length, fertilizers, etc., are accepted by some lines and refused by others. When a shipper once learns that his product is refused by one company he naturally infers that all others will do likewise and the steam road profits by his mistake. The adoption of a uniform exception sheet would further the interests of all the roads, for there is a tendency on the part of the public to consider two or more electric railways, not as separate and individual companies, but merely as "the interurban." In large cities entered by more than one interurban line, a joint shippers' guide issued by all the lines concerned, giving rates, schedules and exceptions, stated in a clear and concise form, would be of benefit to the shipper and consequently bring more business to the interurban roads.

Claims for goods lost or damaged in transit are the nightmare of the traffic solicitor. The interurban company is justified in protecting itself against illegitimate claims, but most claimants become impatient when payment is deferred unnecessarily and withhold their traffic from the company at fault, hoping thus to force a settlement; and the company often loses more in traffic than the amount of the claim. The effect of this non-payment of claims is shown not only in the direct loss of traffic, but in the attitude of the shippers toward the company. To illustrate: Some time ago we received a claim from a shipper which was considered excessive. When we called upon him, acknowledging our responsibility in the matter and agreeing to pay the claim at once, he reduced it to less than half the original amount, stating in explanation that his experience with interurban roads had taught him not to expect payment within four or five months and so he was merely making his claim large enough to pay him for his annoyance and delay in settlement.

Claims should be weighed cautiously by adjusters, and not settled hastily without investigation, but certainly not delayed more than is necessary after prompt investigation. These matters are out of the control of the solicitor, but he must deal first hand with the irate shipper, the threatened loss of business and the angry feeling toward the road.

Regardless of these deficiencies, the interurban roads are

*Abstract of paper read before the Central Electric Railway Association, South Bend, Ind., March 24, 1910.

making great progress and many improvements in their service. Through the solicitor and advertising the public is gradually becoming aware of this fact. With the correction of the faults already noted—the inability to handle carload and bulky freight, the lack of a uniform exception sheet, and the delay in settling claims—the amount of business secured by the interurban roads through their solicitors will be limited only by their facilities for handling it.

MAINTENANCE OF WAY CONVENTION

The eleventh annual convention of the American Railway Engineering and Maintenance of Way Association was held March 15, 16 and 17 at the Congress Hotel, Chicago. The proceedings terminated with a dinner at the same hotel on Thursday evening, March 17. According to the secretary's report, the receipts for the preceding year were $19,758.08, the expenses $21,203.40, and the cash on hand $16,403.01. The membership on March 12, 1910, was 869. Abstracts of the papers of electric railway interest read at the meetings were published in the Electric Railway Journal of March 19, J. B. Austin, Jr., engineer maintenance of way, Long Island Railroad, said in regard to the work of the committee on electrification, published in abstract last week:

"In explanation of the form in which the report is presented I will say that this is a new committee on a new subject, and in gathering information we find it takes rather more time, possibly, than in a case of a subject that has been under discussion for some years. We have had four meetings of the general committee and about 10 or 11 meetings of the various subcommittees, but we feel that our foundation work has not progressed far enough yet to enable us to draw any definite conclusions, or present any recommendations to the association for adoption. I move the adoption of the report of the committee." The motion was carried.

The election of officers resulted as follows: President, L. C. Fritch, chief engineer, Chicago Great Western Railway; second vice-president, Charles S. Churchill, chief engineer, Norfolk & Western Railway; secretary, E. H. Fritch (re-elected); treasurer, C. F. Loweth, engineer and superintendent of bridges and buildings, Chicago, Milwaukee & St. Paul Railway; directors (for three years)—Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines West, and F. S. Stevens, superintendent, Philadelphia & Reading Railway.

ELECTRIC TRACTION ON CANALS

The royal commission on canals and inland navigation of the United Kingdom which has just issued its final report, was appointed in August, 1906, and was presided over by the Right Hon. Lord Shuttleworth.

Referring to the use of electricity for haulage purposes on canals the report points out that recent experiments have been made in France and elsewhere by electric tractors running on rails laid on the towpath. A system of this kind has been established on the Canals d'Aire, de la Deûle, and the diversion of the Scarpe for a distance of 36 miles. By a decree of July, 1907, a concession was given to the Northern Electric Company to establish electric traction on a crowded part of the St. Quentin Canal for a distance of 55 miles. This concession is for 40 years, and reserves to the State full control and the right to purchase. It is also proposed to use electric haulage on the new Canal Du Nord, now in course of construction. On the Tetlow Canal electric haulage is obligatory, other forms of traction not being permitted.

The report adds that discussions at the recent International and Inland Navigation Congresses of European and American Engineers show that the tendency is to accept electric haulage as the best and most economical form of traction on canals on which the traffic is, or may become, sufficient to repay the cost of installation.

THE PHILADELPHIA STRIKE

Several unsuccessful attempts have been made to settle the Philadelphia strike since the conference in the office of George H. Earle, Jr., one of the representatives of the city on the board of directors of the Philadelphia Rapid Transit Company, on March 14, 1910, as mentioned last week. One of these was brought about by Senator B. Penrose, and on March 20, 1910, the company offered to re-employ its former men upon substantially the following conditions: Runs be given as many men as possible at once, those not assigned to runs to be placed on the payroll at $1.50 a day until employment can be provided; a wage of 23 cents an hour effective on June 1, 1910, with an increase of ½ cent an hour each year until the rate becomes 25 cents an hour; the cases of the 173 men who were discharged to be submitted to arbitration; the company to retain the right to discuss grievances with individuals or representatives of any organization of the men; union buttons may be worn, but are not to be more than ¾ in. in diameter and not to be conspicuously displayed.

These terms were rejected by the men, who insisted that the company increase wages to 25 cents an hour immediately and treat with only one grievance committee, this committee to be selected by a majority vote of the men at each barn. Subsequently the representatives of the men submitted a proposal which included a provision that the agreement of June, 1909, be revived as part of the settlement.

Meanwhile there is dissension among the officers of the State Federation of Labor over the advisability of declaring a State-wide sympathetic strike. The president of the State organization was at first enthusiastic about this proposal, but the petering out of the sympathetic strike in Philadelphia and the refusal of avowed union organizations in Philadelphia to break with their employers has served as an omen to the more conservative leaders of the State organization. On March 22 the executive board of the unions, which include among their members the textile workers of the northeastern section of the city, adopted a resolution recommending the return to work on March 23 of all the mill and factory operators on strike. Defections have also been the order among the employees of other trades who struck in sympathy with the conductors and motormen.

COMMITTEES OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

R. I. Todd, president of the American Street & Interurban Railway Transportation & Traffic Association has announced the following committees of that association for the current year:

COMMITTEE ON INTERURBAN RULES

C. D. Emmons, chairman, general manager, Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.

H. A. Nicholl, general manager, Indiana Union Traction Company, Anderson, Ind.

J. W. Brown, superintendent of transportation, West Penn Railways Company, Connellsville, Pa.

F. D. Carpenter, second vice-president and general manager, Western Ohio Railway Company, Lima, Ohio.

C. A. Coolidge, superintendent, Oregon Electric Railway Company, Portland, Ore.

W. R. W. Griffin, general superintendent, New York State Railways, Rochester, N. Y.

COMMITTEE ON CITY RULES

R. E. Danforth, chairman, general manager, Public Service Railway Company, Newark, N. J.

Harry Bullen, general superintendent, Detroit United Railway, Detroit, Mich.

F. I. Fuller, vice-president, Portland Railway, Light & Power Company, Portland, Ore.

D. A. Hegarty, treasurer and general manager, Little Rock Railway & Electric Company, Little Rock, Ark.

H. H. Hunt, district manager, Stone & Webster Management Association, Boston, Mass.

L. H. Palmer, superintendent of transportation, Metropolitan Street Railway Company, New York, N. Y.

COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES

G. O. Nagle, chairman, general manager, Wheeling Traction Company, Wheeling, W. Va.

C. E. Learned, superintendent of inspection, Boston Elevated Railway Company, Boston, Mass.

W. H. Douglass, general superintendent, Northern Ohio Traction & Light Company, Akron, Ohio.

J. E. Duffy, superintendent, Syracuse Rapid Transit Company, Syracuse, N. Y.

L. C. Bradley, general manager, Eastern Pennsylvania Railways Company, Pottsville, Pa.

C. N. Wilcoxon, general manager, Chicago, Lake Shore & South Bend Railway Company, South Bend, Ind.

COMMITTEE ON PASSENGER TRAFFIC

F. W. Coen, chairman, vice-president, Lake Shore Electric Railway Company, Cleveland, Ohio.

Franklin Woodman, general manager, New Hampshire Electric Railways, Haverhill, Mass.

W. S. Whitney, general passenger agent, The Ohio Electric Railway Company, Cincinnati, Ohio.

C. E. Flagg, publicity agent, Spokane & Inland Empire Railroad Company, Spokane, Wash.

W. H. Collins, general superintendent, Fonda, Johnstown & Gloversville Railroad (Electric Division), Gloversville, N. Y.

A. E. Potter, general manager, The Rhode Island Company, Providence, R. I.

COMMITTEE OF EXPRESS AND FREIGHT TRAFFIC

P. P. Crafts, chairman, general manager, Iowa & Illinois Railway Company, Clinton, Ia.

C. V. Wood, vice-president and general manager, The Electric Express Company, Springfield, Mass.

E. H. Hyman, manager, Electric Package Agency, Cleveland, Ohio.

Frank Walsh, manager, Electric Express Company, Schenectady, N. Y.

W. F. Towne, general agent, freight department, Pacific Electric Railway Company, Los Angeles, Cal.

Chas. Floyd, general passenger and freight agent, Grand Rapids, Holland & Chicago Railway, Grand Rapids, Mich.

COMMITTEE OF TRANSFERS AND TRANSFER INFORMATION

M. R. Boylan, chairman, general auditor, Public Service Railway Company, Newark, N. J.

Alexander Rennick, second vice-president and assistant general manager, Philadelphia Rapid Transit Company, Philadelphia, Pa.

F. T. Wood, assistant to general manager, Metropolitan Street Railway Company, New York, N. Y.

Harry Bullen, general superintendent, Detroit United Railway, Detroit, Mich.

R. E. Lee, general superintendent, The Cincinnati Traction Company, Cincinnati, Ohio.

T. C. Cherry, superintendent, Utica & Mohawk Valley Railway Company, Utica, N. Y.

COMMITTEE OF TOPICS OR SUBJECTS

J. H. Pardee, chairman, operating manager, J. G. White & Company, New York, N. Y.

G. W. Parker, general express agent, Detroit United Railway, Detroit, Mich.

H. W. Fuller, general manager, Washington Railway & Electric Company, Washington, D. C.

COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIME TABLES.

N. W. Bolen, chairman, superintendent of transportation, Public Service Railway Company, Newark, N. J.

The municipal authorities of Schaerbeck, near Brussels, Belgium, have just granted a concession for the establishment of a trackless trolley in that town.

HEATING SYSTEM IN CAR HOUSE OF TORONTO & YORK RADIAL RAILWAY

The Toronto & York Radial Railway Company's car house and adjoining buildings at North Toronto, Canada, are heated by a unique fan system designed by the Chicago office of the Harrison Engineering Company, of New York City. Included in this system are a fan and distributing ducts similar to those of a steam hot-blast apparatus, but the heat is transferred directly from the fuel instead of through the medium of steam. This plan has the advantage that there is no steam boiler, coils or other accessories to be drained to prevent freezing should it be necessary to shut down the plant in winter. The fuel used in Toronto is oil, but any kind can be employed. The system has been very satisfactory during the entire winter and seems especially adapted to this kind of service.

The Harrison Aertube heater, the unique feature of this system, consists of a bank of 4-in. cast-iron tubes, 4 ft. long, between headers placed above the furnace in which any fuel may be burned. In action it resembles a hot-air furnace in that the heat is transferred from the coal directly to the air passing through the tubes, but unlike the ordinary furnace, the heating surfaces are particularly well adapted to large systems requiring a fan.

The buildings to which the system has been applied consist of a machine shop, a blacksmith shop, paint room, and car house with its pits. Adjoining the blacksmith shop is the room containing the fan and heater with underground tanks 4 ft. in diameter and 20 ft. long for storing the oil which is used as fuel. There are two six-section Aertube heaters operated in series with a total of 384 tubes. The motor-driven fan takes air from out of doors, but the air can be recirculated from the barn if desired. The air for heating is forced through the tubes of the heater, and thence through the galvanized-iron distributing ducts by the fan, which is 7 ft. x 4 ft., three-quarter housed.

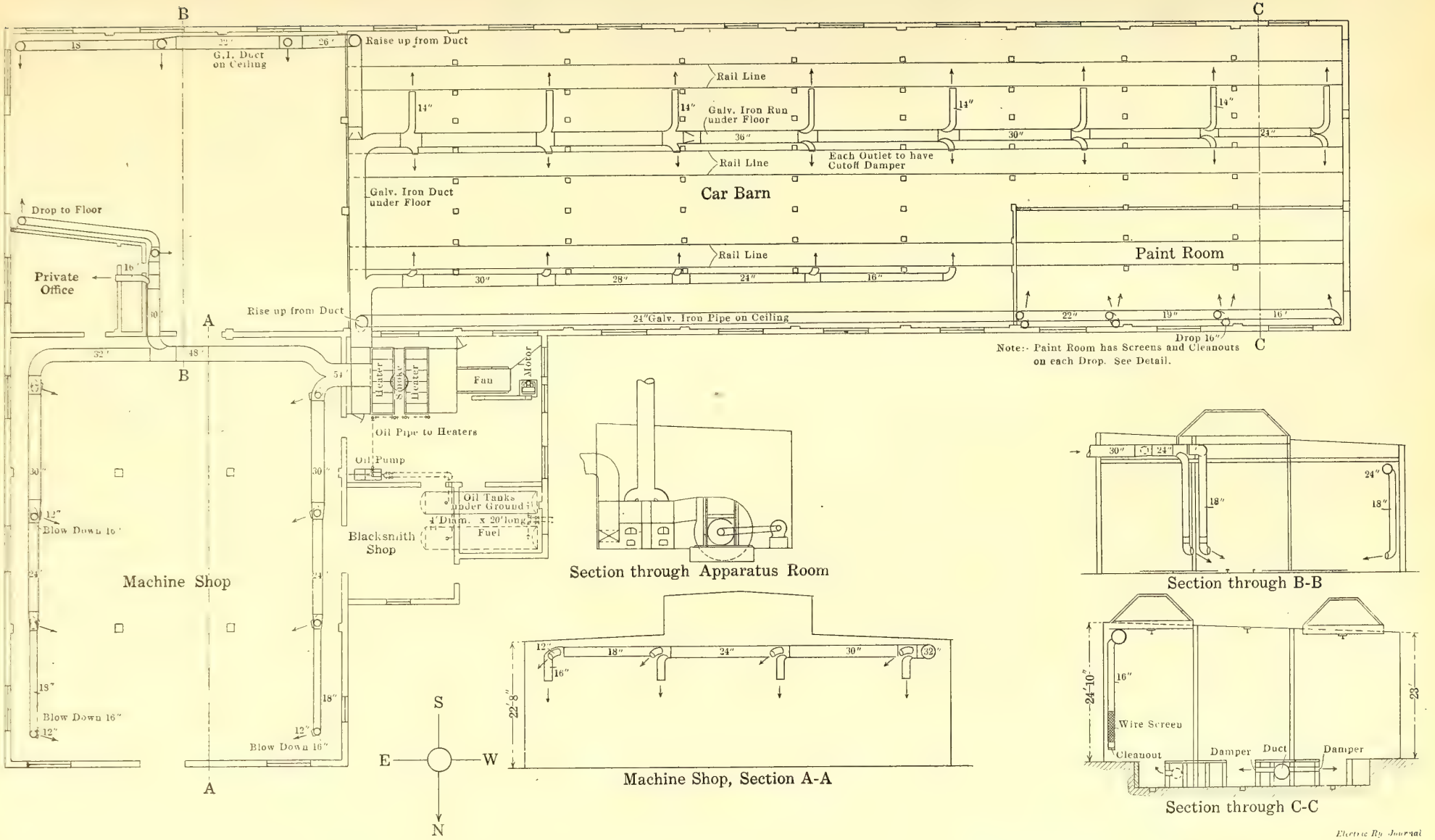
To distribute the heated air throughout the building the main duct branches soon after leaving the heater. One pipe conveys air to the car house, and the other nearly encircles the machine shop at the ceiling. In the machine shop the air is discharged at 16 different points by means of short galvanized-iron pipes, eight of which discharge directly downward, while the rest discharge at an angle of about 45 deg. A branch pipe conveys warm air to the private office.

From the heater a 48 in. x 48-in. galvanized-iron duct leads to the car house. From it are taken three branches, two of which run beneath the floor. To maintain a sufficiently high temperature in the pits so that ice and snow may be melted from the car trucks, branches provided with dampers for regulating the discharge extend at intervals from the underground duct to the pits.

This arrangement of air distribution will allow an effect identical with that secured by ordinary steam hot-blast apparatus. From the main duct in the car house a branch extends at the ceiling the entire length, discharging its air into the paint room located in a corner of the car house. The distribution in the paint room is effected by vertical pipes extending within about 3 ft. of the floor and discharging the warm air at an angle of about 45 deg. Each drop is provided with a wire screen and a cleanout.

With a temperature below zero the system has maintained 65 deg. in the car house and machine shop, 70 deg. in the office, and 80 deg. in the paint room.

The result of the ballot for a strike on the New York, New Haven & Hartford Railroad was announced at 2:15 o'clock March 22, 1910, as follows: Total number of votes cast 3844. In favor of a strike, 3758; against a strike, 86. There were 99 per cent of the trainmen who voted in favor of the strike and 97 per cent of the conductors. Late the same afternoon the brotherhood officers were invited to meet President Mellen, of the railroad.



Plan and Sections of Car House of Toronto & York Radial Railway, Showing Heating System

OPINIONS ON BILL AMENDING PUBLIC SERVICE COMMISSIONS LAW

At a hearing before the railroad committee of the Assembly of the New York Legislature at Albany, on March 16, arguments were made in relation to the Parker bill, which is designed to amend the public service commissions law. Joseph H. Choate, representing F. W. Whitridge, receiver of the Third Avenue Railroad, of New York, made the principal argument against the bill. Mr. Choate said, in part:

"Beaten in the courts, the commissions now come to the Legislature and ask for power which is not within the tenor and meaning of the present act. Instead of considering a bill such as this, which is perplexing legislators and giving the members of the committee hopeless headaches, they might introduce a bill of four lines which would read as follows:

"'Be it enacted, that any powers in respect to traction companies not already conferred upon the Public Service Commission are hereby conferred.'

"The commission has issued orders compelling impossibilities. No greater power over franchises should be given to it.

"Universal transfers were the final blow to the Metropolitan Street Railway Company. It is not practicable to authorize a person to travel all over creation for 5 cents. The commission wants to return to the old transfer system, with unlimited power to order universal transfers without regard to the financial consequences.

"The commission wants also the power to compel the companies to add to their tracks without providing any financial assistance. It is too great a power to give to an irresponsible commission. It was not the intent of the Legislature to take the management out of the hands of the companies or confer powers which are mischievous, insidious and damaging, and this proposed additional power should not be given."

REPLY OF W. R. WILLCOX

William R. Willcox, chairman of the Public Service Commission, First District, issued a reply to the criticisms of Mr. Choate, saying in part:

"I do not care to enter into any lengthy reply to the statements of attorneys hired by those managers of corporations who wish to escape regulations. Such attorneys are paid for their work, and are supposed to make some effort toward earning their fees. It is proper to say, however, that the commission has not reached out for any more power, but has asked the Legislature to make definite and certain some provisions of the law, which are now doubtful of interpretation. This applies particularly to joint rates and fares.

"There is at present much doubt in the minds of lawyers whether the law is broad enough to enable the commission to deal with the transfer question. If the Legislature wishes the commission to deal with transfers, it should make it definite and certain. The constituents of New York members of the Legislature have demanded that we deal with the transfer question. Our position is, if the Legislature wants us to deal with the transfer queestion, then let it put it in the law.

"So far as being 'vindictive and grasping' is concerned, Mr. Choate does not specify any particular case. Perhaps he means vindictive because the commission began an action against his client, Mr. Whitridge, for failure to put wheelguards on his cars in conformity with an order of the commission. Practically all other roads of the city have lived up to the terms of this order, and after Mr. Whitridge's failure to do so and a serious accident had happened, which might have been averted, the commission brought action against him for failure to live up to its order. If this is vindictive, then Mr. Choate must make the most of it."

STATEMENT OF MR. WHITRIDGE

After publication of the interview with Mr. Willcox a statement by Mr. Whitridge was made public, in which he said:

"The Third Avenue Railroad Company is not seeking to escape regulation or to evade the law. The whole trouble with Mr. Willcox is that he has evidently confounded the commission's desires and orders with the statutes. He thinks that he is the law, and he is expounding it to the people. The Public Service Commission sits in its snug offices and issues orders and thinks it is solving the transit problem.

"Why, the Public Service Commission couldn't solve any problem. It hasn't the brains to do so. It proclaims, with a loud beating of tom-toms, that the railroad companies are trying to put it out of business, when, as a matter of fact, it is rapidly committing suicide through its own acts.

"With any sane order of the commission I shall be only too happy to comply, but I don't propose to spend other people's money in order to gratify the ambitions of certain officials."

COST OF REPAIR SHOP EQUIPMENT ADDITIONS

In connection with a petition filed some months ago for a stock and bond issue the Union Street Railway Company, New Bedford, Mass., sent to the railroad commission an extended tabulation of its construction expenditures between 1903 and 1908. Included among these were the details given in the table relating to shop equipment added during the period covered.

Cost of Machinery Additions, Weld Street Repair Shops.

Emery wheels	$28.23
Little Giant drill No. 2	125.00
Hendley universal milling machine No. 3	950.00
Reed lathe, 9 x 18 in.	495.00
Reed lathe, 27 x 13 in.	1,029.00
Motor driven air compressor, capacity 75 cu. ft. min.	950.00
Shafting and fittings	131.46
Three Whitney cranes, 5-ton capacity each	2,550.00
Pneumatic gear hoist, No. 413, capacity 5 tons	322.50
L. G. drill No. 5	110.00
Hose, etc.	52.40
Two grinders	32.00
Two Dake hoists, 5 tons each	480.00
One class G hoist, 76-in. lift	42.00
Three plain trolleys, etc.	127.46
Two No. 12 3-ton pneumatic hoists	379.30
Franklin portable crane	100.00
Ranch wrecking rig	120.50
One 15 hp 500-volt motor	125.00
Davis boring tool, No. 12	97.08
Band saw file and saw	23.13
Two Weston portable voltmeters	123.51
Whitewash sprayer	20.00
Band saw, Fay and Egan, No. 50, and blades	184.70
Continental surfacer No. 2	150.00
Universal rip and cross-cut saw No. 76	227.60
Belting	86.33
New Century field tester	80.00
Four jacks	60.00
Machado and Roller "A" ohm-meter	51.00
New Britain saw setting machine	15.00
Columbia pinion puller	100.00
Cincinnati shaper and back No. 24	536.25
Vise, dogs and jacks	176.00
Two 1-ton triple falls	75.00
Shafting	14.32
G. E. compressor, 8 x 8 in., geared to 35 hp motor	1,316.00
One 5 hp 500-volt suction fan motor	750.00
Blocks and swedges	66.69
Total	$12,302.46

NEW CAR HOUSE IN DAYTON

The People's Railway Company, of Dayton, Ohio, is planning to erect a new car house alongside the main line of the Big Four Railroad, just outside the southerly limits of the city of Dayton. The building will consist of five bays, each 23 ft. in width from center to center of columns and 240 ft. long, divided into 15 panels of 16 ft. each. Four of the bays will contain two tracks each, and the remaining bay one track. There will be pits under all tracks except those to be used for washing purposes. The entire building will ultimately be used as an operating barn, but for the present will be equipped as a repair shop, being subdivided into carpenter, machine and paint shops and store room, leaving about 1152 ft. of track available for the storage of cars outside of these portions.

The construction is of reinforced concrete for the foundations, columns, pits and roof. The temporary partitions are to be built of hollow tile and the exterior curtain walls of sand lime brick. The main floor of the car storage space will be broken by columns only, the bays being formed for the purpose of fire protection by means of metal and concrete screens or curtains extending from the roof down to within about 8-ft. of the floor. The building will be protected by automatic sprinklers and heated with steam or hot water.

News of Electric Railways

Program for Meeting of the Iowa Street & Interurban Railway Association

The following program has been announced for the meeting of the Iowa Street & Interurban Railway Association, to be held at the West Hotel, Sioux City, Ia., on April 21, 22 and 23, 1910:

APRIL 21—MORNING SESSION

Address of welcome by the Mayor of Sioux City.

Response by C. T. Cass, general manager of the Waterloo, Cedar Falls & Northern Railway.

"Medical Side of the Claim Department," by Dr. A. J. McLaughlin, surgeon of the Sioux City Traction Company.

APRIL 21—AFTERNOON SESSION

"Track and Overhead Construction"—(a) "City Railways," by J. G. Huntoon, general superintendent of the Tri-City Railway, Davenport, Ia.; (b) "Interurban Railways," by F. J. Hanlon, vice-president and general manager of the Mason City & Clear Lake Railway, Mason City, Ia.

APRIL 22—MORNING SESSION

"Why Fares Should Not Be Lowered"—(a) "City Fares," by L. D. Mathes, manager of the Dubuque Electric Company; (b) "Interurban Fares," by Wm. G. Dows, president and general manager of the Cedar Rapids & Iowa City Railway & Light Company.

"Treatise on the P-A-Y-E- Car," by a representative of the Pay-As-You-Enter Car Corporation.

APRIL 22—AFTERNOON SESSION

"Handy Legal Points for Everyday Use," by J. L. Kennedy, Sioux City.

"Depreciation," by H. V. Ferguson, vice-president and secretary of the Cedar Rapids & Marion City Railway.

APRIL 23

Discussion of problems encountered in the operation of their properties by those in attendance at the convention.

The Sioux City Traction Company and the Sioux City Gas & Electric Company will act as hosts. As usual, manufacturers who desire to exhibit their appliances and apparatus will be furnished by the association with space in the Sioux City Auditorium free.

Cleveland Traction Situation

At a meeting of the directors of the Cleveland Railway on March 19, 1910, plans for improving the system were discussed, but no announcement was made regarding the outcome of the meeting.

The policy in regard to the fare to Collinwood and Euclid Beach was formulated at this meeting, but no public announcement will be made until Mr. Dahl, the street railway commissioner, has been notified. Horace E. Andrews, president of the company, said that the request that all pay-as-you-enter cars be equipped with fare registers could not be granted, as the directors believed that the results would not justify the expenditure of $90,000, which it had been estimated would be required to comply with the request.

A dividend of 1½ per cent has been declared by the directors of the Cleveland Railway, as authorized by the Tayler grant. The present stockholders will have the privilege of subscribing to the 10 per cent increase in the stock of the company until April 10, 1910. On March 18, 1910, the stock sold at par for the first time on the Cleveland Stock Exchange and on the following day small blocks of it changed hands at 100⅛. This sustains the opinion of Judge Tayler regarding the settlement.

Newton D. Baker, city solicitor, has rendered an opinion to the City Council that the authority of that body in the case of stock issues made by the company extends only to the approval of the expenditure of money secured by the sale.

On the evening of March 14 Councilman Laferty introduced an amendment to the Tayler ordinance which provides for a fare of 3 cents for Collinwood. Mayor Baehr had hoped that legislation of this kind would not be attempted until the matter had been discussed with the officers of the company. Six other street railway ordinances relating to re-routing and other unimportant matters were also introduced at this meeting.

Street Railway Commissioner Dahl spent the greater part of the week ended March 19, 1910, in Chicago and Milwaukee studying the pay-as-you-enter systems and the methods of fare collection. He believes that registers are well adapted to the requirements in Cleveland and said that he could see no objection to the use of T-rail in the residence and outlying sections of the city.

The Humphrey Company, which operates the resort at Euclid Beach, has threatened to run automobiles to transport passengers to its amusement grounds, if the city and company keep the fare at 10 cents.

Tentative Ordinance for Extension of Chicago & Oak Park Elevated Railroad

The local transportation committee of the Chicago City Council has approved a tentative ordinance granting a franchise for the extension of the Chicago & Oak Park Elevated Railroad from a point near Western Avenue to a terminal between Montrose and Lawrence Avenues. There are several conditions in this franchise which are objectionable to the company. Tentatively the franchise is offered for 30 years. The franchise has not yet been considered by the City Council. Some of its provisions follow:

Grant through routes and universal transfers as soon as the other elevated roads come to an agreement on the subject.

Deposit with the city cash or approved bonds to the extent of $100,000, which shall be forfeited, together with the franchise and structure already completed in case the branch line is not completed and the Austin tracks are not elevated in the time specified.

Complete the branch line in three and one-half years and elevate the tracks at once.

Sell its road to the municipality at the option of the city any time within 15 years at an appraised value to be not less than the actual cost price of the right of way, structure and equipment, less the amount of depreciation fixed by the board of appraisers.

Open its books to the city controller and furnish him with such financial statement as he may require.

Purchase the right of way within 18 months from the acceptance of the ordinance.

Accept the ordinance within 16 days of its passage.

Erect stations on the new branch at or near the following streets: Grand Avenue, Chicago Avenue, Division Street, North Avenue, Armitage Avenue and Milwaukee Avenues, with entrances from both streets, Fullerton Avenue, or between Fullerton and Humboldt Boulevard, Diversey Boulevard, Belmont Avenue, Addison Street, Irving Park Boulevard and Montrose Avenue.

Transit Affairs in New York

The Public Service Commission has asked the Board of Estimate and Apportionment for an appropriation of $2,000 to pay the expenses of maintenance of the Brooklyn loop subway for the next six months. This subway extends up Centre Street from Chambers Street and connects with both the Williamsburg and Manhattan bridges. It has cost $10,000,000 and is practically complete except for the Chambers Street terminal, which has been delayed because it is located in the basement of the Municipal Building, on which work is delayed. The commission states that it will be necessary to have the subway looked after until a contract can be made for its equipment, which is expected to be done within six months. This contract may be made for equipment and operation in connection with either the Fourth Avenue subway, Brooklyn, or the Broadway-Lex-

ington Avenue subway, the plans for which are now almost completed.

A hearing was held on March 13, 1910, before the Public Service Commission on the application of the Manhattan Bridge Three-Cent Line for a certificate of convenience and necessity to operate a surface railroad from the shopping district of Brooklyn to the North River in Manhattan. John C. Brackenridge, vice-president and chief engineer of the company, was cross-examined by Prof. C. A. Collin on behalf of the Brooklyn Rapid Transit Company regarding the amount of new track the Three-Cent Line would have to lay and the average rate of speed at which it intended to operate. The new company contemplates using cars about 28 ft. long, each equipped with two 50-hp motors. With such cars, Mr. Brackenridge testified, it would be possible, if other conditions permitted, to attain a speed, even on an up-grade, of 30 m.p.h. He fixed the probable average rate of speed at which the cars of the Three-Cent Line would run as 10 m.p.h.

Riverbank Subway to be Built in Boston

The Boston Elevated Railway has accepted the act providing for the construction of the Riverbank subway to connect the Park Street district with the Charlesgate section of the outer Back Bay. The new line will be more than two miles long and the route from Park Street will be under Boston Common, Beacon Street, Joy Street, Walnut Street and Chestnut Street to the south bank of the Charles River, whence it will be carried to the vicinity of the intersection of Beacon Street and Commonwealth Avenue. The proposed subway will supplement the new Cambridge subway and relieve congestion in the Boylston Street district of the Back Bay. The estimated cost of construction is $4,000,000, and it is expected that the road will be in operation in three years. A tunnel under Beacon Hill will be required, which may be brought into Park Street in connection with the Boston terminus of the Cambridge subway under construction. The Riverbank subway will enable the Boston Elevated Railway to compete more successfully with the suburban lines of the Boston & Albany Railroad by reducing the running time between Newton and other outlying places and Boston. A minimum number of stations will probably be asked by the company to continue the express service betwen the downtown district and suburban centers.

Meeting of the Arkansas Association of Public Utility Operators.—The next meeting of the Arkansas Association of Public Utility Operators will be held at Pine Bluff, Ark., on April 27, 28 and 29, with headquarters at the Jefferson Hotel.

Meeting of the Colorado Electric Light, Power & Railway Association.—The executive committee of the Colorado Electric Light, Power & Railway Association has decided to hold the next convention of the association at the Hotel Colorado, Glenwood Springs, Colo., on Sept. 21, 22 and 23, 1910.

Date Set for Opening Pennsylvania Railroad Tunnels in New York.—The Pennsylvania Railroad has announced that the company's tunnel under the East River between Long Island City and its terminal station at Thirty-third Street and Seventh Avenue, New York, will be opened to the public on May 15, 1910. On March 28, 1910, the officers of the company will conduct a party of invited guests through the station and the tunnel.

Huntington Lines To Build Cars.—The requirements of the Huntington lines in Southern California have increased to such proportions that it has been decided by the Pacific Electric Company, Los Angeles, Cal., to erect a plant in that city which will be equipped for turning out car bodies complete. At present 30 cars of the Los Angeles Railway are in the shops being reconstructed for pay-as-you-enter operation.

Opinion Regarding Franchises.—Attorney-General Denman, of Ohio, has rendered an opinion that a franchise granted a street railway becomes inoperative after a petition for a referendum vote signed by 15 per cent of the electors has been filed with the clerk of the municipality. The petition acts as a veto and a majority vote is necessary to legalize the grant. Electors who have signed the petition cannot withdraw their names after it has been properly filed with the clerk. The opinion was rendered in response to a request from the city solicitor of Ashtabula, Ohio.

Franchise Questions in San Francisco.—The Supervisors of San Francisco on March 14, 1910, directed the Attorney-General of the State to bring suit to forfeit the franchise of the Sutter Street Railroad, which operates a horse car daily on the outer track on Market Street from Sutter Street to the Ferry Building. Progress on the Geary Street, Park & Ocean Railway is interrupted temporarily pending the outcome of the suit brought by Horace G. Platt for an injunction to restrain the city from disposing of the bonds to provide funds for equipping the road as a municipal undertaking.

Subsidiary Companies Organized in Minneapolis.—On account of the recent decision by the Supreme Court of Minnesota in which it was held that the suburban lines of the Twin City Rapid Transit Company are railroads and amenable to the Minnesota law fixing a tax of 4 per cent on gross earnings, it has been decided so to rearrange the incorporation that the suburban railways, the steamer lines operated on Lake Minnetonka and White Bear Lake, and the hotels, restaurants and amusement enterprises of the company might be handled separately for taxation and accounting purposes, and the Minneapolis, St. Paul & Suburban Railway, capitalized at $1,000,000; the Minnetonka & White Bear Navigation Company and the Rapid Transit Realty Company have been incorporated in the interest of the Twin City Rapid Transit Company.

Decision by Ohio Railroad Commission Reversed.—On March 15, 1910, the Supreme Court of Ohio decided that railroads can reduce passenger rates in competition with electric railways between different places on their own lines. A. A. Price, an attorney of Athens, Ohio, filed charges with the Railroad Commission that the Hocking Valley Railroad discriminated against Athens by cutting the rates between places reached by the lines of the Scioto Valley Traction Company and not between others. The Railroad Commission held that the railroad rates were made lower than the rates by electric railway not to meet, but to destroy, competition, and ordered the railroad to charge the same rates as the electric railway between the points served by the lines of both companies, and not to extend the reduction beyond these towns unless by general tariff affecting all the points on the system.

Officers of the New England Street Railway Club.—The nominating committee appointed by W. D. Wright, president of the New England Street Railway Club, recommended that the following officers be voted for at the annual meeting of the club on March 24, 1910: Charles H. Hile, Boston, Mass., president; Franklin Woodman, Haverhill, Mass., Calvert Townley, New Haven, Conn., J. Brodie Smith, Manchester, N. H., G. S. Haley, Rutland, Vt., C. F. Berry, Portland, Me., and D. F. Sherman, Providence, R. I., vice-presidents; John J. Lane, Boston, Mass., secretary; E. P. Shaw, Jr., South Framingham, Mass., treasurer; W. D. Wright, Providence, R. I., Carl A. Sylvester, Newtonville, Mass., W. G. Cory, New Haven, Conn., Thomas Lees, Lowell, Mass., A. S. Michener, Boston, Mass., A. F. Walker, Boston, Mass., and C. V. Wood, Springfield, Mass., executive committee; Charles H. Hile, Boston, Mass., Elton S. Wilde, New Bedford, Mass., Fred F. Stockwell, Cambridgeport, Mass., finance committee.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—President Gorman, of the Maryland Senate, is having a public utilities bill prepared for introduction. Four utility measures are now pending, but it is believed to be the plan of the Democratic leaders to put the Gorman measure through over the other bills. Mr. Benson, the floor leader of the House, is also fostering this measure. The new bill will provide for the appointment of three commissioners, each to be paid $3,000 a year, and a secretary and a general counsel. At least one of the commissioners must be a voter of Baltimore, and the Governor will have power to name them all from the city if he so desires. The commission is authorized to report its find-

ings and recommendations to the Legislature to put them into effect by an enactment. The commission could, however, order the laying of additional railroad switches or the operation of more cars. Attorney-General Straus, who drew the original public utilities bill, is decidedly opposed to the Gorman measure. He is even quoted as saying that he would urge the Governor to veto the measure if it should be passed.

Massachusetts.—W. A. Bancroft, president of the Boston Elevated Railway, appeared in opposition to the immediate construction of the tunnels from Park Street, Boston, to South Boston and Dorchester at the hearing before the committee on metropolitan affairs on March 16. He contended that the company was already committed to extensions in the form of rapid transit routes which will cost $31,550,000. When the Boston Elevated Railway began operation 12 years ago the system comprised 304 miles of track and an investment of about $31,000,000. The investment now is about $85,000,000, and the system comprises 484 miles of track. This increase of nearly 200 per cent in investment has been accompanied by an increase in income from $8,750,000 to $14,500,000. The company is not opposed to any extension which will be supported by the revenue.

New York.—The commission created by the Legislature in 1909 to inquire into the subject of employers' liability and the causes of industrial accidents has made its report to the Legislature. It recommends a fundamental change in the method of compensating injured workmen, and presents two bills to carry out its recommendations which were introduced in the Senate by Senator Wainwright and in the Assembly by Assemblyman Phillips. The first bill applies only to certain specified employments. It recommends the principle of compensation for all accidents regardless of negligence by providing for compensation for all workmen injured in such employments by either the negligence of the employers, his agents, or by the "necessary risk or danger of the employment or one inherent in the danger thereof." Among the employments specified are the following: The erection or demolition of bridges or buildings; the construction of tunnels or subways; all work carried on under compressed air; construction, or repair of wires, or apparatus charged with electric currents; the operation of locomotives, motors or cars, or the construction or repair of steam railroad tracks and roadbeds. The schedule of compensation provided is, in case of death, four years' wages, not to exceed $3,000; and in case of total or partial disability, 50 per cent of the last earnings of the injured person payable weekly, but not more than $10 per week, during the continuance of the disability, not to exceed a period of eight years. The second bill recommended covers all accidents to employees not coming within the purview of the first bill. It introduces the principle of compensation for all accidents, but makes this principle voluntary and subject to agreement between the employer and the employee. This bill, in addition to its elective scheme of compensation, amends the employers' liability act so as to considerably increase the liability of the employer by abrogating or at least greatly modifying the assumption of risk rule. It affects the defense of contributory negligence by placing upon the employer the burden of proving contributory negligence on the part of the employee, whereas, the law now requires the employee to prove his freedom from contributory negligence.

Ohio.—The Langdon tax commission bill, amended as suggested by Attorney-General Denman, has been passed by the House of Representatives. The bill would replace all tax boards with a State commission of three members, to which all corporations would pay their taxes direct. The bill fixes rates as follows: Steam railroads and pipe lines, first $1,000,000 gross receipts, 2 per cent; excess, 3 per cent; interurban railways, first $1,000,000 gross receipts, 1 per cent; excess, 1½ per cent; all other public utilities, first $300,000, 1 per cent; excess, 1½ per cent. Public utilities now pay a tax of 1 per cent on their gross earnings. The Willis law, which requires the payment of a tax of one-tenth of 1 per cent on the capital stock of private corporations, will probably not be changed. The Woods public utilities bill will probably be so amended that the present Railroad Commission will constitute the public utilities commission.

Financial and Corporate

New York Stock and Money Market

March 22, 1910.

Yesterday and to-day the stock market showed some recovery from the depression earlier in the week. The volume of trading, however, continues to be light and price recoveries are fractional. The successful sale of the new issue of New York City bonds—the subscription being four times the offering—has increased the hopeful sentiment. Interborough-Metropolitan has been active. More than 67,000 shares of the two issues were traded in to-day, although the advance was merely nominal.

In spite of the sharp advance last week in the discount rate of the Bank of England, the local money market is but little advanced. Rates to-day were: Call, 2¾ to 3 per cent; 90 days, 4 to 4¼ per cent.

Other Markets

With the failure of the prospect of successful arbitration in the Philadelphia Rapid Transit strike, the stock of that company and Union Traction stock were lower to-day. The pressure to sell is very insistent.

In the Boston market, the issues of Massachusetts Electric and Boston Elevated have been fairly active. The latter especially has been more in evidence during the past week than for many months. Prices remain practically unchanged.

There has been little trading in traction stocks in the Chicago market. A few sales of Metropolitan Elevated and an occasional offering of Chicago Railways Series 2 comprise the entire trading. Prices are unchanged.

In Baltimore, the bonds of the United Railways have been the only traction securities in evidence. These continue to be traded in quite liberally at former prices.

Quotations of various traction securities as compared with last week follow:

	Mar. 15.	Mar. 22.
American Railways Company	45¼	a45½
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	130½	129
Boston & Suburban Electric Companies	a16½	a16
Boston & Suburban Electric Companies (preferred)	a76	a76
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a46	a46
Brooklyn Rapid Transit Company	76	77½
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84	84¾
Capital Traction Company, Washington	a133	*133
Chicago City Railway	a195	*195
Chicago & Oak Park Elevated Railroad (common)	*3¾	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a106	a106
Chicago Railways, ptcptg., ctf. 2	a33	a33
Chicago Railways, ptcptg., ctf. 3	a18	a19
Chicago Railways, ptcptg., ctf. 4s	a9⅛	*9⅛
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76½
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a105½
Detroit United Railway	*62	*62
General Electric Company	154	154½
Georgia Railway & Electric Company (common)	106½	107
Georgia Railway & Electric Company (preferred)	a88	a88
Interborough-Metropolitan Company (common)	22	23½
Interborough-Metropolitan Company (preferred)	55¾	59⅛
Interborough-Metropolitan Company (4½s)	81⅝	82
Kansas City Railway & Light Company (common)	a34	a30½
Kansas City Railway & Light Company (preferred)	a75	*75
Manhattan Railway	*139	137⅛
Massachusetts Electric Companies (common)	a18	a18
Massachusetts Electric Companies (preferred)	a84	a84
Metropolitan West Side, Chicago (common)	a16	a16½
Metropolitan West Side, Chicago (preferred)	a55	a53
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*81¼	*81¼
Northwestern Elevated Railroad (common)	a16	a17
Northwestern Elevated Railroad (preferred)	a68	60
Philadelphia Company, Pittsburg (common)	a51	a51¼
Philadelphia Company, Pittsburg (preferred)	a44½	a44
Philadelphia Rapid Transit Company	a21¼	a22
Philadelphia Traction Company	86	87
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a105½	a105½
Seattle Electric Company (common)	a115	a115
Seattle Electric Company (preferred)	a102	*102
South Side Elevated Railroad (Chicago)	a53¾	a53
Third Avenue Railroad, New York	*8⅜	7½
Toledo Railways & Light Company	*11¾	*11¾
Twin City Rapid Transit, Minneapolis (common)	*114	115¼
Union Traction Company, Philadelphia	a48¾	a49
United Rys. & Electric Company, Baltimore	a14	a13½
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*67	*67
Washington Ry. & Electric Company (common)	38	*40
Washington Ry. & Electric Company (preferred)	a90⅝	*90½
West End Street Railway, Boston (common)	a95	a94½
West End Street Railway, Boston (preferred)	a105½	a106
Westinghouse Elec. & Mfg. Company	68½	a70
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. *Last Sale.

Annual Report of Massachusetts Electric Companies

The income of the Massachusetts Electric Companies during the year ended Sept. 30, 1909, amounted to $1,094,799, divided between $967,630 from dividends on stocks owned and $127,169 interest on notes and bank balances. Expenses were $19,395, leaving a net income of $1,075,404. Against this amount there was charged $157,500 interest on coupon notes, leaving a net divisible income of $917,904. From this sum $513,935, or a total of 2½ per cent dividends on the preferred stock, was deducted, leaving a surplus of $403,969. A profit of $115,997 was realized on the sale of stocks, making, with the surplus of $2,378,792 existing on Sept. 30, 1908, a total surplus as of Sept. 30, 1909, of $2,898,758.

Gordon Abbott, president of the company, says in his statement to shareholders:

"In the last annual report which your board of trustees presented to you it was stated that it seemed probable that the decreases in gross earnings which marked the concluding months of the year ending Sept. 30, 1908, would continue during the first six months of that which has just closed. This expectation happily proved to be unfounded; the gross earnings of the companies in which you are interested were slightly greater for the first half of this fiscal year than those of the same period of the previous year. During the last six months there was a marked improvement in the gross, so that the year as a whole showed an increase in gross earnings for all the companies of $258,843, 3⅓ per cent.

"Operating conditions during the year have been sufficiently favorable, owing to the low price of supplies, to produce an increase of $125,000 in net earnings despite increasingly liberal expenditures on maintenance over those of the previous year. Of this increase $42,569 was absorbed by dividends on the preferred shares of the operating companies, but the remaining increase in net was large enough to justify the Old Colony Street Railway in increasing its dividend from 4 per cent to 5 per cent. The dividend rate of the Boston & Northern was maintained at 5 per cent.

"The sale of preferred shares produced the sum of $1,205,820, and this amount, together with the proceeds of $1,654,000 bonds of the operating companies sold during the year, enabled them to pay off all their floating debt, excepting that owed to the Massachusetts Electric Companies, and in addition left the operating companies with a surplus of cash to pay for cars and new electrical machinery ordered during the past fiscal year, but not yet delivered.

"During the past year the operating companies expended $793,406, as follows: Track construction, $211,515; track reconstruction, $399,407; cars and electrical equipment, $2,368; wires and bonding, $99,932; power stations, $33,503; land and buildings, $32,119; sundry equipment, $14,562; total, $793,406.

"With this expenditure half a mile of new track was built, 18¼ miles of old track reconstructed, 21 miles of new line construction done, and an 800-kw generator added to the Lowell station. Besides this, 40 semi-convertible cars and a 1200-kw generator for the Lawrence station were ordered, but not delivered before the end of the fiscal year. As a result of this expenditure and of the expenditures on maintenance, the trustees are able again to report that the physical condition of the properties has improved.

"On July 1, 1909, a dividend of 1½ per cent was paid on the preferred shares of the Massachusetts Electric Companies, and the trustees have felt justified by the results of the year in increasing the distribution on Jan. 1, 1910, to 1¾ per cent. Although the earnings for the past year would appear to justify the declaration of a dividend at a higher rate than this, your trustees are of the opinion that the time has not yet come when it would be wise to resume the 4 per cent rate, in view of the fact that the past year is the first since 1903 in which the full 4 per cent was earned. They think that the interests of the shareholders will be best served by maintaining a strong financial condition until the earning power of the property has been demonstrated over a longer period."

A consolidated statement of profit and loss of the operating subsidiary street railway and electric light companies for the year ending Sept. 30, 1909, is as follows:

Earnings		$8,052,355.61
Expenses		5,148,396.87
Net earnings		$2,903,958.74
Interest, rentals and taxes		1,778,128.97
Net divisible income		$1,125,829.77
Dividends on common stock	$957,895.00	
Dividends on preferred stock	42,569.10	
		1,000,464.10
Surplus for the year		$125,365.67
Surplus Sept. 30, 1908		210,887.38
Total		$336,253.05
Deductions:		
Injuries and damages prior to insurance	$8,271.45	
Premium on bonds redeemed	2,188.00	
Adjustment of accounts	5,561.18	
Reconstruction	74,387.83	
Reconstruction of leased properties	25,444.38	
Depreciation of Hyde Park Electric Light Company property	4,002.60	
Total deductions		119,855.44
Surplus Sept. 30, 1909		$216,397.61

Binghamton (N. Y.) Railway.—The holders of the $137,000 of first mortgage 6 per cent bonds of the Binghamton Street Railway due on April 1, 1910, are offered the privilege of exchanging their bonds, bond for bond, interest to be adjusted, for first consolidated mortgage 5 per cent tax exempt gold bonds of the Binghamton Railway due in 1931, which cover the entire system of the company.

Brooklyn (N. Y.) Rapid Transit Company.—There have been listed on the New York Stock Exchange $1,230,000 more of first mortgage convertible 4 per cent bonds of the Brooklyn Rapid Transit Company. There have been issued to date $48,296,000 of the refunding bonds of the company, of which $34,787,000 have been listed on the exchange and $13,509,000 are held in the treasury of the company.

Camden & Trenton Railway, Camden, N. J.—The property of the Camden & Trenton Railway was sold under foreclosure on March 18, 1910, for $675,000 to Henry W. Thomson, Jr., representing the bondholders' committee.

Catskill (N. Y.) Traction Company.—The Catskill Traction Company, which has succeeded to the property and franchises of the Catskill Electric Railway, sold at foreclosure on Jan. 12, 1910, has asked the Public Service Commission of the Second District of New York for consent to mortgage its property and franchise to secure a bond issue to the amount of $200,000 and for permission to issue $60,000 in bonds in part payment of the purchase price of the property of the Catskill Electric Railway; also for permission to issue $12,000 capital stock to the incorporators, which has been paid for in cash and $48,000 par value capital stock to W. C. Wood in payment of the balance of the purchase price of the property of the Catskill Electric Railway.

Chicago (Ill.) Railways.—It is said that before April 1, 1910, an announcement will be made of the details of a plan by which the Chicago Railways will operate the lines of the Chicago Consolidated Traction Company under lease for 99 years.

Chicago (Ill.) City Railway.—The report of the Chicago City Railway for the year ended Jan. 31, 1910, as presented at the annual meeting of the stockholders of the company on March 16, 1910, shows earnings briefly as follows: Gross receipts, $9,094,047; expenses, taxes, renewals, etc., $8,230,734; net earnings, $863,313; city's proportion of net earnings, $474,822; amount left for company, $388,491; interest on capital, $1,864,901; income from operation, $2,253,392; other income, $555,714; total, $2,809,106; interest on bonds, $1,110,666; net, $1,698,440; regular dividends, $1,080,000; balance after paying dividends, $618,440. The stockholders have elected E. R. Bliss, B. E. Sunny and Honore Palmer directors to succeed A. J. Earling, Robert M. Fair and S. M. Felton. The officers have been re-elected.

Cleveland (Ohio) Railway.—The holders of the present $14,675,600 of outstanding stock of the Cleveland Railway are offered the right until April 10, 1910, to subscribe for and take 10 per cent of new stock at par. Payment is to be made on the basis of 25 per cent on or before May 1, 1910;

25 per cent on or before July 1, 1910; 25 per cent on or before Sept. 1, 1910, and 25 per cent on Nov. 1, 1910, or optionally in full at any time before Nov. 1, 1910.

East Liverpool Traction & Light Company, East Liverpool, Ohio.—Van Horn Ely, president of the East Liverpool Traction & Light Company, is said to have arranged to take over the Valley Electric Company, New Brighton, Pa., in the interest of the East Liverpool Traction & Light Company.

Interstate Railways, Philadelphia, Pa.—It was stated that about $7,000,000 of the $10,776,000 of 4 per cent bonds of the Interstate Railways had been deposited with the Real Estate Trust Company up to March 14, 1910, in accordance with the terms of a readjustment committee.

Little Rock Railway & Electric Company, Little Rock, Ark.—An extra dividend of 1½ per cent on the $1,500,000 of common stock of the Little Rock Railway & Electric Company was paid on March 1, 1910.

Louisville (Ky.) Railway.—The Louisville Railway reports earnings as follows for the year ended Dec. 31, 1909: Gross earnings, $2,969,132, of which $2,685,288 was derived from the revenue of the city lines, $17,634 from mail and advertising, $162,668 from the revenue of the interurban lines, $24,711 from the freight and express revenue of the interurban lines, and $78,829 from other sources; operating expenses and charges, $2,391,790, of which $1,568,473 was incurred in operating the city lines, $96,932 in operating the interurban lines, $216,000 for State, county and city taxes, $385,384 for interest on debt paid and accrued, and $125,000 for the dividend on the preferred stock; net earnings, $577,341, of which $545,650 was used to pay the dividend on the common stock, $25,000 was set aside for accident reserve, and $6,691 was carried to surplus account.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has reserved decision on a motion of the Twenty-third Street Railway to have the receivers of the Metropolitan Street Railway set aside the surplus earnings of the Twenty-third Street Railway in a special account as a fund to meet the interest on the notes held by the Mercantile Trust Company of $2,200,000 and interest on $400,000 underlying bonds.

Milford & Uxbridge Street Railway, Milford, Mass.—The Milford & Uxbridge Street Railway has petitioned the Massachusetts Railroad Commission for authority to issue $88,000 of preferred stock at a par value of $100 per share.

Nashville Railway & Light Company, Nashville, Tenn.—The Nashville Railway & Light Company reports earnings as follows for the year ended Dec. 31, 1909: Gross earnings for 1909, $1,724,379, as compared with $1,597,029 for 1908; operating expenses and taxes for 1909, $1,013,882, as compared with $954,296 for 1908; earnings from operation for 1909, $710,497, as compared with $642,733 for 1908; interest for 1909, $394,353, as compared with $393,099 for 1908; net earnings for 1909, $316,144, as compared with $249,634 for 1908; reserve, including depreciation, for 1909, $51,513, as compared with $47,742 for 1908; net income for 1909, $264,631, as compared with $201,892 for 1908; reserve, miscellaneous, for 1908 transferred to profit and loss, $45,000; surplus for 1909, $264,631, as compared with $246,892 for 1908; 5 per cent dividend on preferred stock for 1909, $125,000, as compared with $123,445 for 1908; surplus for 1909 after dividend, $139,631, as compared with $123,447.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Jenks announce that they have not received sufficient assents to warrant them in proceeding further with their proposal to buy from the stockholders of the New Orleans Railway & Light Company $4,000,000 of the common stock and $2,000,000 of the preferred stock of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, 1910, page 295.

St. Louis, Monte-Sano & Southern Railway, St. Louis, Mo.—Peter Kerth has been appointed receiver of the St. Louis, Monte-Sano & Southern Railway, which has completed 8 miles of line out of St. Louis.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—The Waterloo, Cedar Falls & Northern Railway has called for payment at 103 and interest on April 1, 1910, the $755,000 of 5 per cent first mortgage gold bonds of the Waterloo-Cedar Falls Rapid Transit Company.

Traffic and Transportation

Coney Island & Brooklyn Railroad Ordered to Equip Its Cars with Fenders and Wheel Guards

After allowing nearly a year for experimenting with the types of fenders and wheel guards to be used by the Coney Island & Brooklyn Railroad, the Public Service Commission of the First District of New York has ordered the company on or before Oct. 15, 1910, to equip all its closed passenger cars with wheel guards of a type or types to be approved by the commission; to equip all open passenger cars on or before July 1, 1910, with wheel guards or platform trip fenders of a type to be approved by the commission, and to file with the commission by April 5, 1910, drawings and specifications showing the types of wheel guards and fenders to be used. There is an order in force which directs the company to use projecting fenders and wheel guards, but the order just adopted provides that as soon as the wheel guards are installed the company shall have the right to fold up the fenders on cars operated over Brooklyn Bridge, Williamsburg Bridge, Washington Street, High Street, Fulton Street between Washington Street and DeKalb Avenue, and Roebling Street between Broadway and Williamsburg Bridge Plaza. The order was adopted on an opinion submitted by Commissioner Maltbie.

The companies operating in Brooklyn and Queens asked for an opportunity to test various types of wheel guards to determine which were best suited to local conditions. On April 28, 1909, the Coney Island & Brooklyn Railroad and other street railroads were ordered to equip their cars with fenders, but the order for wheel guards was withheld pending experiments to be made by the company. The Coney Island & Brooklyn Railroad operates 450 cars over about 50 miles of single track, of which 32 are paved with granite blocks and four with cobblestones, while for about 14 miles there is no pavement at all.

Pursuant to the agreement to allow experiments, the commission took no action until the fall of 1909, when it held hearings, and on Dec. 24, 1909, an order was adopted directing all the companies of the Brooklyn Rapid Transit System and the Coney Island & Brooklyn Railroad to equip their cars with wheel guards of a type or types to be approved by the commission. The Coney Island & Brooklyn Railroad was then granted an independent rehearing, the avowed purpose of the company being to make a record, with a view of testing the legality of the order under a writ of certiorari.

Mr. Maltbie recites the various objections offered by the company, which he dismisses with the exception of the objection made to the expense of altering the open cars. Of the 450 cars operated 259 are open cars, so constructed that there is not sufficient space between the ends of the car and the trucks properly to adjust wheel guards. The cars could be altered to permit of the installation of wheel guards, but it would cost from $150 to $250 for each car. The former figure is the estimate of the commission's expert, the latter that of the company's engineer. Since the hearings it has been suggested that the company be allowed to use a projecting platform-trip fender on the open cars, carried several inches above the rails. The commissioner does not approve altogether of the platform drop fender for the reason that its action depends upon the quickness of the motorman. He says:

"In view of the expense which would be incurred to transform immediately the open cars—approximately $40,000—it seems reasonable to allow the company to determine for itself, as respects these open cars, whether it will install wheel guards and the ordinary fender or substitute for both a platform trip fender. The commission believes that the safety of the public is the fundamental consideration, and prefers that the company should place wheel guards and fenders upon all of its cars; but if the company exercises the privilege allowed it in the order and decides to put on the platform drop fender, and if such a fender shall prove to be inefficient, the commission will feel free to act immediately and order the substitution of more efficient devices for those in use."

Mr. Maltbie, in conclusion, points out that the surface cars of the Brooklyn Rapid Transit System, which operate

under conditions similar to those existing on the lines of the Coney Island & Brooklyn Railroad, are equipped with wheel guards and fenders in accordance with the order of the commission. About 2500 cars of the Brooklyn Rapid Transit System are affected, as against 450 operated by the Coney Island & Brooklyn Railroad.

Decision Regarding Service in Newton, Mass.

The Railroad Commission of Massachusetts has rendered the following decision in the case of the petition of the residents of Newton, Mass., regarding service on the Middlesex & Boston Street Railway:

"The petitioners complain of the infrequency of car service on the Auburndale line, so-called, after 7:30 p. m. At the hearing it appeared that the service was half-hourly during the winter season. The complaint raises two questions—the insufficiency of the service between Lake Street and Centre Street and the service beyond Centre Street in the direction of Auburndale. At the hearing the company agreed to restore the 15-minute service between Lake Street and Centre Street, and this service is now in operation. After the hearing, at the request of the commission, the company filed reports showing the amount of traffic after 7:10 p. m. for 10 days between Centre Street and Auburndale in both directions. A study of these returns, taken in connection with the service already restored, does not show a sufficient demand of the traveling public for the restoration of the 15-minute service from Centre Street to Auburndale.

"A demand is disclosed, however, for additional service to and from the Brae-Burn Country Club upon occasions when winter sports or other events are taking place. While this demand must of necessity depend in some part upon weather conditions, we recommend that such additional service as will meet it be installed."

Lower Car Steps in Portland, Ore.—The Portland Railway, Light & Power Company, Portland, Ore., has agreed to reduce the height of the steps on 40 cars recently equipped for service from 18 in. to 15½ in.

Complaint Against Service on International Railway.—The Public Service Commission of the Second District of New York has received a complaint from residents of Lancaster and Depew against the International Railway, alleging insufficient passenger car service at certain hours of the day and unsanitary condition of passenger cars.

Seattle-Tacoma Fare Case to Be Appealed.—The Puget Sound Electric Railway proposes to appeal to the courts from the finding of the Railroad Commission of Washington, fixing the rates of fare between Seattle and Tacoma and other places along the line of the company. The order of the commission was published in the Electric Railway Journal of March 19, 1910, page 508.

Service of the Washington, Baltimore & Annapolis Electric Railway Extended.—The cars of the Washington, Baltimore & Annapolis Electric Railway are now operated in Washington to the Treasury Building, and transfers are issued between the cars of this company and the cars of the local companies at five places in Washington. Sixty-four limited cars are operated daily between Baltimore and Washington.

Decrease in Fares Asked at Westborough, Mass.—The Selectmen of Westborough have petitioned the Massachusetts Railroad Commission to reduce the fare on the Worcester Consolidated Street Railway between Westborough and Worcester from 20 to 15 cents. The Selectmen also urge that the company be required to continue to operate its power plant and car house in Westborough. There was a hearing at Boston on March 21.

Express Passenger Service Between South Framingham and Boston.—The Middlesex & Boston Street Railway, by arrangement with the Boston Elevated Railway, has begun operating an express passenger car service on week days between South Framingham and the Park Street subway, Boston. Three round trips are made daily. The running time is 1 hour and 20 minutes between South Framingham and Park Street. Stops are made at Natick, Wellesley and the Newtons.

Ohio Electric Railway Benefit Association.—At a meeting of the grand council of the Ohio Electric Railway Benefit Association, held at Newark, Ohio, on March 17, 1910, the following officers were elected: E. J. Kessler, Lima, president; W. H. Robinson, Newark, vice-president; George Heckethorne, Springfield, secretary-treasurer. Special cars from Lima and Springfield carried the delegates to the meeting. A banquet was served in the evening and representatives from chapters in Cincinnati, Dayton, Springfield, Hamilton, Lima, Columbus, Zanesville and Newark were present.

Abandonment of Unprofitable Line Upheld in Wisconsin.—The Wisconsin Railroad Commission has dismissed the complaint of H. W. Brown for the restoration of a discontinued street car service by the Janesville Street Railway. The complaint was based upon the failure by the company to run its cars over a section of its track in Janesville that formerly was used for service. The company contended that it could not maintain the abandoned service; that the entire service in Janesville was unprofitable; that the business of the company was not sufficient to pay running expenses; that the company had not paid dividends or interest on its bonds. In dismissing the petition the commission says that the ordinary rule that a railroad must operate all of its branches as an entirety and that abandonment of any part of a system because it fails to pay a profit is against public policy will not hold in this case, because the entire system is not profitable, and no public good could come from the requirement asked by the petitioners.

Binghamton Fare Complaint Closed.—The Public Service Commission of the Second District of New York has closed on its records the complaint against the Binghamton (N. Y.) Railway regarding passenger fare in which it was alleged that a clause in the contract between the company and the village of Union which stated that "the fare for passengers may be, but shall not exceed, 10 cents for each person for a single ride between Union and Lestershire, or 15 cents for the round trip made the said day between said villages" was not being complied with, because the company compelled passengers who had purchased round-trip tickets for 15 cents to leave the cars at the westerly boundary of Lestershire or pay an extra fare from this boundary to regular stopping places within the village, although passengers who purchased one-way tickets at 10 cents were carried the entire distance between these villages. Under date of March 14, 1910, G. T. Rogers, president of the company, wrote the commission that the officers of the company believed that it would stimulate harmony and good feeling upon the part of its Union, Endicott and Lestershire patrons to issue and accept round-trip Lestershire-Union tickets from and to any place within the village limits of Lestershire, and had decided to do so.

Petition for Owl Service in Harrisburg.—A number of steam railroad employees who live in Harrisburg have asked the State Railroad Commission to require the Central Pennsylvania Traction Company to operate an all-night car service on the more important city lines. The company denies that there is any necessity for the service asked in the complaint. To the charge that about 225 passengers arrive at the Union Station, Harrisburg, between 12:24 a. m. and 5 a. m. the company says that the number of passengers who arrive between the hours mentioned that do not continue to some other destination by steam railroad is not in excess of 75. It also says that the number of railroad train crews leaving Enola, five miles from Harrisburg, and five miles from the nearest point of connection with its line, is very small and has no bearing upon the subject matter of the complaint; that there is no public need for the all-night service; that the expense of such service maintained by cars operated even at infrequent intervals during the hours mentioned would greatly exceed the receipts, and that to compel the company to operate such service would burden it unjustly. The company is prepared to present comparative data upon the general subject matter of the complaint to the commission if the objection which it has entered in general terms should be considered insufficient.

Report on Transit Conditions in Trenton.—Samuel Whinery, who was retained recently by Charles E. Bird, City Counsel of Trenton, N. J., to investigate street railway

conditions in Trenton and make recommendations to the Council for changes in the operation of the lines, has submitted his report, and it has been transmitted to the Council. He took Scranton, Pa.; Syracuse, N. Y.; Utica, N. Y., and Grand Rapids, Mich., which are approximately as large as Trenton, for purposes of comparison, and prepared a table showing the bonds and stock issued in these cities per mile of road and per 1000 inhabitants and the gross earnings and net earnings per mile of road and per 1000 inhabitants and the passengers carried per mile of road and per 1000 inhabitants. Mr. Whinery recommends that more cars be operated during the rush hours; that the cars be kept cleaner and that the traffic ordinance relating to the obstruction of car tracks by vehicles be rigidly enforced. These recommendations should be carried into effect at once. For the future he recommends an increase in the capacity of the power plant of the Trenton Street Railway by the installation of a 1500-hp engine and generator and 600 hp in boilers, the substitution of larger cars for those now in service and the reconstruction and repair of the company's tracks on portions of the system specified in the report. Mr. Whinery says that a sum practically equivalent to the capitalization of the company would be required to replace the present property.

Terre Haute, Indianapolis & Eastern Traction Company.—A new timetable has been issued by the Terre Haute, Indianapolis & Eastern Traction Company which includes an excellent map of the territory served by the company and an alphabetical list of the stations. The other information contained in this publication includes the timetables on 10 divisions, a general statement regarding baggage, chartered cars, mileage and coupon books, interline tickets and the following statement regarding lost tickets and disputes: "If you lose your ticket you are out of pocket the value thereof. The railroad company is under no obligation to give you another in its place, nor to allow you to ride free. Give notice of your loss to the conductor. Pay your fare to him or purchase another ticket from first ticket station. Take conductor's or ticket agent's receipt for the amount paid. When you reach your destination write to the general passenger agent of the road of which you bought your ticket, enclose receipt and explain the circumstances. If your ticket is found and returned unused the company will refund your money. Agents and conductors are governed by the rules of this company. In case of dispute with them, it is always best to pay the fare requested and refer the matter to the general passenger agent, who will promptly investigate and adjust any differences." The new folder shows the connections with steam railroads at 11 of the more important intersecting points. It is made up of a single sheet folded to 3⅛ in. by 6¼ in.

Vice-President H. E. Niesz presided at the meeting of the Electric Club of Chicago on March 16, 1910, in the absence of F. P. Vose, president, who was detained by illness. The object of this meeting was to discuss means of enabling the members to get better acquainted with one another. In any organization of considerable size there is a large proportion of the members who are unacquainted or only slightly acquainted, and Frank L. Perry, chairman of the reception committee of the Electric Club, presented a plan designed to further the spirit of good-fellowship among electrical men, which is one of the important objects of the club, by a scheme of identification cards. These cards are the size of an ordinary business card. A supply of blank cards is provided at the door and also a marking pencil. Each member of the club, on entering the place of meeting, prints in capital letters about three-quarters of an inch high his last name in one line on one of these cards and also, in a word or two, in a line beneath, the distinguishing name of his company or occupation. Clip stick pins are provided, and by this means every man present will have a sufficient identification in a form that may be read at a distance of 20 ft. or more. Before the meeting adjourned the plan advocated by Mr. Perry was adopted unanimously. Among those who addressed the club were A. A. Gray, J. R. Cravath, J. F. Dostal and George R. Bliss, Jr.

Personal Mention

Mr. C. G. Guild has resigned as superintendent of the light and power department of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., to enter the manufacturing field.

Mr. J. W. Hewitt has been appointed trainmaster of the Oregon Water Power division of the Portland Railway, Light & Power Company, Portland, Ore., to succeed Mr. S. T. Jones, resigned.

Mr. W. S. Dimmock has retired as manager of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company, Tacoma, Wash., to return to the home office of Stone & Webster, Boston.

Mr. M. J. Kehoe, superintendent of power of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., has been appointed superintendent of the light and power department to succeed Mr. C. G. Guild, resigned. The position of superintendent of power has been abolished.

Mr. Samuel B. McLenegan has resigned as general manager of the Central California Traction Company, Stockton, Cal. Mr. McLenegan has served continuously for 17 years in electric railway work in California, and proposes for the present at least to devote his attention to his olive orchard interest in the Santa Clara Valley, near San José.

Mr. L. H. Bean, local manager of the Whatcom County Railway & Light Company, Bellingham, Wash., has been appointed manager of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company, Tacoma, Wash., to succeed Mr. W. S. Dimmock, who has returned to the home office of Stone & Webster, in Boston.

Mr. John J. Cotton has been appointed advance agent of the Middlesex & Boston Street Railway, Framingham, Mass., a newly created position, in which he will have charge of all arrangements for the operation of special cars over the lines of the company and the routeing of excursions, etc. Mr. Cotton was formerly a conductor on the Waltham division of the company.

Mr. George F. Staal has been appointed first assistant engineer of way of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to succeed Mr. H. B. Kamschulte, whose resignation was announced in the Electric Railway Journal of March 12, 1910. From 1890 to 1896 Mr. Staal was engaged in private and government engineering work in the Argentine Republic, S. A., and from 1896 to 1900 was engaged in private and government engineering work in the South African Republic. Since April, 1902, he has been connected with the civil engineering department of the Milwaukee Electric Railway & Light Company.

Mr. A. D. Miller, recently manager and superintendent of the Reno (Nev.) Traction Company, has been appointed manager of the Central California Traction Company, Stockton, Cal., to succeed Mr. S. B. McLenegan, whose resignation is announced elsewhere in this column. Mr. Miller was graduated from Stanford University, California, in 1905, with the degree of electrical engineer. His first commercial work was with the engineering department of the Truckee River General Electric Company, Reno, Nev. Subsequently he was appointed assistant engineer of the company, which controlled the Truckee River General Electric Company, the Reno Power, Light & Water Company and the Reno Traction Company. When the property of the Truckee River General Electric Company and the Reno Power, Light & Water Company was sold in 1909 the former owners retained the property of the Reno Traction Company as their only interest in Nevada. The former manager of all three properties entered the employ of the owners of the Truckee River General Electric Company and the Reno Power, Light & Water Company and Mr. Miller was appointed general manager of the Reno Traction Company.

Mr. L. H. Conklin, recently general manager of the Scranton (Pa.) Electric Company, has been engaged by J. G. White & Company, Inc., New York, N. Y., as an engineer

in their operating department. Mr. Conklin was graduated from Pratt Institute, Brooklyn, N. Y., in 1891. From 1891 to 1894 he worked in various capacities in several manufacturing plants to gain practical experience, and in 1894 became expert on the arc apparatus for the Excelsior Electric Company, which then manufactured the arc machines designed by Mr. Wm. Hockhousen, to whom Mr. Conklin afterward became chief assistant. From 1896 to 1900 Mr. Conklin was superintendent of the electric plant of the Flatbush Gas Company, Brooklyn, N. Y., and from 1900 to 1904 he was a member of the firm of Weiderman & Conklin, New York, N. Y., which business is still being conducted. In the spring of 1905 Mr. Conklin entered the employ of Mr. A. M. Young, a director of the American Gas & Electric Company and several other electrical companies, for whom as engineer in the New England territory, he rebuilt and modernized several electric light plants and constructed an electric railway. In the spring of 1907 Mr. Conklin became connected with the West Penn Electric Company, Pittsburgh, Pa., as superintendent of lighting, and in August, 1907, was appointed general superintendent of the West Penn Railways, the West Penn Electric Company, McKeesport & Greensburg Railway, Westmoreland Light, Heat & Power Company and the Latrobe Street Railway, constituting what is known as the West Penn System. Mr. Conklin is a member of the American Institute of Electrical Engineers, a past president of the Pennsylvania Electric Association and an ex-officio member of the executive committee of the National Electric Light Association.

OBITUARY

Don Cameron Gillman, at one time superintendent of employment of the Seattle (Wash.) Electric Company, was one of the victims of the Wellington avalanche on the Great Northern Railroad. Mr. Gillman was a native of Atlantic, Ia., and had been a cadet at West Point Military Academy. He came to the Seattle Electric Company eight years ago and was in its employ for a period of more than two years. Later he entered the service of the Great Northern Railroad. He was 32 years old.

J. J. Mahony, of the railway department of the General Electric Company, died at the home of his sister in Holyoke, Mass., on March 19, 1910. Mr. Mahony was about 48 years of age. He was a native of Worcester, Mass., and was graduated from the Worcester High School. Early in 1888 he entered the works of the Thomson-Houston Company at Lynn, Mass., and after taking the shop course with the company was assigned to construction work. Subsequently he was transferred to the railway department of the company and for a number of years supervised the installation of railway generators and car equipment. In 1893 Mr. Mahony was sent to Australia by the foreign department of the General Electric Company and for several years he was in charge of railway installations in various parts of that country. Upon his return to the United States, Mr. Mahony became associated with Mr. W. B. Potter, chief engineer of the railway department of the General Electric Company, but was eventually transferred to commercial work in the railway department with headquarters in New York City. For the last six or seven years his work had been commercial, confined largely to the Metropolitan district. He was a member of the American Institute of Electrical Engineers, the Engineers' Club, the New York Railroad Club, and the Machinery Club. The remains were interred at Worcester on March 22, 1910.

As a result of the increased demand for power, the Interborough Rapid Transit Company, New York, N. Y., has placed with the General Electric Company an order for two additional 7500-kw low-pressure turbines of the Curtis vertical type with induction generators, to be installed during the summer in the company's Fifty-ninth Street power plant. These units will be duplicates of the three machines already installed in the same station, which were recently discussed at length by H. G. Stott, in his paper before the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, entitled "Tests of a 15,000-kw Steam Engine Low-Pressure Turbine Unit," an abstract of which was published in the Electric Railway Journal of March 12, 1910, page 451.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Omaha, Council Bluffs & Sioux City Railroad, Des Moines, Ia.**—Application has been made by this company for a charter to build an electric railway from Council Bluffs to Sioux City in Iowa. Capital stock, $10,000. Officers: M. H. Miller, president and secretary; B. J. Ness, vice-president, and J. W. Russell, treasurer.

***English Consul Estate, Landsdowne & Baltimore Railway, Baltimore, Md.**—Application has been made in Maryland by this company to build an electric railway from Baltimore via Westport to Landsdowne. Capital stock, $100,000. Incorporators: James Rittenhouse, Henry J. Emerich, S. Newton Robinson, Jr., Charles H. Werner, W. Elmer King, Ernest E. Robinson and Charles J. Hull.

***Silver Springs & Damascus Railway, Silver Springs, Md.**—Application has been made in Maryland for a charter to build an electric railway between Silver Springs and Damascus, Md. Capital stock, $250,000. Incorporators: Charles F. Nesbitt and Lee L. Latimer, Washington, D. C.; H. M. Martin, Charles D. Muir, J. Dawson Williams and Preston B. Ray.

Minneapolis & St. Paul Suburban Railway, Minneapolis, Minn.—Incorporated in Minnesota in the interest of the Twin City Rapid Transit Company to operate a line between the business centers of Minneapolis and St. Paul, included in the system of the Twin City Rapid Transit Company. Capital stock, $1,000,000. Directors: C. G. Goodrich, Minneapolis, president; W. J. Hield, vice-president and general manager; S. E. Pattee, secretary and controller; A. M. Robertson and Horace Lowry.

Citizens' Traction & Power Company, Albuquerque, N. Mex.—Incorporated in New Mexico to build an electric railway in Albuquerque. Capital stock, $75,000. Incorporators and officers: A. W. Hayden, president; D. H. Boatright, vice-president; J. C. Baldridge, treasurer, and Isaac Barth, secretary. [E. R. J., March 5, '10.]

***Neuse-Trent Traction Company, Newbern, N. C.**—Incorporated in North Carolina to build an electric railway from Newbern to Trenton. Capital stock authorized, $300 to $300,000. Incorporators: C. L. Stevens, W. G. Gilbert and H. I. Crumpler, Newbern.

***Citizens' Street Railway, Wilburton, Okla.**—Chartered in Oklahoma to build a 10-mile interurban electric railway from Wilburton to Paterson and Lutie. Capital stock, $1,000,000. Incorporators: James M. Connell, Richard Howard, Benjamin Mills, Ellias M. Cooper and William Powers, Wilburton.

***Niagara Falls, Welland & Dunnville Electric Railway, Welland, Ont.**—Incorporated in Ontario to build an electric railway from Niagara Falls City through Stamford, Thorold, Crowland, Welland, Humberstone, Wainfleet, Moulton and Sherbrooke. Capital stock, $200,000. Those interested are: F. R. Lalor, Dunnville; Franklin Buell, Buffalo, N. Y.; J. C. Gardener, Geo. Arnold, F. E. Misener, G. H. Burgar and H. A. Rose.

Orangeburg (S. C.) Railway.—Incorporated in South Carolina to build a 30-mile electric railway between Orangeburg and Springfield, via Livingston, Elizabeth City, Rock Grove, Goodland, Liberty, Hebron, Zion and Williams. Capital stock, $50,000. Incorporators: W. C. Wolfe, J. A. Berry and Lawrence Manning. [E. R. J., Feb. 12, '10.]

Eastern Texas Traction Company, Greenville, Tex.—Incorporated in Texas to build an electric railway from Greenville to Wolfe City, with probable extensions to Bonham, Denison, Honey Grove, Paris, Cooper, Clarksville, Dallas, Plano, Chisholm and Forney. Capital stock, $12,000. Incorporators: J. H. Blocker, J. B. Murphy, H. E. Vaughan, W. M. McBride, H. C. Tittsworth, Glen A. Coulson and J. R. Green. [E. R. J., Dec. 19, '09.]

Valley Railway & Power Company, Kent, Wash.—Incorporated in Washington to build an electric railway to con-

nect Kent, Renton, Auburn, Seattle and Tacoma. Right of way has been secured as far as Renton. Officers: H. B. Madison, Kent, president; I. P. Calhoun, Kent, secretary; A. T. West, Seattle, general manager, and Lee Monohan, Renton, treasurer. [E. R. J., March 19, '10.]

FRANCHISES

Santa Barbara, Cal.—The City Council has granted the Santa Barbara Consolidated Railroad a 25-year franchise to build an electric railway in Santa Barbara, beginning at the intersection of State Street and Victoria Street and along State Street.

Vacaville, Cal.—The City Trustees have granted the Vallejo & Northern Railway, Vallejo, a franchise to build an electric railway over certain streets in Vacaville. This projected railway will connect Vallejo, Cordelia, Suisun, Vacaville and Sacramento. [E. R. J., March 5, '10.]

Owosso, Mich.—At a special election recently held in Owosso, the Lansing & Northeastern Electric Railway, Lansing, was voted a franchise to build an electric railway in Owosso. This is part of a plan to build a 30-mile electric railway from Lansing to Owosso. The line is almost completed between Morrice and Owosso. [E. R. J., March 22, '10.]

***Valley City, N. D.**—The City Council has granted to the Valley City Street Interurban Railway a franchise to operate electric railways over certain streets in Valley City.

Sandusky, Ohio—The County Commissioners have been offered $12,000 for a 25-year franchise by the Lake Shore Electric Railway, Sandusky, to build an electric railway over the new bridge to be erected over the Huron River at Huron. F. W. Coen, general manager.

***Dallas, Ore.**—E. W. Thomas, representing Philadelphia capitalists, has been granted a franchise to build an electric railway in Dallas. It is the intention to extend the railway to Dry Hollow and Three-Mile Creek.

***Welland, Ont.**—C. J. McLaughlin, Hartford, Conn., has asked the Town Council for a 20-year franchise to build an electric railway in Welland.

Pottsville, Pa.—The City Council has granted the Eastern Pennsylvania Railway the right to double-track its line in Pottsville. L. C. Bradley, general manager.

Poultney, Vt.—The Trustees have granted the Rutland Railway, Light & Power Company, Rutland, the right of way necessary to build an electric railway in Poultney. This is part of a plan to build a 23-mile extension from Rutland to Lake St. Catherine.

Seattle, Wash.—Application has been made by the Seattle, Snohomish & Everett Railway, Seattle, for a 50-year franchise to construct an electric railway between Seattle and Snohomish. The line is to be extended to Everett and will be 32 miles long. Charles W. Kimball, Seattle, secretary and treasurer. [E. R. J., Feb. 13, '09.]

Seattle, Wash.—The City Council has granted the Seattle Electric Company a franchise to construct and operate an electric railway upon certain parts of Atlantic Street and Utah Street in Seattle.

Stoughton, Wis.—The Common Council has granted an extension of six months to the franchise of the Cincinnati Construction Company, Janesville. It is expected that construction of this electric railway between Madison and Janesville will be started May 1. [E. R. J., Jan. 8, '10.]

TRACK AND ROADWAY

Citizens' Light & Transit Company, Pine Bluff, Ark.—Press reports state that this company expects to rebuild most of its railway and make important extensions, commencing the work in July. W. Y. Ellis, Pine Bluff, chief engineer. [E. R. J., March 6, '09.]

Fitzgerald & Ocilla Electric Railway, Fitzgerald, Ga.—This company is said to have financed its projected railway between Fitzgerald and Ocilla, and work has been started at Fitzgerald by the American Construction Company, New York, N. Y., which has the contract. The company has purchased 450 acres of land on the route of the projected railway between the two cities, where it is proposed to establish an amusement park. The following officers were recently elected: S. Tilden Holtzendorf, New York, president; Elmer P. Morris, New York, first vice-president; D. B. Jay, Fitzgerald, second vice-president and general counsel; C. A. Holtzendorf, Fitzgerald, secretary, and W. A. Heller, New York, treasurer. [E. R. J., March 12, '10.]

***Vidalia, Ga.**—A. L. Gillis, Gillis Springs, is interested in a plan to build an 8-mile electric railway between Vidalia and Gillis Springs. Power for the railway could be secured from the Penhoopee River.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company expects to build 2 miles of city track and 5 miles of interurban track. Material for this work has been purchased. C. G. Ballentyne, Honolulu, general manager.

Indiana Union Traction Company, Anderson, Ind.—This company has recently bought $5,000 worth of property at Beech Grove, which will be used to eliminate a few curves at that point, thereby cutting down the running time on the Indianapolis-Muncie division.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—At the annual meeting of the company it was planned to extend the railway from Denver Junction to Waverly and from Waterloo to Belle Plaine. The company has arranged to issue bonds.

Covington, Big Bone & Carrollton Railroad, Covington, Ky.—The Covington & Big Bone Railway has filed amended articles of incorporation changing its name to Covington, Big Bone & Carrollton Railroad. Capital stock is increased from $100,000 to $250,000. M. J. Crouch is interested. [E. R. J., March 12, '10.]

Athol & Orange Street Railway, Athol, Mass.—This company will soon purchase 7 miles of trolley wire to replace the old wire. W. D. Smith, Athol, general manager.

Lansing & Northeastern Electric Railway, Detroit, Mich.—The Michigan Railway Commission has authorized this company to issue $800,000 in bonds to provide funds for the construction of a 30-mile electric railway from Lansing to Owosso. An extension is projected from Morrice east through Duran, thence northeast to Flint, also an extension from Owosso northeast to Saginaw. This new line will be operated in conjunction with the Michigan United Railways. The Owosso & Corunna Electric Company's line will be acquired and rebuilt. The grading contract has been let and about 8 miles of roadbed completed. All bridges have also been constructed. The necessary construction material is on hand, with the exception of a small amount to be used for overhead construction. The third rail system will be installed. The company will build substations at Haslett and Morrice. Power will be leased from the Commonwealth Power Company. Capital stock, authorized, $300,000; issued, $25,000. Officers: T. W. Atwood, Morrice, president; Kirke Lathrop, Detroit, secretary and treasurer; William White, Morrice, purchasing agent; J. J. Martindale, Jackson, electrical engineer; W. J. Sullivan, Morrice, chief engineer. [E. R. J., March 12, '10.]

***Portland-Westphalia Transit Company, Portland, Mich.**—This company has been formed to build an electric railway between Portland, Westphalia and Forest Hill. The promoters have already taken preliminary steps and have partially arranged for bonding the line. Local capital is interested in the plan.

Wahpeton-Breckenridge Street Railway, Breckenridge, Minn.—This company expects to commence construction of its proposed electric railway over principal streets in Breckenridge, Minn., and Wahpeton, N. D., about May 1. Surveys have been made and capital and rights of way have been secured. F. L. Sturm, Wahpeton, general manager. [E. R. J., Nov. 6, '09.]

Mexico, Santa Fé & Perry Traction Company, Mexico, Mo.—This company has filed for record a deed of trust for $1,500,000 with the Fidelity Trust Company, Kansas City, as trustee. Of this amount $600,000 of bonds will be issued after the power house and 4 miles of track are built, and the bonds are then to be issued in the amount of $15,000 for each mile of track. The proposed railway will connect Mexico, Fulton, Columbia and Hannibal.

United Railways, St. Louis, Mo.—This company announces that 51 miles of track and roadway will be reconstructed in St. Louis before the end of the year. It is estimated that the track work will cost approximately $1,500,000.

Morris County Traction Company, Morristown, N. J.—This company advises that it has at present 9 miles of track under construction, and it is expected to begin work at an early date upon another section about 12 miles in length. The work is being done by the Tennis Construction Company, having been awarded the contract last fall. Material for the new work is being purchased through the Morris County Construction Company.

Isothermal Traction Company, Rutherfordton, N. C.—This company advises that construction will commence within 60 days on its projected 50-mile electric railway between Rutherfordton and Gastonia, via Dallas, Cherryville, Waco, Stubbs, Shelby, Boiling Springs, Cliffside, Henrietta, Caroleen and Rutherfordton. Capital stock, $100,000, to be increased to $3,000,000. Three power stations will be located on Broad River and an amusement park will be built at Chimneyrock. Power will be furnished for lighting. Officers: K. S. Finch, Charlotte, president and general manager; John C. Mills, Rutherfordton, vice-president; J. F. Flack, Rutherfordton, secretary and treasurer. All communications should be addressed to the company at Rutherfordton. [E. R. J., March 12, '10.]

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—This company opened its 6-mile extension from Bowling Green to Tontogany for operation March 14. It will connect with the Lake Shore Electric Railway at Woodville and with the Ohio Electric Railway at Tontogany. [E. R. J., May 8, '09.]

Fostoria, Napoleon & Defiance Railway, Columbus, Ohio.—This company announces that most of the right of way has been secured and that franchises have been granted by Seneca, Wood, Henry, Hancock and Defiance Counties. Plans for construction are now under consideration, and work will begin as soon as the weather permits. Officers: Charles A. Bliss, Bowling Green, president; G. H. Yesbera, Bowling Green, vice-president; Rufus T. Betts, Bowling Green, secretary, and W. S. Reese, Toledo, treasurer. [E. R. J., Jan. 15, '10.]

Galion Southern Electric Railway, Galion, Ohio.—It is reported that interest has again been revived in this proposed electric railway, which will connect Galion, Fredericktown and Mount Vernon. Entire right of way has been secured and a new syndicate will build it. Gasoline motor cars will be operated. [E. R. J., March 18, '08.]

Oklahoma, Kansas & Missouri Interurban Railway, Miami, Okla.—Preliminary steps are being taken by this company to build a 23-mile electric railway between Hattonville, Okla., and Galena, Kan. Power for operating the cars will be furnished by the Baxter Light & Power Company, Baxter Springs, Kan. This proposed railway will extend through the new lead and zinc district in Oklahoma. Franklin M. Smith, Joplin, Mo., president and general manager. [E. R. J., Jan. 1, '10.]

Shawnee (Okla.) Electric Railway.—This company is reported to have let a subcontract for grading to the Davis Construction Company. The Shawnee Railway Construction Company is the general contractor. The grades will not exceed 1½ per cent and the curvatures 3 deg. Two steel bridges will be built over the Canadian River. A. Hardgrave, Shawnee, general manager and purchasing agent. [E. R. J., Feb. 19, '10.]

Huntingdon, Lewistown & Juniata Valley Traction Company, Huntingdon, Pa.—This company has awarded a contract to the Pennsylvania Excavating Company, Allentown, for grading 50 miles of its electric railway from Huntingdon to Mount Union and from Huntingdon to Lewistown. This railway will form a connecting line by trolley between Pittsburgh and Philadelphia when completed. J. M. Stare, Huntingdon, secretary and treasurer. [E. R. J., Oct. 30, '09.]

New Wilmington & New Castle Railway, New Castle, Pa.—This company announces that work will begin within 90 days on its proposed 21-mile electric railway between New Castle, New Wilmington and West Middlesex. The route has been surveyed and preparations have been completed for beginning actual work. [E. R. J., March 12, '10.]

***Regina, Sask.**—Mayor R. H. Williams and other civic officials are said to be negotiating with various railway companies in Winnipeg for the erection of a union depot and the construction of an electric railway in Regina. It is expected that 8 miles of track will be laid this year.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—This company will place contracts during the next six weeks for rebuilding Grandy Street tracks preparatory to paving. E. C. Hathaway, Norfolk, general manager.

Richmond & Chesapeake Bay Railway, Richmond, Va.—The survey for the extension of this electric railway to Washington has been completed between Ashland and Fredericksburg. It will cross the Chesapeake & Ohio Railway just west of Doswell.

Seattle (Wash.) Electric Company.—It is stated that Stone & Webster, Boston, Mass., have approved plans for electrifying the Madison Street Cable Railway and authorized an appropriation of $500,000 to cover this improvement.

***Seattle, Wash.**—C. C. Quakenbush and W. B. Sammons are planning to build a gasoline motor railway connecting Aberdeen with Seattle via Elma, cutting down the distance 87 miles. It will probably be known as the Western Washington Railway & Navigation Company, with headquarters at Aberdeen. The capital stock will be about $1,500,000. Most of the right of way is secured and the route has been surveyed. The grade will not exceed 1 per cent. A fund for preliminary work amounting to $35,000 has been raised.

Sabraton Railway, Morgantown, W. Va.—It is stated that this company, which has been sold, with all its rights and franchises, to Harry R. Warfield for $70,000, will be extended to the State line near Cheat Haven. At present it operates between Morgantown and Sabraton.

SHOPS AND BUILDINGS

Athens (Ga.) Electric Railway.—This company states it will soon build a reinforced concrete car house 100 ft. x 240 ft. C. L. Proctor, Athens, general manager.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company advises that it will build a new car house in Honolulu, the necessary excavation for which is now under way. Building material has been received. C. G. Ballentyne, general manager.

Rockford & Interurban Railway, Rockford, Ill.—This company has bought a 25-acre tract of land in Rockford, on which it proposes to build a new car house and repair shop. The company will still continue its work at the Kishwaukee Street shops, which are not now equipped to do all the heavier work. C. P. Wilson, Rockford, general manager.

Winona Interurban Railway, Warsaw, Ind.—This company advises that during the next three weeks it will place contracts for building repair shops. J. C. Schade, Warsaw, assistant secretary.

Boston (Mass.) Elevated Railroad.—The machine shop of this company on Harrison Avenue and its equipment were destroyed by fire on March 12, 1910. It was a four-story brick structure, 300 ft. x 100 ft. The loss is unofficially estimated at $500,000, and is said to be entirely covered by insurance.

Old Colony Street Railway, Boston, Mass.—This company has purchased a tract of land in Brockton, near the Brockton fair grounds, on which it will erect a new car house. It has not yet been decided whether it will be used as an operating car house or for storage purposes.

United Railways, St. Louis, Mo.—This company is planning to build new car sheds on the 55 acres of land it purchased recently in University City. The estimated cost is $250,000. The company has sold its old car sheds at Gravois Avenue and Jefferson Avenue.

Ohio Electric Railway, Cincinnati, Ohio.—This company has leased a site in Bellefontaine upon which it proposes to erect a union passenger and freight station.

POWER HOUSES AND SUBSTATIONS

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—During the next four weeks this company will purchase a complete 1000-kw turbine unit, 550-volt, d.c., including boilers. C. H. Ballentyne, Honolulu, general manager.

Uxbridge & Blackstone Street Railway, Uxbridge, Mass.—This company has awarded the contract for building an addition to its power house in Uxbridge to E. D. Ward.

Manufactures & Supplies

ROLLING STOCK

Ogden (Utah) Rapid Transit Company is in the market for six trailer cars.

Northwestern Elevated Railroad, Chicago, Ill., is considering the purchase of 20 cars.

New Orleans Railway & Light Company, New Orleans, La., will shortly be in the market for 25 cars.

Metropolitan Street Railway, Kansas City, Mo., it is reported, is planning to buy a number of new cars.

Norfolk & Bristol Street Railway, Foxboro, Mass., expects to buy one double-truck snow plow before next fall.

United Railways, St. Louis, Mo., will add 50 steel pay-as-you-enter cars with concrete floors to its rolling stock equipment.

Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, S. A., will soon build one parlor car in its own shops.

Lehigh Valley Transit Company, Allentown, Pa., is in the market for 10 double-truck closed cars with motor and trucks complete.

Montreal & Southern Counties Railway, Montreal, Que., is in the market for a number of freight, combination passenger and baggage and some express cars.

Central Pennsylvania Traction Company, Harrisburg, Pa., it is reported, is in the market for a number of single-truck and double-truck cars.

New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y., has ordered 10 10-bench, open cars from The J. G. Brill Company.

Fremantle Tramways of Australia has ordered three 30-ft. combination cars from The J. G. Brill Company, to be mounted on Brill 21-E trucks.

Los Angeles (Cal.) Railway, reported in the ELECTRIC RAILWAY JOURNAL to be in the market for a number of cars, will buy 90 cars in the very near future.

Fitchburg & Leominster Street Railway, Fitchburg, Mass., reported in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, as contemplating the purchase of two cars, will not buy any cars.

Public Service Railway, Newark, N. J., has ordered 190 trucks, type 27 M. C. B., from The J. G. Brill Company for use under 95 of the 100 cars being built by the Cincinnati Car Company.

Portland Railway, Light & Power Company, Portland, Ore., placed an order with the American Car Company for 40 passenger cars, and has purchased 80 trucks from The J. G. Brill Company.

Chicago, Ottawa & Peoria Railway, La Salle, Ill., is preparing specifications for eight 55-ft. interurban motor cars, to be built with turtle-back roofs, heavily braced. The order will be closed very soon.

Kingston, Portsmouth & Cataraqui Electric Railway, Kingston, Ont., is in the market for one 30-ft. closed car, one 10-bench open car to be mounted on a single truck and one 13-bench double-truck car.

Utah Light & Railway Company, Salt Lake City, Utah, is drawing specifications for 24 new cars complete, 12 of which will be for city service and 12 for interurban service, and will place the order at once.

Oregon Electric Railway, Portland, Ore., has ordered five Smith No. 2-C hot water equipments through W. S. Barstow & Company, New York, for use on the three combination and two observation cars recently ordered.

Cleveland (Ohio) Railway, mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, under the name of the Municipal Traction Company as expecting to buy 250 cars, will order 100 cars and will rebuild about 250 cars.

Roanoke Railway & Electric Company, Roanoke, Va., mentioned in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, as being in the market for four interurban cars, has contracted with The J. G. Brill Company for this number of 40-ft. semi-convertible pay-as-you-enter cars equipped with GE-80 motors.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, which was reported in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910, to have ordered 10 open cars from The J. G. Brill Company, advises that the cars will be equipped with GE No. 218 60-hp motors and K-36 controllers, and will have a seating capacity of 60 each.

Northern Texas Traction Company, Fort Worth, Tex., recorded in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, to have ordered 10 cars from American Car Company, has purchased 15 double-truck car bodies, 26 ft. over corner posts, mounted on Brill 39-E trucks, and equipped with GE-219 two-motor equipments with K-36 controllers.

Lynchburg Traction & Light Company, Lynchburg, Va., reported in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, as being in the market for four double-truck cars, has placed the order for these cars with The J. G. Brill Company. The cars will be 40 ft. long, of the semi-convertible type, and built under the license from the Pay-As-You-Enter Car Corporation, New York, N. Y. The company will reconstruct a number of its 40-ft. convertible cars for pay-as-you-enter service.

Lexington (Ky.) Railway has included the following in its specifications for the four 20-ft. 8-in. semi-convertible cars recently ordered from The J. G. Brill Company:

Seating capacity..... 32	Journal boxes..... Brill
Weight, inc. truck..16,000 lb.	Registers.....Ohmer No. 2
Wheel base.....8 ft.	Roofs .....Monitor deck
Length over vestibule..30 ft.	Sanders ..... Dumpit
Body ..... wood	Sash fixtures..... Brill
Underframe ..... wood	Seats ..... Winner
Brakeshoes. Am.St.& Int.Std.	Springs ..... Brill
Car trimmings..... bronze	Step treads..... wood
Curtain fix....Curtain S. Co.	Trucks ..... Brill 21-E
Curtain material.. Pantasote	Vestibule...Portable at each
Gongs ..... Dedenda	end.
Headlights..2 U. S. No. 1561	

Seattle, Renton & Southern Railroad, Seattle, Wash., which recently ordered nine steel cars from the Moran Company, of Seattle, has drawn up the following specifications:

Seating capacity.....70	Bolsters, body,
Weight.....50,000 lb.	Moran cast steel
Wheel base.....78 in.	Car trimmings.....bronze
Length of body.....49 ft.	Control system.Westinghouse
Length over all.....50 ft. 2 in.	Curtain fix....Curtain S. Co.
Width inside..... 8 ft. 6 in.	Curtain material...Pantasote
Width over all.....9 ft.	Gongs."Keystone" pneumatic
Height inside.....8 ft. 3 in.	Headlights..General Electric
Sill to trolley base...9 ft. 4 in.	Motors.....2 Westinghouse
Height, rail to sills.....3 ft.	Trolley poles and attach-
Body .....metal	ments .....Westinghouse
Underframe .....metal	Trucks,
Air brakes.....Westinghouse	Baldwin Locomotive Works
Axles .....Baldwin	Ventilators .....Globe
	Vestibule.....center entrance

TRADE NOTES

Griffin Wheel Company, Chicago, Ill., had its Denver plant partly destroyed by fire recently.

Peter Smith Heater Company, Detroit, Mich., has received an order for 75 hot-air forced-draft heaters from the Detroit United Railway.

George Batten Company, New York, N. Y., has moved from 11 East Twenty-fourth Street to the Fourth Avenue Building, at Fourth Avenue and Twenty-seventh Street.

Robert M. Babbitt, representative of the ELECTRIC RAILWAY JOURNAL in Chicago, has resigned to become associated with the National India Rubber Manufacturing Company, New York, N. Y.

Electric Storage Battery Company, Philadelphia, Pa., announces that the St. Louis offices of its contract agent have been moved from the Wainwright Building to 1205-6-7 Fullerton Building, at Seventh and Pine Streets, St. Louis.

Patton Paint Company, Newark, N. J., has opened an office in the Hudson Terminal Building, Room 1366, 50 Church Street, New York, N. Y., which will be used as the headquarters for salesmen representing the Eastern factory at Newark.

Locke Insulator Manufacturing Company, Victor, N. Y., has purchased the plant and business of the Lima Insulator Company, Lima, N. Y. The factory at Lima will be maintained and will give the Locke Insulator Manufacturing Company four additional kilns.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., has placed in service an additional area, 150 ft. x 158 ft. in extent, as a gear case, forge and general railway machinery department. Every part of the works is busy. The total number of men employed at this time is 350.

Aberthaw Construction Company, Boston, Mass., is preparing a special report in which are embodied the results of an investigation made recently regarding the use of granolithic and other floors in manufacturing plants. The company will welcome information regarding experience with granolithic floors as to cost, durability, hygienic effect and general convenience.

Edward J. Hunt has been appointed to succeed Robert M. Babbitt as representative of the Electric Railway Journal in Chicago. Mr. Hunt was formerly associated with the Electric Railway Review and has been connected with the Chicago office of the Electric Railway Journal since the consolidation of the Street Railway Journal and the Electric Railway Review.

McKeen Motor Car Company, Omaha, Neb., has recently received the following orders for its gasoline motor car: Buffalo, Rochester & Pittsburg Railroad, one 70-ft. car; El Paso & Southern Railroad, one 55-ft. car, and the Rock Island Line two 70-ft. cars. This makes a total of 66 cars built to date and in use in the United States and Mexico by this company. Twenty-nine railroads are operating or have ordered McKeen cars.

Whitney & Underwood, New York, N. Y., consulting engineers and specialists in trackless trolley and storage battery traction work, report that the amount of business now before them for consideration is very gratifying. They are prepared to take over an entire proposition as consulting engineers, furnish plans and specifications and finance, build and equip traction lines of all kinds for operation.

American Locomotive Company, New York, N. Y., has let contracts for the construction of a large new manufacturing plant and steam shovel works on a 200-acre tract 1 mile east of Gary, Ind. The plant when in operation will employ 3000 men. Construction will begin within a few weeks, and will include the erection of 12 shop buildings and a power house. It is stated that the plant will cost $3,000,000.

J. B. Crawford has been appointed sales manager of the Whipple Supply Company, 50 Church Street, New York, N. Y. Mr. Crawford has had a wide experience and is well known in the electric railway world. His early training was obtained with the Hartford (Conn.) Street Railway and the Groton & Stonington Street Railway, but for several years Mr. Crawford has been located in the Central States with the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., and the Lexington & Interurban Railways, Lexington, Ky. More recently Mr. Crawford was superintendent and purchasing agent of the Winona Interurban Railway.

Graphic Chart Systems Company, New York, N. Y., has been organized with headquarters at No. 1 Wall Street to market a system of charting electric transmission cables devised by W. E. Rundle. This system is in use by the following properties: Interborough Rapid Transit Company, New York (4,000,000 ft. of cable installed), Manhattan Elevated Railway, New York, New York & Queens County Railway, New York & Long Island Railroad, United Railways & Electric Company and Consolidated Gas, Electric Light & Power Company, Baltimore, Md., Niagara Falls Power Company, Underground Electric Railways Company, of London, and Mt. Whitney Electric Power Company. The president of the company is L. F. Deutzman, formerly secretary to Walter G. Oakman, president of the Hudson Companies, and now a partner in the firm of J. S. Merrill & Company. L. R. Fitzgibbon is secretary and treasurer of the company. W. E. Rundle is consulting engineer.

Allis-Chalmers Company, Milwaukee, Wis., has received an order from the management of the Pennsylvania lines West of Pittsburgh for electric generating units to increase the capacity of the power plant at Conway, Pa., from which current is supplied for operating the shops there and for signal work. The new machinery consists of two 750-kva, 3600 r.p.m., 60-cycle, three-phase, 2300-volt steam turbo units. The turbines will receive steam at 145 lb. pressure and 100 deg. superheat. During warm weather the turbines will exhaust into a condenser in which a 28-in. vacuum is maintained. During cold weather, steam from the turbines will be used in heating the plant, and a maximum back pressure of about 2 lb. will be effective on the exhaust end. For exciting the alternators, a 25-kw, 120-volt, 260 r.p.m. direct-current generator coupled to an engine, and a 25-kw, 125-volt generator are to be installed. Two 12-kw fly-wheel type motor-generator sets will be installed to supply current for the railway signal system.

Duplex Metals Company, New York, N. Y., has received a number of letters commending its copper-clad steel wire. Among the users of this wire who have written to the company are the Great Northern Railway, the New York, Ontario & Western Railway and the Police Department of York, Pa. The Great Northern Railway has within the last year and a half equipped five of its divisions with telephone train dispatching apparatus and has used exclusively in this connection the Duplex Metals Company's copper-clad wire. So well satisfied is the company with the wire that E. J. Little, superintendent of telegraphs of the company, says he is about to make requisition for 6000 or 7000 additional miles of the wire. The wire served specially well during heavy sleet and snow storms in the past winter. The New York, Ontario & Western Railway also comments favorably upon the results achieved during the winter with the 12 miles of copper-clad wire installed near Oswego, N. Y. This wire stood the storms without a break whereas new No. 8 galvanized iron wire on the same poles as the copper wire broke in several places.

ADVERTISING LITERATURE

Speer Carbon Company, St. Marys, Pa., is distributing order forms for carbon brushes.

Electrical Testing Laboratories, New York, N. Y., have issued an attractive booklet in which the value of coal for power purposes is discussed.

O. J. Childs Company, Utica, N. Y., has issued a series of folders in which its various fire extinguishers and chemical engines are described and illustrated.

Goldschmidt Thermit Company, New York, N. Y., has included in its publication *Reactions,* for the first quarter of 1910, the following articles: "Largest Thermit Repair Ever Made," "How to Figure the Amount of Thermit Required for a Weld," "Around the Railroad Shops," and "Welding Electric Motor Cases."

Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany, has issued two pamphlets, one of which contains illustrations of electric locomotives for narrow gage railways, and the other illustrations of electric locomotives for standard gage lines. The illustrations are accompanied by lists of installations.

Electric Service Supplies Company, Philadelphia, Pa., has issued a 20-page booklet, entitled "A Method for Preventing Lightning Troubles," in which are contained a detailed description of the Garton-Daniels lightning arrester, and illustrations which show how the apparatus is operated and how it should be installed.

Standard Paint Company, New York, N. Y., has printed a 24-page booklet which has for its subject preservative coatings. In it are described briefly the properties and uses of the various paint preparations manufactured by the company. Several tables convey a general idea of the purposes to which the company's paints can be put and illustrate their relative drying properties.

Western Electric Company, New York, N. Y., has issued a bulletin, No. 5111, descriptive of its new design of "Hawthorn," type "LL," multipolar, engine-driven, direct-current generators. In addition to the regular two-wire generators, there are described and discussed type "LL" three-wire generators and balancer sets for use with either of two systems for the maintenance of a a three-wire system of distribution with balanced voltages.

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The Annual Maintenance Issue

Every department of an electric railway company is intimately concerned with the way in which the maintenance work is conducted. Upon the engineering department devolves its direction and execution. The accounting department is anxious to obtain a proper distribution of the expenses; the claim agent is interested because of the close relation which exists between the care of the work performed in shops and the reliability of the equipment in service; finally the general manager considers the subject from all of these aspects as well as from that of their co-ordination in the operation of the road as a whole. Over the original design of its equipment the average electric railway has comparatively little control after the general type of its cars, motors, overhead equipment and power station apparatus has been selected, but the details of the maintenance work devolve practically in their entirety on the railway engineer. While he usually is not able to modify radically the original design of the apparatus he can often greatly improve and strengthen it as it passes through the repair shops. The result is that many of the important advances made in electric railway equipment have had their origin in the maintenance department.

The present issue is the third annual maintenance number of this paper. Each of these issues has been published during the first week in April, because the work of preparing for next winter must be done during the coming summer months. Outside maintenance must be carried on, the closed cars must be put into condition and plans must be completed for the new equipment required. To some companies it may seem premature to order now cars and other equipment which will not be used until next autumn but it is by no means too early. There is no economy in waiting until a short time before apparatus is actually needed and then placing a rush order. Such a plan, of necessity, must mean less satisfactory work and prices and probably less satisfactory deliveries.

Railway Motor Maintenance a Perpetual Problem

Observation of the causes of car equipment breakdowns in service emphasizes the fact that no matter how far designers of railway motors may travel in the search for reliability, constant vigilance on the part of operating companies will ever be necessary to obtain the best results in car mileage per failure. The secret of success, of course, is to determine the cause of the trouble, but for each fault there is usually a large number of possible causes, occurring over a wide area and at irregular periods. To assist in the diagnosis, it is interesting to find that most companies now expect the car crew, or the motorman, to report motor troubles with considerable thoroughness and to indicate, if possible, the cause. As the motorman is the only source of primary information regarding service troubles in the equipment, it will be wise to encourage him to give as

full a report as possible rather than simply a fragmentary statement upon his return to the car house. Allowing for differences between men, there is opportunity in many instances for giving more facts than usually appear on reports of failures. If the trainmen are given to understand that all that the company desires is to learn the utmost about each failure with the object of preventing similar occurrences in the future, and if the car house supervisor or starter, or even the car house repair foreman, is authorized to ask questions in some detail as to the performance of the equipment when the motorman comes in there is no doubt that light would be shed upon many defects. Under the ordinary system of requiring the motorman to make a report of only a line or two when an equipment failure occurs, the company may lose valuable information. The preparation of certain stereotyped questions for use at car houses in the discretion of the foreman or starter might help, and while such lists of questions would lack flexibility, they could be used effectively to stimulate the memories of the men. Thus, if an armature flashes over, it is desirable to know if possible what was the position of the controller handle at the time, where the car was running and about the speed, whether the main fuse blew, what was the immediate appearance of the commutator and brushes if examined, and other like points which a car house examination cannot disclose, but which bear directly upon the difficulty. Continued reports of flashing on a certain line might show, for example, that the trouble occurred whenever the car passed from one feeder section into another, and the trouble, if traced, might be charged to too high voltage on crossing the gap. The nearer the mechanical department can come to surveying the whole field of motor performance, the more certain will be the reduction of failures, with their indirect cost in traffic delays and their direct charge upon revenue.

Home Repairing by the Small Company

One of the hardest problems before the manager of the small railway property is to convince his board of directors that a well-equipped shop is a necessity and not a luxury. The average director will admit without question the desirability of a few of the most commonly used machine tools, but when the subject of special tools comes up he is apt to take the narrow view that it does not pay to have devices which are required only occasionally. This idea is undoubtedly correct when applied to manufacturing. There it is often more economical to send out a greater part of the work. But a different rule must be followed in electric railway maintenance because so much repairing is of an emergency character in which the time element is most important. An inadequate shop outfit places the company at the mercy of the local carpenter and machine or blacksmith shops which are rarely equipped with tools exactly suitable for electric railway work and as many of the jobs turned over to them are wanted in a hurry, they feel more than justified in exacting exorbitant prices. In cases of this kind, the extra cost and loss of revenue through delays incident to outside repair work usually far exceed the fixed and running charges on a modest shop outfit. Even a 10-car system can afford to have such tools as a lathe, boring mill, wheel press and grinder, together with a smithy. An equipment of this character may be adapted readily for other purposes by the use of inexpensive attachments. Thus the lathe may be employed for commutator slotting, the boring mill for drilling and the wheel press for straightening axles and shafts. In recent years, also, a number of combination tools have been placed on the market expecially suitable for the road too small to use individual machines for any considerable part of the day. Some car-house space usually can be spared for placing the machines, while conveniences like an overhead runway for armatures, motor cases and other heavy parts can be built up from worn-out rails, obsolete railway motors and other old material which had been waiting for a good bargain with the junk man. An adequate shop equipment for the track, line and power departments is just as useful as in the maintenance of the rolling stock.

Premium and Piece-work Systems

No discussion on maintenance would be complete if it did not take into account the influence of labor charges on the total expenditures. The problem of getting the most labor for the minimum total outlay is always difficult because it involves a psychological factor, namely, the attitude of the workmen toward any scheme which seems to threaten the amount contained in their pay envelopes. In view of this fact, it may be of interest to point out that the large electric railway systems in New York have developed labor accelerating methods, which have proved successful from the standpoint of both the employer and employee. Thus, in the case of the Metropolitan Street Railway Company, whose shop practices are described in this number, the premium system was applied while converting 250 cars to the prepayment type. Instead of employing straight piece-work rates, the shop superintendent, assisted by the foreman of each department, fixed a minimum period in which a given job could be done by a good man under the old conditions, and then provided that the workman should share equally with the company the profit accruing from any saving in time. Thus, it was made clear to the men at the outset that they would not earn less but that they could earn more. The result was that, instead of spending $23,035.75 as estimated on the day-rate basis for the job under consideration, the cost on the premium basis was but $18,401.24. The saving to the company on this contract considered by itself was 20 per cent, but the actual gain was greater, because through a saving in time of 42 per cent, a large number of cars was available for the transportation service earlier than otherwise. As the men were working practically on their own time, it was necessary to examine only the quality of the finished job and not to keep watch over them continuously.

The method adopted last year by the Third Avenue Railroad Company for doing similar work was somewhat different but equally successful. Detailed piece-work prices were fixed on the assumption that the men would do from 25 per cent to 30 per cent more work on the new basis. A bonus was given for carrying out a series of operations, like the complete power wiring of a car in less than the usual period. The company found that the average increase in daily earnings per man under these conditions ranged from 25 cents to 50 cents. Both the Third Avenue Railroad Company and the Interborough Rapid Transit Company have gone into piece-work painting also. The latter company found that the adoption of this practice saved 25 per cent in labor cost, while it increased the earnings of the men some 20 per cent.

Of course, the full benefits of piece-work can only be obtained through the co-operation of the working force. It is not proper to assume that the mere existence of piece-work

in place of a former hourly-payment scheme will bring in the millenium of maximum output and maximum daily wages, while maintaining the highest quality of workmanship. The shop foreman who takes up piece-work must ordinarily do considerable missionary work before his department gets into line for efficient service under the new régime. The individual workman must be shown how to make the most of his time, and such matters as the location of tools within constant reach, plans for the machining of a second piece as soon as the first is out of the tool, reduction to the minimum of the number of hammer strokes in every similar operation, proper position for quickest adjustment of material, and anticipation of supplies needed for a given number of consecutive jobs, are all worth the personal attention of the head of the department. When a good man goes to the foreman and complains that he cannot earn as much under the piece-work plan as before, it will pay to spend a couple of hours with him if necessary in determining the cause. If others do not have that difficulty, it may be simply a little lost motion or the personal inefficiency of the man which interferes with his success. If the workman cannot rise to the situation after these points are brought to his attention, he must inevitably be superseded, since a fair piece-work scheme is based upon reasonable average times of performing given tasks instead of records in production. In the paint and motor repair shops enough operations are specialized duplications to make piece-work very attractive when carefully planned and administered.

Preservation of Ties

The steam and electric railways of the United States spent more than $60,000,000 for cross-ties in 1908, which was a year of strict economy in expenditures for maintenance and new construction. The normal demand each year for renewals alone is close to 120,000,000 ties, and the construction of new lines is constantly adding to the yearly consumption for renewals. Where is the future supply of cross-ties coming from and what will be their cost? In many parts of the country, the local supply has long since been exhausted and the user of ties there has to add to the purchase price of the tie at the place of cutting the cost of a long haul by land or water. Timber producers, guided by the advice of forestry experts, have made a start on the conservation of the remaining forests and the cultivation of timber on a large scale. In time, these steps may restore a closer balance between production and consumption, but it is equally important that every effort should be made to reduce the consumption of timber, especially such as results from decay or exposure, by the general use of preservative treatments. Electric railways which are to-day buying and installing untreated ties and poles will discover within a few years, when they have to make renewals, that the present-day prices of timber no longer prevail.

There can be no greater fallacy than that preservative treatment does not pay at the present prices of timber, and it is a significant fact that the use of treated timber is more general in the Southern States, where the supply is still comparatively plentiful and prices are low, than in the Northern States where most of the supply has been exhausted. One reason for this is, no doubt, that the atmospheric and soil conditions in the South are more conducive to rapid decay than in the North. On the other hand, the cost of timber is almost half. Preservative treatment is an investment whose profit is as capable of almost as exact a calculation as that of a bond.

A misconception exists in many quarters of the cost of applying preservative treatment. It may be done for as low as 10 cents per tie or as much as 40 cents per tie, depending on the quantity of the preservative used and the method of applying it. For street railway work, the less expensive methods usually are quite as efficient as the more costly. The difference in expense is largely dependent on the depth of penetration and the character of the preservative used. When a large part of the tie surface is exposed to rain and sun and the ties rest on a soil which holds the moisture, larger quantities of preservative and deeper penetration are required than when the ties are imbedded in concrete. The opinion is held among many engineers that a tie into which has been injected a moderate quantity of creosote or other antiseptic oil will last indefinitely, if completely imbedded in concrete.

Maintenance Records

It is very common and absolutely correct to speak of electric railroading at the present time as a science. The fixed rates of fare charged and the increasing costs of the labor and material required for operation have greatly reduced the margin of profit for most electric railway companies during the past few years, and, except in the case of a few favored properties, guess-work methods of operation can mean nothing now but bankruptcy. Every avenue by which the income of a property can be increased and by which its expenses can be decreased must be scientifically studied by the manager of to-day. But the etymological meaning of the word science is knowledge and a scientific study of electric railway operation presupposes possession of significant facts relating to operation, an analysis these facts and an ability through this analysis to reach t conclusions. The fundamental basis of scientific operation, therefore, is the records of results produced by different types of equipment and by various methods under given conditions. To provide a basis by which these results can be intelligently compared is the aim of the joint committee of the Accountants' and Engineering associations on shop accounts, an object, in our opinion, commensurate in importance with those of the other committees on standards of these two associations.

If maintenance records are carefully kept they have a cumulative value, but if carelessly compiled they are worse than useless because they are misleading either by reason of incompleteness or of actual clerical errors. Conclusions based upon any set of maintenance records should therefore include a knowledge of the manner in which these records were compiled. In many cases it would undoubtedly be the part of wisdom to have these detailed shop and maintenance records in charge of a clerk employed especially for that purpose. On a medium-sized road his time would be fully occupied, and on a smaller road other work could be found for him to do if he had the spare time. The expenditure for such clerical help in classifying and systemizing these records would usually not only more than counterbalance the cost, but would often be the means of preventing wasteful or inefficient practices. Of course, it is possible to introduce too much system in work of this kind, but there is greater danger on the side of inaccuracy. A few carefully prepared forms, either on cards or in bound books, whichever may be preferred, with the records kept constantly up to date, with appropriate summaries daily or for a not longer period than weekly, and with comparisons of payrolls, as well as the cost of materials, are usually all that are required.

The value of accurate and concise maintenance records in economical operation has been proved so often that no argument is needed in their favor. They have many times eliminated the use of expensive materials and have helped the movement toward standard apparatus and standard practice. If a company is testing different makes of apparatus, the results should include the records of each so that the most efficient may be adopted. Railway supply houses welcome the establishment of competitive trials of this kind as they assist the manufacturer in overcoming prejudices which sometimes exist in the minds of even the most progressive managers.

Another and most important use of maintenance records is that of perpetuating the experience of a company through several administrations. The successor of a master mechanic, power station or track engineer, or the head of any other department, is placed in immediate touch with the practice which preceded him if records of this kind have been maintained Whatever the reason which actuates a company to establish maintenance records, the results will nearly always be found to be the greatest help in reducing operating expenses.

Light Cars

Perhaps in no department of railway work has there been such a radical change in opinion during the past two or three years as in the question of car weights. A few years ago the only popular conception of a light car was a single truck car. Now, engineers all over the country are endeavoring to see in what directions the weights of cars, particularly for city service, can be reduced. The subject has a very broad application because a reduction in the weight of cars is reflected in the cost of track maintenance and of power station operation, as well as in car maintenance itself.

The ideal car should be of the lightest weight consistent with sufficient strength and rigidity of all parts to withstand the stresses of operation without undue depreciation. It is apparent that a reduction of the weight of one part will reduce by so much the stresses on its co-related parts. Thus a lighter roof will permit the use of lighter side framing which, in turn, may be carried by a lighter underframe. The body with its weight thus reduced can be mounted safely on lighter trucks and, last but by no means least in importance, car motors of less capacity and weight will be required to propel the car at the same speed.

Any comparison of car weights must take into account local conditions. If one road has steep grades, frequent sharp curves and rough track and another road is favored with smooth, level tracks, manifestly then the same type and weight of cars will not be the best for both services, even though the same traffic is handled. Other things being equal, the road with the best track can operate the lightest cars. There has been a marked improvement in the general condition of electric railway tracks during the past few years but this improvement has not been accompanied, until very recently, by any material reduction in car weights which better track would warrant. On the contrary, the tendency in the past with most roads has been continuously to increase the weights of cars ordered. This condition has been due in many instances to the purchaser's desire to develop a type of equipment that would require less maintenance than the cars previously operated. As each lot of new cars has been bought the purchaser has arbitrarily increased the sizes of certain parts with an economical end in view but often without regard for the effect on the other component members of the car structure. In designing a car of minimum weight, each member must be proportioned to carry a definite load with an ample factor of safety but without the addition of any ineffective material, whose weight would unnecessarily stress other members. This analytical method of design requires a clear understanding of the principles of structural mechanics, but the results in the way of reducing operating expenses warrant a study of these principles by all progressive engineers who may be planning new cars.

Although the movement for lighter cars began to gain impetus long before last fall it was undoubtedly accelerated by the Denver convention where an excellent opportunity was afforded visiting railway officers to observe the service given with light cars by the Denver City Tramway Company. Car builders will testify that since the Denver convention many purchasers of cars have shown a keen desire to reduce the weight of new rolling stock and designers have attacked the problem with renewed vigor.

The new semi-convertible cars of the Boston & Northern and Old Colony Street Railway which are described elsewhere in this issue are typical examples of cars reduced in weight by eliminating every ounce of superfluous material. While retaining the same seating capacity and approximately the same general dimensions as in a previous standard design of car the total weight has been lowered from 48,700 lb. to 42,090 lb. or 165 lb. per seat. The data on weights of parts which are included in the description form a tabulation as unique as it is valuable. A study of these detail weights will show where further savings, if any, can be made in building future cars. That the effort spent in designing these light weight cars was not wasted is evident from the results of the power consumption tests made before the new cars were placed in service. A saving in power alone of 73 cents per car per day is well worth while when it can be made, as in this case, with no additional initial investment.

A good example of a road which has been operating light cars for some years is the inter-city system of the Cincinnati, Newport & Covington Light & Traction Company. The cost for maintenance and the average power demand under the operating conditions existing on this property both reflect the value of light equipments. The schedules require about 100 cars, each of which seats 32 passengers and weighs not more than 13 tons. Small cars with center aisles and cross seats are well suited for the short-haul traffic which is handled. Although the company has a trackage of 61 miles and loops many of its cars across the Ohio River and through the business district of Cincinnati, the average length of ride is short. Space within the car bodies is utilized fully with seats and not quite so much space per seat is provided as would be necessary if the length of the ride were longer.

The Covington cars weigh approximately 810 lb. per passenger seat. They operate over steep grades; on some lines the rise is fully 350 ft. During 1909 the cars on this road made a total of 4,100,000 miles and the cost for car maintenance was only about 2 miles per car-mile. An important feature in the economy of operation of the Covington system, due largely to the operation of light cars, is the low power demand. The total actual power delivered in 1909 to the railway feeders, which, of course, includes all tracks and line losses, averaged very close to 1.6 kw-hours per car-mile. For some months the consumption was as low as 1.5 kw-hours and under severe winter conditions as high as 1.8 kw-hours. Most of the cars are

equipped with two motors of an old type, the Westinghouse No. 39, rated at 35 hp. Out of the 179 cars operated with two motors each, but 12 armatures failed in 1907 and the cars were kept in good operating condition with only three men working in the repair pits and one man in the armature shop.

The examples cited above show some of the possibilities of the light car; they are not intended as arguments in favor of the use of cars of small size which may increase unduly the platform cost per passenger seat. All the factors of platform labor, power and repair costs are functions to be considered in designing rolling stock and the possibility of improving car construction so as further to reduce these costs is an incentive for future effort on the part of car designers and builders.

A Sane Public Utility Commission Law

The bill creating the New Jersey Public Utility Commission was signed by Governor Fort on March 24. It is an amendment of the railroad law enacted in 1907, and changes the Railroad Commission to a Board of Public Utility Commissioners with enlarged powers. The amended law extends the authority of the commission to all classes of public utilities and in that respect is broader than the legislation of the other leading States on this subject. This commission will take rank in importance with the commissions of Massachusetts, Wisconsin, New York and Vermont.

The powers of the New Jersey commission are not all-inclusive and the plain definition of the duties imposed by the Legislature will mean that the commission will devote its time and earnest attention more to the questions of service, in which the public is directly interested, than to practical corporate affairs and details of operation which concern the companies alone. In the railway law of 1907 provision was made for a court review in case of dissent from an opinion and this fair and just safeguard is, therefore, retained.

No drastic, thunderous phrases appear in the New Jersey law. It is stated that the commission shall have general supervision over all public utilities. It shall have power to require: First, compliance with the laws of the State and performance of the public duties imposed thereby upon public utilities; second, safe and adequate service; third, a uniform accounting system; fourth, discontinuance of rebates or other unjust, unfair and unreasonable discriminations. In addition to these broad powers, the commission shall pass upon all issues of securities in order to see that they conform to the laws of the State. These laws provide that stock shall be issued at not less than par and 5 per cent bonds at not less than 80. Bonds bearing less than 5 per cent interest, which has been issued under a trust deed executed prior to Aug. 14, 1906, may be issued at 70 until Feb. 13, 1911.

One of the most important sections of the New Jersey law is that which limits the amount of annual expenditure by the commission to $50,000. This means that the commission will have, above the salaries of its three members, $32,000, out of which the salary of the secretary, not to exceed $4,000 per annum, and other necessary expenses may be met. The Railroad Commission law of New Jersey, which was passed in 1907, allowed a total expense not to exceed $30,000 per annum. The constant observance of affairs in New York by the many residents of New Jersey whose business is on Manhattan Island makes it apparent that this feature of the law arises from a studied determination to prevent any such excessive burden for salaries and expenses as has been imposed by the Public Service Commission of the First District of New York upon the public that it was designed to serve. This commission expended for its general expenses, in the period from July 1, 1907, to Dec. 31, 1908, $1,383,313. This is a tax upon the public which no ends accomplished by the commission can justify.

It will be observed that the New Jersey law does not confer any direct power upon the commission to make rates. It is in this respect that the act differs most conspicuously from the regulative measures passed by other States which have recently enacted reformative laws on this subject. The New Jersey board, however, may hear and examine complaints concerning rates and may make recommendations thereon. That is to say, the commission has power publicly to air grievances and when convinced, after investigation, that rates should be changed, it can recommend an increase or reduction.

In comparison with the recommendatory action conferred by the New Jersey law respecting rates, the measures of the other States are drastic. The most severe, of course, both in design and in possibility of execution is that of New York. It is a fact of importance, however, and astounding to the public, that comparatively few reductions have been ordered by the New York commissions, even after the searching analysis and investigation which the law and a wide-open treasury for expenses permit. It is of equal importance to state that in both Wisconsin and Massachusetts, where supervision over rates exists, a number of advances have been permitted because of the manifest inability of companies to maintain their properties and earn a fair return on the reasonable investment therein at the rates with which they started operation. Such advances help to relieve the companies affected, to conserve their investments and to maintain the service they render to the public. But so long as the rate-making power is conferred by statute, the danger exists that commissioners will be appointed who will use the great authority of their office to enforce unwarrantably low rates, to the ultimate detriment of both the property and the service.

Many people whose opinions are entitled to respect will criticize the law on the ground that it does not confer upon the commission the rate-making power. These critics believe that any public utility law which does not give the commission mandatory power over rates is foredoomed to failure. With these views we are not in sympathy. We believe that much depends upon the personnel of the commissioners. Regardless of the details of the law under which it acts, a commission composed of men of courage and common sense, having at heart the interests of the whole public—both the corporations and their patrons—can do much to promote, among all parties concerned, that fair dealing and spirit of amity which will result in good service. To accomplish this in a constructive way is, in our opinion, one of the chief functions of any public utility commission.

The complete law under which the New Jersey commission will act is a sane measure. The exclusion of rate-making power from the law is, in reality, a statesmanlike recognition of the fact that the public is more interested in securing adequate service than in unreasonably low rates. The law is a consistent expression of the principle that it is not the true mission of the State to adopt and hold an attitude of paternalism toward public utility corporations. If a regulative policy is the will of the public, the State should not go further than to supervise so as to prevent financial excesses, undue discrimination and poor service.

DEPARTMENT OF ROLLING STOCK AND SHOPS OF THE METROPOLITAN STREET RAILWAY, NEW YORK

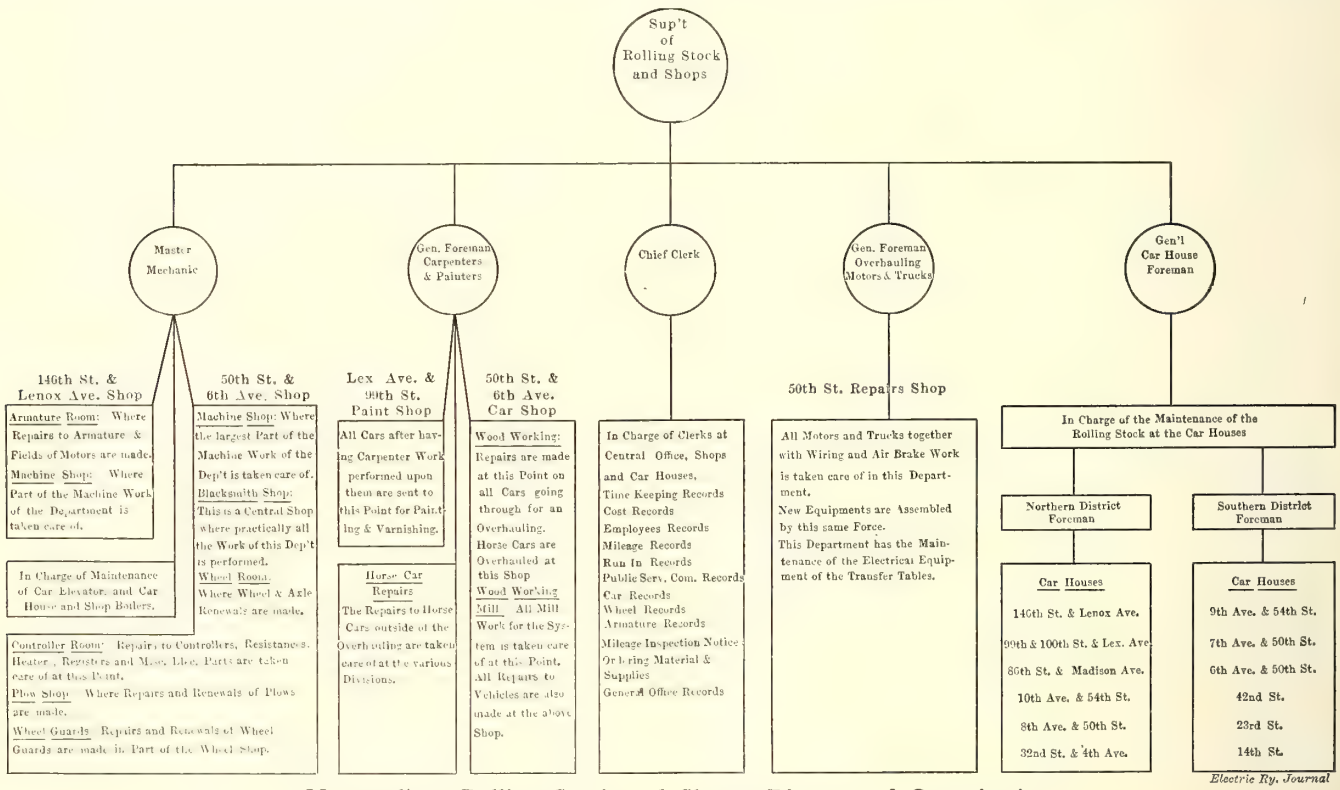
Important Improvements which Have Been Made Since the Appointment of Receivers

AN article last week described the important changes which have occurred during the past 2½ years in the surface railway system of New York as they have been affected by the rehabilitation and reorganization of the Metropolitan Street Railway System. The task set for the receivers on taking possession of the property was a gigantic one, as the Metropolitan system, when it went into the hands of receivers, was the largest, measured in gross receipts, of any in the country. The only possible way of attaining success and a high degree of efficiency and economy was first to determine what was to constitute the Metropolitan Street Railway System of the future, and coincidently to make a scientific study of each department so as to introduce all the improvements which the latest developments in the art permitted. In following out this policy the receivers were actuated by the belief that by this course only could the real earning power of the property be demonstrated. If the system was capable under more favorable operating conditions of making a better showing than when it was obliged to default on its fixed charges, the interests of stockholders, bondholders and creditors lay in the development of that fact. This plan having been decided upon, and having received the sanction of the court which was directing the affairs of the company, an active but conservative campaign of improvement was inaugurated.

The first step was to obtain technical information of the practice and the performance of apparatus in other cities. The adoption, or adaptation, of these methods when suitable to the conditions in New York was then taken up and an effort was made to give each problem such treatment that the decisions reached would apply, not only to present needs, but to future requirements. Naturally one of the most important departments to which this plan of systematic selection was applied was that of rolling stock and shops, and it is the intention in this article to outline the principal steps taken in reorganizing this department.

CHIEF OBJECTS SOUGHT

The chief purposes of the management in following out the policy just outlined was to secure general economy and efficiency, but the correlative advantage of reliability is greater in New York, perhaps, than in any other city. The reason for this is the great cost of real estate, which means high fixed charges per car for car storage and increases the desirability of reducing the number of cars required to supply a given service. The congested nature of the streets and the importance of developing the short haul traffic, which can be attracted in New York by continuous and regular service, also make it very important to reduce the number of breakdowns on the street. Hence reliability of operation was the chief object sought in the work of rehabilitating the car equipment of the Metropolitan Street Railway Company, but, as will be shown in this article, economy and general efficiency were also secured.



Electric Ry. Journal

Metropolitan Rolling Stock and Shops—Diagram of Organization

ORGANIZATION

At the time of the appointment of the receivers on Sept. 24, 1907, the department now known as the rolling stock and shops department was divided into three separate departments. One was in charge of the general master mechanic, who had charge of the woodworking and painting repairs to all cars and vehicles, as well as the operation of the plow shop and the general machine shop. The second department was under the jurisdiction of the master mechanic in charge of shops. This department took care of the armature, field, controller and miscellaneous electric repairs, together with such machine shop work as was incident to this work. The third department was in charge of the superintendent of equipment, who supervised the regular maintenance of the cars at the car houses, including such truck

and electrical repairs as might be made at such points.

A reorganization was gradually effected and a superintendent of rolling stock and shops was placed at the head of the department, the reorganization of which, as it now exists, is shown in the accompanying chart.

The change in the organization of the rolling stock and shops department as outlined above would in itself have tended eventually to improve the condition of the maintenance of the equipment of the system, as, with all the departments concentrated under one head, very much better results can be attained than where there are two or three subdivisions. The greatest factor, however, of improvement in the maintenance of the rolling stock was due to the rehabilitation of the car bodies, trucks and electrical equipment. This took place principally during 1908, and followed lines which will be described later in this article.

IMPROVEMENT IN EMPLOYEES

Early in the work of rehabilitation a number of the car houses were rebuilt, and the improved facilities thereby provided, not only added greatly to the character of the maintenance carried on at the car houses and shops, but the bettered surroundings enabled the management to obtain a superior class of workmen in both car houses and shop departments than would otherwise have been the case. This was particularly desirable, as during the period of prosperity terminating in the fall of 1907, it had been exceedingly difficult to obtain proper workmen. Consequently a large foreign element had gradually worked into the car houses and shops, principally the former. Many of these men were not able to speak the English language, and it was hard to obtain the proper character of work from them. During 1908-1909 especial effort was made to eliminate these men. This has now been accomplished, with the result that the company is obtaining more intelligent and better results in car maintenance.

INSPECTION OF EQUIPMENT

Improved methods have also been put into force in connection with this class of work. The principal one perhaps was the establishment of the mileage system of inspection of equipment. Formerly cars were inspected once a week, irrespective of the amount of service that each had performed during that period. But the transfer of the individual car mileage records from the office of the supervisor of division office organization to the office of the superintendent of rolling stock and shops made it possible on Feb. 15, 1909, to inaugurate a system of inspection upon a mileage basis.

The number of miles made between inspections varies somewhat, according to the type of electrical equipment. Motors of the older types are inspected upon a basis of 700 miles, with an allowance of 100 miles more or less. Equipments of the more modern types are inspected upon an 800-mile basis, also with the same allowance. Two additional clerks were placed in this office for this work, and it was found possible after the mileage inspection had been in force for several weeks to make a reduction of 22 men in the various car houses. These men were all engaged on the inspection of cars, and the saving effected amounted to about $12,000 per year.

The inspection is carried on by what is termed the inspection force, under an inspector who acts as an assistant car house foreman, and is held personally responsible for the work under his supervision. Each member of the inspection force is assigned to the inspection of certain parts of the car bodies, trucks or electrical equipments. The practical result of these systematic examinations is that a large number of defects are discovered and troubles are corrected before they become serious. Very valuable assistance in this work has been afforded by a test car which was placed in service during the early part of 1909.

The benefits derived from this plan are strikingly illustrated in Table I, which is a record of the number of run-ins during 1908 and 1909. As will be seen, the percentage reduction in

TABLE II.—STORAGE CAPACITY OF CAR HOUSES, MEASURED IN SINGLE TRUCK CARS, 32 FT. 6 IN. OVER ALL

Location of car houses.	Lin. ft. of tracks.	Ground floor.	Second floor.	Total.
(b) 14th St. and Ave. B	2642	77	...	...
	*259	..	...	..
	1507	..	46	123
23d St. and 11th Ave	3092	92	...	92
(a) 24th St. and 11th Ave	1618	44	...	44
32d St. and 4th Ave	5551	165	...	..
	*968	31	...	196
42d St. and 12th Ave	2781	92	...	92
50th St. and 8th Ave	2680	78	...	78
50th St. and 7th Ave	4649	123	...	123
50th St. and 6th Ave	3460	104 (c)	...	..
	*182	..	...	..
	3694	..	110	..
	2045	..	61 (d)	..
	*3810	..	109 (e)	384
54th St. and 9th Ave	4711	133	...	..
	4989	..	140	273
(b) 54th St. and 10th Ave	3634	97	...	..
	*528	13	...	110
(a) 85th St. and Madison Ave	2574	76	...	..
	*368	8	...	84
99th St. and Lexington Ave	2770	82	...	..
	2881	..	82	164
	*176	..	...	..
100th St. and Lexington Ave	2686	82	...	..
	2740	..	79	161
146th St. and Lenox Ave	8376	251	...	..
	8133	..	245	496

Note.—(a) Signifies a storage yard. (b) Signifies space rented. (c) Signifies 32 cars stored on repair tracks are included. (d) Third floor. (e) Fourth floor. (*) Signifies tracks not slotted.

TABLE I.—RUN-INS DURING 1908 AND 1909—METROPOLITAN STREET RAILWAY, INCLUDING CARS RENTED TO 59TH STREET LINE (C. P. N. & E. R. R. CO.).

	Chargeable to Car Houses									Not Chargeable to Car Houses									
Week ending 7 a. m.	Air brake.	Hand brake.	Car body.	Control.	Motor.	Plow.	Wheel.	Miscellaneous.	Total chargeable.	Accident.	Channel rail.	Derailment.	Collision.	Track obstruction.	Tight slot.	Switch.	Glass broken.	Total not chargeable.	Grand total.
Jan. 6, 1908, to June 29, 1908	327	7,168	5,884	3,197	4,800	6,578	1,267	2,195	31,416	193	266	44	933	283	150	..	1,279	3,148	34,564
July 6, 1908, to Dec. 28, 1908	98	2,757	4,409	980	1,625	1,635	404	699	12,607	104	1,588	250	623	143	9	1	509	3,227	15,834
Total, 1908	425	9,925	10,293	4,177	6,425	8,213	1,671	2,894	44,023	297	1,854	294	1,556	426	159	1	1,788	6,375	50,398
Jan. 4, 1909, to June 28, 1909	108	1,838	2,707	532	747	1,393	351	445	8,121	122	1,140	139	659	175	37	54	498	2,824	10,945
July 5, 1909, to Dec. 27, 1909	95	1,014	1,771	383	732	1,159	158	463	5,775	78	627	105	503	251	..	133	191	1,888	7,663
Total, 1909	203	2,852	4,478	915	1,479	2,552	509	908	13,896	200	1,767	244	1,162	426	37	187	689	4,712	18,608
Reduction, in per cent, 1909 over 1908	52	71	56	79	77	69	70	69	69	33	5	10	25	0	77	..	61	26	63

1909 over 1908 of run-ins chargeable to car houses varies between 52 per cent and 79 per cent.

The division of work adopted in repairs is that at the car houses regular renewals are made of such equipment as brake shoes, the wearing parts of brake riggings, carbon brushes, etc. Armatures and wheels are also replaced at the car houses.

Any small amount of carpenter work or painting made necessary by accidents is also taken care of there. In car houses where the work of this character is sufficient in amount to keep one or more carpenters or painters busy, such men remain at the car house. Otherwise it is thought better to send workmen of this kind from the main repair shop to do the work, rather than to send the car to the repair shop. Minor plow repairs and lubrication are also attended to at the car houses.

DAILY INSPECTION

In addition to the regular mileage inspection, cars are inspected at night when run off the road. The plows, plow leads and body terminals, plow fuses, springs, bolts attaching plow to plow yoke, and plow sleeve nuts are carefully examined, as well as the wearing plates. Brakes are examined to see that they are properly adjusted, and a general examination is given to all parts of the motor that might be liable to become loose during the day's run.

CAR CLEANING

Car cleaning is followed up as nearly as practicable along the following lines:

Cars coming in are stationed close to a given point in the car houses, where they are first thoroughly sprinkled and swept. As it is desirable to have this done before the other workers start on the cars, the sweepers report somewhat earlier than the rest of the car-cleaning force. The interior of the car is then wiped with cheese cloth and the dust removed from the ventilators, hand-strap rail and window ledges.

In polishing the glass, two men usually work together, one on the interior and one on the exterior of the car. This is done to facilitate the work, as the small marks on the glass can be detected more readily and cleaned. If the dust on the outside of the car body is not too heavy to be dry wiped without injuring the varnish, this is done by men who are detailed for the purpose. Special attention is given to keeping the incandescent lamps and shades bright and clean.

The washing of cars is done either during or after a rainstorm, long, soft-haired brushes and plenty of clear water being used for the purpose. The interior and exterior of the vestibules are washed at inspection periods, soap being used in connection with warm water. The cleaning of ventilators is taken care of at regular periods, when they are thoroughly washed, dryed and polished.

All dry wiping, scrubbing of vestibules and car washing is done at the car houses during the day time when possible.

LIST OF CAR HOUSES

Table II gives a list of the car houses of the company.

METHOD OF CHECKING RUN-INS

Run-ins are checked up by the general car house foreman, who obtains from the foreman of each car house a statement of the reason for each trouble occurring to cars under his authority. These run-ins are then tabulated weekly by car houses and causes and a report is prepared showing a comparison with the record for the previous week and for the corresponding week of the previous year.

REPAIR SHOP MAINTENANCE

Regular maintenance work at the repair shops has also been placed on a systematic basis by the adoption of a schedule requiring that a certain number of each of the various types of cars shall be sent to the shop at the ends of definite periods varying between 12 and 18 months. At this time the car body is given a thorough overhauling, and is painted and varnished or touched up and varnished as may be necessary. At the same time the trucks and electrical equipment, as well as the air brakes if the car is so equipped, are also overhauled. This work, at present, is concentrated at two shops. The woodworking, truck and electrical equipment work is carried on at Fiftieth Street and Sixth Avenue. The cars are then shifted to Ninety-ninth Street and Lexington Avenue, where the painting and varnishing work is done on the second floor of these shops.

CONCENTRATION OF MAINTENANCE WORK

In regular maintenance one of the principal objects sought has been the concentration of the work, and where in the past it was customary for gear wheels to be changed at the car house or in the motor and truck repair shop, this work is now done in the wheel shop. This change has permitted the management to use a solid gear, instead of the split gear formerly employed. The solid gear has practically eliminated all trouble with loose gears, and gives much more satisfactory service.

Another part of the maintenance work which has been concentrated is that of changing bearings and pinions. It was formerly customary to do this at the car houses, with the result that good bearing and pinion fits were not always obtained. This work is now taken care of at the One Hundred and Forty-sixth Street armature room, and passes through the hands of one man, so that uniform results in bearing fits are assured. During the past winter, the repairs to electric heaters have been concentrated at the controller room at Fiftieth Street and Sixth Avenue, and results comparable in degree to those in the previous cases described have been obtained.

As far as possible, the blacksmith work has been concentrated at Fiftieth Street and Sixth Avenue. In the past it was customary to have a blacksmith and helper located at practically every car house on the system. With the rearrangement of the blacksmith shop at Fiftieth Street and Sixth Avenue, better facilities were installed.

CONDITION OF ELECTRICAL EQUIPMENT

In judging the condition of electrical equipment from the maintenance standpoint, one of the best criterions is the condition of the work going through the armature room, and in particular the number of armatures received at this point for all classes of repairs. The average number of armatures received per week for the year ending Dec. 31, 1909, was 65.03, or an average of 9.24 per day. This shows an exceedingly good condition of the electrical equipment, especially when, as in this case, these figures cover armatures sent in for mechanical as well as electrical repairs.

In fact the number quoted above also includes a large number of armatures sent in for the turning and slotting of the commutators, which is a wear and tear item and not what might be termed a breakdown repair. Expressed in another ratio, the average number of armatures sent to the armature room per day is less than one-quarter of one per cent of the total number of motors of the system.

EXTRAORDINARY MAINTENANCE

During the past two years the company has also carried out a large amount of extraordinary maintenance on its cars to adapt them to the standards now selected. A large part of this work was done during 1908, although some of it was started in the latter part of the year 1907. An account will now be given of this work.

OPEN-CAR REHABILITATION

The first cars that were rehabilitated systematically were the open cars. Two hundred of the double-truck cars were forwarded to the works of the John Stephenson Company, at Elizabeth, N. J., where the car bodies were overhauled and painted. The rest, consisting of 82 double-truck open cars, were rehabilitated in the company's own shop at Ninety-sixth Street and First Avenue. The trucks and electrical equipments of all of these open cars were overhauled at the shop at Ninety-sixth Street and First Avenue. In addition, 272 single-truck open cars were rehabilitated entirely by the department of rolling stock and shops. The bodies were repaired and painted and the trucks and electrical equipment thoroughly overhauled.

Work upon the open cars was not completed until some time during July, 1908.

CLOSED-CAR REHABILITATION

The work of rehabilitation of the closed-car equipment was started during the latter part of May, 1908, and to obtain additional facilities so that this work could be taken care of by the company's own employees, a shop was started at the Kingsbridge car house, and, after some time, all of the carpenter and painting work for the rehabilitation of the double-truck closed cars was concentrated at this point. The single-truck closed cars were rehabilitated at Fiftieth Street and Sixth Avenue.

After a few of the closed cars had been so renewed and painted yellow, the management decided to change the color from the then standard yellow to the present standard green, which is known as "Coach Painters' Green, Medium." The first car that was painted green was turned out of the shop on July 15, 1908, and as soon as possible thereafter all of the other cars were painted in the same manner.

The cost of this work, covering car body, truck and electrical equipment rehabilitation, averaged as follows:

Single-truck open cars	$298.00 per car
Double-truck open cars	504.01 per car
Single-truck closed cars	304.68 per car
Double-truck closed cars	551.00 per car

From July 1 to Dec. 7, 1908, 502 single-truck closed cars and 622 double-truck closed cars, or a total of 1124 closed cars, were rehabilitated.

The following statement shows the rate at which these cars were turned out according to months:

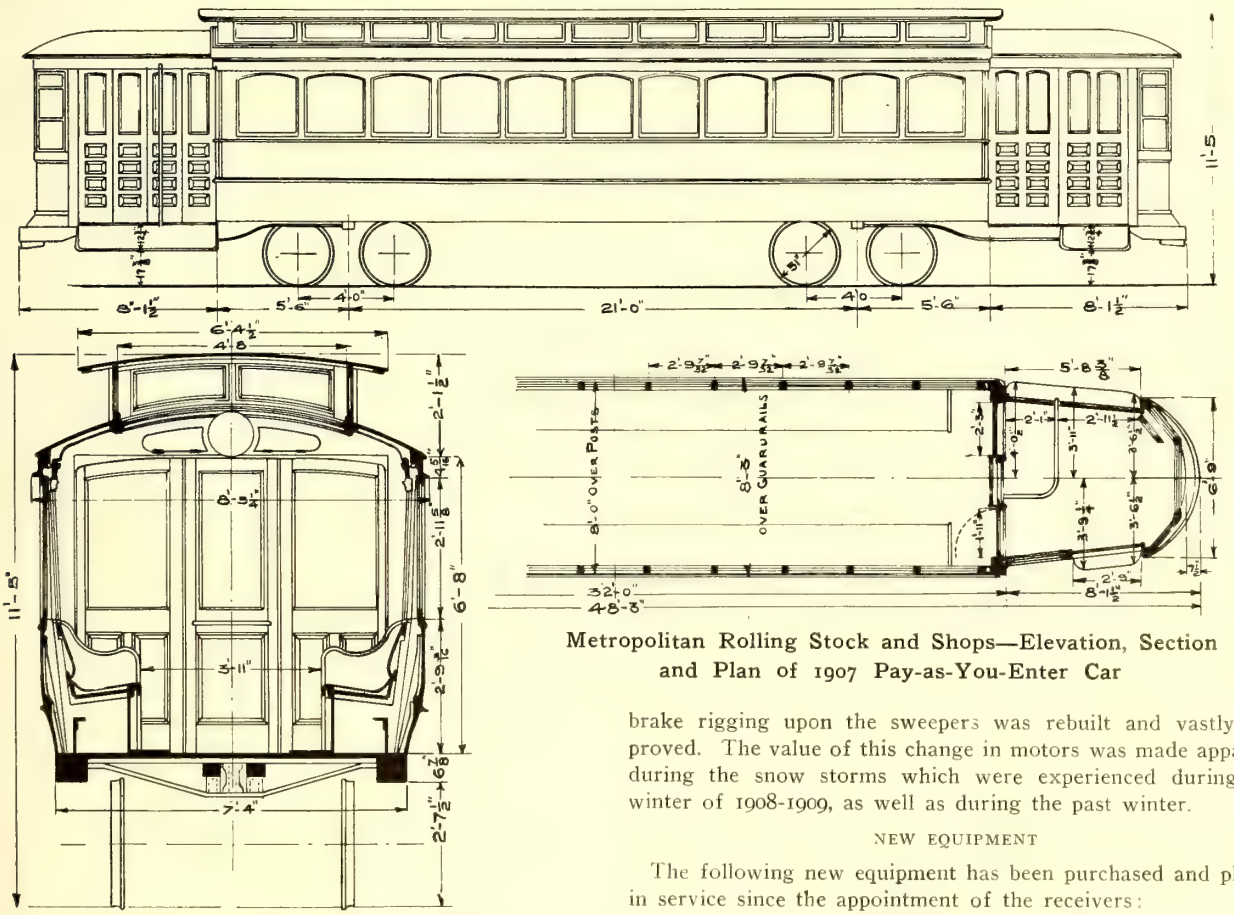
Month.	Single truck closed.	Double truck closed.	Total.
July	24	66	90
August	73	143	216
September	75	181	256
October	149	140	289
November	119	90	209
December	62	2	64
Totals	502	622	1,124

In rehabilitating the electrical equipment the cables were renewed in all of the double-truck closed cars and placed in cable boxes on the interior of the car. Wherever the cables came below the floor of the car they were placed in conduit, forming what is termed the "semi-conduit" system. The cable boxes were lined with ¼-in. asbestos lumber. The installation of this work was inspected and approved by the electrical branch of the local Board of Fire Underwriters.

The single-truck closed cars were equipped with the cables taken from the double-truck closed cars, but, previous to their installation, the cables were tested by the Bishop Gutta Percha Company, and any defective wire was removed. These wires were then made up into a cable by the Bishop company. Where the wires were exposed below the flooring on these cars, conduit was used for their protection.

SNOW-SWEEPER IMPROVEMENT

Previous to the winter of 1908 the 70 snow sweepers of the system were stripped of the GE-1000 motors used for driving the car and GE-57 motors were substituted. In addition the brake rigging upon the sweepers was rebuilt and vastly improved. The value of this change in motors was made apparent during the snow storms which were experienced during the winter of 1908-1909, as well as during the past winter.



Metropolitan Rolling Stock and Shops—Elevation, Section and Plan of 1907 Pay-as-You-Enter Car

NEW EQUIPMENT

The following new equipment has been purchased and placed in service since the appointment of the receivers:

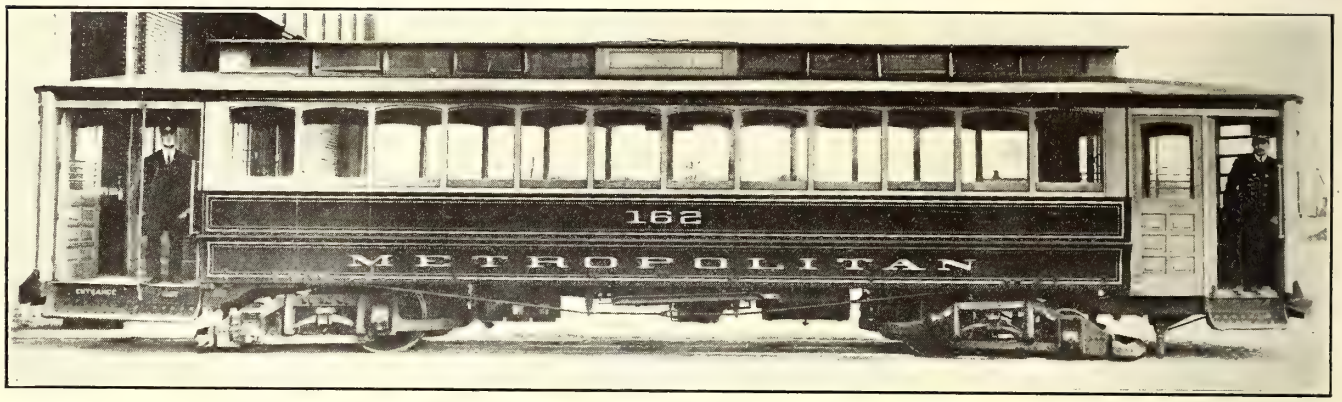
Passengers Cars.		
Pay-as-you-enter cars, 1907 type	155	
Standard closed cars	89	
Prepayment cars, 1908 type	126	
Total	370	
Under purchase:		
Standard cars	6	
Prepayment cars, 1908 type, semi-steel	2	
Grand total passenger cars		378
Service Cars.		
Snow sweepers	22	
Power slot scrapers	10	
Derrick or construction car	1	
Total		33
Grand total of all cars purchased or now being constructed		411

THE 1907 TYPE OF PAY-AS-YOU ENTER CARS

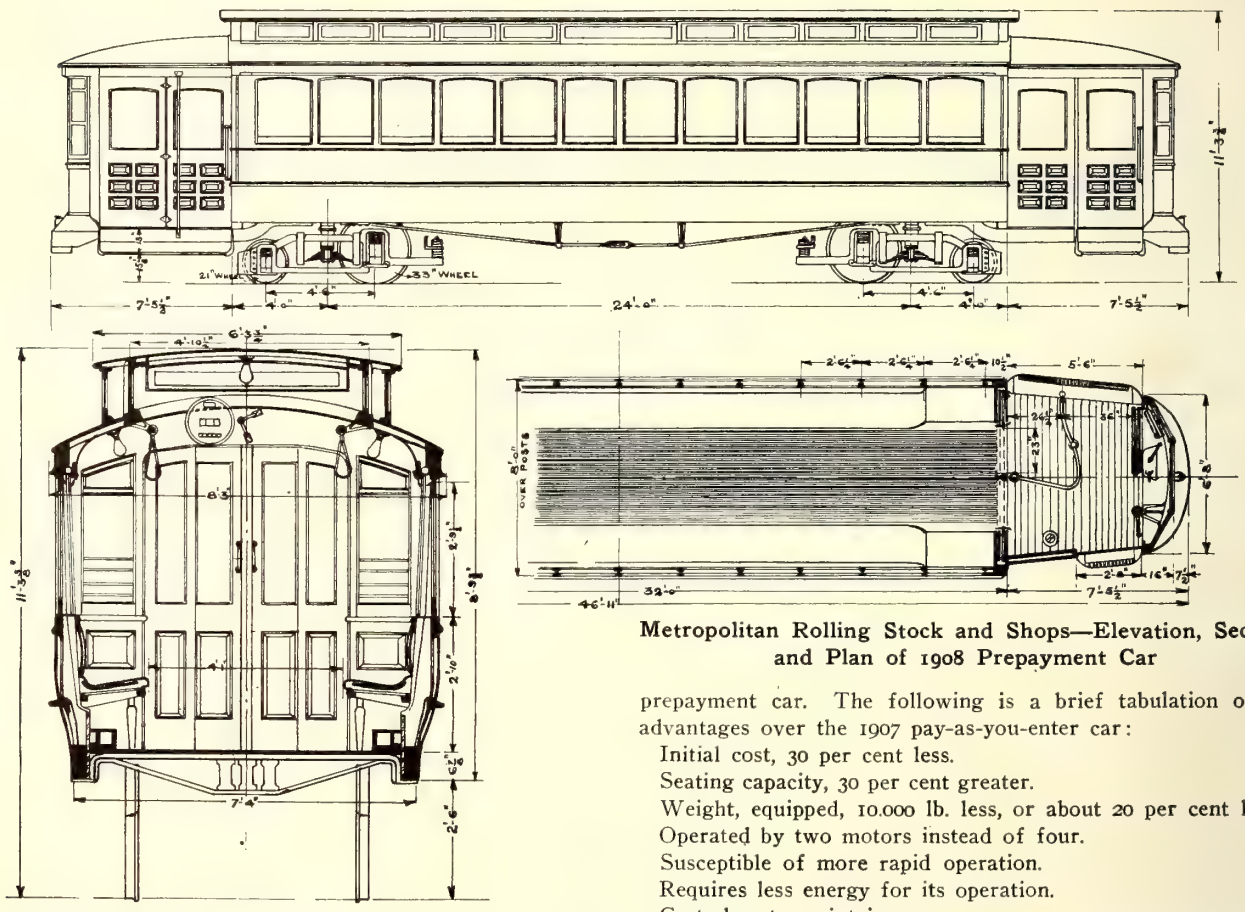
The Metropolitan Street Railway Company was one of the first in the country to adopt pay-as-you-enter cars, and in 1908 155 of this type of car were placed in service on the Madison and Fourth Avenue line. They were approximately 48 ft. over bumpers and had a body 32 ft. in length, whereas the previous standard car of the company had a 28-ft. body and was

37 ft. 2 in. over bumpers. These cars were equipped with four motors each.

The 1907 pay-as-you-enter cars met with instant success with the public, and clearly demonstrated the expediency of operating cars of this general nature under the conditions prevailing on Manhattan Island, as well as the wisdom of the management in adopting them. But, as frequently occurs in cases where so radical a departure is made from previous standards, the company found that for its conditions certain changes in design were desirable. Before adopting any standard, however, an extended study was made of types of cars used in different cities, as well as tests of all the different types used in New York, to determine the minimum average length of car stop, quickest practical rate of acceleration and average current consumption. It will not be necessary to review here the extent and scope of the study conducted in the endeavor to reach the solution of this question, as an account of the investigation was published on page 500 of the Electric Railway Journal for Dec. 5, 1908. As there stated, the conclusions reached were in favor of the light type of car described in that article. The extent of the investigation and the conclusions derived, including the estimate made of the cost of operation per annum per pound weight of car, attracted a great of attention at the time. as the study was probably the most exhaustive given to that subject before or since. Briefly, it showed that in New York the cost of transporting each additional pound in weight of a car cost 7 cents per year, of which 5 cents was for the additional power and 2 cents represented track maintenance. From these data the company ordered 126 of the modified type of car which its examination had indicated was the most desirable for New York conditions. This car became known as the 1908



Metropolitan Rolling Stock and Shops—Side View of 1908 Prepayment Car



Metropolitan Rolling Stock and Shops—Elevation, Section and Plan of 1908 Prepayment Car

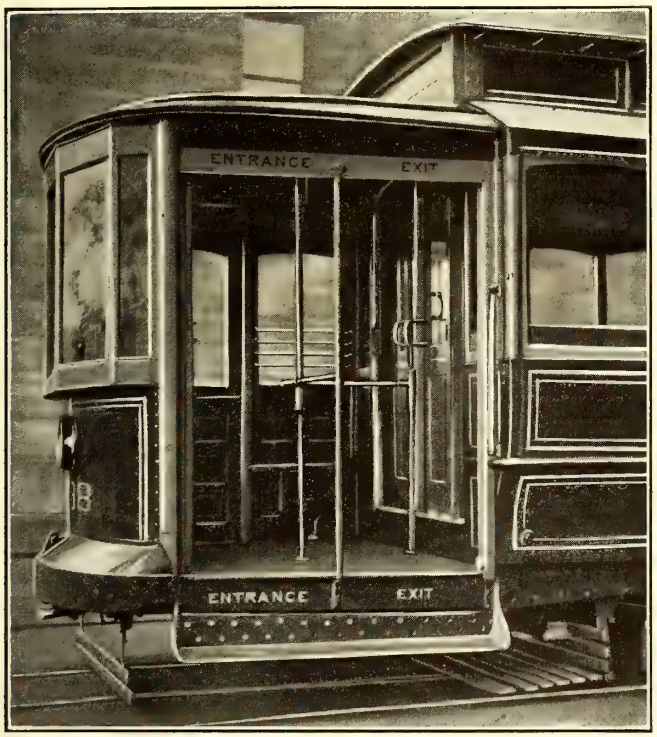
prepayment car. The following is a brief tabulation of its advantages over the 1907 pay-as-you-enter car:

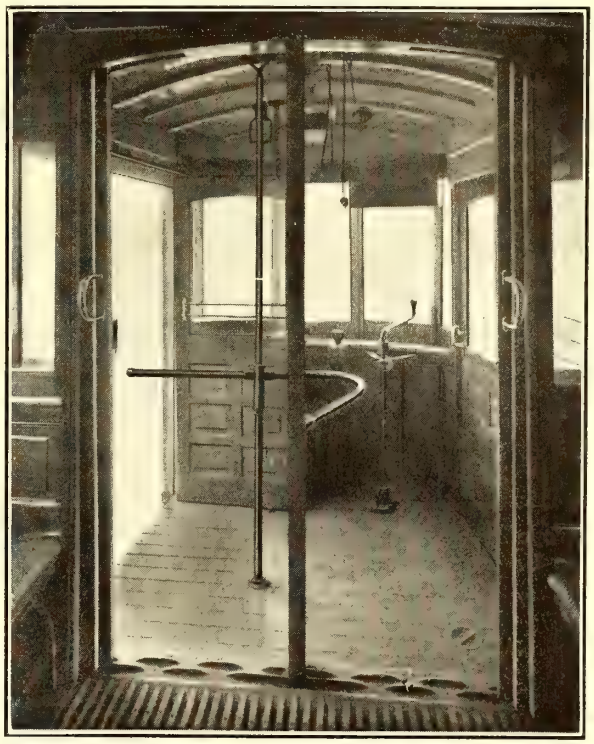
Initial cost, 30 per cent less.
Seating capacity, 30 per cent greater.
Weight, equipped, 10.000 lb. less, or about 20 per cent less.
Operated by two motors instead of four.
Susceptible of more rapid operation.
Requires less energy for its operation.
Costs less to maintain.
Materially saves the wear and tear on the track structure.

CAR MOTORS

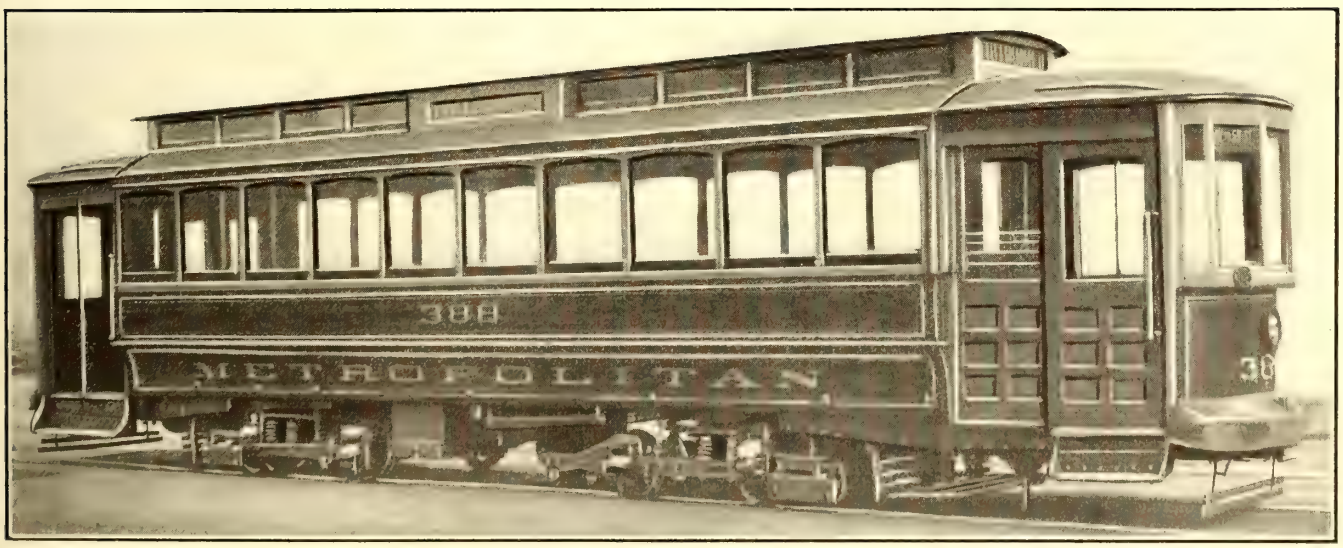
The improvements in car designs introduced in 1908 by the company were by no means confined to the design of the car body itself. The rolling stock was taken up as a whole, and one of the most important parts of the equipment was, of course, the motor. To reduce armature trouble due to water in the motor casings, an improved mummified wire-wound coil was developed with special reference to its moisture-resisting qualities and was adopted as standard. The subject of motor

design itself was then taken up with the manufacturers of electrical equipment and following along lines suggested by the company, each of the two largest manufacturers of motors developed a type of commutating-pole motor with a frame in one piece, making the casing practically water tight and eliminating the possibility of the lower half of the frame dropping on the pavement. These motors also have a high rate of acceleration. They have been adopted by the company as standard for its future car equipment, and are known to the trade under the names of GE-210 and Westinghouse No. 310.





Metropolitan Rolling Stock and Shops—Front and Rear Platform of Converted Car



Metropolitan Rolling Stock and Shops—Side View of Converted Car

These motors were installed on the 1908 prepayment cars mentioned above and also upon 80 of the standard closed cars, to which reference has been made.

TRUCKS

An interesting feature in connection with the trucks upon which the 1908 prepayment cars are mounted lies in the fact that the position of the pony wheels has been reversed—that is, the car is mounted on the trucks in such a manner that the pony wheels on the front truck precede the driving wheels and the pony wheels on the rear truck follow the driving wheels. By this means the overhang on the cars has been materially reduced and it has been possible to increase the truck centers from 21 ft., as in the case of the 1907 pay-as-you-enter car, to 24 ft. in the case of the 1908 prepayment car.

REBUILT CARS

The 1908 type of car proved so satisfactory that the company decided to change over a number of its old cars to prepayment cars. The first so altered were 13 cars, known as "combination" cars, owing to the fact that when they were originally purchased one end of the car was open and the other end closed. During 1907 these cars had been rebuilt so as to make them entirely closed, one end having a drop platform, while the other end had a platform level with the interior floor. It was these cars which the management decided to convert first into the "prepayment" type of car, and in December, 1908, work was started upon them in the shops. In addition to these 13 cars there was one car which had been partially rebuilt into a regular pay-as-you-enter car. The design was changed and the

car was completed according to the 1907 model. Later six standard double-truck closed cars were converted to the "prepayment" type. These cars were placed in service during the spring of 1909 on the Madison Avenue line. Later they were transferred to the 116th Street Crosstown line.

These cars demonstrated the practicability of converting the old cars to the prepayment type and early in the summer of 1909 the management decided to change over a lot of 250 of standard double-truck closed cars in the same way. The work of converting these cars was started in July, 1909, and they were completed by the end of December.



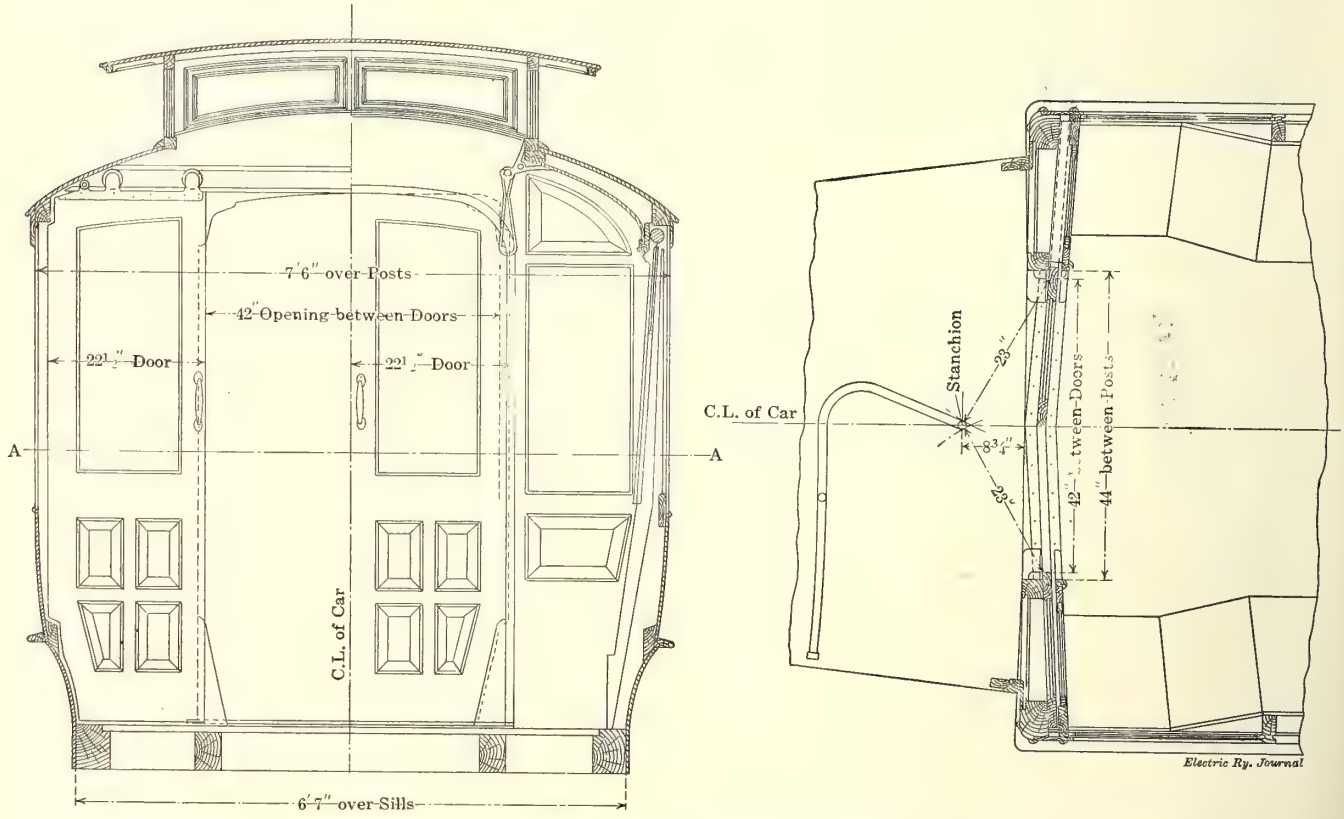
Metropolitan Rolling Stock and Shops—Double-Piece Door as Used in Converted Car and 1908 Prepayment Car

The cars so altered were some originally built by The J. G. Brill Company and were of the type of car which had been standard on the Metropolitan Street Railway, with only minor changes, from 1898 to 1906. The cars measured 6 ft. 7 in. in width over the sills, had a 28-ft. body and an over-all length of 37 ft. The cars with trucks and motors, but with hand brakes, weighed 27,040 lb.

DETAILS OF CONVERSION

Some particulars of the mechanical changes made in these cars to adapt them to prepayment operation may be interesting. The platforms were increased in length from 4 ft. 6 in. over bumpers to 6 ft. 6½ in. over bumpers, making the total length of the cars over bumpers 41 ft. 1 in. To extend the platforms, the platform center and side knees were spliced and reinforced with ⅜-in. steel plates, the hood was extended to accommodate the increased length of platform, and double folding doors were installed on the platform. To increase the seating capacity, which before the change was 36 persons, a seat for three persons was placed on one side of each platform and a folding corner seat for one passenger on the other side. As the cars are double ended and as these seats were lowered only on the front platform, the seating capacity was increased to 40 persons. The addition to the length of the platform required additional strength in the side trusses. In consequence, the side truss rod was lengthened and the truss was deepened 10 in. At the same time a truss was built under the end sills so as to take in the platform center knees.

The original cars, of course, were equipped with double sliding end doors with an opening, when open, 34 in. in width. This, of course, was too narrow for a car operated on the prepayment plan, and on the first lot of cars two-piece bulkhead doors were used in which one part slid over the other to provide an opening 47 in. in width. Toward the end of the work of converting these 250 cars, a new arrangement was developed whereby it was possible to use a single door on each side of the center line of the bulkhead instead of the two-piece door. This arrangement was installed upon the last car that was converted of the lot of 250 cars, and is working in a very satisfactory manner. The design, which has been patented by H. H. Adams, superintendent of rolling stock of the Metropolitan Street Railway Company, is illustrated in the accompanying engraving. It will be seen that additional space for the door runway is secured by placing the single-piece doors on a slight angle, so



Metropolitan Rolling Stock and Shops—Section and Plan Showing Arrangement of Bulkheads and Single-Piece Door in Latest Converted Cars

as to pass by the inside of the corner posts. This change has been found to reduce the cost of conversion so far as the end bulkhead work is concerned and insures a simpler operation of the doors.

COST OF CONVERSION

The cost of conversion, including the equipment of the cars by air brakes, was $276.28 per car for labor and $613.08 per car for material. The addition in weight to the car, including the weight of the air-brake equipment, was about 2000 lb. Against this there were four additional seats.

COMPARISON OF THE WEIGHTS OF THE THREE TYPES

All three cars are illustrated in the accompanying engravings. The following statement in regard to the weights may be interesting. These weights include motors, trucks and brakes.

1907 pay-as-you-enter car, scale weight, 47,800 lb. The electrical equipment consists of four GE-80 motors. The trucks are Brill 27-GE.

1908 prepayment car, scale weight, 38,000 lb. The electrical equipment of this car consists of two Westinghouse 310 interpole motors. The trucks are Brill 39-E.

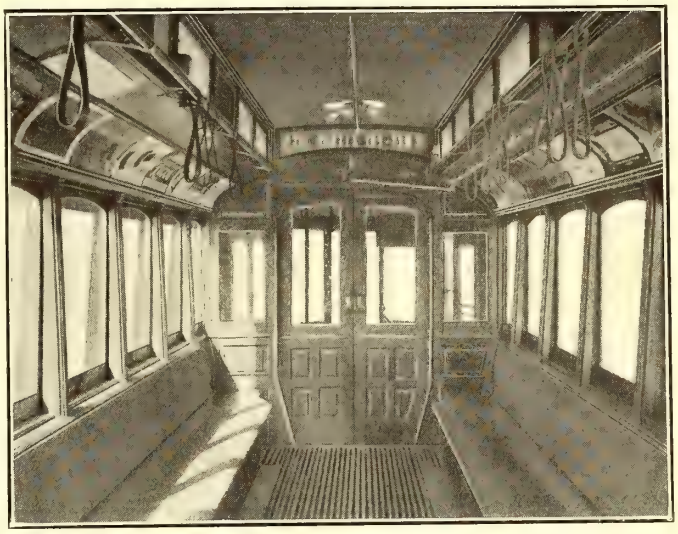
The converted prepayment car (converted in 1909), scale weight, 30,530 lb. The electrical equipment under this car consists of two GE-57 motors. The trucks are Brill maximum traction No. 22.

LINES OPERATED BY DIFFERENT TYPES OF CARS

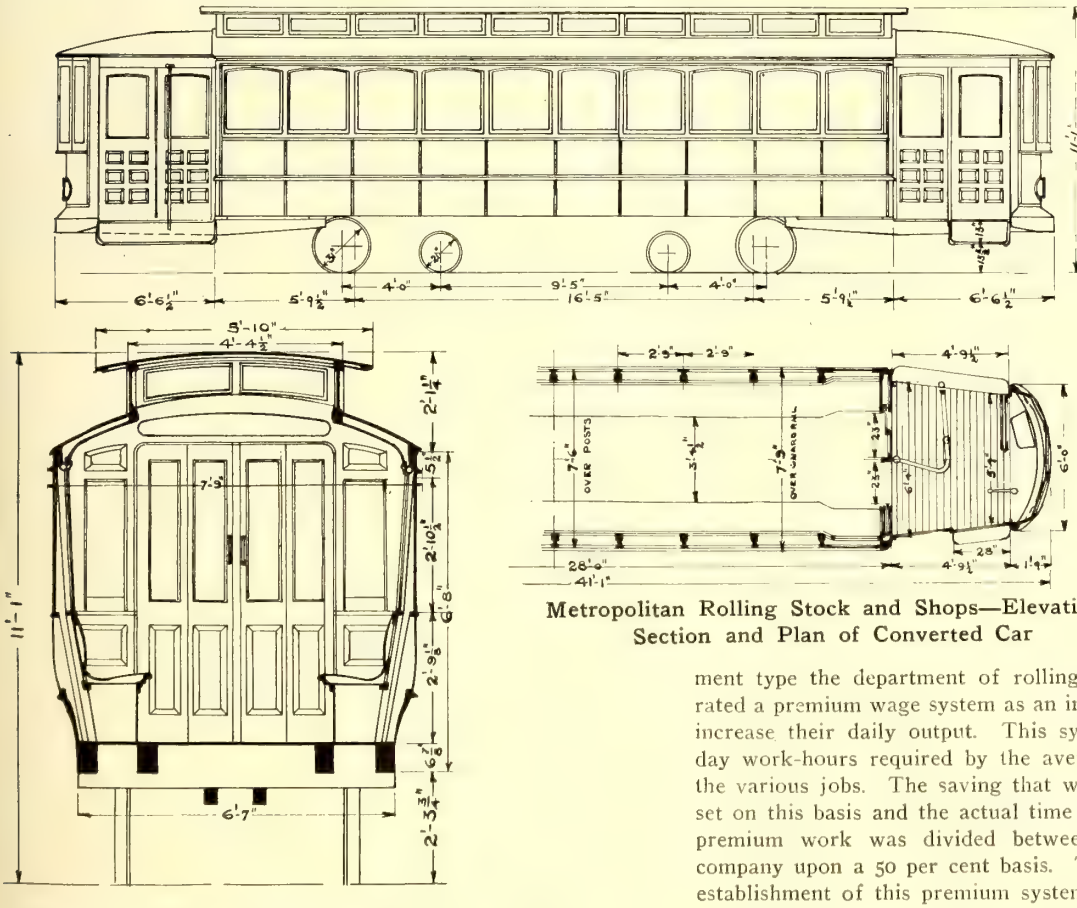
The following is a brief summary of the routes on which the different types of cars run. The Broadway & Amsterdam Avenue and the Broadway-Columbus-Lenox Avenue lines are operated by the 250 prepayment cars, which have been converted from standard box cars.

The Fourth & Madison Avenue line is served by 125 1908 prepayment cars and approximately 50 of the 1907 type of pay-as-you-enter cars. On the Eighth Avenue line approximately 100 of the 1907 type of pay-as-you-enter cars are operated. The 116th Street Crosstown line has 20 of the converted prepayment cars.

All of the work in connection with the conversion of the 250 standard cars was done by the company's employees in its own shops, with the exception that the rattan covering for the seats was installed under contract in the shops. The mill work was taken care of at Fiftieth Street and Sixth Avenue; 160 of the cars were completed at Fiftieth Street and Sixth Avenue and 90 at 146th Street and Lenox Avenue. The painting and varnishing work were done at the shops at Lexington Avenue and Ninety-ninth Street.



Metropolitan Rolling Stock and Shops—Single Piece Bulkhead Door



Metropolitan Rolling Stock and Shops—Elevation, Section and Plan of Converted Car

A vast amount of work passed through the carpenter shop mill in conjunction with this job. One item alone consisted of 4000 doors and partitions. The amount of work that could be gotten through the carpenter shop mill was the limiting feature to the rapidity with which the work could be completed.

PREMIUM WAGE SYSTEM

To move forward the conversion of the 250 cars to "prepayment type the department of rolling stock and shops inaugurated a premium wage system as an incentive to the workmen to increase their daily output. This system was based upon the day work-hours required by the average workmen to perform the various jobs. The saving that was made between the time set on this basis and the actual time taken by the workmen on premium work was divided between the workmen and the company upon a 50 per cent basis. The notice announcing the establishment of this premium system read as follows:

New York, Sept. 20, 1909.

The System As We Propose to Introduce It:

It is proposed to introduce the premium system in connection with the alteration of 250 standard cars to prepayment cars, and this statement is drawn to give the workmen a fair understanding of what is proposed.

The premium system is based upon the following conditions:

(1) The basis for the system will be the estimated time in hours required for an average workman to complete any particular job on what is known as regular work.

(2) The amount of the premium is determined by the saving in hours or fractions thereof that the workman makes from the time set for each job, and the amount of the premium will be half the time saved on each job at the rate of the particular workman.

EXAMPLE: A certain job is rated at 40 hours and is completed in say 30 hours; the workman will receive the 30 hours plus half of the 10 hours saved, or a total of 35 hours for the job. In other words, he receives 35 hours of pay at his rate for working 30 hours.

(3) Under the premium system, workmen will not make less than their regular rate of pay, and this system is introduced in order to enable the workman to increase his pay by putting extra effort on his work.

(4) The time allowed for any job will be fixed by the superintendent of rolling stock and shops, together with the foreman of a department, and will be as near as can be estimated the time which the average workman would take to complete the work. Should it be found that the hours set for a premium job are too low, it will be reconsidered before a similar job is again put in work.

(5) The time allowed will include all time necessary to procure tools, set up scaffolding, etc., but, of course, in the case of any extraordinary delay, the time so lost will be added to the time allowed. In the case of extraordinary delay, the foreman will decide the allowance in time to be made.

(6) All work will be checked and passed by the foreman or shop inspector before being accepted, and the workman will only be paid the premium after the work has been found satisfactory. In the case of dispute, the matter will be referred to the superintendent of rolling stock and shops, whose decision will be final as to the quality of workmanship.

(7) In the case of overtime, the premium will be calculated on the wages due for the actual time worked without taking into account the extra allowance of time for overtime on the day work basis.

(8) In the case of a job requiring more than one workman in a crew, the time set for the complete job will be figured on the basis of the number of men to the crew. The total time taken by the crew will be calculated for premium, which will be paid each workman in the crew in proportion to the hours he has worked on the job.

General Remarks:

The largest premiums will, we expect, be earned by those workmen who arrange their work systematically and who keep their tools in good order and make every move count.

In starting this premium system, it is the desire of the company to place this proposition before the workmen in the clearest possible manner, and any explanations or questions that may be asked by the workmen will be fully explained.

In introducing this system, the company does so in the hope that the workmen may make better wages by giving an increased effort to the company, and the company gains by having the work out of the shop sooner.

The standard of the workmanship must be the same as that at present in practice upon the day work system.

Typical copies of job orders follow. As will be seen they give the title and number of the jobs and a description of all of the work entailed by them.

Work on 250 Standard Cars Altered to Prepayment Cars.
Job No. 1601.
Putting in New End Bulkhead.
(This job does not include tearing out old bulkhead.)

The first operation is to square the end of the car. Next, shaping header, mortising header and gaining end sill. Installing the door and center posts, putting in sash rails, strainer rails and strainers, top sash rails and blocking. Installing head panel and corner post plates or irons. Putting in top and bottom panels and toe board. Installing end fenders, fender plates and concave corner irons. Finish fender irons to vestibule post line. Scrimp panels on inside. Install all bulkhead moldings and clean bulkhead for painting.

1 end of car..... 40 hours

Work on 250 Standard Cars Altered to Prepayment Cars.
Job No. 1602.
Putting in Vestibules.

Fit castings to corner posts. Install all vestibule door headers, square up posts and headers and screw posts to crownpiece and bonnet. Put in center dividing post to header and sub-platform knee. Fit vestibule at corner posts and top at bonnet and bottom at dashrail; attach canvas at top under bonnet, put wooden rim on dashrail; put corner irons at junction of corner posts and dashrail. Screw vestibule to posts and dashrail. Put in filling blocks and facia inside of vestibule. Sliding door track, blocking and door track at top. Fit facia panels on outside of vestibule. Face body corner posts on outside with ⅜-in. whitewood from sash rails to letter boards. Put in all glass in vestibule and all moldings. Put on vestibule post cappings. Clean up all joints and all around in and outside for painting.

1 end of car..... 55 hours

Work on 250 Standard Cars Altered to Prepayment Cars.
Job No. 1603.
Platform Flooring.

Level all platform beams and lay flooring. Screw flooring to platform beams and subknees. Cut floor at junction of door tracks and round edges at step entrances on both sides.

1 car—2 platforms per car..... 15 hours

SAVING BY THE PREMIUM SYSTEM

Four thousand seven hundred and ten jobs were performed upon the premium basis, with the following results:

Estimated time required to perform the work upon a day rate basis, 85,909½ hours, at a cost of	$23,035.75
Actual time required by the workmen upon premium basis, 50,020½ hours, at a cost of	18,401.24
Saving in time required upon the premium basis, 35,889 hours, 42 per cent; saving in the cost, 20 per cent	$4,634.51

The company has been as well satisfied with the moral effect of the establishment of the premium system as with its financial results. Its experience has been that where men are working upon a day-rate basis, it is necessary to watch them to see that they are giving an honest day's work, and also to watch the character of their work. On the premium basis it is not necessary to watch the workman, but, of course, attention has to be given to the character of his work.

DIRECTION

All of the work described in this article has been carried out under the general direction of Oren Root, manager for the receivers and under immediate supervision of H. H. Adams, superintendent of rolling stock and shops. During the earlier months of the receivership period, and before the reorganization of the rolling stock and shops department was accomplished, the electrical engineer, J. R. C. Armstrong, rendered service in a consulting capacity in connection with various improvements to which reference has been made above.

OTHER ARTICLES

In an early issue of the paper particulars will be given of improvements in minor equipment made in the departments of rolling stock and shops of the Metropolitan Street Railway Company.

RICHMOND BRAKE SHOE PRACTICE

The Virginia Railway & Power Company, Richmond, Va., has given considerable attention to the brake-shoe question within the last year or two, having eliminated the original seven or eight styles of shoes for replacement by one type, and it has also made its single-truck brake rigging interchangeable. The standard shoe, which is used on both single and double-truck cars, is the American Brake Shoe & Foundry Company's design M-1091, which is not exactly the same as the American Street & Interurban Railway Association standard, owing to the fact that the Richmond company started the standardization before the association's designs were promulgated. The company had on hand at the time hundreds of heads which it could not afford to throw away, and hence the shoe adopted is unique to Richmond. The shoe itself is of gray iron, but no attempt is made to get the lowest possible scrap value, owing to the fact that in Richmond there are grades as high as 12 per cent and 13 per cent. It has been found, however, that the shoes can be worn down to the back, if desirable. The brake shoes are examined carefully every night.

PAINTING PRACTICE IN CHARLESTON

The Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C., has recently decided to give up the use of the present straw body color in favor of the Sherwin-Williams traction green. This decision was reached on account of the difficulty which has been experienced in matching up the straw color. The management is a strong believer in the long schedule, allowing four weeks to be taken for painting a car from the wood up. When this work is done in connection with the general overhauling of a car, about six weeks elapse before the completion of the job, as the company does not employ a comparatively large shop force to hurry matters along. Trucks and car-bodies usually require considerable touching up every nine to 12 months owing to the salty atmosphere of Charleston.

Although the painting is done in the company's shops, the work itself is performed under contract with a boss painter. The latter hires his own help, but uses the material furnished or specified by the railway company. Every step of the work is checked by the master mechanic. Contracts are made for retouching, complete repainting and the handling of specified parts, as roof, floors, doors, trucks.

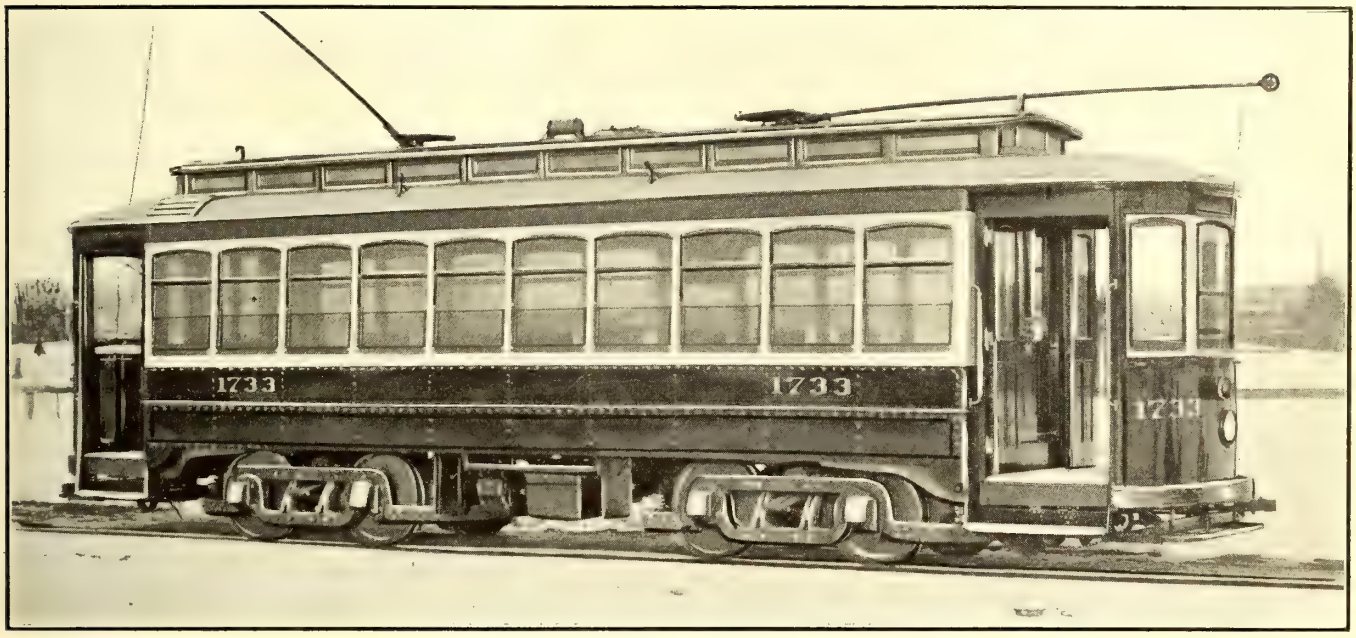
The average cost for painting a vestibuled doube-truck car with 30 ft. body and 37 ft. over-all is $62. This work includes burning off and removing all interior varnish and applying three coats of varnish to the exterior. A single-truck car with 20-ft. body and 28 ft. 7 in. over-all costs $46 under the same conditions, and a shorter single-truck car, 24 ft. over all, costs $40. One coat of varnish outside and inside costs $15 for a double-truck car and $10 for a single-truck car.

REDUCED WEIGHT SEMI-CONVERTIBLE CAR

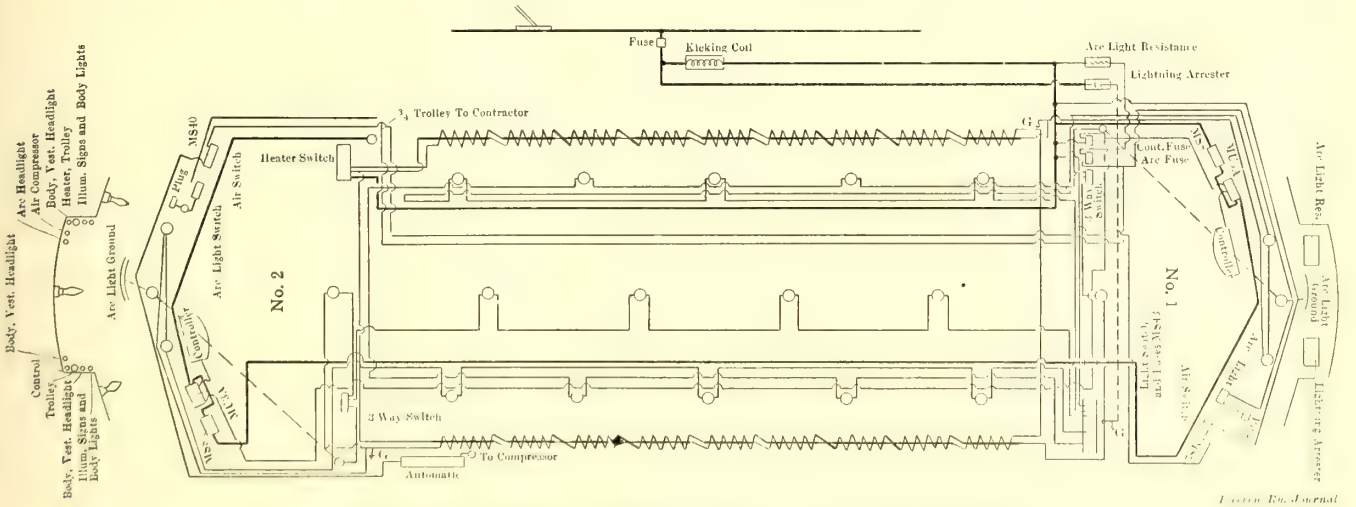
An Interesting New Design of Car Built for the Boston & Northern and the Old Colony Street Railways

ONE of the significant tendencies in the field of rolling stock design at present is the interest of operating companies in the reduction of car weights. In the campaign to accomplish a decrease in the cost of operation, car design has been one of the latest points of attack. The advantages of reduced weight need no demonstration, so long as the decrease is accompanied by no sacrifice of strength in working parts. Lessened cost of power, lower maintenance expense, more rapid acceleration and braking for the same expenditure and absorption of energy, decreased cost of replacing fittings in certain instances, and less wear of track and joints result from the operation of lighter cars.

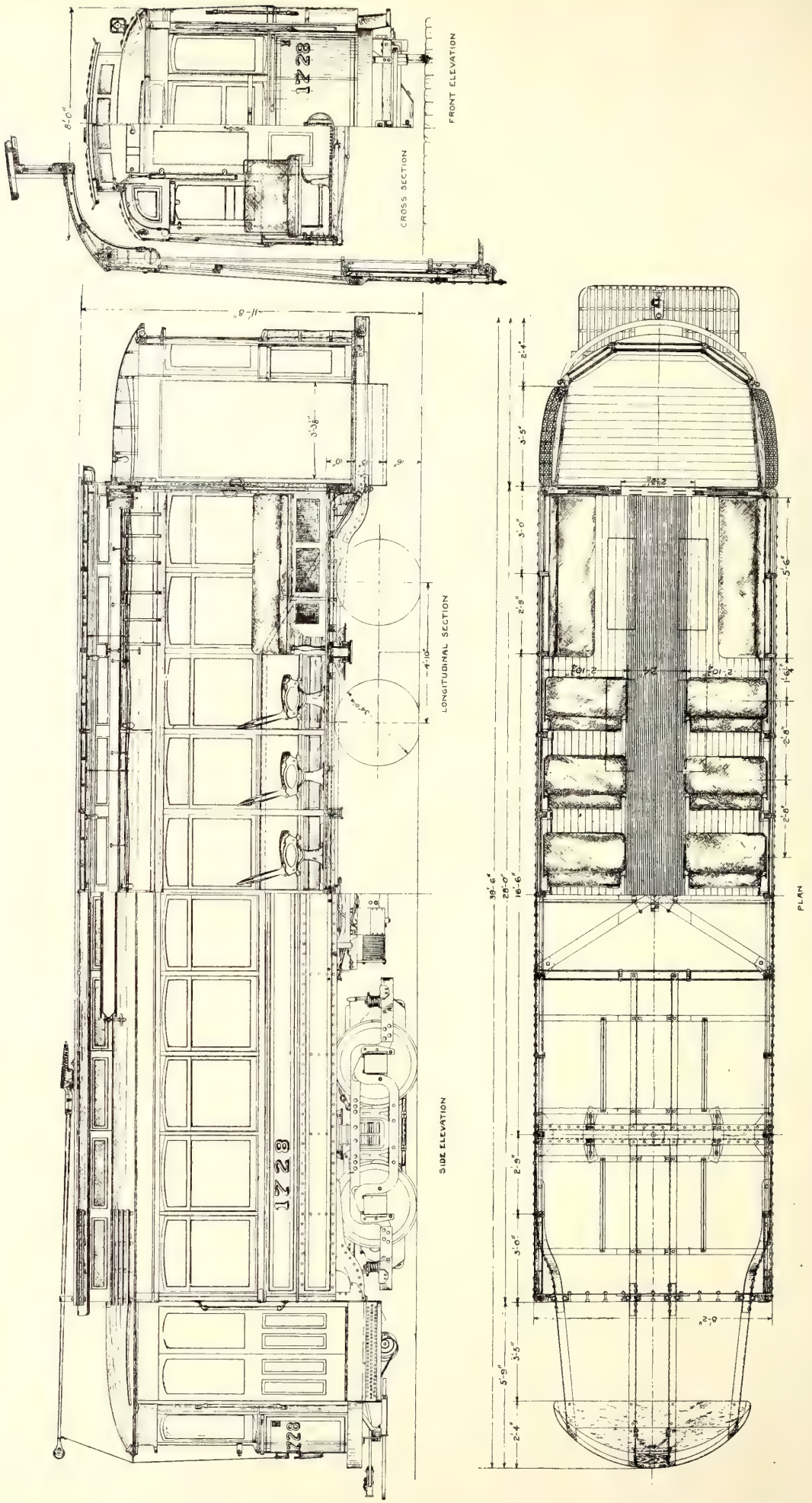
In appreciation of these points the Boston & Northern and the Old Colony Street Railway Companies have made a thorough study of car design in relation to weight during the past 18 months, and are now placing in service 44 new semi-convertibles of the so-called "1909" type which are 6,610 lb. lighter per car than the "1907" type of semi-convertible car used by the two systems. These cars were designed in detail by E. W. Holst, superintendent of equipment for the two roads, which are operated under the financial administration of the Massachusetts Electric Companies. In general the plan of design was to duplicate the seating capacity and more important dimensions of the 1907 cars so as to produce the same type of transportation unit, and at the same time, to cut down practically every ounce in weight which could be spared without sacrifice of necessary strength. Upon the completion of the design and award of the contract, a systematic inspection of the progress of the work in the shop was set in motion, including the careful weighing of every item under the control of the railway companies. These accumulated weights form one of the most complete analyses of car body and fitting equipment ever made in American street railway practice, and are printed herewith. Following the assembly of the new type of car, official weigher's records were taken of the complete rolling stock unit. Finally, to demonstrate the actual saving in power of the new car over the old type tests were made of the energy consumption of each type in successive commercial runs over rep-



Boston & Northern Light Car—Fig. 1, Exterior



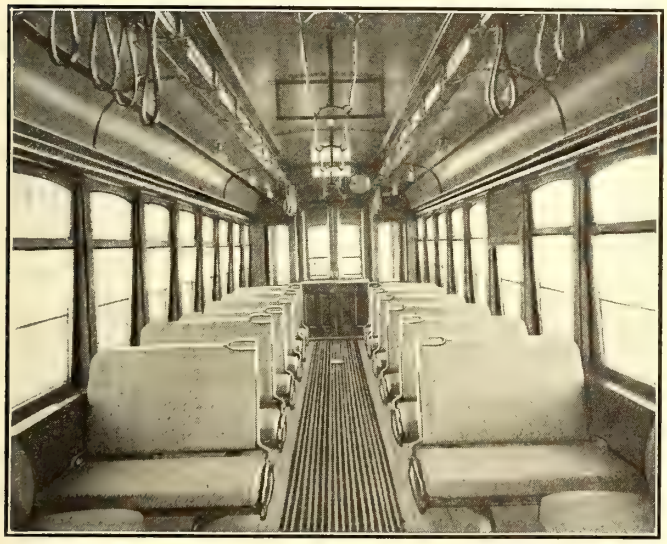
Boston & Northern Light Car—Fig. 2, Wiring Diagram



Boston & Northern Light Car—Fig. 3, Half Side and End Elevations, Cross Sections and Plan Above and Below Flooring

resentative urban and interurban routes, with meter checking before tests and the exchange of motormen to get average results. The result of these tests indicated that if the 44 1909 type of cars should be substituted for the 1907 cars on the urban service subjected to electrical measurement, there would easily be a saving of $0.732 per car per day, or $11,756 per year; and similarly, if the substitution were made in the interurban service, the saving in power consumption per car per day would be $0.873, or $14,020 per year for the total 44 cars placed in service. This has been accomplished with no increase in the cost of the new cars over the 1907 type.

Fig. 1 shows a photographic view of the 1909 semi-convertible car exterior, and Fig. 4 shows the interior. The car body is 28 ft. long and the total length of the car over the bumpers is 39 ft. 6 in. The width of the car over the weatherboards is 8 ft., and the seating capacity is 40 passengers. Twelve cross and four longitudinal seats are provided. The height from the rail to the trolley board is 11 ft. 8 in. Four GE-80 motors are provided per car with K28-J controllers, and the trucks are of the Standard O-50 type, with 34-in. solid steel wheels of Schoen make, 2½-in. thread and 4¾-in. axles. The wheel base is 4 ft. 10 in. The total weight of the car complete



Boston & Northern Light Car—Fig. 4, Interior View

and ready for service, but without passengers, is 42,090 lb., compared with a total weight of 48,700 lb. in the case of the 1907 car. The 1909 car was built by the Laconia Car Company works, Laconia, N. H., according to the designs of the purchaser. Fig. 3 shows the car in plan and section.

In addition to the improvement in weight which the 1909 cars afford, the steps are 2 in. nearer the ground and the space inside the car is nearly 100 cu. ft. greater than in the 1907 type. The vestibules are also 1 in. wider and 1½ in. longer in the 1909 car, and the seats are 1¼ in. longer, with 1⅝ in. increase in the length of cushion, the aisle width being the same as in the 1907 car, 24 in. Instead of being carried up in an arched construction, as in the earlier car, the posts in the new car are straight, and approximately 92 cu. ft. of additional head room are thus gained. The windows are built in two unequally high sections, the lower portion being carried downward into a pocket extending slightly below the floor level, while the comparatively light upper sash is carried up past the weather board into the roof. This reduction in the weight of glass carried up into the roof enabled the company to secure a much lighter roof construction, although the car has the same dimensions from floor to roof and the same outside dimensions over the weather board as the 1907 car. Table I shows the comparison in detailed dimensions between the 1907 and the 1909 cars.

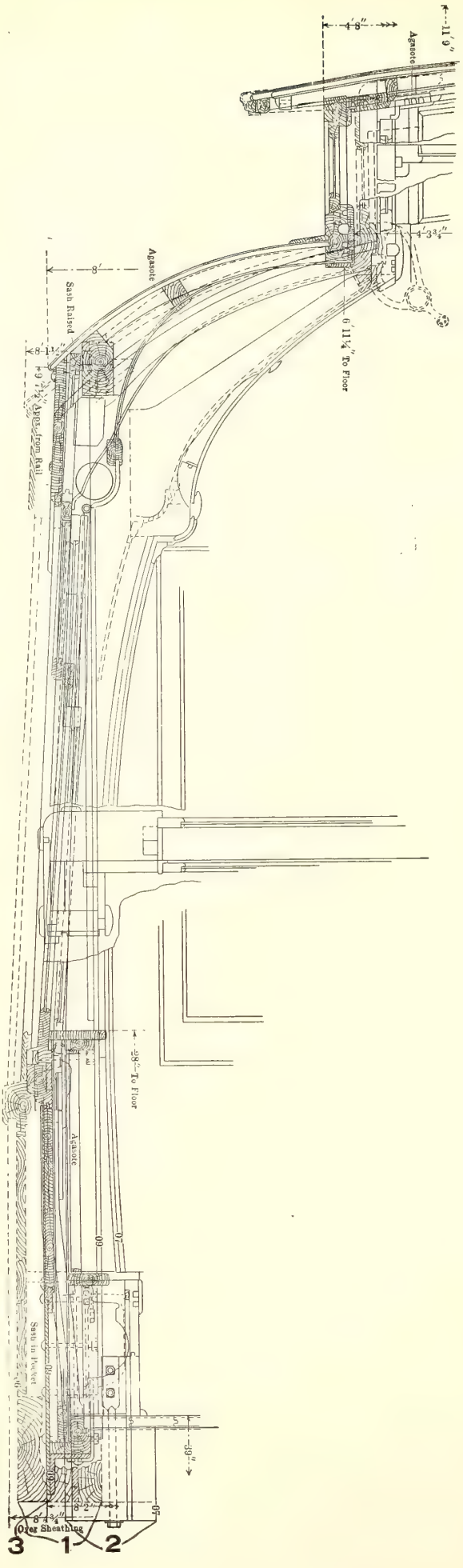
Comparison with the 1907 car shows that while nearly all the important dimensions are substantially unchanged in the new car, the comfort of the passenger is materially increased by the later design. The gain in head room affords improved ventilation, and the increase in seat and cushion length though slight comes at a place where it will be highly appreciated. Two persons per seat can be more comfortably accommodated than in the earlier car. In each car 10 windows are provided on a side, but the windows in the new car are 1½ in. wider than in the older type. In the new car the underframing is of the composite type. The car body has been brought down to a height of 39 in. from the rail to the top of the floor, in spite of the use of 34-in. wheels, and the underframing is designed to permit a free swing of the wheels for a curve with a center radius of 30 ft. Nothing but the floor is located immediately above the wheels, and the step heights above the rail are as follows, compared with the 1907 car:

	1909 car, inches.	1907 car, inches.
Height of step, above rail	16	18
Height of step to platform	13	14
Height, platform to floor	10	10

In the new car the steel sill formerly placed on the inside of the post has been located on the outside, making use of the sill as the bottom member of the side of the car and installing an angle iron in place of the sill. From the bottom of the seat to the window rail the side of the car is filled in with wood plated on the outside with steel. The lower window sash drops into a pocket between the end of the seat and the outside panel, the truss plank being cut between the posts up to the bottom of

TABLE I.—COMPARISON OF SEMI-CONVERTIBLE CARS (28 FT.) BUILT IN 1907 AND 1909.

	Car No. 1703, 1907 Type.	Car No. 1728, 1909 Type.
Type of car	Semi-Convertible	Semi-Convertible
Builder	Brill Company Kuhlman Shop	Laconia Car Co.
Length of car body	28 ft.	28 ft.
Length over bumpers	39 ft. 9 in.	39 ft. 6 in.
Length over dashers	38 ft. 5 in.	38 ft. 7 in.
Seating capacity	40	40
Seating arrangement	12 cross, 4 longitudinal	12 cross, 4 longitudinal
Height from rail to trolley board	12 ft.	11 ft. 9 in.
Truck centers	16 ft.	16 ft. 6 in.
Width of vestibule	6 ft. 7 in.	6 ft. 7 in.
Length of vestibule	4 ft. 7 in.	4 ft. 8½ in.
Length of step	3 ft. 4½ in.	3 ft. 5 in.
Width of car over weatherboard	8 ft.	8 ft.
Width of car over window stool	8 ft. 2 in.	8 ft. 4 in.
Width of car over side	8 ft. 2 in.	8 ft. 2 in.
Width of car body at bottom sill	7 ft. 10¾ in.	8 ft. 2 in.
Height from floor to monitor	8 ft. 3½ in.	8 ft. 3½ in.
Width of monitor	45½ in.	52½ in.
Height of monitor	14½ in.	14½ in.
Height of rail to step	18 in.	16 in.
Height of step to platform	14 in.	13 in.
Height of platform to car floor	10 in.	10 in.
Width of aisle	24 in.	24 in.
Total length of seat	2 ft. 7½ in.	2 ft. 8¾ in.
Width of cushion	17 in.	17 in.
Length of cushion	2 ft. 7⅜ in.	2 ft. 9 in.
Number windows per side	10	10
Distance of seats on center	2 ft. 8 in.	2 ft. 8 in.
Length of longitudinal seats	5 ft. 6 in.	5 ft. 6 in.
Location of register cord	Center	Center
Type of seats	Brill Winner cane	Heywood, cane
Kind of fenders	Pfingst, 5½ in.	Pfingst, 5½ in.
Kind of snow scrapers	Root spring	Root spring
Kind of draw-bar	O. C. & B. N. standard	O. C. & B. N. standard
Kind of shackles	O. C. & B. N. standard	O. C. & B. N. standard
Kind of sand-boxes	Brill standard	Kilbourn
Type of trucks	Brill 27-E-1	Standard "o.50"
Wheel base	6 ft. 4 in.	4 ft. 10 in.
Cast or steel wheels	Steel tire	Solid steel
Make of wheels	National	Schoen
Diameter of wheels	34 in.	34 in.
Tread of wheels	2½ in.	2½ in.
Size of axle	4¾ in.	4¾ in.
Kind of journals	M. C. B. 3¾ in. x 7 in.	M. C. B. 3¾ in. x 7 in.
Kind of brakes	National air and hand	G E air and hand
Type of compressor	National A-4	C. P. 27, G. E.
Kind of automatic governor	National	G. E.
Kind of hand brakes	Double purchase, 13-in. Brill ratchet handle	Peacock geared
Type of motors	four, GE-80	four, GE-80
Gear ratio	22-64 and 17-69	22-64 and 17-69
Kind of gear	Solid	Split
Type of resistance	C. G.	R. G.
Type of controllers	K-28-J	K-28-J
Circuit breaker	M. S. 8 and M. U. 3A	M. S. 8 and M. U. 3A
Type and number of heaters	18 two-heat, 20-in. circular consolidated	18 truss plank consolidated
Heater current-amperes	6-12-18	6-12-18
Kind of trolley base	U. S. 11	U. S. 13
Distance between trolley stands	13 ft.	13 ft.
Single or double trolley	Double	Double
Kind of trolley catcher	Victor	Wilson, No. 2C
Kind of wiring	Conduit	Conduit
Type of lightning arrester	M. D.	M. D.
Kind of contactors	S. B. 402 C-1	S. B. 402 C-1
Kind of fuse box	M. A. 13 A	M. A. 13 A
Number of lights inside car	14	14
Total lights per car	22	22
Kind of arc light	Mosher	Mosher
Kind of incandescent headlight	Dayton	Neal
Kind of register	Two International	Two International
Location of whistle	Under platform	Under platform
Color painted	Standard yellow	Standard yellow
Weight of car, complete	48,700 approx.	42,090 approx.



Boston & Northern Light Car—Fig. 5, Half Section Showing the Comparison Between the 34-ft. Easy Access Car, 28-ft. Brill Semi-Convertible Car and the 28-ft. Standard Car

Electric Ry. Journal

the seat. Agasote panels are used to fill in between the posts from the bottom of the seat to the window sill. The lower window sash is provided with a hinged cover, and the latter cannot be opened when the window is closed, thus avoiding the trouble often experienced from passengers who expectorate, or throw cigar butts and other debris into the window pocket.

The car is equipped with 18 Consolidated truss plank heaters, the number being the same as in the 1907 cars, but the space taken up is somewhat less on account of the use of a steel sill on the inside of the posts. The heaters are placed in between each post and fitted with a special cap which extends around the post, making substantially one continuous heater from end to end of the car. The seats were redesigned to fit in between the posts on the truss planks instead of being attached in the usual manner to the side of the car. Each seat weighs complete only 70 lb. The bolsters are built of pressed steel, and the frame is tied at the ends with plate reinforced by wood, and the two center angle irons are fitted at the end of the bumper at each end with a heavy oak block acting as a shock absorber. The bumper sill is therefore somewhat smaller in cross-section than is common, the arrangement being to distribute the blow as much as possible in the car framing instead of trying to absorb it in the platform and vestibule.

The trucks are equipped with roller center and side bearings. The journals are of the M. C. B. type. The distance between truck centers is 16 ft. 6 in. The maximum weight of the wheels is 550 lb. each and a ¾-in. flange is used. All the trucks were designed to take the M. C. B. M 512 shoe, and each truck is equipped with a non-chattering brake hanger patented by Mr. Holst. The new cars are equipped with General Electric air brakes, CP-27 compressor, K-28-J controllers, with lightning arresters, kicking coil and arc headlight resistance mounted on the roof, and a contactor switch is provided beneath the floor of the car to break the main circuit away from the controller. One fuse is mounted on the roof. In addition to the contactor box, tripping switches and breakers, a fuse box is located underneath the car. Fig. 2 shows the general arrangement of the wiring circuits. The car is wired in conduit beneath the floor, and each circuit is provided with a separate enclosed fuse. Fuses controlling auxiliary circuits are mounted in groups in appropriate cases.

The interior finish of these cars is in natural cherry, the floors being Georgia pine. The steps are composite, the fronts being of galvanized steel and the rear of ash. Toe guards are of compressed steel, and the sides of resistance grid boxes are of pressed steel. A feature of the interior equipment is the location of the air brake governor beneath one of the longitudinal seats. The governor is mounted upon a sliding wooden base and is easily detachable for inspection or repairs. The air reservoirs are installed in the form of two tanks located beneath the longitudinal seats. The sand boxes, of Kilbourn make, are located close to the end heater coils, in order to secure the maximum drying action, and a deflector is provided at the mouth of the chamber containing the sand box to enable a free circulation of air to take place. The register cords are carried in holders located in the center of the aisle, to avoid interfering with the comfort of passengers by conductors who are usually required to lean over the seats in ringing up fares and transfers. Motormen's seats are provided in these equipments. The posts are narrow enough at the vestibule doors to enable the conductor to see every person in the vestibule. The arm guards at the windows were specially designed for these cars in the general plan of construction. Wired-glass monitor sashes are used and Agasote was employed freely in the monitor and roof lining. The cars are equipped with Mosher arc headlights, and each car is provided with 14 inside incandescent lamps. At the ends the company's standard illuminated sign is installed, two 16-cp lamps being placed in a pocket underneath the hood and protected by a galvanized-iron reflector painted white. The signs are arranged with sheet steel slides, carrying six readings. The exteriors of the cars are painted yellow.

Table II shows the car weight in detail, the chief subdivision

TABLE II.—DETAILED WEIGHTS OF 1909 SEMI-CONVERTIBLE CAR.

	lb.	oz.	Total lb.	Total oz.
Heater switch	17	..	..	..
Heaters	90	18	..	..
Heater shields	256	8	..	..
Heater shields (malleable)	34	..	..	..
Heater shields	5	2	403	12
Sand box without hopper	42	..	..	..
Sand box lever and casting	26	7	..	..
Sand box rod	11	9	..	..
Sand box hoppers	14	4	..	..
Sand box bearing	1	..	..	..
Sand box spouts	22	4	117	8
Scraper staff and wheel	47	..	..	..
Scrapers	392	14	..	..
Scraper chain	14	12	..	..
Scraper collar	1	10	..	..
Scraper timber	23	8	479	12
Fenders—Pfingst	108	..	..	..
Fenders—Castings	56	4	164	4
Peacock brakes (2)	100	..	..	..
Truck brake rods (2)	52	..	..	..
Brake lever link	4	9	..	..
Brake rod carrier (2)	5	13	..	..
Brake cable rollers	13	4	..	..
Brake pins	6	11	..	..
Sway bar	41	..	..	..
Wire cable	15	4	238	9
Headlights, incandescent (2)	32	..	32	..
Registers (2)	49	..	49	..
Trolley catchers (2)	27	..	27	..
Draw bars (2)	134	..	134	..

ELECTRICAL EQUIPMENT.

	lb.	oz.	Total lb.	Total oz.
Conduit	358	..	..	..
Fittings and straps	23	..	..	..
345 junction boxes	9	8	..	..
362 junction boxes (2)	54	..	..	..
365 junction boxes (2)	57	..	..	..
Made up cables (2)	134	..	..	..
Made-up resistance cables	59	8	..	..
Light wire Air wire Trolley wire Heater wire Arc wire	230	..	230	..
Motor lead boxes (2)	36	..	230	..
Motor lead box brackets	9	8	..	..
Bell mouths	25	..	..	..
MS switches (2)	29	..	..	..
MU 3 A switches (2)	14	..	..	..
MS 2 switches	4	..	..	..
MS 40 switches	6	..	..	..
MS 43 switches	3	8	..	..
Spare fuse box	5	8	..	..
Consol. fuse box (2)	7	2	..	..
Roof fuse, complete	11	..	..	..
Slate base and fuse (lights)	6	8	..	..
Contactor box	189	8	..	..
Contactor angle	40	8	..	..
Contactor angle	16	12	..	..
Contactor hanger	30	13	..	..
Resistance box (3)	216	..	..	..
Resistance hanger	35	2	..	..
Lightning arrester	20	0	..	..
Kicking coil core	6	12	..	..
M A 13 fuse box	16	8	..	..
Controller (2)	510	..	..	..
Bracket	1	9	..	..
Fiber block	1	12	..	..
Miscellaneous bolts	9	11	..	..
Arc headlights	11	..	..	..
Arc resistance	30	..	..	..
Arc plugs	..	14	..	..
Lamps	2	..	..	..
Sockets	7	..	..	..
Spare lamps and sockets	1	..	..	..
Trolley stand	121	8	..	..
Pole Harp Wheel	32	.	2,382	7
94-lb. trolley and light wire weighed with car body, and also included here (2,382-7—94)	..	.	2,288	7
Trucks (2)	6,305	..	12,610	..
Motors (4)	2,960	..	11,840	..

AIR BRAKE EQUIPMENT.

	lb.	oz.	Total lb.	Total oz.
Air compressor	627	..	..	..
Brake cylinder	170	8	..	..
Cylinder hanger	39	8	..	..
Cylinder con. rod	19	9	..	..
Cylinder levers	48	10	..	..
Compressor bracket	13	15	..	..
Comp. clamp	..	13	..	..
Com. angle	44	5	..	..
Comp. brace	2	8	..	..
Comp. hanger	55	0	..	..
Motorman's valve back	1	15	..	..
Motorman's valve	38	..	..	..
M. C. governor	29	..	..	..
Reservoirs (2)	94	8	..	..
Mufflers (2)	10	..	..	..
Intake strainers	6	8	....	..
Whistles (2)	7	8	..	..
Safety valve	2	5	..	..
Drain cocks (2)	1	8	..	..

AIR BRAKE EQUIPMENT (CONTINUED).

	lb.	oz.	Total lb.	Total oz.
Shut-off cock, air (2)	2	8	..	..
Whistle valves (2)	1	14	..	..
Air pipe	94	..	..	..
Pipe fittings	20	2	..	..
Pressure gages (2)	3	8	1,335	..

CAR BODY DETAILS.

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Window guards	12	..	6	4	8
Show case catch	4	..	1½	..	6
Cupboard catch	4	..	3	..	12
Sash springs	52	..	..	1	8
Deck sash opener	4	2	11	10	12
Brass butts, 2 in	8	..	..	..	6
Sash lock top	40	..	4	10	..
Finish above vest. windows, white-wood and ash	48	..	7	21	..
Side window stools, ash	2	42	..	84	..
Window stool irons	20	..	12	15	..
Wood battens on vestibule	8	..	..	..	..
Letter board returns	8	..	..	..	..
Stool returns	8	..	..	..	..
Window corners	8	..	..	12	..
Letter boards	2	50	..	100	..
Half-round, on letter board Window arches Side battens and plugs	..	..	..	10	8
Glass	..	..	..	438	4
Window screens, comp. with bracket	20	5	11	113	12
Vest. M. I. window bands	4	2	5	9	4
End sash without glass	4	4	1	16	4
Monitor without glass	20	1	..	20	..
Swing, without glass	4	3	8	14	..
Side vest, sash, without glass	4	3	7	13	12
Center vest, sash, without glass	2	5	2	10	4
Top casement sash, without glass	20	2	1	41	4
Bottom casement sash, without glass	20	3	2	62	8
Swing sash fasteners	8	..	3	1	8
Sash lift and leather	6	1	..	6	..
Sash lifts	40	..	1½	3	12
Sash lifts	4	3	12	..	..
Sash lifts	2	..	2	..	4
Vest. sash adjust plate	4	..	2	..	8
Window guard brackets	8	..	7	3	8
Strap hinges	12	..	13	9	12
Pocket cover bracket pivots	40	..	1½	3	12
Window bands	32	3	½	97	..
Anti-rattler brackets	8	..	3	1	8
Pocket covers	12	1	2	13	8
Pocket covers	8	1	..	8	..
				1,159	8

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Post anchor iron	8	..	8	4	..
Post anchor iron	4	..	8	2	..
Top queen post	4	4	..	16	..
Bottom queen post	4	3	..	12	..
Queen post	4	3	..	12	..
Center tee rod queen post	1	6	..	6	..
				52	..

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Shims on bolsters under angles	8	..	8	4	..
Bolster top plate	2	80	..	160	..
Bolster bottom plate	2	110	..	220	..
Bolster fillers	4	60	8	242	..
Bolster angle to side plate	4	14	..	56	..
Side bearing castings	8	4	2	33	..
Side bearing plates	4	5	12	23	..
Side bearing shims	8	..	4	2	..
				740	..

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
End door curtain brackets	8	..	½	..	4
End window curtain brackets	8	..	½	..	4
Curtain brackets	40	..	¾	2	8
Curtains, side	20	5	13	116	4
Curtains, door	4	4	3	14	8
Curtains, end	4	1	7	5	12
				139	8

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Safety treads	4	13	5	53	4
Step tread clamp plate, R	4	..	8	2	0
Step tread clamp plate, L	4	..	6½	1	10
Motorman's steps	6	1	13	10	14
Step tread, oak	4	3	3	12	12
Step risers	4	4	7	17	12
Step hangers, body	4	7	14	31	8
Step hanger vest. end sill	4	6	..	24	..
				153	12

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Seats, reversible	..	..	..	834	..
Seats, stationary	..	..	..	222	8
Corner seat angle clip	8	..	2½	1	4
Heel boards with perforated panels, long	4	7	4	20	4
Heel boards with perforated panels, short	4	2	8	10	..
Corner seat frames, ash	..	..	..	58	8
				1,147	8

CAR BODY DETAILS (CONTINUED)

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Gong shells, 12-in	2	6	12	13	8
Gong bracket and Tapper	2	3	7½	6	15
Gong pin	2	..	6½	..	13
				21	4
Draw head spring	2	13	..	26	..
Draw head castings	8	17	..	136	..
Draw head angles	4	83	..	332	..
Draw bar rest	2	19	2	38	4
Draw bar angle	4	1	8	6	..
				538	4
Whitewood roofing	..	..	..	210	..
Roof tin	1	1	15	1	15
Trolley plank	2	55	4	110	8
Trolley plank	13	..	9½	6	7½
Roof racks	4	6	4	25	..
Duck	2	4	14	9	12
				364	6½
Channel bumpers	2	71	..	142	..
Angle iron bolster to cross timber	4	23	8	94	..
Steel side sheets	6	17	10	107	..
Dashers	6	18	5	110	..
Long side battens	2	23	..	46	..
Dasher batten	6	..	..	11	..
Center timber support iron	2	..	8	1	..
Platform and bumpers support iron	4	1	..	4	..
Bumper clip	8	1	..	8	..
Cross timber clip	4	3	4	13	..
Iron under platform support	8	3	..	24	..
Bumper block brace	2	8	..	16	..
Bumper block plate	2	3	8	7	..
Iron on side ¼-in. floor timber	8	..	4	2	..
				585	
End frame with head board, whitewood panels, window arches, battens, whitewood, birch	60	..	..	139	..
Headlining battens	4	2	..	8	..
Monitor frames, hard pine and cherry	2	90	..	180	..
All wood rafters	..	..	..	70	..
Iron rafters	7	12	2¼	85	..
End carlines and monitors, cherry	10	1	1½	11	..
Side eaves rail	2	8	8	17	..
End eaves rail	2	2	..	4	..
Ash filling boards	..	..	..	64	..
Whitewood filling boards	..	..	..	59	..
Steel battens on roof	..	..	..	3	..
Steel corners on window stool	4	..	4	1	..
Steel corners on letter boards	4	1	..	4	..
Steel corner bottom corner posts	4	4	10	18	8
Side battens, steel	4	..	5	1	4
Side battens, steel	10	..	6¼	4	..
Iron side end corner	4	3	..	12	..
Side sign furring ash	..	..	..	7	..
B-C hanger, furring ash	..	..	..	5	..
Lamp rosette	..	..	..	19	..
Wire furring ash	..	..	..	47	..
Head line furring pine	..	..	..	48	..
Whitewood molding, roof	..	..	..	4	8
Lead corners	..	..	..	3	..
Cherry on posts and under windows	..	..	..	138	..
Maple matting	..	..	..	76	..
Agasote vest. panels with cherry	6	8	5	50	..
Headlining and wire molding	..	..	..	22	..
Panel over heater, cherry	..	..	..	2	6
Panel over heater, molding	..	..	..	..	12
Light wire covering	2	..	6½	..	13
Agasote upper body window	20	2	8	50	..
Agasote upper deck window	3	41	10	125	..
Agasote lower deck window	6	12	12	76	..
End body, cherry finish	..	..	..	96	..
Sheet iron clips hold panels under windows	80	..	1¾	9	..
End panel in bulkhead, cherry	4	1	4	5	..
Center plate furring	2	3	4	6	8
				1,471	15
Register cord sheave	6	2	2	..	12
Pole sockets	4	..	2	..	8
Hand pole acorns	4	..	2	..	8
Register bracket	2	1	1	2	2
Pole strap pole	4	1	6	5	8
Pole straps	24	..	2½	3	12
R. & B. cords leather (4 cords)	..	..	..	4	3
Cord hooks	2	..	1½	..	3
Cord eyelets	16	..	1	..	16
Signal bells complete	2	2	3	4	6
Grab handles	8	..	13½	6	12
Pole brackets	12	..	14	10	8
B/C brackets	10	..	12	7	8
Grab brackets	16	..	10	10	..
				57	8
Sign brackets	4	..	1½	..	6
Sign end casting	4	..	4½	1	2
Sign reflector	2	1	9	3	2
Front reflector	2	..	11	1	6
End sign bracket	4	2	4½	9	2

CAR BODY DETAILS (CONTINUED)

	No. per car.	Weight lb.	Weight oz.	Total lb.	Total oz.
Sign bracket	4	..	7	1	12
Sign light holder	4	1	14	7	8
End sign	2	7	6	14	12
				39	2
Oil hole cover	2	..	¼	..	½
Nameplates	2	..	4	..	8
Trap lifts	8	..	5	2	8
Trap lifts	8	..	6	3	..
King pin	2	9	..	18	..
Trolley hooks	2	4	½	8	1
				32	1½
Vestibule door frame, ash	12	9	6	114	..
Vestibule posts front	8	10	4	82	..
Vestibule girts and stool, ash	18	2	11	48	6
Vestibule plate, ash	2	7	..	14	..
Bonnets—whitewood and ash	2	30	8	61	..
Vestibule finish ash and cherry	..	..	..	46	..
Vestibule angle irons	2	11	8	23	..
Vestibule angle castings	4	..	14	3	8
				391	14
⅞-in. hard pine floor	..	..	..	496	..
¾-in. hard pine floor	..	..	..	156	..
⅞-in. hard pine floor, vestibule	..	..	..	65	..
Vestibule floor furring	8	3	4	26	..
				743	..
Miscellaneous, screws, bolts, etc	..	..	..	177	..
Wallace door hangers	2	30	..	60	..
End door bolt	12	..	2	1	8
End door bolt washer	8	..	½	..	4
End door strips	16	..	4	4	..
Vest. door latch	4	..	3	..	12
End door face strips	4	..	5	1	6
End door threshold	4	2	..	8	..
End door threshold	2	11	..	22	..
Vest. door butts, bronze	12	..	14¾	11	1
Door handles, outside	4	1	3	4	12
Door handles, inside	4	1	2	4	8
Door fastener, outside	2	..	5	..	10
Door fastener, inside	2	..	3	..	6
End door catch	2	..	4	..	8
End door casing	2	..	3	..	6
Vest. door latch plate	8	..	6	3	..
" " handles	4	..	7	1	12
" " keeper	4	..	2	..	8
" " striker	4	..	4	1	..
" " lock pieces	4	..	½	..	2
End doors, 2 prs., no glass	4	20	4	81	..
Vest. doors, 4 prs., no glass	4	36	4	145	..
				352	7
End sills, oak	2	88	8	177	..
Bottom braces, oak	2	47	8	95	..
Center sills, oak	2	11	..	22	..
Cross sills, oak	2	36	..	72	..
Cap timbers, oak	16	7	4	116	..
End sills, furring oak	4	5	12	23	..
Queen post timber Floor timber, ¼ in. oak Floor timber, 1¼ in. oak	4	..	..	8	..
Sills with sash numbers, hard pine	20	4	..	80	..
Truss plank, cherry	20	5	8	111	..
Bumpers	2	5	8	11	..
Spring casting, furring oak	4	3	4	13	..
Wood platform, oak	2	60	..	120	..
Side and corner post, ash	22	15	8	343	..
End belts, ash	2	35	..	70	..
Body plates, hard pine	2	76	..	152	..
Truss rods	2	73	..	146	..
Trap tee irons	8	11	2	89	..
Platform supports	4	113	4	453	..
End sill plates	2	12	8	25	..
Long side plates with reinforcing bars riveted on top edge and angle riveted to bottom edge	..	..	..	1250	..
Truss rod anchors	4	15	..	60	..
				3,436	0

TABLE III.—SUMMARY OF CAR WEIGHTS, 1909 TYPE.

	Lb.	Oz.
Car body bare as weighed	11,170	4
Heaters	403	12
Sand boxes	117	8
Headlights (incandescent)	32	..
Seats, reversible	834	..
Seats, stationary	222	8
Scrapers	479	12
Fenders	164	4
Hand brakes	238	9
Draw bars	134	..
Registers, trolley catchers	76	..
Electrical equipment, excluding motors	2,382	7
Air brake equipment	1,335	..
Four GE-80 motors	11,840	..
Two Standard trucks	12,610	..
Total	42,040	10

being on the body and fittings, where the major saving occurred. A summary of these weights is given in Table III.

Great care was taken to determine the actual weights of the completed cars, trucks, etc. There was naturally some slight differences between different cars, but the following are some of the actual weights: Car body No. 1406, 1909 type, with both trucks, weighed 25,790 lb. With one end jacked up, the weight of a single truck in this equipment was 6305 lb. The weight of car No. 1721, of the 1907 type, was 48,700 lb. The weight of car No. 645, a 30-ft. straight side box car made by the Stephenson works in 1903, was 44,600 lb. The weight of car No. 1394, of the 1909 type, was 42,090 lb. The weight of one truck with motors was 12,250 lb. These figures show a clear gain of 3½ tons in each of the new cars compared with the 1907 type.

The engraving on page 574 shows a half section of the three types of cars described. No. 1 is a 34-ft. semi-convertible car of the 1906 type with large platform, pneumatic operating doors and folding steps. Section No. 2 is of the 1907 28-ft. semi-convertible cars, and No. 3 is the 1909 28-ft. standard car. The sections show the difference in the design of the cars, especially in the headroom in the lower deck. The dimensions from floor to roof of the car were kept the same and the total width of car of the 1907 and 1909 types over the side, just below the window sill, is the same.

The results of this saving are shown in the following summaries of tests made with recording wattmeters in actual service, counts having been taken of the passengers in addition to the precaution of changing around the motormen as outlined above. For conservative estimates, the cost of power was assumed to be 0.6 cent per kw-hour.

TESTS

Tests in urban service were made on the Stoughton-Campello line. The round trip required 1½ hours, and the distance run was 15.72 miles. The cars used were (1) 1907 semi-convertible "1717," with Brill 27-E-1 trucks, 6 ft. 4 in. wheelbase, and (2) the 1909 semi-convertible "1728," with standard O-50 trucks, 4 ft. 10 in. wheelbase. Three trips were run on Feb. 15, one being rejected on account of delay, and three trips on Feb. 16, 1910. One car ran 30 minutes later than the other. The equipment on both cars was practically the same.

Meters were checked before tests, and exchanged on the second day. The motormen were also exchanged on the second day in order to get average results. The rail was good on both days, although snow was on ground. The first day was cold, the second day warm, causing the motormen to run carefully on account of water on track.

The following is a summary of tests with the cars equipped with a 17-69 gear ratio:

	Trips.	Stops per car-mile.	Average watt-hours per trip.	Watt-hours per car-mile.	Difference, watt-hours per car-mile.
1728 car.....	5	5.3	41,200	2,621	581
1717 car.....	5	4.7	50,344	3,202	...

Assuming a car to run 210 miles per day, and a cost of 6 cents per kw-hour, the difference quoted above would mean a saving of $0.732 per day per car. The 44 1909 cars would then show a saving of $11,756 per year of 365 days over the same number of 1907 type of cars.

The following is a summary of the tests made in the interurban runs from Brockton to New Bedford with a 22-64 gear ratio:

Type.		Stops per car-mile.	Watt-hours per car-mile.	Difference, watt-hours per car-mile.
1907	1,710	2.68	3,320	539
1909	1,733	2.20	2,781	...

The Brussels Tramways Company is making extensive improvements in anticipation of handling the large crowds which are expected to attend the exposition to be held in that city during the coming summer. A 4000-kw turbo-generator is being installed in the power station and 100 new motor cars and 100 open trail cars have been purchased.

INSPECTION AND REPAIR OF ELECTRICAL EQUIPMENT

The following paragraphs will describe some electrical practices of a railway company whose methods of inspection, repair and manufacture are so thorough that its total equipment failures in the severe winter months cause an average loss of only 0.75 mile for every 1000 car-miles operated. This company's standard four-motor equipments are the GE-80 and GE-67 types geared 17:67, while the greater number of its two-motor equipments consist of GE-67 and GE-1000 types, also geared 17:67. The most common controller on double-truck cars is the K-16, but the single-truck cars carry K-10 controllers modified to the K-11 type by using No. 4 wire.

Cars are inspected every 24 hours at the division depots, but a more thorough inspection is made once a month. One unusual feature of this work is the attention given to the trolley-base connections, which are soldered on special terminals and further secured with set-screws bolted down solid. Passenger cars are thoroughly overhauled every 55,000 miles to 60,000 miles. Since a car is not permitted to stay out of service for more than a day, it is necessary to use spare trucks, motors, controllers and other parts. This substitution of equipment makes it possible to repair individual parts of cars more thoroughly than would be possible on the car itself. Upon receiving a car for the general overhaul, the braking and electrical connections are immediately unfastened, the car body raised on a trestle and the trucks shunted to the truck shop. The brake cylinders and the electrical apparatus, including resistances and trolley stands, are then taken off and replaced at once with new or overhauled material. The cable ducts on the car body are opened, cleaned and repainted, renewals being made where necessary.

ELECTRICAL EQUIPMENT OVERHAULING

In overhauling the electrical equipment, the motors are first stripped of their armatures, field coils and brush-holders, which are sent to the proper department. The oil cups are cleaned and the motor frame is scraped inside and out. After the interior of the motor casing has been painted with black insulating compound, oiled canvas liners are placed around the permanent pole pieces and the frames are ready for assembling. The cleaned or repaired field coils are next put in place and the magnet plates bolted home with finished steel bolts and hexagon nuts having spring-lock washers. After the motor frames have been bolted together, a gage is inserted between the pole pieces to test for proper spacing. If the distances are found correct, the armature is inserted and another gage used to determine the distance from the pole pieces. When the brush-holder yokes, brush-holder bearings and lubricating equipment have been installed the motor is subjected to a running test for three hours at 40 amp. During the course of this test, the motor is coated with a quick-drying mineral black paint. Finally, the overhauled gearing is lubricated, encased and put on the trucks with the motors ready for service. The motors and gearing are always overhauled in sets of two or four.

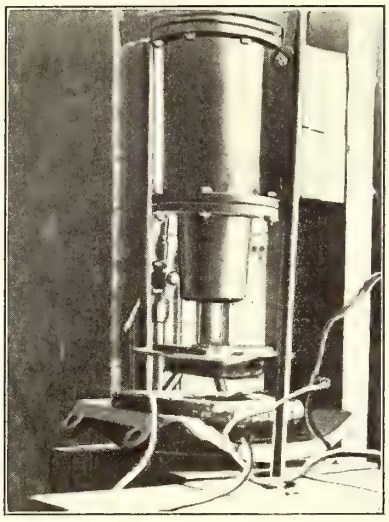
The armatures taken out of the motors are first inspected for bearings and, where necessary, renewals are made with cast-steel sleeves lined with babbitt. Next the entire armature is carefully cleaned, the commutator turned and polished, and the string band inspected or renewed. The commutator is then subjected to the millivolt test from bar to bar. Finally, the armature is given a 1000-volt ground test and, after shellacking, is available for service.

The field coils removed from the motors are placed in a section of a motor frame and undergo a millivolt reading without a magnet. Then a second reading is taken, after a magnet attached to an air-cylinder has been lowered on the coil as shown in one of the illustrations. If the meter reads up to standard and shows no variation when the coil is under pressure, the outside tape is repaired and the coil is dipped in air-drying compound. In this connection it may be added that in the case of outside-hung motors a great reduction in motor-lead trouble has been attained by boring the motor

frames on the axle side and bringing the leads out as near the king bolts as possible.

MANUFACTURE OF ARMATURE COILS

The following description of the manufacture of a GE-67 armature coil will give a fair idea of the company's practice in coil work generally.



Commutator Repair and Air Magnet for Field Testing

The GE-67 coils are made three at a time, as the coil-former has a triple groove. Before they are taken off the former they are kept to shape by binding them with soft lead straps. Fish-paper strips are then inserted by hand between the coils, after which the coil is tied up and the lead straps removed for re-use. The coil is next dipped in Standard varnish and left to air-dry. After drying, the insulation is removed from the ends for a length of 2½ in. The ends are then tinned and covered with web-sleeving. After this the strings are taken off and the sides of the coils are surrounded by fish paper, which is hot-glued on by a small air press. Only the sides are treated in this manner, as they form the part which goes into the slots. The coils are then taped by machine with linen taping, which is applied so that half the next turn always overlaps the preceding one. The coil is then dipped in air-drying Voltalac and treated with soapstone to make it enter easily into the armature slot. The completed coils are stored in closets, according to type, and are marked with the date of manufacture so that the oldest will be taken out first.



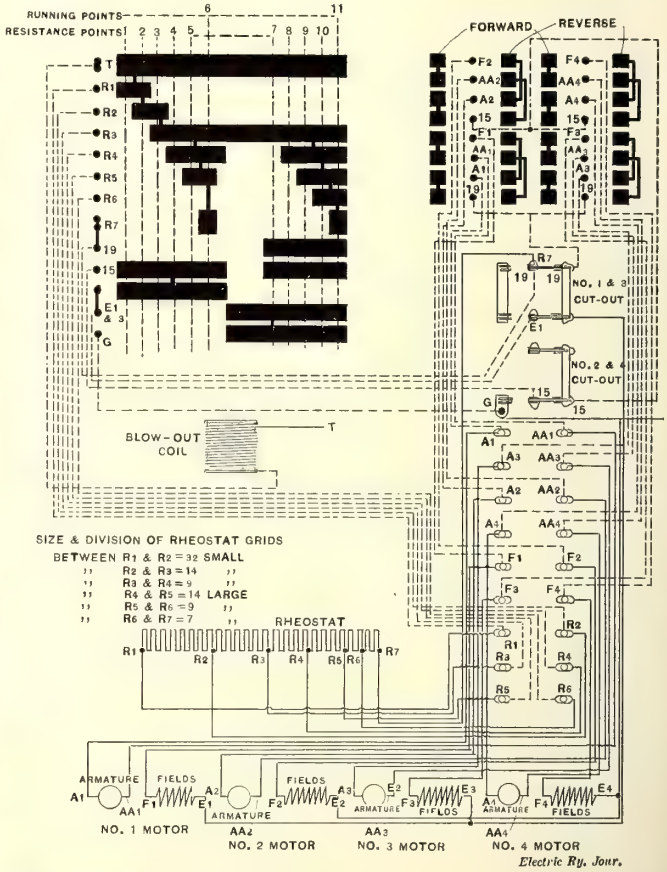
Coil Formers for GE and Westinghouse Armatures on One Shaft

The same shaft which carries the GE-67 former shown in the illustration has two treadles, as it is arranged to receive either a Westinghouse No. 3 or No. 12 coil former at the opposite end. The Westinghouse formers permit the winding of single coils only.

The different car depots are supplied with armature tags, on which the foremen indicate why a given armature has been removed and replaced. This tag accompanies the defective armature to the shops, where the stub is torn off and returned to the carhouse as a receipt. The other side of the tag is used for the shop foreman's report on the repaired armature and its destination. A history of every armature is kept in the master mechanic's office in a loose-leaf record, which shows when the armature was purchased, repaired electrically or mechanically, turned, painted, rewound or furnished with new bearings. At the end of every month the different classes of repairs are totalized.

FIELD COIL MANUFACTURE

Field coils, after winding, are heated for the removal of moisture and then dipped in Standard yellow varnish until the absence of bubbles shows that all air has been expelled. Next the coil is baked over night and then supplied with flexible leads made up of 245 strands of untinned No. 30 rubber-covered wire. One lead is 24 in. and the other 6 in. long. When the leads are soldered on, insulation is begun. The leads, however, are not tied down parallel to the coil until some mica has been inserted between them and the coil. The insulation consists of two double-overlaps (four thicknesses) of glace belting and one layer of insulating tape. The field is then re-dipped and baked all night. After the second baking, the corners of the coil are reinforced with No. 8 oil duck. The entire coil is then taped with black Competition rubber tape and air dried in Voltalac to complete the operation.

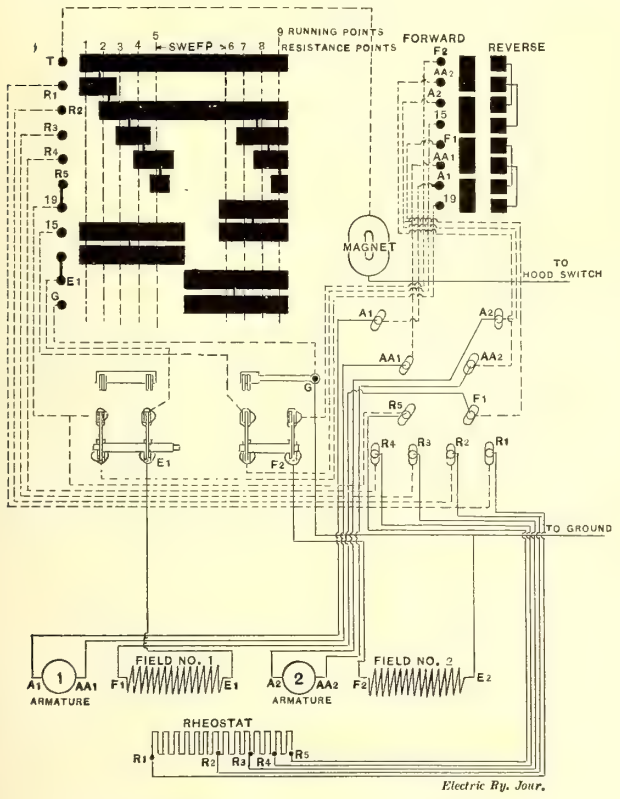


Connections for S.P. K-6 Controller and Rheostat for Four GE-1000 or GE-67 Motors

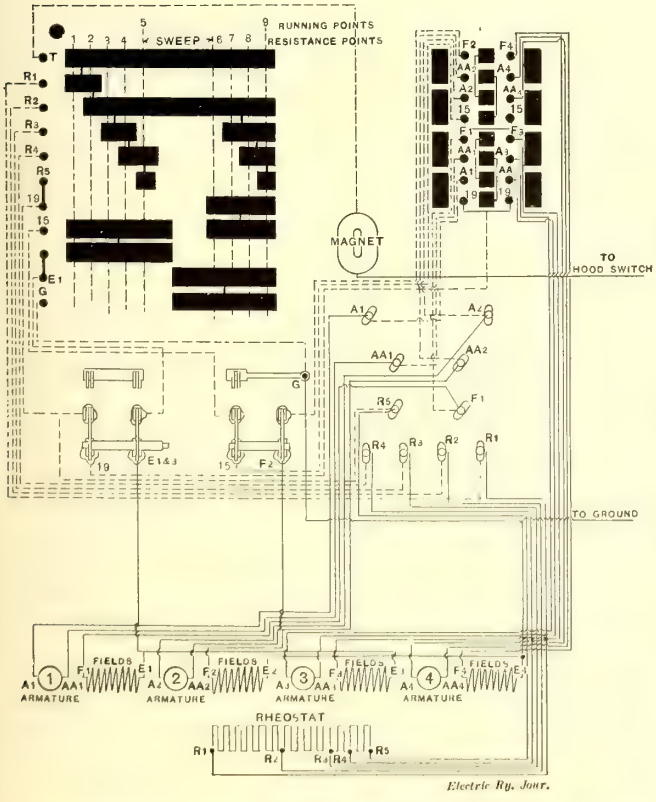
CONTROLLER WORK

Particular attention has been given to controller troubles, and, as a result, several changes have been made in construc-

tion. That portion of the controller case opposite the space between the main and reversing cylinders is covered with No. 16 fiber screwed down on wooden blocks and the cylinders are separated by a fiber barrier. In the K-6 controller, insulating



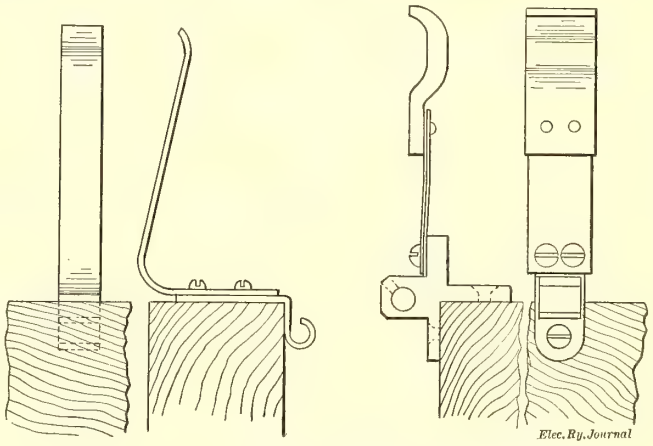
Connections for S.P. K-10 Controller



Connections for S.P. K-12 Controller and Four Motors

barriers have been placed between fingers 15 and E, in addition to those between 19 and R-6 and 19 and 15, which were installed by the manufacturer. The controller board is also insulated with mica from finger 19 to ground. Instead of carry ing the ground wire from the ground terminal on the main board to F2, a wire is sweated to F2 and connected to ground on the main cylinder block. In all controllers the motor cut-outs are plainly marked "1" and "2" to avoid errors.

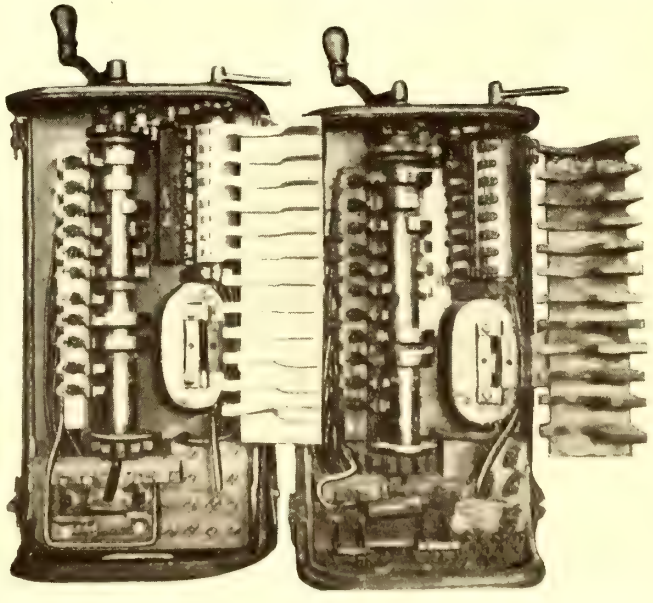
Nearly all parts of the K-6 and K-10 controllers are interchangeable. Old segments and fingers are cut down for use again wherever possible. Every division is supplied with a



Two Types of Reverse Fingers in Controllers

bar bender to make segments from bars supplied by the shop storeroom. Phosphor bronze fingers are used on the reverse cylinder at one-third the cost of the usual drop forgings. All heavy filing or sand-papering is avoided in cleaning fingers, segments and cover plates, as such parts are simply dipped in lye and acid, then chamfered with a rough file and buffed.

One feature of the controllers is that they are not grounded, but are insulated on a wooden block, yet very little trouble has arisen from blow-outs and there have been no instances of shocks to the motorman. When the controllers go through the daily inspection they are blown out with compressed air, which results in keeping them so clean that there are no leaks or bad short circuits. In overhauling controllers the case is stripped down to the back, pointed with black insulating paint



New and Overhauled Controllers

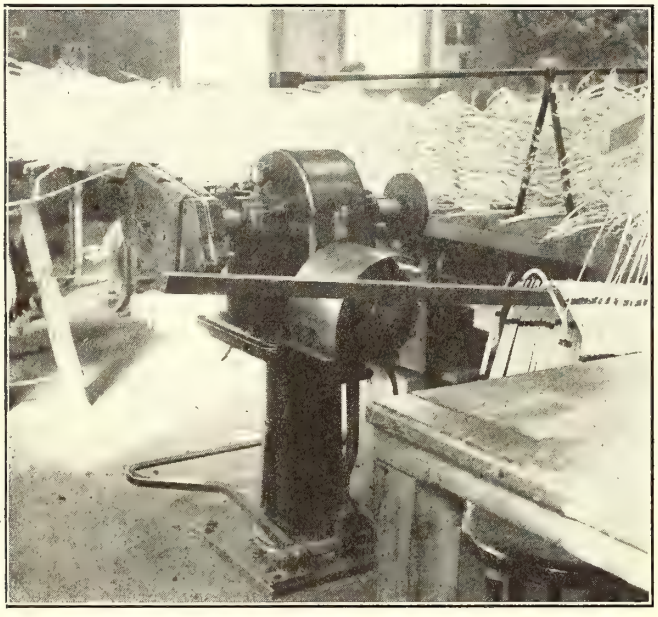
on both sides and lined inside with asbestos, after which the interior is rebuilt.

The Richmond Railway & Power Company, Richmond, Va., finding that its passengers have the usual tendency to place their feet on the corner rattan seats, protects the later by attaching along the edge a wooden strip 1½ in. high and ⅜ in. thick.

SHOPS OF THE CINCINNATI TRACTION COMPANY

Motor-Driven Tools, Armature Shop Methods and System of Card Records

THE shops of the Cincinnati Traction Company have an equipment of excellent tools, practically all of which are driven by individual electric motors. This article includes descriptions of the motor-driven tools, the armature shop methods and the system of card records used in shop accounting and supervision. It also mentions several interesting maintenance practices that are being followed on the Cincinnati property.



Cincinnati Shops—Armature Coil-Winding Machine

ELECTRICAL REPAIR SHOP

The Cincinnati Traction Company normally runs 700 cars which are equipped with 1700 motors. Heavy grades on many car routes make very severe demands on these motors, a large proportion of which are on single-truck cars. Many of the motors have been in service for a long time and a considerable number of them are of the GE-1000 and 800 types. The severe service conditions which the Cincinnati equipments have to meet are reflected in the armature repair room. At the present time new coils are made in this department at an average rate sufficient to wind about 75 armatures per month. No armatures are repaired in the car houses, but all such work is centralized in the main electrical repair shop where a complete installation of coil manufacturing apparatus has been made. Practically all the tools in this shop, some of which are illustrated herewith, have been designed and built in the nearby machine shop of this company.

The armature shop machinery is enclosed in a substantial building, one-story high, with large windows on all four sides. This building is subdivided into an armature coil-winding room and a general electrical repair room with one corner set off for testing purposes. The larger tools in both rooms are served by a chain-block hoist supported on an I-beam trolley runway.

WINDING ARMATURE COILS

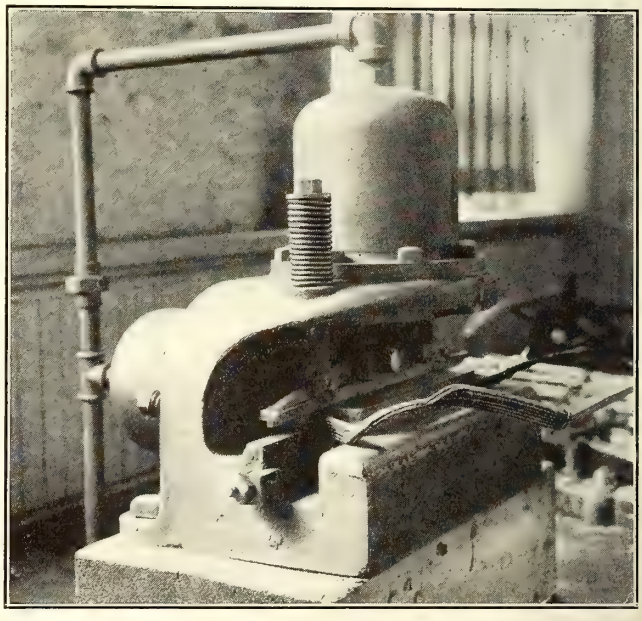
All the armature coils required for the maintenance of the 1700 car motors are made in the winding room at this shop. Power-driven forms are used in winding all but GE-58 coils. Winding and taping machines are arranged on opposite sides of a central table on which the unfinished coils are stacked. Steam-heated forming presses are mounted on a bench at one side and the curtain department is at the opposite end of the room.

Three forms are provided for winding GE-58 coils. These vary in size by the thickness of the wire used so that a set made up of one layer wound on each form will nest accurately. The middle of the three sections is wrapped with fish paper so that its wires are separated from the other two. When the three sections have been assembled a covering of fish paper is glued on and the set is pressed into shape.

One of the illustrations shows a home-made, air-operated press used in shaping coils. In this press, as well as in the older type toggle-joint presses also used, the forming blocks are hollowed out and provided with steam connections. After the application of the fish-paper jacket the coil is inserted in the press, pressure is applied, the coils and glue are heated by steam fed into the forming blocks, and then the coil is allowed to cool under pressure. During this process the attendant, who also applies the fish paper, busies himself with getting another coil ready for the press.

The air-operated coil press has two cylinders, at right angles to each other, and their pistons operate two forming pieces. Brass forms are used and sets are available for coils of several different shapes. The piston on the horizontal cylinder is fitted with a spring somewhat heavier than that on the upright piston, and therefore when equal air pressure is admitted to both cylinders, the upper forming piece comes into place a little ahead of the lower one. A small engineer's valve is used to control the air to the cylinders of the press.

After the straight part of the coils has been covered with paper the coils are passed along to the taping table which is in charge of two young women. Here the straight portions are wound with fish cloth. The final covering is made by winding white cotton web tape all the way around the coil and doubling it on those sections which are to lie within the slots. Before taping, the coils are dipped and allowed to dry, and after taping they are given a second dipping.



Cincinnati Shops—Two-Cylinder Armature Coil Press

The coil-taping machines and power-operated winding forms are driven from a shaft extending under a large table in the center of the room. This shaft is in turn driven by a 5-hp Westinghouse motor which stands on the floor under the table.

Field coils that have been burned out in service are utilized and the wire re-insulated if not too badly damaged. By means of home-made devices, as shown in the illustration on page 583, the wire is cleaned and retaped as it is wound onto a power-driven form. About $4.50 is saved on each coil by this process. The winding lathe used in this work is similar to that used in winding armature coils. It was designed and built in these shops. It is driven by a belt from a driving shaft in the winding room. All the power required for winding coils is furnished by a single 5-hp motor, and the current used is metered so that a proper charge may be made in determining the cost of coils.

A stock of sheet insulation cut into the shapes required in winding work is kept in a rack in the electrical shop. This insulation is punched out of large sheets by means of sets of dies used in a punch press, which is a part of the machine-shop equipment.

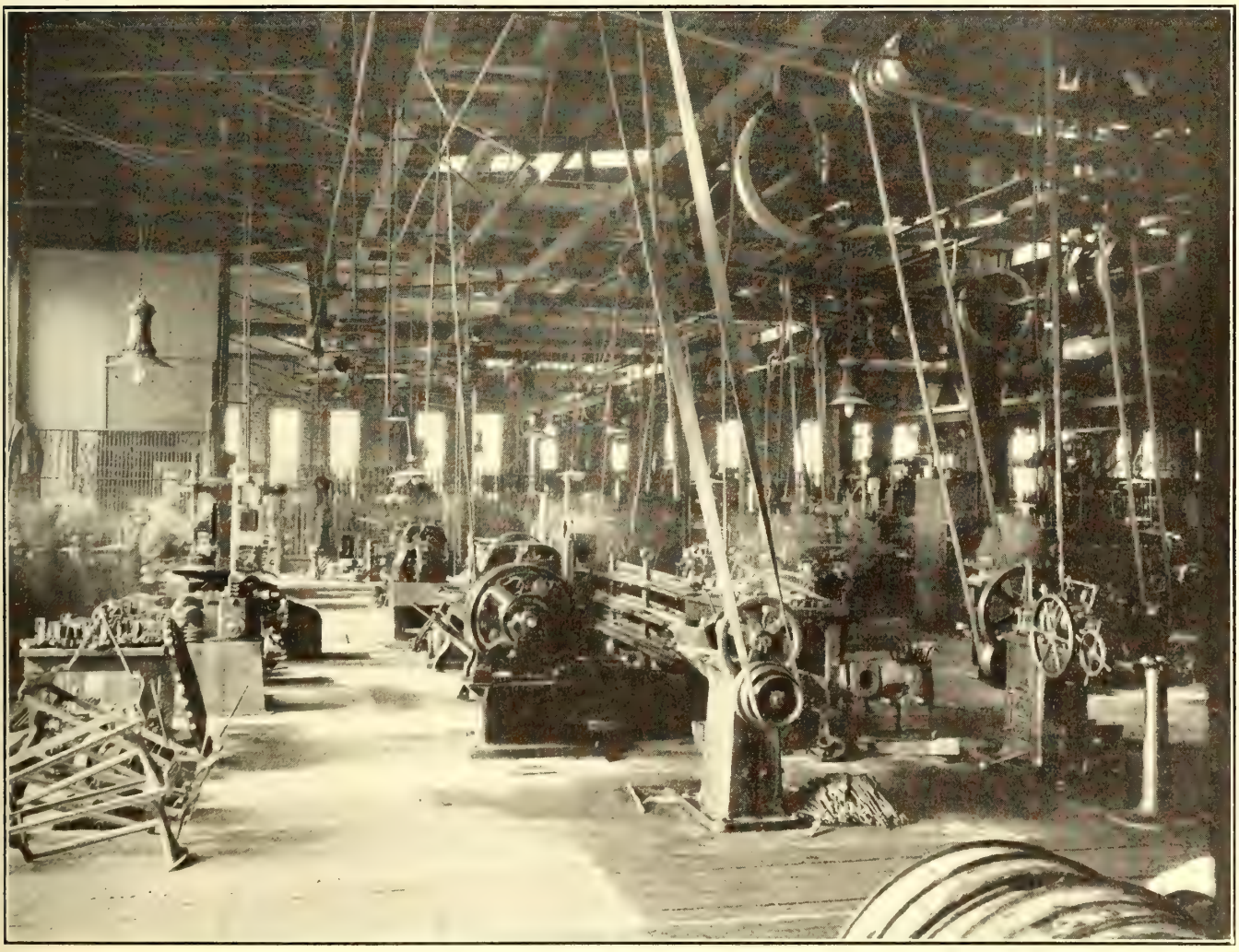
COIL TERMINAL ANCHORAGE

About 14 months ago a new terminal anchorage was designed and put into use on all field coils manufactured in this shop. Since then not one of these terminals has been destroyed. Provision for attaching a lead wire to either outside or inside terminals is afforded by a tapped and threaded boss against the top of which the lead-wire terminal lug is held securely by a cap screw with a lock washer. The terminal for the outside wire is about 3¾-in. long and L-shaped so that it will fit over the side of the coil. A hole is drilled in the angle of the L for insertion of the wire. The inside terminal also is formed to fit the contour of the coil and is provided with a strip of copper which reaches across the width of the coil and is bent around the end of the inside wire before soldering. The main part of each terminal is common brass.

IMPREGNATING PLANT

The impregnating plant is shown on page 583. This equipment was built by the J. P. Devine Company and insulating compounds manufactured by the Standard Varnish Company are used. About 12 coils are treated each day and the plant is operated daily, because all of the coils in the 1700 motors are being put through this process. Vacuum is obtained with a motor-driven pump and the supply tank is operated by an independent motor. The raised platform about the two tanks and the substantial stairway thereto facilitate the work.

The compound in the supply tanks is kept hot all the time by means of steam fed from the shop steam supply system. During the daytime when coils are being treated the steam is reheated in a gas-fired superheater built inside the armature shop close to the impregnating plant. By means of this superheater the temperature of steam at 50 lb. pressure is raised to about 600 deg.



Cincinnati Shops—General View of One-Half of Machine Shop

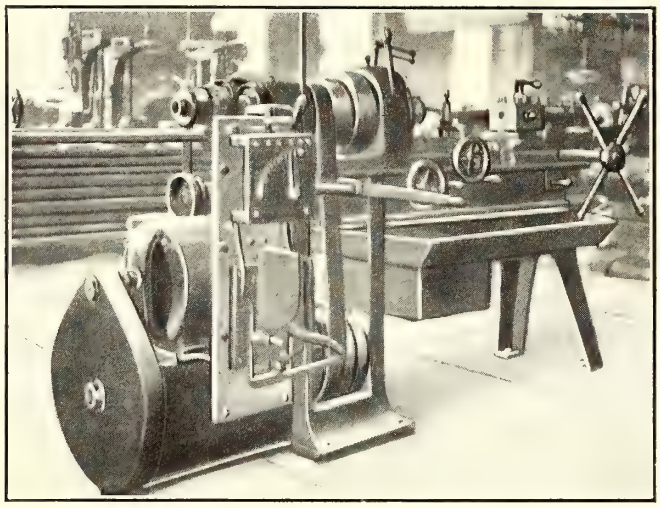
The pressure tank is emptied each afternoon and a set of coils put in to dry during the night. The ordinary shop steam supply is used to keep the pressure tank hot over night. In the morning a vacuum of about 27 in. is put on the pressure tank for 2½ hours. Meanwhile the compound is being heated by the superheated steam. Then the compound is allowed to flow into the tank and cover the coils. The supply valve is closed and the coils are kept under an 80-lb. pressure for 2½ hours. The results obtained by this process of coil treatment have been especially satisfactory.

Before a coil is put through the insulation process it is wound with strip muslin and special threaded plugs are inserted in the coil terminals to exclude the compound. After the coils are removed from the liquid the muslin is quickly torn off. This leaves the outer surface of the coils in a

smooth condition. The old muslin, which carries with it a great deal of compound, is saved and when a sufficient quantity has accumulated the compound is melted off by placing the refuse muslin in a kettle under which there is a hot fire.

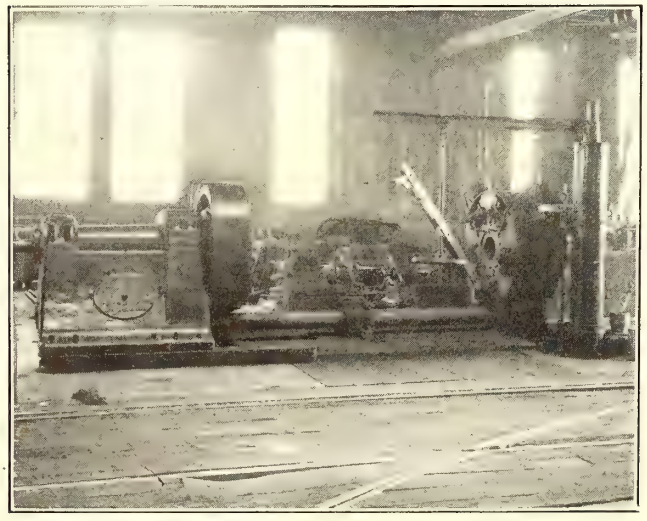
MISCELLANEOUS SHOP EQUIPMENT

The armature shop equipment includes two lathes, each of which is independently driven by an electric motor. One of



Cincinnati Shops—Small Turret Lathe with Independent Motor Drive

these lathes is used for turning commutators and the other for banding. The lathes stand at right angles to each other and close to a platform on which armatures are stored. A jib crane with a chain-block hoist serves the two lathes and the storage platform. By this arrangement of tools the course of an armature through the shop is made direct. The winding horses are located on the south side of the building. From here the armatures are taken into the baking oven at the southeast corner and thence to the storage platform nearby. The platform has on it at all times armatures in two conditions: at the south end are those which are ready for the turning lathe, and at the north end those which are ready for shipment to a car house. The single jib crane located near the



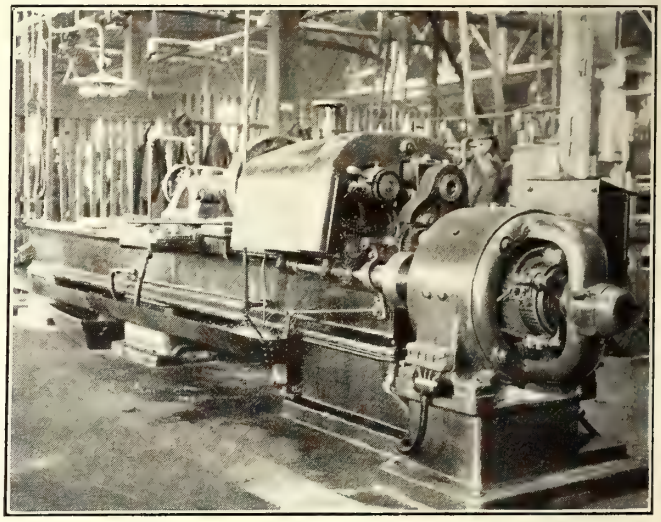
Cincinnati Shops—Motor-Driven Wheel Lathe Served by Air Crane

two lathes and the platform is thus available for doing practically all the heavy lifting required in moving the armatures about the shop.

Each armature shaft, just before the armature is approved for service, is fitted with new bearings. No special attempt has been made to standardize armature shafts and so bearings are fitted for each. The platform on which the finished armatures are stored is close to the door leading to the machine shop and the man from the machine shop who finishes the bearings can easily step across and caliper the shafts.

TESTING BOARD

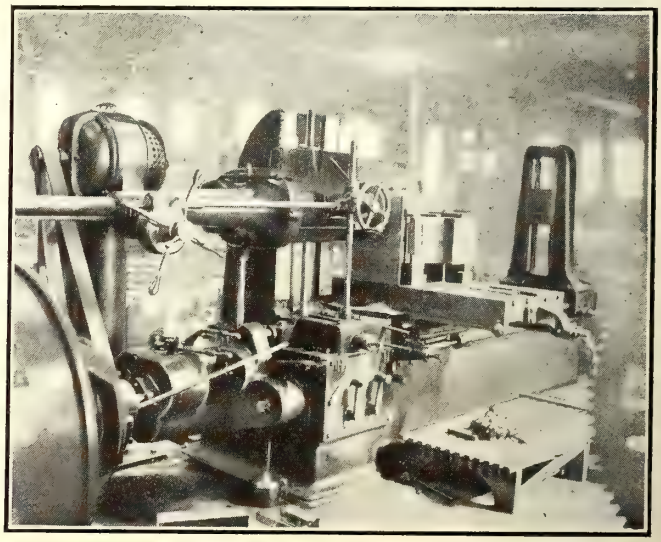
A testing board has been fitted up in one corner of the electrical shop. Controllers are repaired and resistances as-



Cincinnati Shops—24-in. Lathe and D.C. Variable-Speed Motor

sembled here. The testing board includes two panels with illuminated dial voltmeter and ammeter mounted on a swinging bracket. In testing circuit breakers they are mounted vertically. A series of seven knife switches connecting with resistance grids makes possible an adjustment of the load from 55 to 335 amp.

Alternating current for testing purposes is available in any part of the armature shop. Current is received into the shop at 110 volts and a system of wiring in conduit makes this voltage available at a number of sockets conveniently distributed. The 2500-volt testing transformer is mounted on a truck and is provided with a long connection cord. No mat-

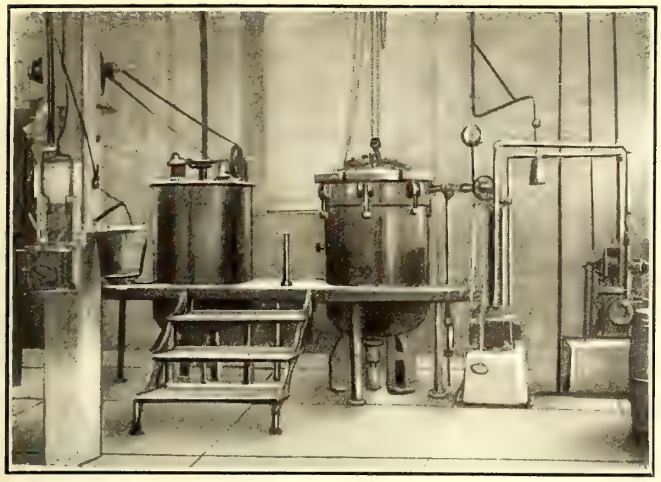


Cincinnati Shops—Horizontal Boring Machine with Independent Motor Drive

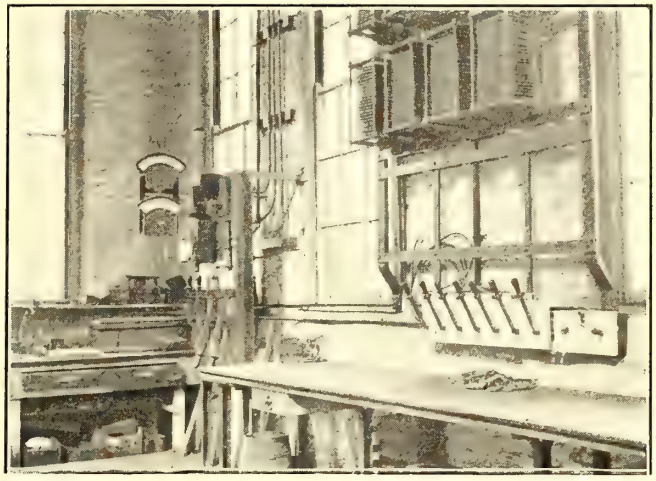
ter where the truck may be wheeled about the shop floor the cord will still reach one of the current supply sockets.

CURTAINS

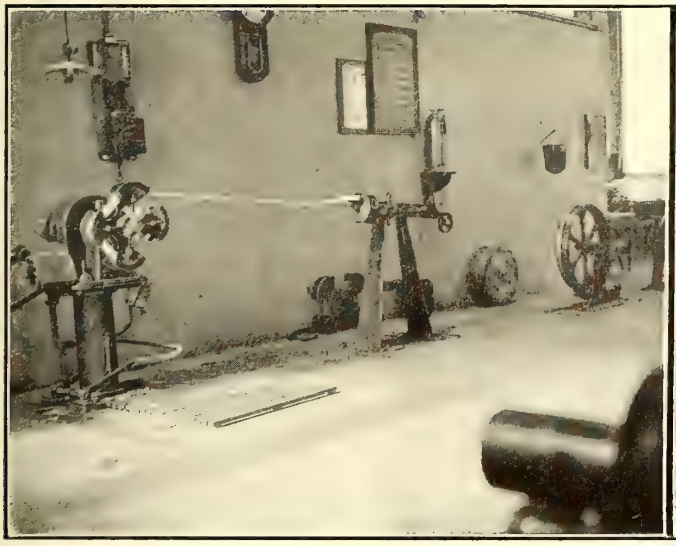
Two power-operated sewing machines have been installed at one side of the coil-winding room. These machines are operated by two girls, who repair and make all the curtains for the open cars. About 200 sets of summer car curtains are re-



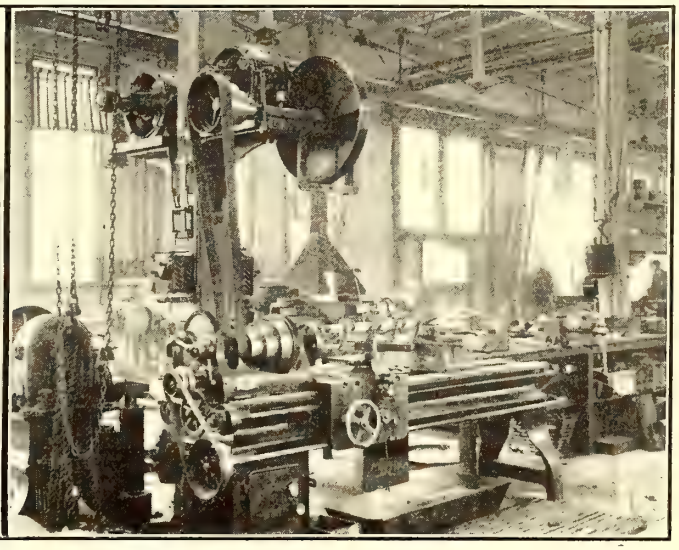
Cincinnati Shops—Vacuum Impregnating Plant in Armature Shop



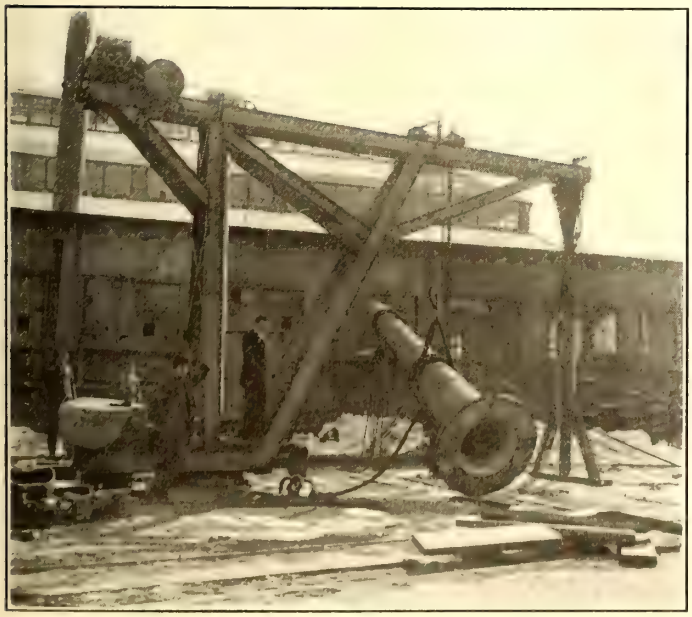
Cincinnati Shops—Corner of Electrical Shop Set Apart for Testing



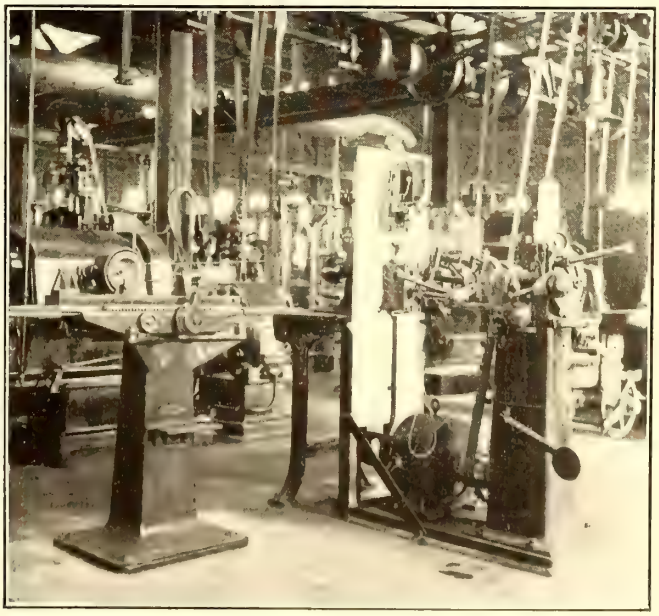
Cincinnati Shops—Field Winding Lathe and Wire-Retaping Device



Cincinnati Shops—Independent Motor Drive for Banding and Commutator Lathes



Cincinnati Shops—Home-Made Electric Crane in Shop Yard



Cincinnati Shops—Motor Installation Driving Two Grinding Tools

quired each year. A cheap canvas is used because it is thought more economical to replace them frequently than to repair more expensive curtains. All the curtains on every car that is put through the shop are inspected and overhauled by these two young women. The better class of curtains used on closed

ACCOUNT No. TITLE

JOB STARTED JOB FINISHED REPORTED CLOSED

	LABOR	MATERIAL	TOTAL		LABOR	MATERIAL	TOTAL
Amount Forward January				Amount Forward July			
February				August			
March				September			
April				October			
May				November			
June				December			
				TOTAL			

Cincinnati Shops—Cost Accounting Record Card

cars are rebound and the cloth is turned end for end, thus putting the faded part next to the roller and out of sight.

When this curtain shop was equipped with the power-driven sewing machines several attempts were made to build a satisfactory power clutch for driving the sewing machines off from the main shaft underneath the table. None of these was highly successful. Now the machines are under excellent control, obtained through the medium of a power transmission device manufactured by the sewing machine builder.

MACHINE SHOP

The machine shop of the Cincinnati Traction Company is of particular interest because of its excellent equipment of tools, nearly all of which are independently driven by 500-volt electric motors. In purchasing these tools special care was taken to choose those which would be suitable for removal at a later date to the new shop buildings which the company is planning to erect. The present machine shop building is shared jointly by the Cincinnati Traction Company and the Cincinnati Car Company. A high fence separates the work of the two companies. The car-building company's business has grown to such proportions that it is necessary for it to have more room and hence the traction company, which has ample land close by the present shops, will erect new buildings and the Cinnati Car Company will occupy part of the space now used by the traction company.

Cincinnati Traction Company.

Barn Armature Record.

Car | OPEN BOX | Date, 190

Armature, Type,

Date in, Date out,

CAUSE FOR SENDING TO SHOP:

Barn Foreman.

B. P.

Person Receiving Armature.

NOTE—Both Barn Foreman and person receiving armature must write what in their opinion was the cause of the trouble.

Cincinnati Shops—Report Accompanying Defective Armature

MOTOR INSTALLATIONS

Several of the accompanying illustrations show various methods of motor installation for driving the tools in the machine shop. The electrical equipment has been installed in a very thorough manner. The 500-volt supply is brought to a main switchboard erected close to the shop foreman's office and from this board feed lines radiate to various groups of tools. Each line is protected by a circuit breaker on the board. All of the wiring inside the building is enclosed in tightly fitted iron conduit with porcelain condulets at all outlets. In laying out the conduit great care was taken to provide against accidental injury to the conducting wires. The thoroughness of this work was warranted because of the desire for protection against fire and assurance of continued current supply to each machine tool.

The feed lines from the control board pass through conduit carried on the roof rafters or under the concrete floor and terminate in small panel boards at the tools. One of these boards is illustrated in the view showing the group of tool grinders. At the board the feed lines emerge from the porcelain outlet and connect directly with a General Electric type C two-pole circuit breaker. From the opposite terminals of the circuit breakers the lines are again carried in conduit to a starting box and thence in conduit to the motor. In this way no wires are exposed, except the very short lengths necessary for attaching to the terminals of the different pieces of apparatus. The terminal board at each tool is of fireproof construction and is mounted in a substantial angle-iron frame bolted to the concrete floor or to the machine which is to be driven.

The motors are of the variable-speed commutating type and of both Westinghouse and General Electric manufacture. Special care was taken in the choice of motors for operating the various kinds of tools. Those motors which drive lathes have reversing controllers with a speed control handle directly on the lathe carriage. Thus it is possible for the machinist to start, stop or regulate the speed of his lathe through wide limits without leaving the position where he can best observe the working of the cutting tool. Some of the older tools in the shop are driven by GE-800 railway motors, which, at a cost of about $30 each, were rewound with shunt fields and now are said to give excellent service for driving constant speed tools.

HORIZONTAL BORING MACHINE

A great variety of railway shop work can be done with facility on the new Lucas horizontal boring machine shown on page 582. This machine is driven by a 5-hp semi-enclosed motor mounted on a cast-iron pedestal which supports it about 5 ft. above the floor and stands about 2 ft. away from the bed of the boring machine. The elevated position of the motor permits the use of a belt for transmitting power to the gear box of the machine. The table of the boring machine may be fed in either direction horizontally and the boring shaft has hand and automatic feeds for horizontal or vertical movement. With these combinations and a number of large cutting tools a considerable variety of work can be performed. The illustration shows the machine in the act of facing a casting.

REBORING MOTOR SHELLS

The horizontal boring machine just described is used for reboring motor shells. In this work a heavy jig and dummy shaft are used to support the shell on the machine table. Special clamps are provided for holding the jig to the table so that the holes bored will conform to uniform standards. When a shell is to be bored the bolt holes in the bearing housings are first rebored and increased in diameter from 1 in. to 1¼ in. Then the jig is set on the table of the horizontal boring mill and an arbor is put through the axle bearings. The shell and jig are held to the table by bolts passed through the holes in the bearing housings. By means of a boring bar with adjustable cutting tools the armature boxes are first rebored. Next an arbor is put through the armature bearings and the cutting tool adjusted to refinish or rebore the axle bearing housing. By the use of this combination of jig and bars uniformity in bearing housings is assured.

Four sizes of axles are used. New axles are finished 4½ in. in diameter and after they have been worn are taken out and turned down to 4¼ in., then, after a second wearing, they are turned to a diameter of 4 in. for use in another type of motor. In this way, with these three standard sizes, the purchase of one new axle and the machine work on two worn axles make

it possible to put three new axles in service on the road. In working over old axles they are carefully annealed in a blacksmith shop so that the metal may be under no undue stresses when it is returned to service.

LATHE EQUIPMENT

A 24-in. Lodge & Shipley lathe, direct driven by a 10-hp motor, is used for turning axles and for all kinds of general work. Two lathes of similar manufacture with swings of 20 in. and 16 in., driven by 7½-hp and 5-hp motors respectively, are used for smaller work. The 24-in. lathe showing the driving motor in the foreground is illustrated on page 582.

The Dreses turret lathe shown in one of the illustrations is driven by a 2-hp motor installed directly at one end of the machine. Power from the motor is transmitted through a single reduction gearing to a shaft close to the floor. This shaft extends under one end of the bed of the lathe and carries a set of cone pulleys which connect with the other set of cone pulleys by the usual leather belt. The switch, starting box and circuit-breaker for the motor are installed on a standard control panel within reach of the lathe operator from his position near the tool post.

WHEEL LATHE

The 42-in. Putnam wheel lathe illustrated is driven by a 25-hp variable-speed motor with a reversing speed controller. In turning steel wheels they are first roughed with a round-nosed tool and then finished with a shaping tool ground to the full contour of the tread and flange. A special air hoist for handling wheels and axles is mounted close to the driving end of the lathe. This hoist is made up of an air cylinder and a heavy piston extending upward. The top of the piston carries an I-beam jib reinforced with a heavy tension rod. A trolley carriage made of two small wheels yoked together travels on the lower lips of the I-beam and supports a balanced arm, which is used to lift the wheels. This lathe and crane are installed near the shop track on which wheels are received, and one man can easily lift a pair of wheels off the shop track with the crane and swing them onto the lathe centers. The lifting movement of the jib crane is controlled by an engineer's valve mounted on one side of the vertical cylinder.

MISCELLANEOUS TOOLS

The pair of grinding machines shown in one of the illustrations on page 583 is driven by a 4-hp motor, with a pulley on each end of the armature shaft. One of these machines is a Bullard surface grinder and the other is a Sellers universal twist-drill grinder. This installation stands close to the enclosed tool room adjoining the shop foreman's office.

In addition to the tools here described the equipment of this shop includes the following tools driven by motors of the capacities stated:

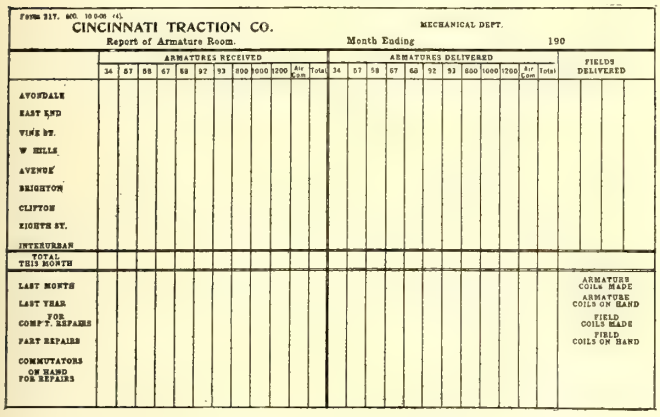
King 4-in. vertical boring mill, 10 hp.
Pond 21-in. chucking lathe, 7½ hp.
4-ft. radial drill, 5 hp.
Lodge & Shipley 36-in. lathe, 12 hp.
Emery tool grinder, 4 hp.
Two sensitive drills, 2 hp.
Small punch and shear, 3 hp.

Other tools not independently driven are as follows:

Niles wheel borer.
Niles 200-ton wheel press.
Horizontal planer, 36 in. x 36 in. x 12 ft.
24-in. back-geared shaper.
No. 3 Cincinnati milling machine.
Jones & Lampson 2-in. turret lathe.
Two punch presses.

Axle straightening press with Watson-Stillman hydraulic punch, having 8-in. ram.

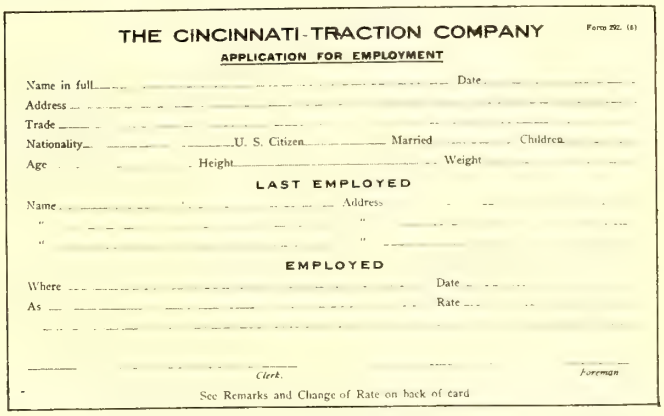
Just outside the machine shop is a motor-operated crane which has done good service in unloading material from freight cars and placing it on the shop tracks. An illustration on page 583 shows this crane in the act of lifting a heavy cast-iron pillar, which is to form the center support of a more powerful crane that will replace the one shown in the illustration. On this crane, as well as on all the lifting apparatus used in the



CINCINNATI TRACTION CO. — MECHANICAL DEPT.
Report of Armature Room. — Month Ending ____ 190

	ARMATURES RECEIVED											ARMATURES DELIVERED											FIELDS DELIVERED
	34	57	58	67	68	92	93	800	1000	1200	Air Com.	Total	34	57	58	67	68	92	93	800	1000	1200	Air Com.	Total	
AVONDALE																									
EAST END																									
VINE ST.																									
W. HILLS																									
AVENUE																									
BRIGHTON																									
CLIFTON																									
EIGHTH ST.																									
INTERURBAN																									
TOTAL THIS MONTH																									
LAST MONTH																									ARMATURE COILS MADE
LAST YEAR																									ARMATURE COILS ON HAND
FOR COMP'T. REPAIRS																									FIELD COILS MADE
PART REPAIRS																									FIELD COILS ON HAND
COMMUTATORS ON HAND FOR REPAIRS																									

Cincinnati Shops—Monthly Comparative Statement of Armature Shop Work



THE CINCINNATI TRACTION COMPANY
APPLICATION FOR EMPLOYMENT

Name in full ____ Date ____
Address ____
Trade ____
Nationality ____ U. S. Citizen ____ Married ____ Children ____
Age ____ Height ____ Weight ____

LAST EMPLOYED

Name ____ Address ____
" ____ "
" ____ "

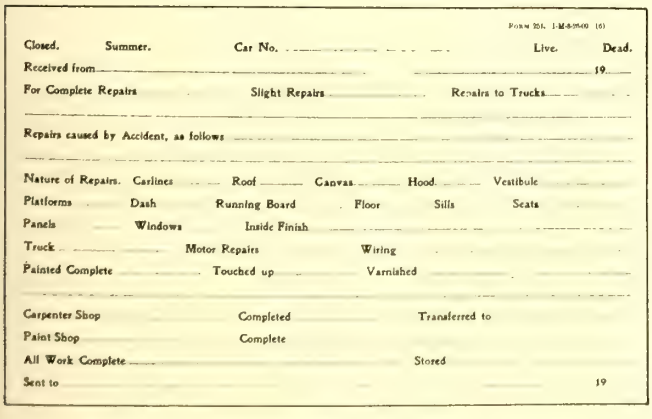
EMPLOYED

Where ____ Date ____
As ____ Rate ____

Clerk. Foreman.

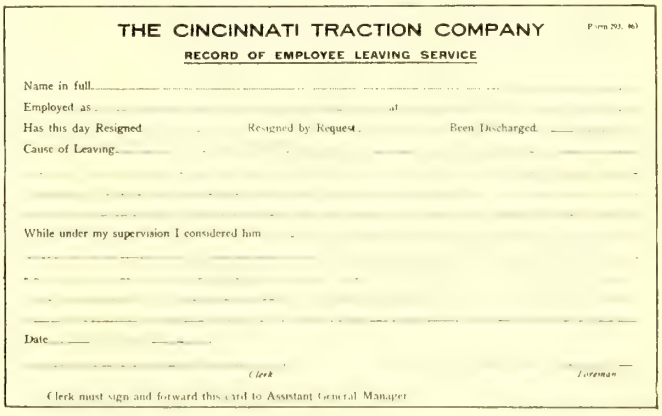
See Remarks and Change of Rate on back of card

Cincinnati Shops—Record to be Filled Out by Applicant for Employment



Closed. Summer. Car No. ____ Live. Dead.
Received from ____ 19
For Complete Repairs ____ Slight Repairs ____ Repairs to Trucks ____
Repairs caused by Accident, as follows ____
Nature of Repairs. Carlines ____ Roof ____ Canvas ____ Hood ____ Vestibule ____
Platforms ____ Dash ____ Running Board ____ Floor ____ Sills ____ Seats ____
Panels ____ Windows ____ Inside Finish ____
Truck ____ Motor Repairs ____ Wiring ____
Painted Complete ____ Touched up ____ Varnished ____
Carpenter Shop ____ Completed ____ Transferred to ____
Paint Shop ____ Complete ____
All Work Complete ____ Stored ____
Sent to ____ 19

Cincinnati Shops—Shop Car Repair Records



THE CINCINNATI TRACTION COMPANY
RECORD OF EMPLOYEE LEAVING SERVICE

Name in full ____
Employed as ____ at ____
Has this day Resigned ____ Resigned by Request ____ Been Discharged ____
Cause of Leaving ____
While under my supervision I considered him ____
Date ____
Clerk. Foreman.
Clerk must sign and forward this card to Assistant General Manager

Cincinnati Shops—Record of Employee Leaving Service

shops and car houses which is operated by air, control is had by the use of engineers' brake valves. These valves are easier to maintain than the more usual type employed in this service and are freer from leakage.

SHOP CARD RECORDS

When a car is turned into the shop for repairs or general overhauling, a heavy brown manila tag, 8½ in. x 5 in. in size, provided with a protected eyelet, is tied on. The shop inspector notes on this repair tag or card just what work is to be done. After the car has been repaired and has been approved by the inspector the tag is visèd and returned to the master mechanic's office. When the repair tag is received at the office the information presented thereon is transferred to the duplicate card car record and filed vertically according to the car number. One of these cards is reproduced on page 585. Thus in a single file the master mechanic has at his disposal the complete shop record of each car that has been repaired.

A simple method of presenting the shop expense for various operating accounts of jobs, is had by the use of a card record made up of 8 in. x 5 in. cards ruled as shown in the reproduction on page 584. These cards are filed vertically and one card is used for each job or standing maintenance order. It will be noted that the record affords a ready means of presenting the labor and material and total costs for any one class of work or any single job, separated according to the months of the year. The cards are kept in drawers and are indexed and subdivided into three groups: (1) purchasing agent's orders; (2) job orders and (3) maintenance accounts.

The records of the electrical shop of the mechanical department present a complete history of each field and armature according to number. Each day the barn foreman sends to the foreman of the armature room detailed reports showing the cause for removing and sending to the shop each armature that needs repairing. The blank used in making such reports is reproduced on page 584. The use of this blank has a good effect in encouraging care and watchfulness on the part of the men handling the equipment in the barns. It will be noted that the barn foreman first is required to set down his opinion of the cause for requiring that the armature be sent to the shop. Later, when the armature and the foreman's report accompanying it are received in the armature shop, the person receiving the armature writes on the bottom of the blank his opinion of the cause of the trouble to the equipment. These reports, containing the opinions of the two men handling the armature are made in triplicate. One is kept by the barn man, one is sent to the armature room with the armature, and the third is sent to the master mechanic.

An independent record of each armature is kept in a loose-leaf book by the foreman of the armature room. The pages in this book are ruled to present the following information: Number of the armature, style, dates received, nature of repairs and dates delivered. The pages are 6 in. x 9 in. in size.

Each month a complete summary of the work of the armature shop is made up and inserted in the system of card records kept in the master mechanic's office. One of these reports is shown on page 585. It shows the number of armatures received and delivered to each of the car houses, the number of fields delivered, armature coils made, armature coils on hand, field coils made and field coils on hand. Totals for the armatures of various types of motors and air compressors are presented and similar totals for all classes of armatures for each barn and shop are shown. The report also presents detailed comparisons of the work done on armatures of the same type during the last month and the last year; it shows the number of armatures sent in for complete repairs and part repairs; commutator repairs, and the number in the armature shop awaiting repairs. A similar report is used for recording the repair work on fields and the number of trolley wheels returned and delivered. With these reports and detailed comparisons presented the master mechanic is able to keep a close line on the performance of the various classes of equipment, as well as note the amount of work done upon each car by the shop forces.

A rather complete record of the service of each shop employee is kept by the master mechanic, on a form illustrated on page 585. When application for employment is made the man is required to answer the questions shown on the blank and to give references. All references are investigated before a man is employed. Space is provided on the back of the application card for noting the date on which the man is employed and his hourly rate; also the date on which his work or his rate of pay may be changed. When an employee leaves the service a summary of his record is presented on a card which shows the date and cause of leaving, and gives the foreman's opinion of the man. After having been properly filled out at the shop, these cards are forwarded to the office of the assistant general manager.

SCHEME FOR PREVENTING BREAKAGE OF COAL-HANDLING GEAR

At the power plant of the St. Clair Tunnel Company, at Port Huron, Mich., a simple scheme has been adopted for preventing the breaking of important parts of the coal-conveying apparatus. Coal for this plant is received in steam cars and dropped into a crusher located beneath the track parallel with the boiler and bunker house. From the crusher a horizontal conveyor carries the coal to an elevator which in turn discharges into a belt conveyor above the coal bunkers in the roof of the boiler house. This train of coal conveying elevators and belts is driven by an electric motor through a sprocket wheel and chain. When the plant was first started the driving chain and sprocket frequently were broken by the excessive load put on when a miner's pick or some other piece of foreign metal got into the crusher. It was necessary at first to keep extra sprocket wheels on hand so that repairs could be made quickly if the crusher became clogged with foreign substances and broke the driving apparatus.

The sprocket wheel originally was keyed onto its shaft and thus any undue strain on the shaft showed its full effect in tending to break the teeth on the sprocket wheel or the links of the chain. To provide against such damage, the use of the sprocket wheel key was discontinued and the wheel so fastened to the shaft that an abnormal load would shear the fastening rather than break the teeth of the sprocket.

In mounting the sprocket wheel in the improved way the hub was bored out so that it had a slack fit on the shaft. Then a collar was set on the shaft on either side of the hub to hold the sprocket in its proper location. Next a hole was drilled clear through the two collars and the hub of the sprocket and a pin inserted. By the cut-and-try method a pin ⅜ in. in diameter was found to give sufficient shearing stress to carry the full load of the coal-handling machinery, and to give way and let the sprocket turn on the shaft whenever an undue load was thrown on the crushing or conveying machinery. This simple little scheme of mounting the sprocket wheel has done away with a troublesome detail of operation. Now when the pin shears and the motor revolves without driving the coal-handling apparatus the foreign substance causing the shut-down is removed from the crusher, a new pin is inserted quickly and the machinery soon placed in operating condition.

STEEL CAR PANELS OVER WOOD

Owing to the climatic conditions in Richmond, Va., the wooden panels on the cars are frequently cracked. Instead of replacing them with new wood panels the Virginia Railway & Power Company covers the old panels with steel of No. 18 gage. These steel sheets are screwed on under the old side moldings and when painted they cannot be distinguished from wood. In fact, there are many cars which have wood panels on one side and steel-covered panels on the other. When steel panels are applied, they are continued past the belt rail without a break and this prevents the rotting which occurs when water from the belt rail gets inside the car between the joints of the wooden half-panels. The plates are shaped in the company's shops and are applied whenever it is found that a considerable number of the wooden panels are split.

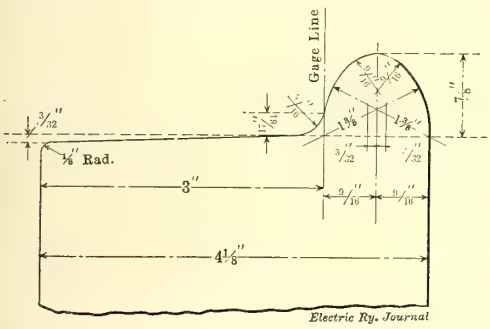
INTERESTING SHOP PRACTICES AT INDIANAPOLIS

Ingenious Methods of Caring for Wheels, Brakes and Motors on a Large Road

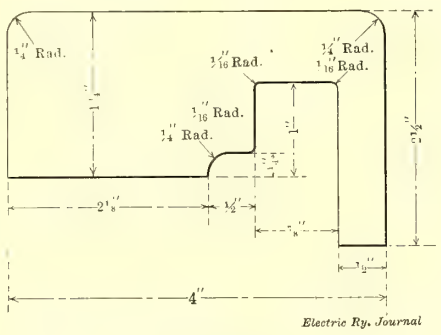
THE repair work for the city cars of the Indianapolis Traction & Terminal Company and for the interurban cars operated on one division of the Terre Haute, Indianapolis & Eastern Traction Company is done at the West Washington shops of the former company. Many interesting and thorough practices are followed here under the guidance of L. M. Clark, master mechanic. The detail system of record cards and monthly summaries of repair work are worthy of special attention because they are designed to give the management of the road very accurate and comprehensive statements of the condition of the various types of equipment. The buildings in which the repair work is done are not new, with the exception of the paint shop described elsewhere in this issue. The reconstruction of part of the shop group is contemplated. The present article describes the wheel practice, an air-brake testing department and motor testing, and presents a number of the blank forms used, together with a description of some of the more interesting shop kinks.

WHEEL PRACTICE

The Indianapolis companies were among the first electric roads to use steel wheels and steel-tired wheels, but now the steel-tired wheels are being dispensed with. About a year ago the two companies adopted a forged-steel wheel manufactured by the Forged Steel Wheel Company, Butler, Pa. None of these wheels has, as yet, been in the shop for re-turning, although some of them have run more than 40,000 miles. The wheels used under interurban cars are 34 in. and 38 in. in diameter and have rims 3¼ in. thick with a contour as shown in the accompanying engraving. The tread of this wheel is 3 in. wide and the flange 1⅛ in. thick from gage line to the back of the wheel. The flange is ⅞ in. deep. It is the practice to wear and turn the rims down to a thickness of ⅝ in.



Indianapolis Shops—Contour of Steel Wheel Flange and Tread



Indianapolis Shops—Limit of Wheel-wear Gage

The wheels in service are inspected with a limit gage made from case-hardened steel ¼ in. thick. It is so shaped that its position is fixed by the back of the wheel and the flat of the tread. It will fit over a flange that has a thickness no greater than ⅞ in. on a line ¼ in. above the projected line of the tread. When a wheel has reached this limit of wear it is taken out of service and about 5/16 in. of metal is turned off the tread in order to reshape the flange. The wheel inspectors pay especial attention to ordering wheels in for re-turning at the point in their life when the flange can be reshaped with the least practicable loss of metal on the tread.

WHEEL RECORDS

Detailed records of the performance of each wheel are carefully kept in the office of the master mechanic. When a pair of wheels is sent into the shop for any work a tag of the form illustrated is attached to the axle. On the face of this tag are entered the axle number and the tire number. The tire on the gear side is denoted by the letter "G." The face of the tag also bears the name of the inspector and the date on which the wheels are removed from service. The reverse side of the tag as illustrated shows a list of the eight common reasons for withdrawing wheels and axles from service and provides a space opposite for checking. The reverse side of the tag also has spaces for showing the car number, wheel number, name of inspector and date for each wheel removed and put on.

After the steel car-wheel record cards have served their purpose in the shop and the desired information has been entered thereon at the time the wheels are returned to service, the cards are turned into the master mechanic's office. Here a card-index system presents the history of each wheel. One of these cards, which are 6 in. x 4 in. in size, is reproduced in part. It will be noted that the various identifying characteristics of the wheel are exhibited at the top, including the size, material, date of purchase, name of manufacturer and notes regarding the fitting of the wheel. Lines are ruled for 14 entries to show the numbers of the cars under which this wheel has been placed, the date it was put under each car, the measurement at that time, the date, cause of, and measurement at the time of removal, and a tabulation of the number of miles and days, and loss of metal in service, also the shop number of the workmen who handled the wheel.

AIR BRAKE MAINTENANCE

A testing room for air brake parts has been fitted up with devices for making thorough inspections of the more important parts of the braking equipment. The shop forces have built here a complete testing rack arranged so that a series of service tests may be given triple, brake, feed and safety valves and various types of motor-compressor governors. The governors are set at known loads by feeding the test current through large banks of incandescent lamps used for resistance.

The most interesting feature of this air-brake test room is an installation of reservoirs equipped for accurately testing the pumping capacity of motor-driven air compressors. The principal parts of this testing set are two tanks, the capacities of which have been carefully calibrated by measuring with water. These tanks are mounted on the side wall of the room and connected by a short run of pipe with a valve inserted. Provision is made for closely observing the temperature of the air within the tanks, and in computing tests account is taken of the relation between temperature and pressure. These corrections are readily made by the use of a temperature table and they adjust the results for the correct pumping pressure exclusive of that caused by the heat of compression.

The upper of the two tanks is connected with the pump by a flexible metallic tube which is air tight. When the test set was first installed rubber hose was used, but it was found that the heat, during continued service, weakened this to a point where accidents might be expected.

The object of the pump test is to obtain an accurate record of the amount of free air pumped by the motor compressor while working against a back pressure of 100 lb. When being tested, the compressor is run for the full number of revolutions which it should make in a minute and not for a unit of time of one minute. This precaution is taken because of a possible

variation in voltage which might change the speed even though the pump was in good condition. The reason for using two tanks is to be able to maintain a constant back pressure of 100 lb. on the pump, meanwhile timing its revolutions and measuring the air exhausted into the lower tank.

In performing a test the pump is set to work and its exhaust led through the metallic tube to the upper tank, the pressure in which is allowed to reach 100 lb. The lower tank has a capacity of 5 cu. ft. and is connected with the upper tank through a valve. When the pressure in the upper tank has reached 100 lb. the operator starts counting the revolutions of the pump and his assistant tends the valve between the pressure and measuring tanks, keeping the pressure at 100 lb.

During the test the excess air above that required for maintaining a pressure of 100 lb. in the pressure tank, passes into the measuring tank, which, at the start, was under atmospheric pressure. At the end of the run, which extends for a definite number of revolutions of the pump, the pressure in the measuring tank is noted. Atmospheric pressure is added to the gage pressure and the sum is divided by the capacity (5 cu. ft.) of the reservoir to ascertain the number of feet of free air pumped during the run with the compressor operating against the 100 lb. back pressure. From a handy table the inspector is able to know what this pump should do, and if it does not meet the requirements the necessary repairs are made. No leeway is allowed and if a pump does not operate up to its full rated capacity under this test it is repaired before being put into service, otherwise it certainly would not operate at its rated output when installed under the car.

This method of testing a pump in a special room has the advantage that the test conditions can be maintained constant and any defect in the pump be located easily, while if the test were made on the car a poor pump might be excused on account of leaky pipes, incorrect gage or some other outside condition.

AIR-BRAKE RECORDS

A monthly report of the repairs made to air brake equipment is prepared. The blank used to make this report is reproduced. It presents a list of the types of compressors, governors and brake valves used and the defects and repairs more commonly experienced. In addition, the work on valves, cylinders, slack adjusters and air gages is noted, and a summary showing the number of cars on which the piping has been repaired and the brakes overhauled or standardized for the current month as compared with the previous month is presented.

Form 50

Indianapolis Traction & Terminal Company

STEEL CAR WHEEL RECORD CARD

AXLE NO._____ G TIRE NO._____
TIRE NO._____ _____

REPAIRS_____

_____

_____

BY_____

DATE_____

DEFECTS

X	Sharp Flange
	Loose Tire
	Broken Tire
	Loose Wheel
	Flat Wheel
	Loose Gear
	Broken Gear
	Sprung Axle

REMOVED
CAR NO._____
WHEEL NO._____
BY_____
DATE_____

PUT IN
CAR NO._____
WHEEL NO._____
BY_____
DATE_____

Indianapolis Shops—Obverse and Reverse of Car Wheel Record Card

Form 239 5c 7 09

TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION CO.

		Diam of Centre		Material		Wheel Fitted by		Pressed on by	
Wheel No		Made by		Purchased		Pd in Service		Tons Pressure	
		Diam	Material		Made by	Purchased	Put in Service	Fitted by	
Axle No									
Tire No.									
	Put In			Removed		No.	No. Days	Tire	
Car No	Date	Measurement	Date	Cause	Measurements	Miles	in Ser.	Loss	Work Done By

Indianapolis Shops—Card Index Record of Wheel Performance

FORM 129

INDIANAPOLIS TRACTION AND TERMINAL COMPANY

Air Compressor Record

Make & Type_____ Pump No._____ Motor No._____

PUT IN		REMOVED		SERVICE		REPAIRS			TEST	
Car No.	Date	Cause	Date	Mileage	No. Days in Service	Nature	By	Date	Cu. Ft.	By

Indianapolis Shops—Air Compressor Record Cards

Form 110

Indianapolis Traction and Terminal Company

Monthly Report of Air Brake Repairs.

W. Washington St. Shops For Month of 19

Type of Compressor	Defects: Disabled	Worn Cyl's	Worn Valves	Worn Bearings	Dirty Valves	Clogged Suction	Defective Lubrica	Motor Trouble	Air Leakage	Repairs: Cyl. Reborn	Overhauled	Repaired	Tested	Total No.
West'g D-1-E-G.														
" " D-2-E-G														
Christ'sen AA1														
Governors	Disabled	Defective Packing	Defective Contacts	Burned Magnets	Grounds			Air Leakage			Overhauled	Repaired	Tested	Total No.
West'ghouse G														
" " J														
Christ'sen E														

Brake Valves	Disabled	Air Leak'g	Defective Distrib.	Overhauled	Repaired	Tested	Total No.	Misc.	Disabled	Air Leakage	Defective Lubrica	Overhauled	Repaired	Tested	Total No.
West'g O.V.P.								Triple Valves							
" Misc.								Feed " "							
Christ'sen Eng.								Brake Cyl.							
								Sla Adjuster							
								Air Gauges.							

Miscellaneous

No. of Cars. piping repaired, Current Month_____ Previous Month_____
" " " Brakes Overhauled " " " _____ " " " _____
" " " " Standardized " " " _____ " " " _____

Remarks

_____

_____

_____

_____

_____

_____

_____

_____

Clerk _____ Foreman

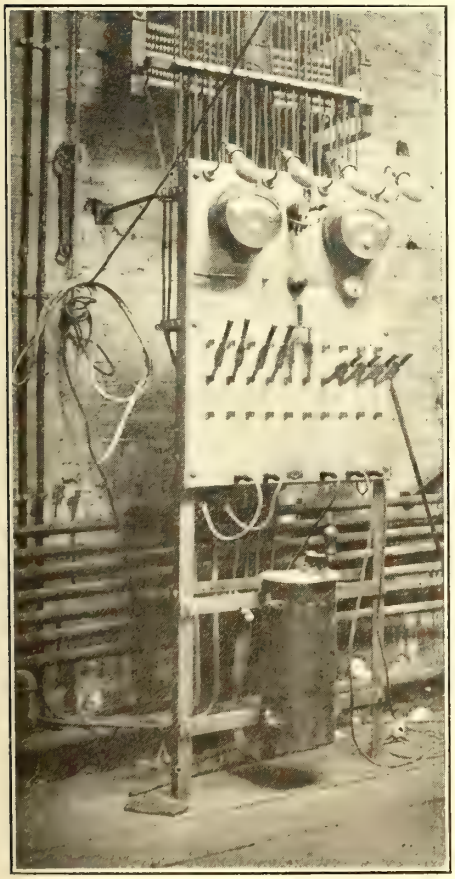
Indianapolis Shops—Monthly Summary of Airbrake Repairs

A set of card records for the use of the master mechanic's office is kept. These records, as reproduced, show the type and number of each air compressor and give the data regarding its service, the time of installation, time of removal and the repairs and tests made. Information for making this record is obtained from an air-compressor repair card tied to the compressor when it is taken out of service. The obverse and reverse of these tags, which are handled in a way similar to the wheel record tags, are shown.

MOTOR TESTING

Every car motor that is repaired in the Indianapolis shops is given a running test on the shop floor before it is put under a car. An illustration of the motor-testing board and a wiring diagram of that board are reproduced. A table of constants for the current and voltage readings fo. each type of motor has been prepared, so that when a motor is being given a test and the current and voltage values are noted it then is possible to determine fully whether or not the motor is running freely. If the bearings should not have been fitted properly the extra demand for current will indicate the fact. By the careful use of testing methods many causes for motor heating are learned in the shop where they can be easily corrected, and unnecessary pull-ins be prevented.

The testing board stands at one corner of the truck repair shop. An independent feed line direct from the power house furnishes current to this board. By means of this special connection the voltage regulation obtained at the testing board is equal to that of the power station busbars and is not affected by the shifting of cars in the shop yards, as it would be if the testing board were fed from the trolley wire. The board is equipped with a 100-amp ammeter and a 600-volt voltmeter and is protected by a 100-amp circuit-breaker. The lower part of the board carries eight single-pole, double-throw, 100-amp knife switches and a double-pole double throw switch, by means of which the various resistance grid connections are made to obtain a wide range of resistance values for comparative purposes. With these connections a range of resistance from 8.42 to 26.48 ohms in steps of 0.25 ohm and from 2.12 to 7.38 ohms in steps of 0.052 ohm may be obtained with facility. An R-28 controller serves for operating the floor tests given the motors. Testing current is distributed from the board to four different parts of the shops over cables carried in iron conduit. These cables terminte just below the test board and each is equipped with a feed connection plug. There is only one live socket to which these plugs can be connected; thus it is impossible for more than one of the distributing lines to be alive at one time. This precaution is taken to provide against accidents on the shop floor.

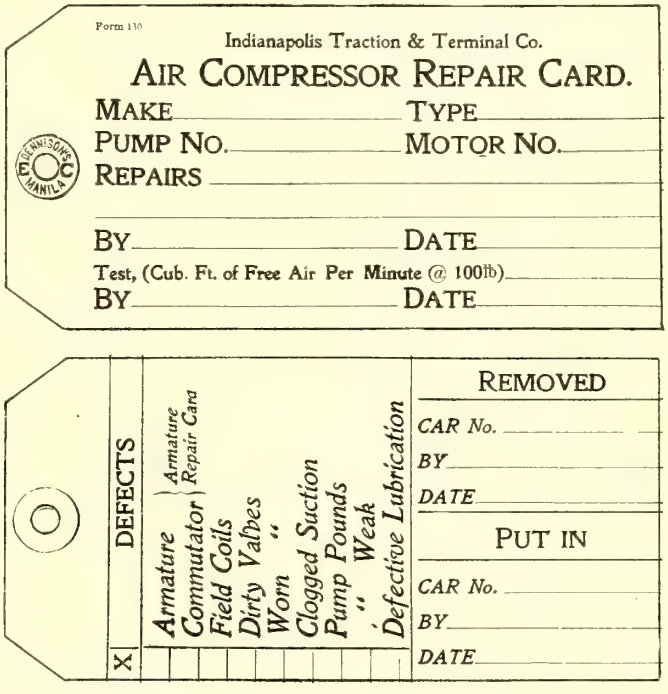


Indianapolis Shops—Test Board in Motor Repair Shop

ADJUSTING RESISTANCES

Resistance grids are repaired at a bench not far from the testing board. A lead from the board furnishes testing current at the repair bench and all resistance is checked before it is placed under a car. The method of checking requires that the proper resistance at each of the controller steps shall be obtained. The table used in adjusting resistance connections is given on page 591. As shown, the quantities quoted in this table for each resistance step are based on the use of a constant testing current of 10 amp, and thus the readings are in volts rather than in ohms. A current of 10 amp is not sufficient to heat the grids and therefore no correction for hot resistance is necessary. The use of constant current makes the calculation in voltage a simple matter because, with the testing current of 10 amp, the voltage reading at any step along the series of resistance connections equals 10 times the ohms resistance in the circuit, and it is only necessary to read the voltage and move the decimal point one place to the left to obtain the ohms resistance of the circuit.

In checking repaired resistance grids, measurements are first taken at the taps noted in the accompanying table. Then if the resistance at the various steps is not found to be correctly divided, adjustments are made by changing the taps until the voltage reading for the various steps closely approximates that shown in the table.



Indianapolis Shops—Obverse and Reverse of Air Compressor Repair Card

Alternating current for testing armatures is obtained from a small rotary converter installed in the armature shop. The a.c. output of the generator is fed to a step-up transformer from which current is taken to give voltage tests of the following values:

Late type armatures when new	2,400 volts
Late type armatures when old	1,800 volts
Old type armatures new or rewound	1,800 volts
Old type armatures repaired	1,200 volts

When an armature is sent into the shop for repairs a tag similar to that earlier described for checking the work done on wheels is attached. The printing on the two sides of one of these armature repair tags is reproduced. After the armature has been put through the shop the tag is turned in at the master mechanic's office and the information presented thereon is transferred to an armature record card illustrated on page 591. These cards are filed in an index and each presents the complete history of one armature, showing the time the armature has been in service, the reasons for renewal, the repairs made and the mileage and number of days in service.

Once a month a report of motor repairs is prepared by the shop office force. This report is similar in general form to that used in connection with the air brakes and indicates the repair work required on each of the various types of motors used. Space is provided for comparing with the record for the previous month, the number of repairs of different kinds happening during the current month.

SHOP KINKS

Babbitted bearings are finished on a lathe fitted with a special quick-clamping device for holding the bearing shell in line. An illustration of the carriage of this lathe with a bearing in place is shown. The bearings are finished with tools set in a Davis boring bar having a micrometer adjustment. The hinged clamping block is designed to hold the largest bearing shells. Liners are provided for shells of smaller sizes so that this lathe attachment serves for finishing all babbitted bearings.

A number of the small tools in the shop are operated by 110-volt motors. Current for this service is obtained from an old separately excited 500-volt motor run at slow speed.

To increase the speed in handling wheels in and out of a Niles lathe the tail stock of that lathe has been fitted with a 6-in. diameter 36-in. stroke air cylinder which serves to move the heavy tail stock quickly and without effort on the part of the lathe operator.

The thermit process of welding has been used in these shops for two years and its varied usefulness has been demonstrated many times. One of the interesting repair jobs made with thermit is that of welding truss rods. When a car has been in a collision and the truss rods damaged, the rods are straightened and rewelded in place without tearing down the car siding for removal.

Form 131-5m 11-09

Indianapolis Traction & Terminal Co.

ARMATURE REPAIR CARD

TYPE

SHOP NO.

REPAIRS

BY

DATE

	DEFECTS	REMOVED
		Car No.
		Motor No.
		By
		Date
		PUT IN
		Car No.
		Motor No.
		By
		Date
X	Grounded	
	Open Circuited	
	Short Circuited	
	Carbonized	
	Worn Bearings	
	Defective Bands	
	Rough Commutator	
	Defective Shaft	
	Down on Pole Pieces	

Indianapolis Shops—Obverse and Reverse of Armature Shop Tag

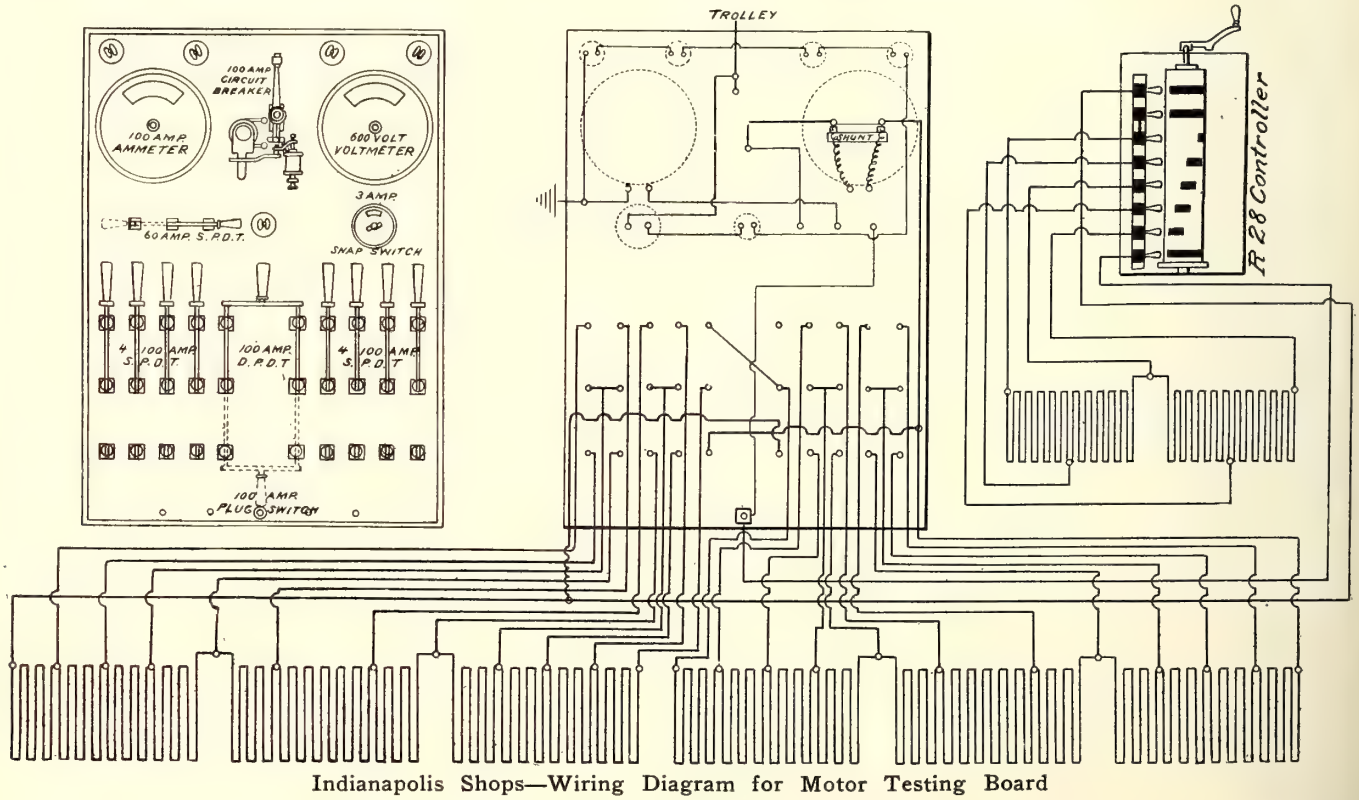
INDIANAPOLIS TRACTION AND TERMINAL COMPANY

COMPARATIVE REPORT OF PULL-OFF CARS

FOR MONTH OF.....

CAR BARN	Year	Car Body	Truck	Motor	Control	Cable	Air Brake	Trolley	Heater	Register	Lights	Sig. Bells	Brk. Glass	Air Frozen	Slack Brakes	Tight Brakes	Hot Brgs.	No Fire	No Water	No Defect	Relief Car	Wreck	Total	% of Cars Operated
ILLINOIS ST.																								

Indianapolis Shops—Comparative Report of Cars Pulled Out of Service



Indianapolis Shops—Wiring Diagram for Motor Testing Board

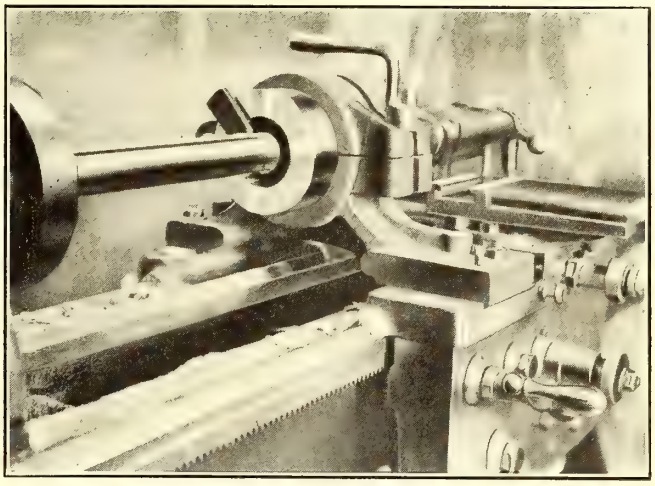
In the armature shop pure tin is used in place of solder for the purpose of fastening commutator leads so that they will not melt out at temperatures which would soften ordinary solder. The leads to Westinghouse 56 motor commutators are fastened in the slots without soldering and excellent results have been obtained by following this practice. The slots in the commutator bars are milled out to a width of 4/1000 in. less than the diameter of the wires. The leads are driven into the narrow slots with a flat tool and the compression of the metal holds them securely in place without the use of solder or wedges.

Motors.	Control	Weight of Car.	Dwg No.	Connections	Volts.
2 GE-800	K2	11 Tons	746	R1-R5	66½
2 WH-3				R1-R4	63
2 WH-49	K10			R1-R3	52½
				R1-R2	34
2 WH-56	K11	20 Tons	747	R1-R5	38
				R1-R4	34½
				R1-R3	29
				R1-R2	20
2 WH-93A2	K11	20 Tons	748	R1-R5	38
				R1-R4	35
				R1-R3	31
				R1-R2	24

Indianapolis Shops—Table Used in Adjusting Resistances

BORING COMPRESSOR CYLINDERS

A special jig and reamer are used for finishing air compressor cylinders. The jig in which the compressor cylinder casting is held is made of cast iron about 1½ in. thick and is grooved on the under side to fit the lathe bed. This jig holds the cylinder in line with the center of the headstock, in which position it is adjusted by liners and clamped with bolts. The special reamer fits the headstock and has a cutting face about 6 in. long. Two of these reamers have been provided at a cost of about $40 each. A wide cutting face is obtained with a reamer and thus the walls of the cylinder are finished to a true cylindrical shape.



Indianapolis Shops—Method of Finishing Bearings with Boring Bar

BLANK FORMS

The form of card used by interurban motormen for reporting troubles found during operation is shown herewith. The original cards are 5 in. wide by 12 in. long printed on heavy manila stock. The arrangement of the listed car parts is such as to make it possible to find quickly the proper line on which the notation is to be made. The blank form carries a line for

Form 33

Terre Haute, Indianapolis and Eastern Traction Co.

Motorman's Report of Probable Defects in Car No. .....

..... DIVISION

TIME { On..... M / Off..... M DATE..... 190...

LENGTH OF DETENTION..... M.N'S TRAIN NO.....

PLACE OF TROUBLE ..... TIME OF TROUBLE.... M

CAR BODY.	AIR BRAKE.
Roof	Compressor
Body	Governor
Doors	Brake Valve
Windows	Feed Valve
Ventilators	Triple Valve
Steps	Gauge
Grab Handles	Cylinder
Pilot	Slack Adjuster
Seats	Hose Coupling
Lights	Insulation Hose
Hand Brake	Leaks
Draw Bar	Brakes
TRUCK NO	Whistle
Wheels	Whistle Valve
Axles	Signal Whistle
Journals	Signal Whistle Valve
Center Bearing	MISCELLANEOUS.
Side Bearings	Headlight No.
Brake Rigging	Headlight Screen
Loose Bolts	Trolley
MOTOR NO.	Extra Trolley
Armature	Retriever
Fields	Sander
Brush Holders	Heater
Leads	Toilet
Bearings	Water Cooler
CONTROL.	Lightning Arrester
Controller No.	Gong
Contactor	Signal Bell
Reverser	Signal Bell Cord
Switch Group	Register
Line Switch	Fire Extinguisher
Limit Switch	Cla's Lamps
Batteries	Tail Lamps
Rheostat	Flags
Circuit Breaker	Telephone No.
Fuses	Ventilator Stick
Switch Board	Broom
	Switch Iron

REMARKS .....

THE ABOVE DEFECTS REPAIRED 190

MOTORMAN

FOREMAN CONDUCTOR

NOTE.—Check B. O. opposite name of apparatus to be reported as defective. If apparent defects cannot be readily located, give in addition to check mark, particulars which may assist in locating same.

Reports of defective apparatus not included in the list can be noted under the heading of "Remarks."

Indianapolis Shops—Motorman's Report of Probable Defects

FORM 84 SCOTT-MILLER CO., INDPLS

INDIANAPOLIS TRACTION AND TERMINAL COMPANY

Armature Record

Type..... Factory No..... Shop No.....

PUT IN			REMOVED		SERVICE		REPAIRS		
Car No	Motor No	Date	Cause	Date	Mileage	No. Days in Service	Nature	By	Date

Indianapolis Shops—Individual Armature Record

Form 75 10m

INDIANAPOLIS TRACTION AND TERMINAL COMPANY

DEFECT CARD

CAR No..... DATE..... 19...

CAR BODY	Repairman's No.	CONTROL	Repairman's No.
Roof		Controller	
Body		Circuit Breaker	
Doors		Fuse Box	
Windows		Rheostats	
Ventilators		Cables	
Steps		AIR BRAKE	
Running Board		Compressor	
Grab Handles		Governor	
Fender		Brake Valve	
Seats		Brake Cylinder	
TRUCK No		Air Gauge	
Wheel No.		Insulating Hose	
Axle No.		Piping	
Journal No.		Brakes	
Gear No.		MISCELLANEOUS	
Center Bearing		Trolley	
Side Bearing		" " Catcher	
Brake Rigging		Sander	
Loose Bolts		Heater	
MOTOR No.		Lightning Arrester	
Armature		Gong	
Fields		Signal Bells	
Brush Holders		Repister	
Leads		Lights	
Bearings		Hand Brake	
Pinion		Draw Bar	

REMARKS

CAR OUT OF SERVICE—TIME.....A.M./P.M. ..... 19..... INSPECTOR

CAR DELIVERED SHOP. " .....A.M./P.M. ..... 19..... SHIFTER

REPAIRS COMPLETED. " .....A.M./P.M. ..... 19..... CLERK

Inspectors will mark "BO" opposite defects to be reported. If defects cannot be readily located, give, in addition to check-mark, particulars which will assist in locating trouble. Repairmen will mark their Clock No. opposite defect repaired.

MATERIAL USED.

ANT	TYPE No.	MATERIAL	REPAIRMAN'S No.
		Pinions	
		Gears	
		Carbons	
		Brush Holders	
		Field Coils	
		Trolley Wheels	
		" " Harps	
		" " Pins	
		" " Poles	
		Journal Brasses	
		Brake Shoes	
		Cast-iron Wheels	
		Steel Wheels	
		Axles	

Repairmen will note the amount of all material used as indicated above, and will mark their Clock No. opposite

REPAIRS MADE

ITEM REPAIRMAN'S No.	

recording the date when the defects are repaired. Special notice is called to the insertion of the word "probable" in the title of this report. There is always a possibility that one of these cards may be used as evidence in law suits and so it is not thought wise to place too much responsibility on the motorman's opinion regarding a defect. Therefore they are called "probable defects."

The shop defect card used by inspectors for the city cars is also illustrated. This card is 4½ in. x 8 in. in size and carries a list of the principal car parts on the front side. Space is provided on the reverse side for noting the material used for repair work and indicating the repairman's number after each subject.

Monthly reports on motor repairs and on Westinghouse unit switch control repairs, similar in general form to those used for reporting the repairs to air-compressors, are also used. The report for motor repairs lists the different types of motors used. The following column headings are employed on the upper part of the blank: Armatures—open circuit, short circuit, grounded, down on pole pieces, worn bearings, defective shaft. Field coils—short circuit, grounded, damaged by armature. Commutators—grounded, rough, worn out. Miscellaneous—defective brush holders, defective leads, worn axle bearings, broken frames. Total. The lower half of the blank contains the following: Armatures rewound, armatures repaired, field coils rewound, field coils repaired, field coils impregnated, commutators new, commutators repaired, commutators grooved and turned, armature coils new, armature shaft new.

The monthly report for the unit switch control repairs is of uniform size with the other monthly reports. The left-hand vertical column contains a list of the switches, and the details for the types of repairs, the headings of the vertical columns, follow: disabled, dirty interlocks, defective interlocks, defective main contact, defective shunts, grounded, defective arcing box, loose connections, leaking piston, packing, leaking valves, overhauled, repaired tested. The divisions of storage battery repairs noted on the same blank are: disabled, grounded, short circuited, open circuited, electrolyte low, electrolyte weak, electrolyte dirty, defective jars, loose connections, overhauled, repaired, charged tested. In addition space is allowed for entering records of defective contact, loose connections, grounded, broken, repaired tested, for each of the parts of the miscellaneous equipment, like grid, resistance, control cable, motor cables, etc. At the bottom of the blank are lines for tabulating the total number of control failures in service, car miles and car miles per control failure, for the current and previous months.

Another blank form used at these shops is the daily report of car inspection which shows the car number and defects reported and indicates the repairs made and the shop numbers of the men doing the work, also the oiling done each day. A daily report of car repairs showing the car number, the time in and out of the shop, the defect repairs made, by whom, the date in the shop, is used, as is a monthly summary of car repairs which shows for each day the number of cars on which repair work falling under any 11 different subdivisions of the equipment has been done. A monthly report of the material disbursed shows for each day the number of gears and pinions of each type issued, the number of cast-iron and steel wheels, axles and pounds of babbitt issued.

A form of report used for presenting the number of pull-offs during one month and the reasons for taking the cars out of service is also used. These forms are 11 in. x 8½ in. in size and are so ruled that the monthly summary can be compared with the same monthly summaries for two years previous, subdivided according to each of the four car houses and summarized for the entire city system. These comparative reports of pull-offs when completed each month are posted on the bulletin boards in the various car houses so that the men may study the work of the different sections of the city and be encouraged to improve the record for the following month.

EXAMINATION OF TRAINMEN OF THE FT. WAYNE & WABASH VALLEY TRACTION COMPANY

Frank I. Hardy, superintendent of transportation, Fort Wayne & Wabash Valley Traction Company, has just held an examination for all the city and interurban trainmen of that company. Both the plan of conducting examinations and the knowledge of the men were put to test. As this was the first written examination which had been held by the Fort Wayne & Wabash Valley organization, it was not definitely known whether the plan would be successful. Special care was taken with the examination so that the officers would be able later to decide whether or not a periodical questioning of the men as carried out at this time is advisable. The examination just concluded has led to the opinion that similar, but shorter, written tests should be held about once a year, especially for the newer men. Probably future tests for the older men will not be so comprehensive, but it is thought that they will be of undoubted value in keeping the trainmen alive to the responsibilities of operation.

About six weeks before the examination was held the men were told of it in a general way and warned that they would be called upon to answer all manner of inquiries regarding the duties which they were employed to perform. This announcement was followed by a great many debates between the men. When it was not possible for a group of carmen to settle a debatable point to the satisfaction of all, the superintendent was called upon for a ruling. Thus for the six weeks prior to the holding of the examination practically every man in the train service of the Fort Wayne & Wabash Valley Traction Company was on the alert to clear his mind of every doubt regarding the correct interpretation of the operating rules. The good results of this study were clearly shown in the high average marking to which the examination papers were entitled.

The questions were kept secret until the men were called into the superintendent's office for examination. There were 367 questions for motormen and 272 for conductors. The answers were written on printed question blank forms. As the men sat in the superintendent's office while writing their answers, there was no opportunity for discussion with each other. If two interpretations could be put on a question, the men were free to ask the superintendent what was desired. Otherwise each man was instructed to give his own answer to all questions as he understood them.

Seventy-three of the questions were for both motormen and conductors. They had to do with standard time, time tables, signal rules, train signals, air-whistle signals, bell-cord signals, hand and lamp signals, fixed signals, rules governing the use of signals, train rules, rules for movement of trains by telephone orders and train orders. The questions for conductors only related principally to the proper method of making out reports and the answers to these questions were graded by a representative of the auditing department. The questions for motormen only were largely with regard to mechanical subjects, such as motor and car equipment, air brakes, reservoirs, triple valve, brake valve, etc.

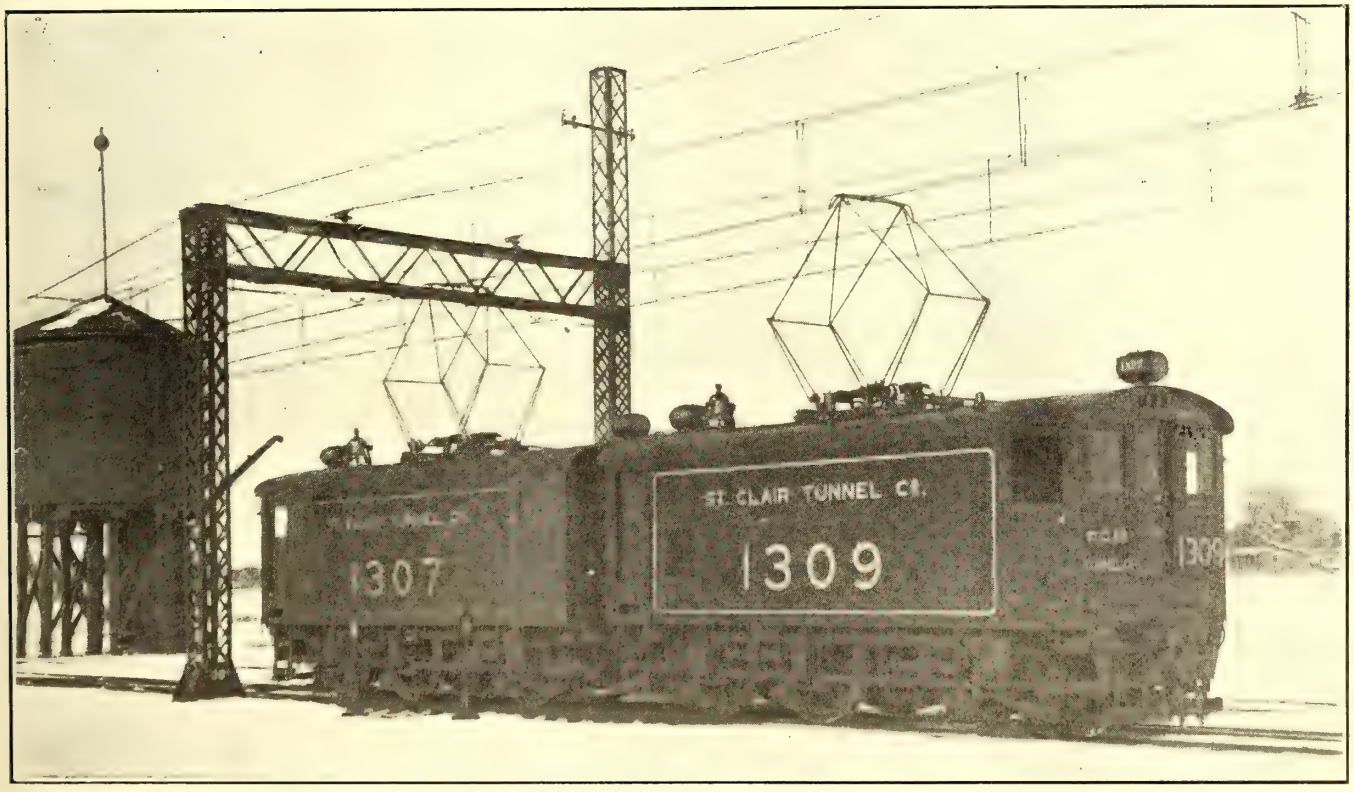
After the examination papers had been graded Mr. Hardy called the men into the office one by one and discussed with them all of the points on which the answers showed that they were not clear. It was interesting to learn that those men who had the best operating record stood among the highest in the examination. This showed that reasoning power more than knack was the most desirable qualification for a trainman.

One of the catch questions which the motormen were requested to answer was as follows: "If, when rapidly approaching a steam railroad crossing, it was found that the brakes would not work, that the trolley had left the wire and there was danger ahead, what would you do?" Without studying the question some of the men answered, "Jump." This, of course, was a catch question to see whether the men fully understood the method of reversing with the different classes of unit switch and platform control.

MAINTENANCE AND OPERATING FEATURES OF THE ELECTRIFIED ST. CLAIR TUNNEL

The First Extended Account of the Performance of This Line Since Operation Commenced

THE St. Clair tunnel of the Grand Trunk Railway System has been electrically equipped since May 18, 1908, and the severest requirements of the service are said to have been met very successfully by the single-phase system. The equipment was furnished by the Westinghouse Electric & Manufacturing Company and installed under the supervision of Bion J. Arnold, consulting engineer. The tunnel is a single track bore, lined with a cast-iron shell, and has an inside diameter of about 19 ft. The length of the tunnel from portal to portal is 6032 ft. The open tunnel approach on the Port Huron side is slightly over 2500 ft. in length, while that on the Sarnia side is nearly 3300 ft. in length. The total distance between the American and Canadian summits is 12,000 ft., or about 2¼ miles. The grade on the tunnel approaches and the shore sections of the tunnel is 2 per cent, while that in the flat middle section of the tunnel, about 1700 ft. in length, is of 0.1 per cent downward toward the east to provide for drainage.



St. Clair Tunnel—Side View of Double Unit Electric Locomotive

The specifications for the electrification of the tunnel service stipulated, in addition to various guarantees regarding efficiencies at different parts of the system and of the system as a whole, that the installation when completed should be capable of hauling a 1000-ton train through the tunnel from terminal to terminal in 15 minutes, that in doing so the maximum speed should not exceed 25 m.p.h. and that the minimum speed when ascending a 2 per cent grade should not be less than 10 m.p.h.

The single-phase system was chosen for this work on the score of economy in operation. Preliminary figures showed the first costs for the two systems to be about equal if no battery were installed. The estimates including batteries were slightly favorable to the d.c. system. However, the increased first cost with a battery would have been large in either case because of the nature of the load with frequent high peaks and short intervals during which charging could be done. The guaranteed efficiencies of the two systems without batteries indicated a considerable saving in the cost of power by the use of the a.c. system. The distribution losses and the use of current for rheostatic control lowered the relative efficiency of the d.c. system. Preliminary guaranteed figures for the power consumption for one locomotive trip hauling a 1000-ton train through the tunnel were 141 kw-hours for the single-phase system. In practice, considerably better figures of performance than those guaranteed have been obtained.

An illustrated article describing the electrical equipment of the St. Clair tunnel was presented in this paper in the issue of Nov. 14, 1908. The electrical equipment includes six three-motor locomotive units fed with 3300-volt, 25-cycle current generated in a steam turbine station and distributed by a catenary supported copper wire. This article will describe the more interesting features of maintenance and operation which have developed during the past two years of electrified service.

OPERATING STATISTICS

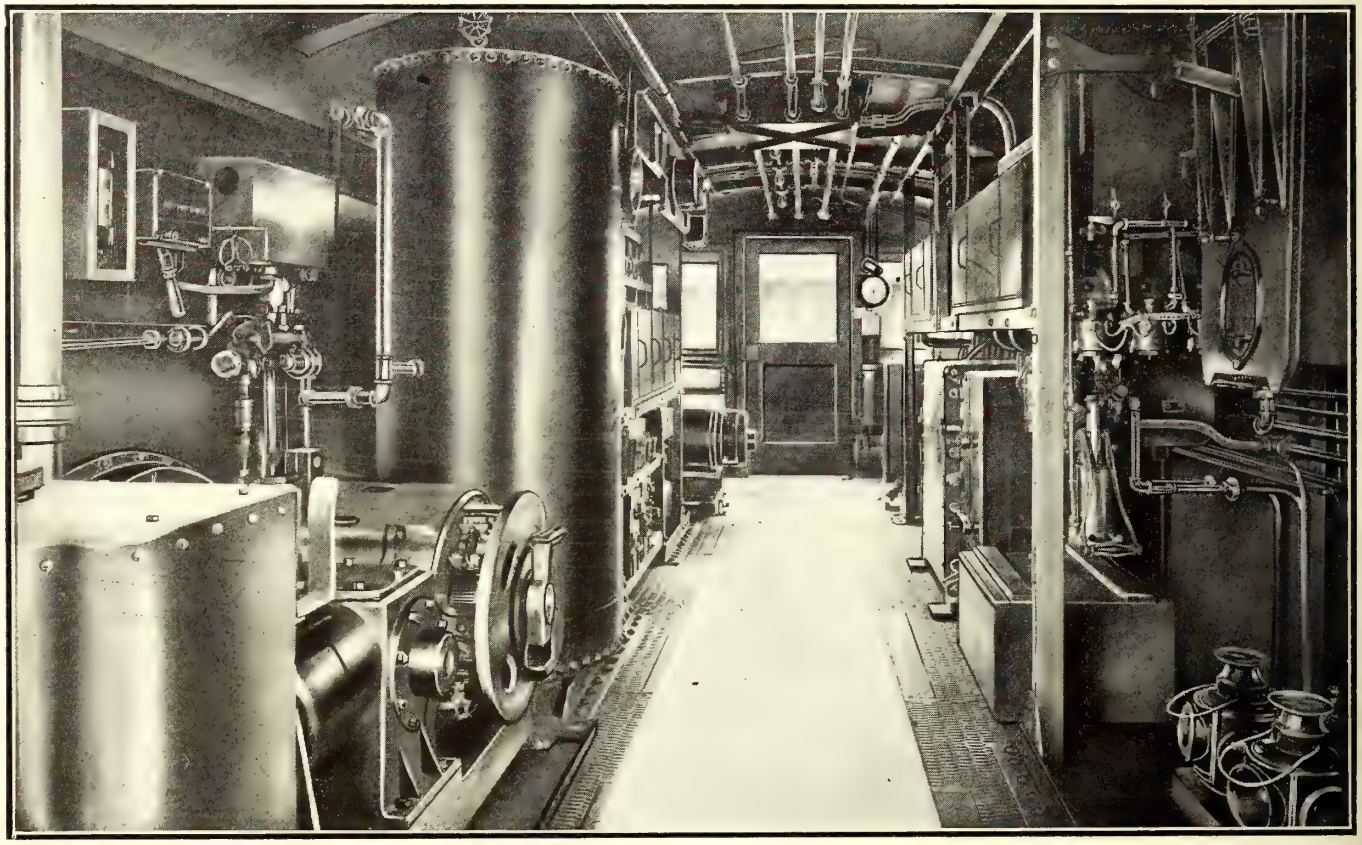
The St. Clair Tunnel Company has furnished some comparative figures for steam and electrical operation which are of interest, indicating as they do in a general way the relation between important items of operating costs. These data refer to two years' operation—one before and one after electrification. Although the amount of traffic handled during these two years was not identical, the service performed was sufficiently similar for purposes of approximate comparison of figures.

The cost of coal with electrical operation was 30 per cent

of the cost of coal under steam operation. A part of this saving is due to the greater economy of the electrical system so far as coal consumption is concerned, while another large part of the saving is due to the fact that it was necessary to burn anthracite coal in the steam locomotives that formerly operated through the tunnel, while ordinary run-of-mine or even slack coal is used for power plant operation.

The total service charges, including all items that are charged by the railway company against locomotive service, but not including fixed charges, indicate that this charge under the electrical operation is about 60 per cent of the charge under steam operation. If, however, the fixed charges, including both interest and depreciation on equipment, are added in each case, it is found that the total charge for locomotive service under electrical operation is approximately 84½ per cent of the charge under steam operation.

If a comparison be made of fuel costs under steam operation with the cost of electrical energy delivered at trolley under electrical operation, it is found that, disregarding fixed charges, the cost of power delivered to the locomotives under electrical operation is 69 per cent of the cost of the fuel under steam operation. If, however, the fixed charge (and depreciation) due to the initial investment for the electrical generating plant and distributing system be added to the charge for electricity delivered at the locomotive, this charge then practically equals fuel cost under steam operation. This indicates that the saving is effected in other items than that of cost of power delivered to the two locomotives in the form of electrical energy in one case and of fuel in the other. One of the large items in this saving is in the maintenance and repairs to locomotives, which for the years under comparison indicates the electrical cost to be about 55 per cent of the steam cost. Other items chargeable to steam operation, such as the coaling of locomotives, water supply, etc., do not appear at all in the charges for electric locomotives.



St. Clair Tunnel—Interior View of Locomotive

LOCOMOTIVE MAINTENANCE

Three locomotives are available for use in the tunnel and switching service. At present the entire traffic is handled by two locomotives, each of which consists of two half-units. The half-units are duplicates in every respect and are equipped with the multiple-unit system of control. Each half-unit is mounted on three axles driven through gears by three single-phase motors with a normal rating of 250 hp. Inasmuch as the motors have a very liberal overload rating it is possible to develop 2000 hp with two half-units. The locomotives are powerful enough easily to start a 1000-ton train on a 2 per cent grade. In a test made on a half-unit using a dynamometer car it was found that a single half-unit would develop a 43,000-lb. drawbar pull before slipping the wheels. The locomotives have a maximum speed of 35 m.p.h., but they are never called upon to operate faster than 25 m.p.h. to handle the full number of trains.

The general dimensions of a locomotive half-unit are as follows:

Length over all	23 ft. 6 in.
Height from top of rail to top of pantograph bow when lowered	14 ft. 11 in.
Width of cab over all	9 ft. 8 in.
Total weight of half-unit	67½ tons
Length of rigid wheel base	16 ft.
Diameter of driving wheel	5 ft. 2 in.
Normal speed with 100-ton train ascending 2 per cent grade	10 m.p.h.
Normal speed on level track	25 m.p.h.

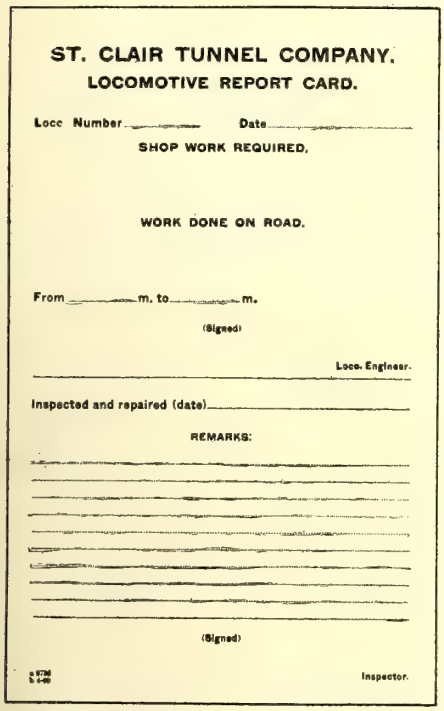
The electric locomotives have required very little change in design or unusual maintenance work. A two-track section of a roundhouse in the Sarnia yards has been equipped as an inspection shed for the electric units. The locomotives may be taken in or out of this shed at either end.

An annunciator system has been installed here in connection with the 3300-volt trolley wire to provide against accidents. Ordinarily the section of trolley wire inside of the inspection shed is disconnected from the trolley line outside. When current is desired to move or to test a car a hook switch installed about 10 ft. above the floor at one end of the building is thrown to connect the interior and exterior trolley wires. Within the box of this switch a ground connection is provided so that

when the knife of the switch is pulled open, to cut the shed trolley off from the line, the trolley wire within the car house automatically is grounded. An annunciator bell rings at 15-second intervals to warn the men while the 3300-volt trolley is alive.

LOCOMOTIVE INSPECTION

A regular program of inspection is followed and each half-unit is held in the inspection shed for 12 hours every three days. In addition to this short inspection each half-unit is held in for more thorough care for 24 hours once every 24 days. Thus the units are in service 80 per cent of the time, which is considerably more than is possible with steam locomotives. The roundhouse force includes a foreman, two day and one night inspectors, one wiper and one overhead lineman whose services are available either here or in trolley work. In making one of the regular 24-day half-unit inspections the various parts of the unit are inspected and checked off according to the program laid down on the inspection card reproduced herewith. The inspection, which is made every three days, includes the following: Back of switch groups; intake strainers; fan and main motor nettings; jumper pins (these are spread to insure good contact); foot buttons which include bell and two sanders; poppet valves (main and emergency reservoirs); reducing valves; overload trip relay; hand air pump; hand brake (this is well lubricated and kept in good operating condition); pantograph tension and operating mechanism. The inspectors keep a log of all the work done and make daily reports to the superintendent.


ST. CLAIR TUNNEL COMPANY.
LOCOMOTIVE REPORT CARD.

Locc Number..... Date.....

SHOP WORK REQUIRED.

WORK DONE ON ROAD.

From.....m. to.....m.

(Signed)

Loco. Engineer.

Inspected and repaired (date).....

REMARKS:

(Signed)

Inspector.

St. Clair Tunnel—Locomotive Report Card

The change from steam to electric service was made without any undue delay. In the article earlier referred to mention was made of how steam and electric service was alternated until all the employees became accustomed to their duties, and then the steam locomotives were relieved from tunnel duty. At the beginning of electric operation when the alternate steam and electric service was operated, the electric locomotives were taken into the shop after each 18-hour run and thoroughly inspected. After the first few weeks of service, when it was quite certain that all parts of the equipment were operating smoothly, the regular inspection period of once every three days was adopted.

TIRES AND GEARS

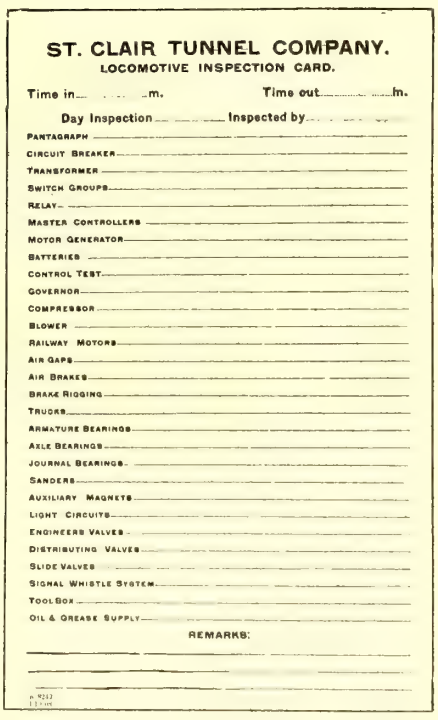
It has been found necessary to turn the locomotive tires once every 12 months. This is on account of flange wear rather than hollowing of the tread. The flange wear is attributed to the low center of gravity of the unit. Once every 30 days each locomotive is turned around so that the flange wear may be evenly distributed. The motor or journal bearings have given no trouble. The armature of each of the three motors drives its axle through a pinion with 16 teeth and a gear with 85 teeth. The life of these pinions is from 50,000 miles to 60,000 miles and some have run 64,000 miles. None of the gears has yet been renewed after two years' service. Whenever a pinion has run more than 30,000 miles and the wheels are removed for any purpose, a new pinion is put on so that the wheels may not have to be removed unnecessarily.

LOCOMOTIVE PANTOGRAPHS

The standard Westinghouse galvanized sheet-steel pantograph shoe is used, one on each half-unit. The average life of these shoes is about 3000 miles. The shoe is adjusted to have a pressure against the wire of 7½ lb. in the winter and 5 lb. in the summer. These low contact pressures are made possible by the limited speed of 25 miles an hour at which the trains operate. Shoes with copper wearing surfaces were tried with the idea that they would not wear the wire, but as no apparent advantage was realized and as their life was much shorter than that of the galvanized steel shoes, the trial was abandoned. The steel shoes apparently do not wear the wire so much as the copper shoes. This is attributed to the reduction in friction when dissimilar metals are used. A spring balance is used when adjusting the pantograph tension. Such adjustments are needed very infrequently, but if any undue flashing is noted during operation the tension is inspected and usually it is found that the pantograph spring has become weak or that the joints in the pantograph are stiff.

LOCOMOTIVE CREWS

When the electric locomotives were first put into service classes of instruction were held every afternoon for two months. The men who had been operating the steam locomotives attended these classes when off duty. Later when the school work was concluded the steam locomotive engineers were put in charge of the new electric locomotives and instructors rode with them. The men who formerly operated the steam locomotives and now run the electric locomotives are enthusiastic over the change, even though their rate of pay is slightly reduced by their being required to work longer hours. The locomotive crews are made up of two men, an engineer and an assistant. The assistant spends his time in looking over the electrical apparatus in the cabs of the two half-units while they are in operation, and when not thus engaged he rides in the rear half-unit. Formerly two brakemen were required for each train passing through the tunnel. The smoothness with which the trains are handled has made it safe to operate with but one brakeman.


ST. CLAIR TUNNEL COMPANY.
LOCOMOTIVE INSPECTION CARD.

Time in.....m. Time out.....m.

Day Inspection..... Inspected by.....

PANTAGRAPH
CIRCUIT BREAKER
TRANSFORMER
SWITCH GROUPS
RELAY
MASTER CONTROLLERS
MOTOR GENERATOR
BATTERIES
CONTROL TEST
GOVERNOR
COMPRESSOR
BLOWER
RAILWAY MOTORS
AIR GAPS
AIR BRAKES
BRAKE RIGGING
TRUCKS
ARMATURE BEARINGS
AXLE BEARINGS
JOURNAL BEARINGS
SANDERS
AUXILIARY MAGNETS
LIGHT CIRCUITS
ENGINEERS VALVES
DISTRIBUTING VALVES
SLIDE VALVES
SIGNAL WHISTLE SYSTEM
TOOL BOX
OIL & GREASE SUPPLY

REMARKS:

St. Clair Tunnel—Locomotive Inspection Card

TRAIN OPERATION

A round trip through the tunnel, including the terminal switching when a train is handled in either direction, requires a run of about 10 miles. The freight trains are made up so as not to exceed 1000 tons each and all cars are inspected before passage through the tunnel. This is necessary for the preven-

tion of accidents and because the tunnel is the dividing section between two main divisions of the Grand Trunk Railway system, one in Canada and one in the United States. While the freight trains stand in the yards for inspection the air-brake piping system is charged from a yard air service pipe line which extends through the tunnel and is fed by an electrically operated air pump at Sarnia. The charging, which is done before the electric locomotive couples onto the train, requires no additional layover because the train must stand in the yard to be inspected, and use is made of the yard air supply system so that the air-compressor equipment on the locomotive may be relieved of the unnecessary duty of charging a long freight train just prior to starting through the tunnel.

Under normal conditions passenger trains are hauled through the tunnel with two-unit locomotives, but one-half unit would be ample so far as pulling capacity is concerned. However, 1000-ton freight trains are handled most frequently and as these require full locomotives, the locomotive pairs already coupled for freight service are used also to handle the passenger trains. Otherwise, if the half-units were separated, one-half would be idle on one side of the river while the other was pulling a passenger train through the tunnel. At the end of the run the halves would be available for hauling only passenger trains or freight trains below the maximum rating. Thus to simplify operation the two half-units are always operated as one locomotive. The average mileage for each locomotive is in the neighborhood of 2700 miles per month. The maximum monthly mileage was 3540 miles. Looking at it in another way each locomotive made an average of 10 round trips of the electric zone per day.

An indicating ammeter in each locomotive cab serves to assist in keeping the demand on the power station within a safe maximum. The locomotive engineers are required not to let the motors of one-half unit exceed a maximum of 3500 amp. There are 17 running positions on the controllers. The first, second and third notches are only for switching, coupling up a train and other purposes where slow speeds are desired. The fourth to the twentieth notches, inclusive, are running notches and the controller can be left on any of these, according to the speed that is desired. The engineers become very adept at gaging the amount of power required when starting trains of various loads. When using the ammeter it becomes possible to accelerate the train and to notch up the controller as the current tends to drop. If a train will not start on 3000 amp or less per half-unit the crew is instructed to look for trouble in the air-brake system.

INSTRUCTIONS FOR ENGINEERS

Some extracts from the instruction book for the government of engineers in the operation of locomotives follow:

"When the locomotives are in the terminal or lying idle at the end of the run the condition of the apparatus should be as follows:

"1. Trolley locked down.

"2. Compressor switch and blower switch left in off position.

"3. Battery switches open.

"4. Heater switches left open.

"5. Controller lever in the off position and reverse lever and plug removed.

"On leaving the locomotive the engineer should in all cases set the hand brake so that the locomotive cannot run away when unattended.

TO PREPARE TO OPERATE

"1. Inspect all motor, axle and main journal bearings to ascertain if sufficient oil is in the cellars.

"2. See that the safety chain is unhooked from trolley.

"3. Insert plug and reverse lever in controller.

"4. Close battery switches up on even days and down on odd days of the month.

"5. Press (trolley lock) button on the controller which will cause the trolley to rise if there is air pressure in the main reservoir; if not then turn the three-way valve on top of the emergency control reservoir 90 deg. to the right and if there is air pressure in this reservoir the trolley will rise when the unlock button on the controller is pressed. If there is no air in the emergency reservoir, the hand pump can be used as described later.

"6. Press the reset button on the controller, which will cause the line switch or circuit-breaker to close.

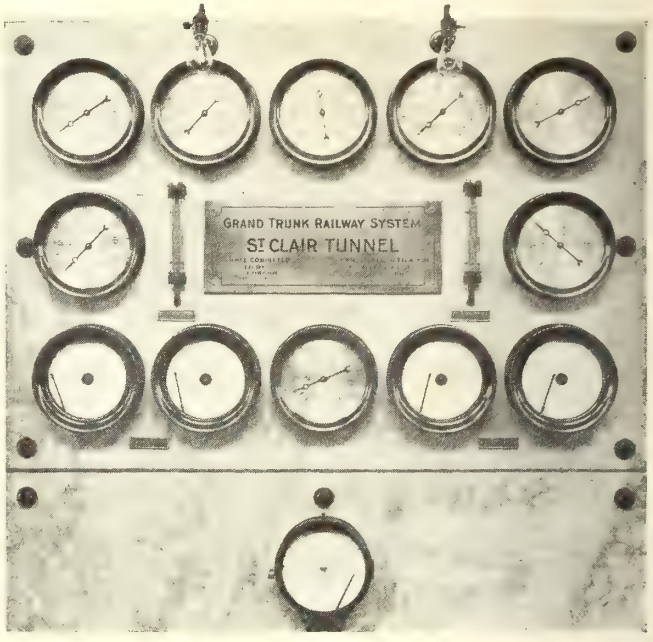
"7. Close air compressor switch. If there is no air pressure in the main or emergency reservoir, close the air compressor switch and pull in the line switch by hand, holding it in until sufficient air pressure is obtained to hold it in.

"8. Start motor-generator set by closing switches.

"9. Test bell, sanders and lights.

"10. Test out control as described in pages (of instruction book) following.

"11. Start blower motor. The blower must be kept in constant operation while the locomotive is running.



The gages on the top line, reading from the left, are: Turbine No. 2 condenser, turbine No. 2 steam, auxiliary steam, turbine No. 1 steam, turbine No. 1 condenser. Those on the bottom line, reading from the left are: Recording vacuum No. 2, recording steam No. 2, auxiliary exhaust, recording steam at boilers, recording vacuum No. 1. The round gages on each side of the nameplate are: Power house compressed air system, the power house heating system. The vertical gages are for the two draft fans. The single gage at the bottom of the board is a recording thermometer to indicate the superheat of the steam.

St. Clair Tunnel—View of Gage Board at Power Station

"12. See that the sand boxes are filled; and if the sand is not perfectly dry, close the switches for the sand heaters.

"13. Be sure that the main reservoir pressure is normal.

MULTIPLE OPERATION

"When two or more locomotives are to be operated in multiple, all locomotives should be operated from one controller of one locomotive, perferably the forward controller of the leading locomotive.

"1. Make the three jumper connections between locomotives by means of three cables provided for that purpose, taking care to see that the jumpers are placed in the proper sockets. The outside jumpers should be crossed between locomotives.

"2. Test control and make sure that its operation is correct in all locomotives.

"3. Remove reverse levers and control plugs from all controllers except the one from which the train is to be operated.

"4. Close all battery switches and battery charging switches in all of the locomotives.

"5. Be sure that all trolleys are up and that all circuit-breakers are in.

TROLLEY

"In case of any mechanical difficulty with the trolley, lower it by pressing the button on the master controller marked 'Trolley Down.' If air pressure is not available, pull down the trolley by means of the pole with hook on the end, which is supplied with each locomotive. If the locking mechanism

is out of order, hold the trolley down by air or with the pole until some person can climb to the roof and snap the safety chain which fastens the trolley down and at the same time grounds it. In case the locking mechanism is all right, the air cock on the trolley side of the magnet valve leading to the unlocking cylinder should be closed to prevent the trolley being raised before the safety chain has been snapped on. A thorough inspection should then be made.

"Never go on top of a locomotive under any circumstances when the trolley is in contact with the overhead wire. Immediately after going on top of the locomotive while the trolley is down, the safety chain should be snapped on so that there can be no possible chance of the trolley being raised while any person is working on the roof of the locomotive.

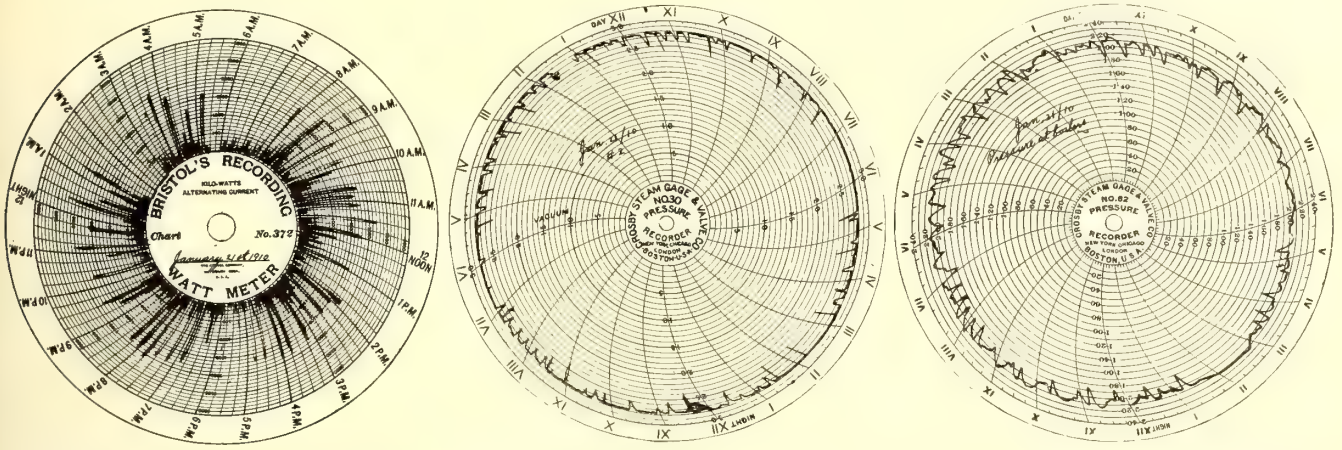
FIRE

"In case of fire in the locomotive lower the trolley immediately and use sand for extinguishing it. Never use water unless absolutely necessary, as it is liable to increase the fire by causing short-circuits if the trolley is up, and will in any case seriously damage the apparatus. Fire extinguishers are provided in the cab of the locomotive and should be used only in case of extreme emergencies where it is evident that sand will not put out the fire."

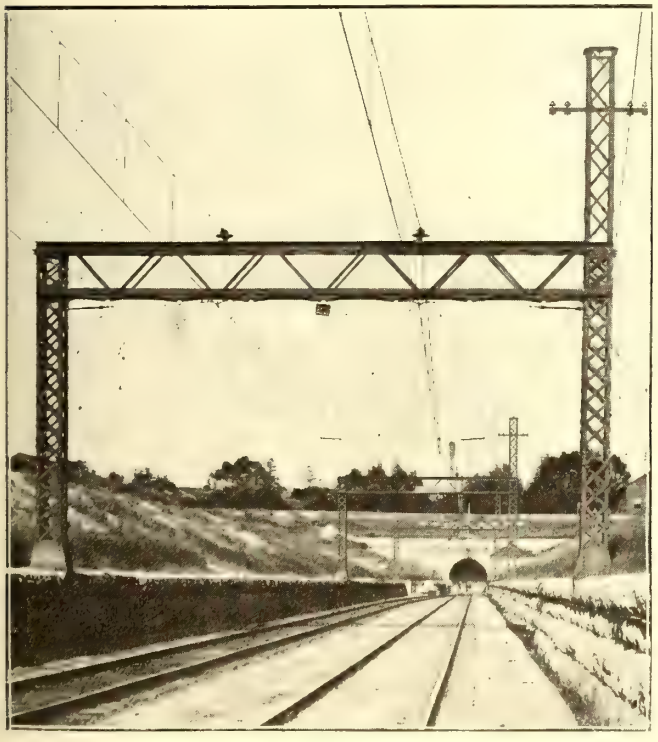
SPEED INDICATOR AND RECORDER

One of the pairs of locomotive units is equipped with a speed indicator and recorder of Hausshalter's design. This apparatus was manufactured by Seidel & Naumann of Dresden, and purchased through the Engineers Agency, 63 Chancery Lane, London, England. A short section of one of the records from this tachometer is reproduced. By means of the speed-measuring apparatus the traveling speed of the locomotive is, at all times, graphically recorded on a roll of paper. The rate of speed is also indicated on a dial within the view of the locomotive engineer. The chief use of this device is to provide a means for preventing the over-speeding of the locomotives. Operating rules require that at no time shall the speed exceed 25 m.p.h. and as every movement of the train is permanently recorded within the box as well as indicated by a pointer the use of the device is very effective.

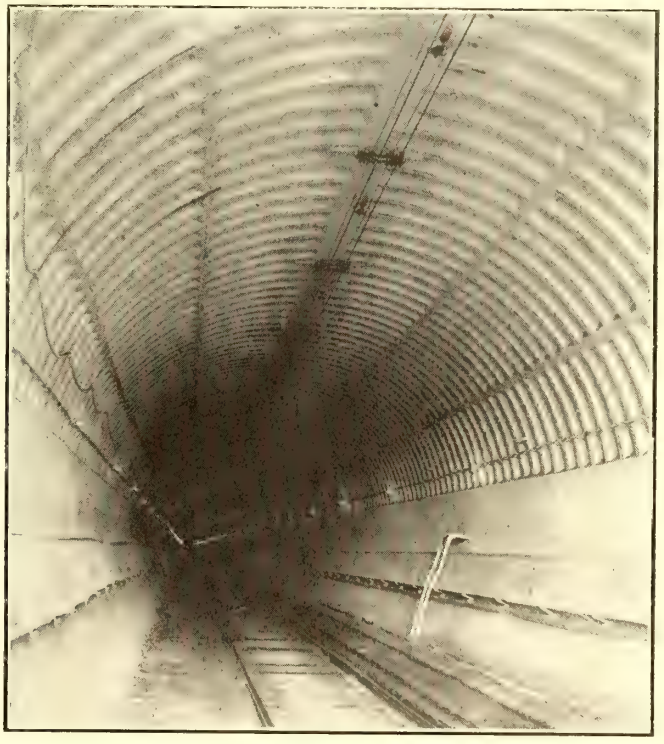
The principal mechanism of this speed-measuring apparatus is enclosed in a substantial iron box, the moving parts being driven from one of the main axles of the locomotive while



St. Clair Tunnel—Chart Records for Jan. 21, 1910, from Recording Wattmeter, Vacuum Gage and Steam-Pressure Gage

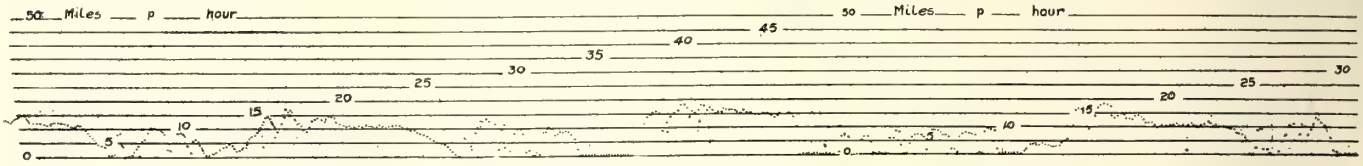


St. Clair Tunnel—View of Overhead Bridge and Single Catenary Construction



St. Clair Tunnel—Interior of Tunnel, Showing Overhead Construction and System of Lighting

the train is in motion, and by a clockwork for 20 minutes after the train has come to a stop. The clockwork spring is automatically wound during running by an eccentric and pitman feeder. The device which moves the paper on which the record is made automatically punches the three-minute intervals and in addition to this the record shows the rate of speed in the form of a curve. One roll of paper will last for about



St. Clair Tunnel—Section of Record from Speed-Recording Device

375 hours of operation. During service the speed indicating and recording device requires no attention except when the train stops for longer than 20 minutes. Then the apparatus must be wound up by hand. In the instruction book of the St. Clair Tunnel Company suggestions are included for maintaining the speed-measuring apparatus in good condition. The suggestions conclude with the statement, "It is necessary in the engineer's own interest that the time of stoppage particularly should be registered exactly."

TROLLEY MAINTENANCE

The trolley circuits for the entire electrified zone normally are all in one electrical section. Switches are provided at each tunnel incline for cutting off the yards from the tunnel section, if such sectionalization should ever be needed. Since operation was started there have been practically no electrical troubles or mechanical defects in the trolley circuits. At one time a high brake wheel on an especially large car grounded the trolley wire in the tunnel and opened the breaker, but the trolley wire itself was not damaged enough to interfere with the continued operation of the same train after the brake staff had been bent out of the way. Aside from three of the porcelain spool insulators that were cracked when installed, the trolley wire insulation and suspension have given no trouble.

Within the tunnel bore the messenger cables are insulated from the conductor wires. The messengers are carried on porcelain spools and the trolley wires are supported from the messengers by special wood-break hangers 3 in. square and 15 in. long. The effective insulating length of these hangers is about 5 in. If a porcelain insulator breaks down and allows the messenger cable to ground on the tunnel shell, then the wood-break hangers are put under electrical stress and the weakest one begins to smoke. As stated in the preceding paragraph three such breakages have occurred. In each instance the smoking wood insulator was noted in time so that repairs were made before service was interrupted. A tunnel patrolman is always on duty inspecting the tracks and whenever this man notes any unusual condition of the trolley wire he makes a mark on the tunnel lining for relocation and advises the motive power department by calling up from the nearest tunnel telephone.

The pantograph shoes are lubricated with a mixture of cheap grease and graphite. This lubricant distributes itself over the trolley wires and so coats them with grease that ice has never yet formed to a thickness sufficient to interfere with regular operation.

THE ST. CLAIR TUNNEL COMPANY

Record of Operation of Power House for Date _____ 19

TIME	TURBINE PANEL K W.		LOCOMOTIVE PANEL		PUMP PANEL			POWER AND LIGHT PANEL				ASC LIGHT PANEL	ENGINE DRIVEN EXCITERS				MOTOR DRIVEN EXCITERS			HOUSE PANEL	Comp. Plant Started and Stopped	VACUUM		TEMPERATURES.									
						Pt. Huron	Sarnia		Pt. Huron	Sarnia	Tunnel	In. Out	1		2		D. C.		A. C.					Circulating Water				Steam at Turbin		Steam at Superheater		Boiler Feed	
	1	2	Amps	K W Hours	K W Hours	Av Amps	Av Amps	K W Hours	Av Amps	Av Amps	Av Amps	TIME	Amps	Volts	Amps	Volts	A	V	A	K W Hours	TIME	1	2	1 In	1 Out	2 In	2 Out	1	2	In	Out	1	2
12 Md. Nt																																
1																																
2																																
3																																
9 P M																																
10																																
11																																
Totals,																																
Averages,																																

	TURBO – GENERATORS				BOILERS	1	2	3	4	WATER METERS	
	STARTED	IN PARALLEL	STOPPED	EMERGENCIES TESTED	IN USE					No. 1	No. 2
No. 1					Blown Down					6 A. M.	6 A. M.
No. 2					Cleaned					6 P. M.	6 P. M.

Materials Used, Waste, Oil, Grease, Coal

Other Materials

Power off, Time and Cause

Engineers Report, Day Shift, from A. M. to P. M.

Day Engineer

Engineers Report, Night Shift, from P. M. to A. M.

Night Engineer

St. Clair Tunnel—Record Card of Operation of Power House

Connections between the power station switches and the conductors and the track return in the tunnel are made through lead-covered cables for the feed line and bare copper return cables. The cables pass from the power station in underground ducts for a distance of about 150 ft. to a shaft leading down to the tunnel bore. An extra lead-covered cable, with end bells ready for quick connection at both ends, is available in case the feeder cable gets damaged.

LIGHTNING ARRESTERS

Westinghouse gravity type lightning arresters with metal

arcing points are used for protection of the trolley and messenger in the electrical zone outside of the tunnel. The metal arcing points of these arresters, which are mounted on the steel catenary bridges, afforded a convenient perch for birds and until precautionary measures were taken the breakers not infrequently were opened by short-circuits caused by the birds alighting on the arcing points. The bodies of the birds would carbonize and afford a path to ground for the current and so the fuse stick would not fall and disconnect the arrester. The passage of current to ground would thus open the circuit breaker at the power house, but sometimes the arc would be so severe before the breaker opened that the metal support of the lightning arrester would weaken and let the heavy insulator fall. The possibility of the recurrence of such lightning arrester troubles has been effectively provided against by adding a perch for the birds directly above the metal arcing points. An ordinary two-wire porcelain cleat is supported from one end only by a small metal bracket. Thus the bird uses the cleat rather than the arcing points as a perch and protection from a short-circuit is afforded.

TELEPHONES

In installing the power telephone circuit cable was used throughout and no part of the line is carried on poles. The object in this special construction was to avoid any mechanical interference with the service. The telephone service on such installations has its greatest value in times of trouble and so the circuits were installed to avoid any probability of mechanical interference. So far the telephone has given uninterrupted service. The telephone circuit used by the motive power department has instruments connected with it at the following points: One on the power station switchboard, one in the power station office, two in the tunnel, one at the top of the tunnel cut on the power house side, one in each of the two tunnel pumping stations and one each at the dispatcher's office in Sarnia and the roundhouse in Sarnia. All of these instruments are bridged on the line and a ringing code is used for calling the different stations.

POWER PLANT

The generating station which supplies 3300-volt alternating current for the electric zone is located in Port Huron on the St. Clair River front, about 150 ft. distant from the line of the tunnel. The boiler house equipment includes four 400-hp B. & W. sectional water-tube boilers, each having three drums 42 in. in diameter by 23 ft. 4 in. long. The tubes are arranged 21 wide in order to secure quick steaming, and the three drums provide a large hot-water storage capacity to assist in maintaining steam pressure under excessive demands. Each battery of boilers is fed by six Jones underfeed stokers controlled by a Cole automatic regulator. On account of the great variations in the load on this plant an American Blower Company steel-plate fan 11 ft. deep by 3 ft. 5 in. wide, driven by an enclosed vertical engine, is used to accelerate quickly the fires of each group of boilers. The speed of the fan engines, through the control of a Kitts regulating valve, is varied according to the steam pressure at the turbines. This forced draft apparatus, like all other parts of the plant, is in duplicate to provide for continuity of service.

AUTOMATIC BOILER PLANT MACHINERY

It may be of interest to describe the operation of the train of automatic apparatus which serves under severe overload to keep the steam pressure high enough to prevent a slowing down of the turbine unit. While no trains are in the tunnel the load on the station is about 400 kw; but when a freight train passes into the tunnel and starts to climb the incline a peak load amounting to about 2000 kw is thrown onto the turbine suddenly and unannounced. This electrical overload makes a heavy demand for steam in the turbine and it is necessary for the boilers to be forced immediately or their reserve capacity will be exhausted and the pressure fall below a good operating point.

The interaction of the various parts of the steam supply when excessive load comes into the turbine is as follows: Attached to the supply line is a pressure line extending to the Kitts valve which is located in the boiler room. The diaphragm in this valve is under two pressures. On one side is the 200-lb. pressure of the live steam main and on the other side is the 125-lb. pressure of the auxiliary main. A balance lever serves to keep the valve in equilibrium. When the heavy demand comes on the steam line to the turbine and the pressure in that line falls, the Kitts valve is thrown out of balance and the movement of it in turn opens the throttle of the engine which drives the forced draft fan. Normally a difference in pressure of 4 lb. will operate this valve. As the load on the turbine continues to draw heavily on the boilers the steam pressure lowers and the Kitts valve feeds more steam into the fan engine until the fan is driven at full speed. The increase in air fed to the boilers forces more rapid combustion.

With the coming on of the load the fuel is fed more rapidly. The Cole stoker-control valves are driven through a system of belts operating off from the flywheel of the fan engine. As the fan speeds up the wheel which drives the Cole regulating valve is accelerated and the Jones stokers operate faster. Thus the auxiliary apparatus furnishes more air and more fuel to the firebox very quickly after the load comes on the steam turbine.

When the control valve for the fan engine was first installed the high-pressure tap was made from the main steam header in the boiler house. The valve then lacked sensitiveness and so to improve the service the live steam tap was made at a point in the steam line close to the turbine throttle. Thus the valve is affected by the additional drop in pressure caused by the increased load and the resistance of the header and turbine connections. In addition to making the valve more sensitive this change in location of the pressure tap has reduced the temperature in the Kitts valve. Formerly the value diaphragms lasted only two or three weeks, but since the longer pressure line has been used the life of the diaphragms has been increased to three or four months.

SUPERHEATER

A separately fired Foster superheater is installed between the two batteries of boilers. This superheater has the capacity for heating 36,000 lb. of steam per hour at 200 lb. per sq. in. to a final temperature of 587 deg. Fahr., which corresponds to a superheat of 200 deg. The grates are hand-fired and the temperature of the steam is controlled automatically by means of the thermo-couple in the steam outlet of the superheater. This thermo-couple is connected to a relay with a large solenoid which opens and closes the valves to a hydraulic piston. These valves move dampers in the air ducts and thus regulate the draft.

In practical operation the regulating devices have been found to control the temperature very closely, notwithstanding the great variation in load to which the power plant is subjected. The superheater is of especial value because on periods of normal and low load the piping and turbine are kept highly heated by it, and thus initial condensation is greatly reduced at the time of the sudden demands.

GENERATORS

The two Westinghouse-Parsons turbo-generators which comprise the main units of this plant are designed to operate at a normal voltage of 3300 volts with a frequency of 25 cycles per second. They are three-phase machines and by the specifications are required to furnish their full rated load of 1250 kw from a single phase. Each of the turbine units is capable of handling the entire load and so one machine always is held in reserve. Either turbine regularly handles peaks of from 2000 kw to 2300 kw, single phase, which last for four or five minutes at intervals of about 15 minutes. This phase also carries the lighting load. The other phases carry the load of the pumping and auxiliary apparatus, amounting to 250 kw.

With normal traffic through the tunnel the daily output of the plant is about 10,000 kw-hours. The maximum output for one day was 12,000 kw-hours and the highest peak load, 2750 kw. This plant has been in continuous service without any interruption in the delivery of current since starting in April, 1908. After nearly two years of operation the turbines were opened and it was hardly possible to detect any erosion, even on the low-pressure vanes; the tool marks were still plainly visible in the main bearings.

The turbine glands have a water seal and because of the necessity for maintaining the water supply continuously an emergency connection has been made with the city water service. The city water line connects with the discharge line from the house pump. The house service is under 75 lb. pressure and the city pressure varies from 35 lb. to 60 lb. A check valve in the city water connection provides against the use of city water except when the house supply pressure falls below that of the city pressure. Because of this emergency connection, the house pump can safely be stopped without endangering the water glands at the main turbine bearings.

The main generators are cooled by means of air drawn through the coils by vanes mounted on the rotor. The supply of air for this cooling service as originally installed was all taken from out of doors. An independent supply duct serves each turbine. The ducts are short and so air is taken into the turbine generator at practically the outdoor temperature. Formerly difficulty was experienced in severe weather because of frost accumulating on the air intake screens and cutting down the circulation. To provide against this condition an opening was cut through the side of each duct. Now in cold weather the turbine cooling air is taken from the basement. The circulation of this air through the turbine generator also serves to warm the building.

When the plant was first started each turbo-generator set was used on alternate days. Now the load is shifted from one machine to the other twice a week. It is stated that the daily change was made at the beginning of operation so that the men would become familiar with the program of starting and stopping the units. After the service was well under way, however, it was not thought desirable to shift the load so frequently because of the stresses set up in a turbine when it is warming or cooling.

REGULATION OF VOLTAGE

A Tirrill voltage regulator set is a very essential part of the regulating equipment of this plant. This set is connected with the locomotive phase of the generator only and maintains it practically constant at 3300 volts, even though the load swings from 250 kw to 2500 kw. When a heavy train goes through the tunnel and a maximum load comes on the railway phase, the other two phases get considerably out of balance and so, to keep the voltage on the lighting supply constant, all the lighting transformers are connected with the locomotive phase. The smaller pump motors, machine shop and other motors are all of the three-phase induction type operating directly across the 3300-volt line, and so they are not unduly affected by the locomotive phase being out of balance with the two unloaded phases.

On account of the widely variable nature of the load it is necessary to keep an especially careful watch over the turbine governors and emergency valves. A systematic method of testing these safety devices is followed. Whenever a turbine unit is shut down, and the load is changed from one to the other twice a week, the emergency valve tripping device is given a service test. The engineer moves the governor rod so that the speed of the turbine is increased, meanwhile watching the frequency indicator and noting at what frequency the emergency valve closes. The valve is set to open at 10 per cent above normal speed and it is thus put to an actual test twice each week.

All the circuit breakers on the station switchboard are now equipped with contact points which complete a circuit and ring an annunciator bell whenever a breaker opens. This system of announcing the opening of a breaker has made it possible for the turbine engineer also to act as switchboard attendant. If the engineer needs assistance at any time he has a push-button available on the board so that he can ring gongs located in the boiler house and in the basement where the auxiliaries are located, and call either the boiler tender or the oiler. There also is a speaking tube from the engine room to the boiler room. At night the fireman reports to the engineer every 15 minutes. If he fails to report regularly the engineer blows a whistle or sends the oiler to see whether the fireman needs assistance. A telephone instrument, connected with the electrical department line, is mounted on the power station switchboard so that the turbine engineer can quickly answer emergency calls coming from the tunnel or the yards.

DRIP TANK

A barometric jet condenser with a 30-in. inlet manufactured by the H. L. Worthington Company serves each steam turbine. A 36-in. exhaust pipe connects the exhaust outlet for the turbine with a reducing fitting attached to the condenser head. There are two bends in the connection and on low loads when the plant was first operated it was found that water accumulated in the bottom bend. This accumulation of water, unless withdrawn, would cause water-hammer as well as offer a resistance to the passage of steam from the turbine to the condenser head. To provide against this undesirable feature a drip tank has been installed in the basement. This tank has a capacity of about 20 gal. A pipe leads directly to the tank from the bottom of the U-shaped condenser connection. Any water forming in the condenser connection during low load drains into the storage tank in the basement. A water gage is provided on the tank and the hot water is drawn off from the tank once an hour. Valves are placed in the drip connection so that the vacuum will not be lost while the tank is being emptied. Reference to the vacuum chart will show, however, that when the water has been drawn from the tank and it is again connected with the turbine exhaust connection, there is about 3½ in. drop in the vacuum. This accounts for the loops and straight lines in the vacuum chart, which appear at hourly intervals.

The power station is illuminated by eight Nernst lamps in the turbine room and two in the boiler room, in addition to nearly 200 incandescent lamps located suitably for special illumination. Lighting current is taken from the main a.c. generator. Normally the exciter unit, which is controlled by a Tirrill regulator, is below voltage and so its current would not be suitable for lighting. Four oil lamps are kept burning every night for emergency use but as yet have never been needed. The lighting circuit switch is of the double-throw type and so connected that in emergency it can be thrown over and lighting current taken from a steam-driven exciter which, though not normally used, can be started quickly.

OPERATION OF POWER PLANT

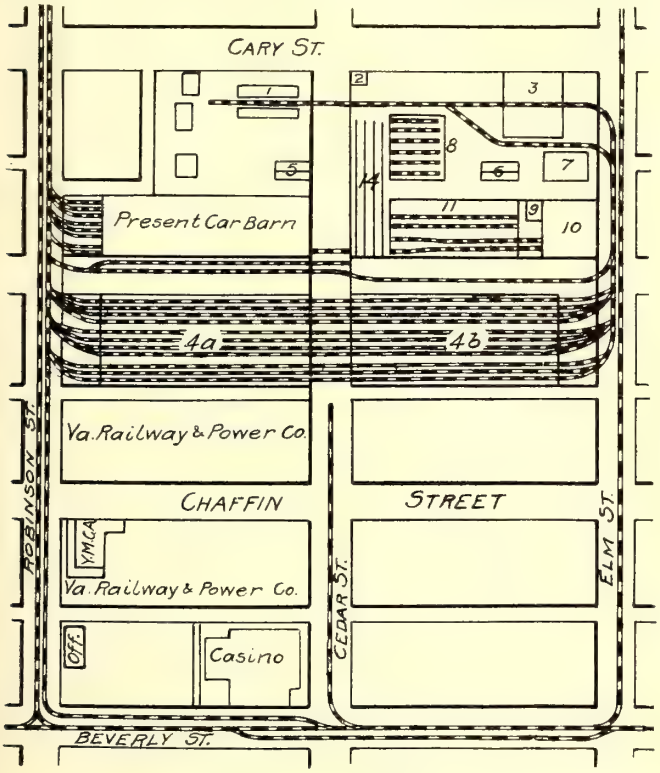
The power station staff includes the following: First engineer, turbine engineer, oiler, fireman (and water tender), machinist, ash handler, janitor, and laborer. The night staff includes turbine engineer, oiler and water tender. The turbine engineer acts as switchboard operator. Only one of the two turbine units is ever required to carry the entire load and as the switchboard is within a few feet of the steam end of the turbine and requires practically no attention, one man can easily attend to both the turbine and the switchboard.

OPERATING STAFF

The operation and motive power features of the St. Clair tunnel are in charge of W. D. Hall, superintendent of power plant and electrical equipment and superintendent of tunnel, who reports to W. D. Robb, superintendent of motive power, Grand Trunk Railway System. Reporting to Mr. Hall are four subdivisions of the force: A first engineer in charge of the power house, four pumping plant attendants, roundhouse foreman and the line crew of two men who take care of the electric lighting and trolley maintenance.

FIREPROOF CAR STRUCTURES FOR RICHMOND, VIRGINIA

The Virginia Railway & Power Company, Richmond, Va., was in the hands of a receiver up to July 1, 1909. During the receivership period, which lasted 5 years, no large amounts were disbursed for new work and practically all money spent was purely for the maintenance of the property. It has now been decided, however, to replace the old-time wooden car houses with structures of brick, concrete and steel. These are being planned and built to conform as closely as practicable to the



KEY TO BUILDINGS.

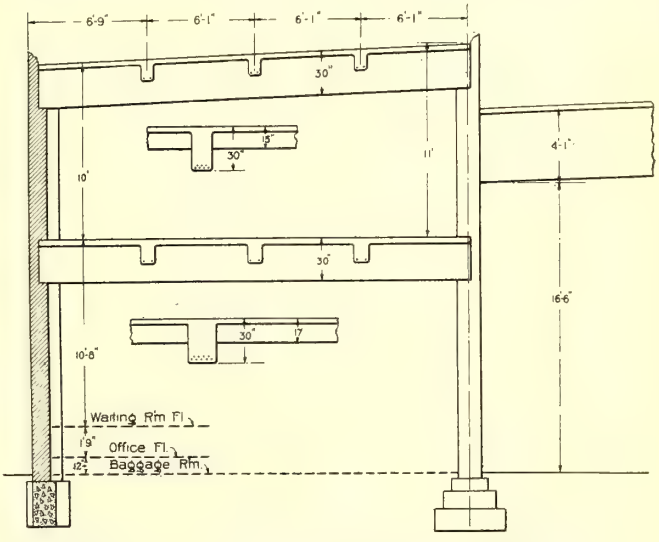
No. 1, Sand house.
No. 2, New oil room.
No. 3, Storeroom.
No. 4a and 4b, Car houses.
Nos. 5 and 6, Men's toilets and lockers.
No. 7, Blacksmith shop.
No. 8, New paint shop.
No. 9, Boiler room.
No. 10, Paint shop to be proposed new machine shop.
No. 11, Machine shop to be proposed new carpenter shop.
Nos. 12 and 13, Proposed car houses.
No. 14, Transfer table.

Richmond Car Structures—Plan of New Main Shops and Car Houses

fireproof standards of the local underwriters. In each case, the insurance association has figured out a base rate for what it considers a good risk and has afterward increased the premium in accordance with the number and character of the fire hazards. The combined capacity of the new buildings will be ample to house the 300 and odd cars now in service. The company has decided to make the double-truck semi-convertible car its standard, so that the new car house capacity will be ample to cover the estimated growth in traffic for 10 years.

The main installation will involve the erection of a $600,000 car storage and repair plant made up chiefly of two car houses and general repair shops arranged as shown in the accompanying plan. The company will also build a combined passenger and freight terminal and car house at Twenty-ninth and P Streets in Richmond and also one at Manchester, Va. Other plans are in mind for extensive renewals and rehabilitation of track, but these are dependent on the Richmond Council granting the company a new blanket franchise. The latter would include provisions for rerouting of certain lines which were built by the original competing companies and which are still unprofitably operated owing to the necessity of complying with the old franchise conditions.

The combined car house and shops will be in the west end of Richmond, 1¾ miles from the center of the city, on property which is now used in part for the same purposes. Both the old and new conditions are indicated on the plan previously mentioned. The building marked "Casino" is to be replaced eventually by a passenger terminal, as the property in this vicinity is directly in line with the prevailing westward movement of the Richmond population and this point is already the terminus of three other city lines. Aside from the general rearrangement of



Richmond Car Structures—Section of Manchester Car House Through Waiting Room and Men's Quarters

the shops, the storage facilities will be enlarged by the construction of the two car houses which will have a total capacity of 165 single-truck or 110 double-truck cars. The old car house has already been improved by the installation of a granolithic floor and concrete pits.

The new paint and machine shops will receive rolling stock from the car house by means of a transfer table, which will be 32 ft. 3 in. overall to accommodate the longest cars used by the company. The greater part of the table is being built up of second-hand girder rails, I-beams, wheels, etc., which were lying around the shops. The 90-lb. girder rails of the transfer table will be cut and fitted into the 10-in. I-beam framing as shown so that only the head of the rail will project above the I-beam. The table will be operated by an old GE-62 motor. Locking levers manipulated from the operator's cab will be provided to lock the table at any given track. The transfer pit will be of concrete and will have a slope on each side for the convenience of the men in passing from one shop to another.

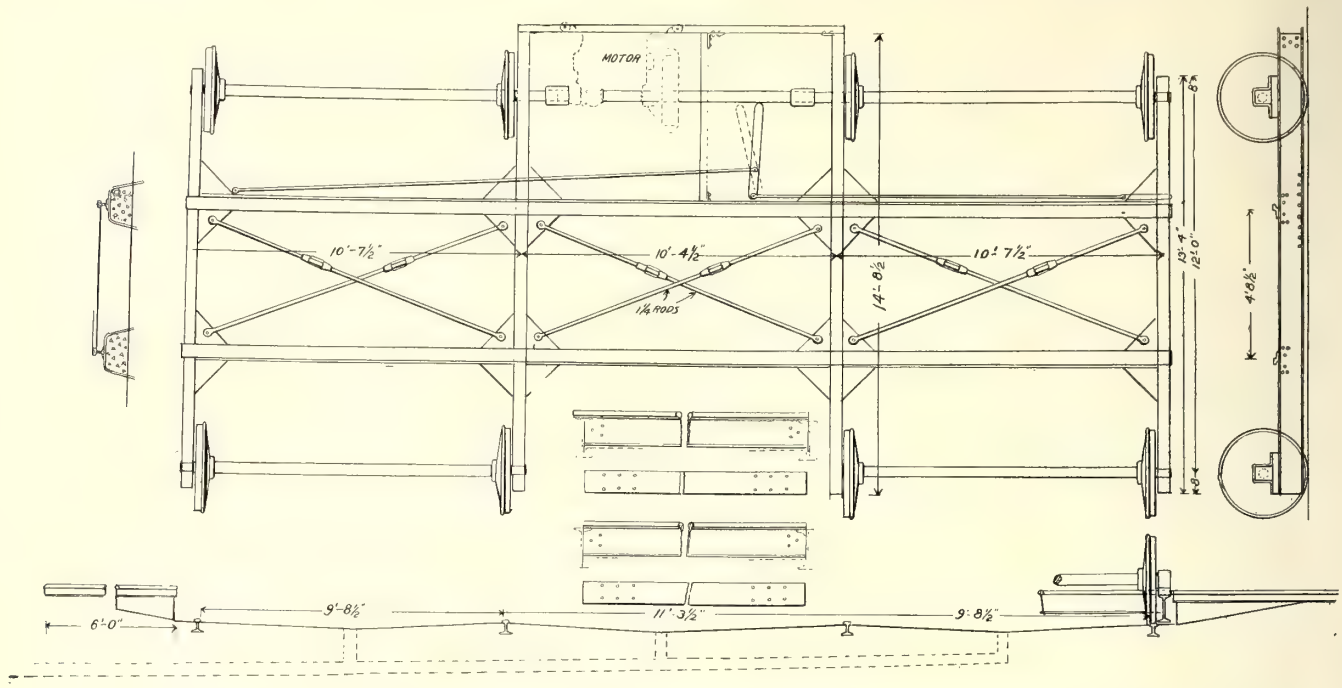


Richmond Car Structures—Elevation of Car House and Passenger Terminal at Manchester, Va

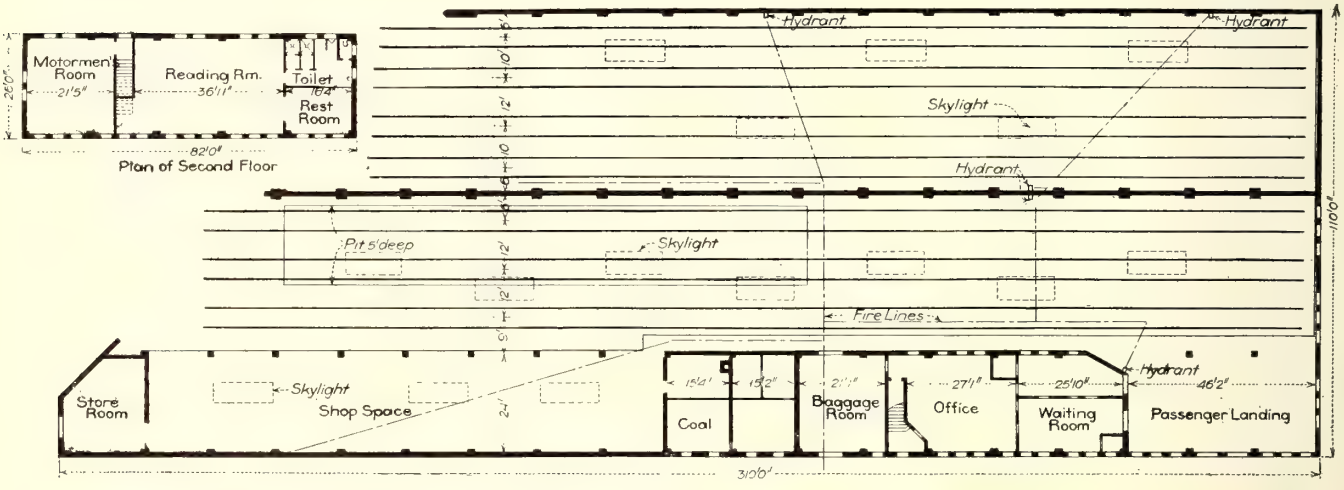
THE MANCHESTER CAR HOUSE

The Manchester building is to serve for the storage and light repairs of the interurban cars of the Richmond-Petersburg line. The first floor will be divided into two car bays and a group of

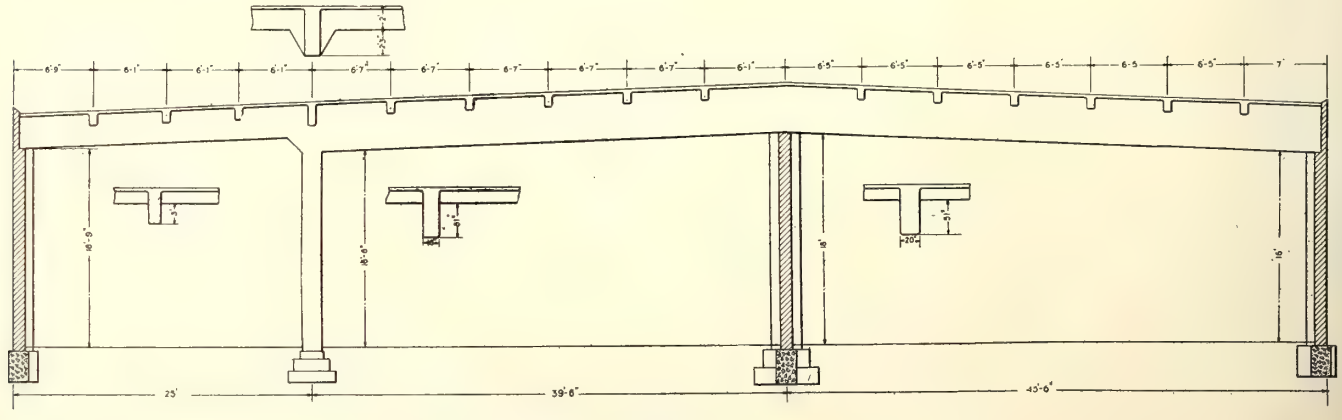
utilities structures, including a shop-heating plant, dispatcher's and ticket office, baggage-room, passengers' waiting-rooms and platform. It will be observed that the passengers are to board or leave the cars on the inside of the building. Separate waiting-rooms will be provided for the white and colored passengers with separate exits to the platform and separate ticket windows. Above this portion of the building is a second story which is reached by a stairway in the dispatcher's office. The



Richmond Car Structures—Transfer Table Between New Shop and Present Car House



Richmond Car Structures—Plan of Car House and Passenger Terminal at Manchester, Va.

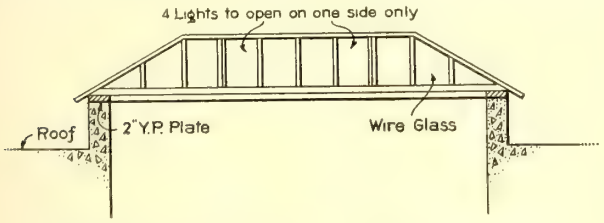


Richmond Car Structures—Section of Manchester Car House

upper floor is to be devoted exclusively to the Y. M. C. A. recreation room of the conductors and motormen. It will be observed that the arrangement is such that the men can proceed directly to their quarters after depositing their trip reports at the window in the vestibule.

The greatest length of the structure will be 310 ft. along the northern line of the utilities division. This length will gradually diminish to about 217 ft. along the southern wall, as shown. This diagonal entrance was adopted for convenience in moving long cars in and out of the building. The width of the structure will be 110 ft., of which about 25 ft. will be taken up by the utilities section and the balance by seven tracks divided into bays of three and four tracks. The brick wall between these bays has no openings whatever. The four-track section will be used exclusively for storage and will have no entrance doors, but in the three-track section, where overhauling pits are to be provided, rolling doors will be provided to close the entrances. The last of the three tracks, which is marked No. 7 on the plan, will be used for passenger and baggage loading only, while the other two will be supplied with an open pit, 128 ft. long. The floors of both bays will be built to a grade of 1 per cent.

The walls and most of the partitions of the Manchester building will be of brick. The piers will be of brick with the exception of a line of 16-in. and 20-in. concrete columns with plain rod reinforcement forming the dividing line between the car house proper and the utilities section. Partitions of terra cotta are to be used to some extent in the utilities rooms, as indicated on the drawing. The roof will be of 3-in. concrete slabs reinforced with wire mesh to be carried on reinforced-concrete roof girders. This roof has been designed to carry a live load of 30 lb. per square foot in addition to the dead load. About one-fifteenth of the roof area has been reserved for skylights of wired glass. These skylights will be furnished on one side with four movable ventilating sash operated by chains from below. The front of the car house will be carried on double I-beams supported on double channel columns filled with concrete. These columns will have footings of reinforced concrete. The partition wall between the utilities section and the car house proper is carried 5 ft. above the roof. A granolithic floor will be used in all of the rooms of the shop except in the office, where a yellow-pine floor is to be laid. The floor of the upper story will be of reinforced concrete with granolithic finish. The stairway to the upper floor is to be of reinforced concrete with wire mesh and will be supported by an 8-in. brick wall. The windows and doors will have row-lock arches. The window sills and copings and the chimney cap will be of stone and the door sills of granite. It will be seen from these particulars that every endeavor has been made to secure as fire-



Richmond Car Structures—Detail of Skylight

proof a structure as practicable for an operating car house. Fire-fighting means will be provided by a city main connection to fire lines and hydrants distributed as shown on the plan. Fire extinguishers will also be installed in the offices.

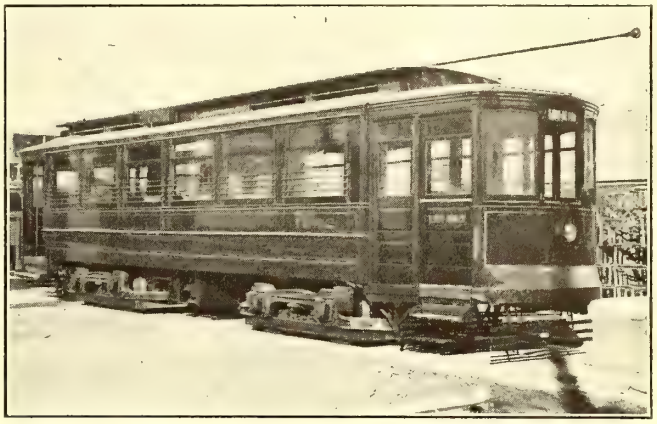
GENERAL

The new structures are being built under the direction of C. B. Buchanan, general superintendent of railways, and Calvin Whiteley, Jr., chief engineer of railways.

During a recent meeting of the South African Electric Power Commission, A. Beaton, acting chief engineer of the Central South African Railways, approved of the general principle of electrifying the lines in the low country, and also the Springs-Randfontein line.

COST OF CONVERTING AND STANDARDIZING CHICAGO RAILWAYS CARS

The detail methods followed by the Chicago Railways Company in reconstructing 328 double-end vestibuled closed cars into pay-as-you-enter equipments were described and illustrated in the ELECTRIC RAILWAY JOURNAL for Nov. 27, 1909, page 1092. Figures for the cost of converting one car are now available. In studying these figures it should be remembered



Chicago Railways Company—Reconstructed Pay-As-You-Enter Car

that the cars converted, which were of the St. Louis double-truck box type with four motors, had undergone a period of six years' severe service in Chicago. These cars have been thoroughly rebuilt and converted for pay-as-you-enter service under license from the Pay-As-You-Enter Car Corporation.

Quantity. Description.	Material.	Labor.	Totals.
WOOD MILL			
672 ft. 1½-in. cherry, at $0.12	$80.64	....	....
24 ft. 1½-in. yellow pine, at $0.04	.96	....	....
152 ft. 3½-in. ash, at $0.07½	11.40	....	....
40 ft. 1½-in. ash, at $0.06½	2.60	....	....
56 ft. 1½-in. ash, at $0.05	2.80	....	....
35 ft. ⅝-in. poplar, at $0.06½	2.28	....	....
72 ft. 1-in. birch, at $0.06½	4.68	....	....
	....	....	$105.36
LABOR			
60 hrs. wood machinist, at $0.29	....	$17.40	....
90 hrs. wood machinist, at $0.28	....	25.20	....
15 hrs. wood machinist, at $0.39	....	5.85	....
65 hrs. wood machinist's helper, at $0.21	....	13.65	....
18 hrs. wood machinist's helper, at $0.25	....	4.50	....
	....	....	66.60
CARPENTER SHOP			
196 lbs. malleable castings, at $0.03	$5.88	....	....
60 lbs. brass castings, at $0.18	10.80	....	....
120 lbs. 16x36x120 steel, at $2.20	2.64	....	....
2 register rods, complete with springs, pedals and levers	5.00	....	....
1 register back	1.50	....	....
2 Duner door tracks, at $6.25	12.50	....	....
2 Duner door track pins, at $1.00	2.00	....	....
2 brass door handles, No. 2, at $0.20	.40	....	....
6 brass door handles, No. 3, at $0.25	1.50	....	....
2 brass door handles, No. 1, at $0.15	.30	....	....
2 catches, brass, at $0.25	.50	....	....
2 catches, with plates complete, at $0.35	.70	....	....
12 rubber rollers, with brass bushings and holders, at $0.15	1.80	....	....
12 door rollers for 1st drs., at $0.35	4.20	....	....
12 special hinges, 2¼ in. x 5 in., at $0.017	.21	....	....
3 pair brass butts, 2¼ in. x 4 in., at $0.728	2.19	....	....
12 brass door roller strips, at $0.25	3.00	....	....
4 air sander traps, at $1.85	7.40	....	....
288 ft. ¼-in. black pipe, at $5.10	14.69	....	....
40 ft. 1-in. black pipe, at $4.45	1.78	....	....
2 ft. tees, at $0.10	.20	....	....
120 lb. mild steel, at $1.90	2.28	....	....
2 hand brakes, at $12.50	25.00	....	....
2 bascule fenders, at $16.50	33.00	....	....
228 ft. rattan (sq. ft.), at $0.21	47.88	....	....
8 lts. glass, 20 in. x 36 in., at $0.262	2.10	....	....
6 lts. glass, 14 in. x 34 in., at $0.16	.96	....	....
6 lts. glass, 20 in. x 28 in., at $0.18	1.08	....	....
12 lts. glass, 42 in. x 24 in., at $0.38	4.56	....	....
12 lts. glass, 10 in. x 42 in., at $0.15	1.80	....	....
12 brass storm sash catches, at $0.15	1.80	....	....
Bolts and screws	5.00	....	....
	....	....	204.65
719 hrs. carpenter, at $0.30	....	$215.70	....
50 hrs. carpenter, at $0.26	....	13.00	....
10 hrs. plumber, at $0.28	....	2.80	....
75 hrs. blacksmith and helper, at $0.56	....	42.00	....
15 hrs. machinist, at $0.31	....	4.65	....
25 hrs. machinist, at $0.23	....	5.75	....

ELECTRICAL DEPARTMENT

Quantity. Description.	Material.	Labor.	Totals.
1 set cables, at $60.00	60.00	....	....
2 Pullman fuse boxes, at $8.10	16.20	....	....
2 headlights, at $5.50	11.00	....	....
2 platform heaters, at $3.00	6.00	....	....
2 trolley catchers, at $6.00	12.00	....	....
2 Pullman trolley bases, at $19.00	38.00	....	....
475 ft. No. 18 wire, at $0.636	3.02	....	....
400 ft. No. 14 wire, at $0.935	3.74	....	....
23 light sockets, at $0.22¼	5.12	....	....
2 wall sockets, at $0.12	.24	....	....
18 16-cp frosted side lamps, at $0.209	3.77	....	....
2 16-cp clear market lamps, at $0.19	.38	....	....
3 32-cp frosted center lamps, at $0.3686	1.11	....	....
2 32-cp clear platform lamps, at $0.3420	.69	....	....
1 heater switch, at $5.00	5.00	....	....
2 32-cp headlight lamps, at $0.35	.70	....	....
1 switch, at $0.404	.41	....	....
2 3-way switches, at $0.44½	.89	....	....
		....	$168.27

LABOR

40 hrs. electrician, at $0.28	....	$11.20	....
			11.20

TRUCK DEPARTMENT

48 ¾-in. x 2½-in. machine bolts, at $1.85.	$0.89	....	....
16 ¾-in. x 6½-in. machine bolts, at $2.76.	.45	....	....
8 ¾-in. x 4½-in. machine bolts, at $2.30.	.19	....	....
16 ¾-in. x 3½-in. machine bolts, at $2.08.	.34	....	....
8 ⅝-in. x 2-in. machine bolts, at $1.83	.15	....	....
8 ⅝-in. x 2½-in. machine bolts, at $1.48.	.12	....	....
4 ⅝-in. x 1½-in. machine bolts, at $1.17.	.05	....	....
16 ⅝-in. x 3-in. machine bolts, at $1.46	.24	....	....
24 ¾-in. x 3-in. C. H. bolts, at $2.37	.57	....	....
48 ⅝-in. x 2½-in. C. S. bolts, at $1.47	.71	....	....
8 ¾-in. x 10-in. G. S. bolts, at $0.21	.08	$1.60	....
8 ¾-in. x 3½-in. G. S. bolts, at $3.90	.32	....	....
16 ⅝-in. x 2-in. rivets, at $0.15	.16	2.24	....
2 ¾-in. x 3-in. brake lever pins, at $0.05.	.01	.09	....
2 ¾-in. x 3½-in. brake lever pins, at $0.05	.01	.09	....
4 ⅞-in. x 5½-in. machine bolts, at $3.98.	.16	....	....
4 ⅞-in. x 3½-in. machine bolts, at $3.21.	.13	....	....
16 ½-in. x 4-in. cotter keys, at $0.966	.02	....	....
16 3/16-in. x 1-in. cotter keys, at $0.45	.01	....	....
8 ½-in. x 5½-in. C. S. bolts, at $2.15	.18	....	....
8 ⅝-in. x 2½-in. C. C. bolts, at $1.47	.12	....	....
80 ¾-in. spring washers, at $0.625	.50	....	....
84 ⅝-in. spring washers, at $0.525	.45	....	....
4 brake beam supports, ⅜ in. x 2 in. x 16 in., at $0.16	.40	.24	....
4 brake beam supports, ⅜ in. x 2 in. x 12 in., at $0.14	.32	.24	....
4 brake beam guards, at $0.95	1.20	2.60	....
4 brake levers, at $0.50	1.60	.40	....
4 axles, at $11.70	42.00	4.80	....
8 wheels, at $8.12	60.80	4.16	....
8 journal boxes, at $2.56	20.64	....	....
8 journal brasses, at $2.15	16.40	.80	....
4 2¾-in. x 6-in. x 7/16-in. coil springs, at $0.09	.36	....	....
2 1½-in. turn buckles, at $1.50	3.00	....	....
8 1⅛-in. x 5-in. x 6-in. coil springs, at $0.315	2.52	....	....
8 journal box wear plates, ⅜-in. x 4 in. x 12 in., at $0.25	.80	1.20	....
16 journal box clamps, at $0.15	1.60	.80	....
2 brake lever guards, at $0.73	.24	1.22	....
8 bolster hangers, at $0.46	1.76	1.92	....
8 brake shoe keys, at $0.16	.16	1.12	....
4 St. L. side frames, at $19.15	71.40	5.20	....
4 end bars, at $5.16	13.12	7.52	....
4 center cross bars, at $3.44	11.28	2.48	....
2 center bearings, at $0.48	.96	....	....
4 side clamps, at $0.56	2.24	....	....
4 elliptical springs, at $6.00	24.00	....	....
2 channel irons, at $1.69	3.00	.38	....
4 btm. bolster pins, 1½ in. x 12 in., at $0.27	.88	.20	....
4 top bolster pins, 1¼ in. x 2 in. x 15 in., at $0.27	.88	.20	....
8 brake beams, at $2.14	11.84	5.28	....
8 brake shoe heads, at $0.48	3.84	....	....
8 brake shoes, at $0.36	2.88	....	....
16 brake hangers, at $0.15	2.40	....	....
8 brake hanger castings, at $0.15	1.20	....	....
4 brake beam center castings, at $0.51	2.04	....	....
8 release springs, at $0.29	.80	1.52	....
2 cast clips for brake beam supports, at $0.06	....	....	....
4 forged clips for brake beam supports, at $0.50	2.00	....	....
38 hrs. truckmen, at $0.23	....	8.74	....
	....	....	56.04
	....	....	314.48

PAINT DEPARTMENT

Material	$27.00	....	....
		$27.00	....
Labor	....	43.00	....
	....	....	70.00
Air door operating device	....	....	55.00
Grand total			$1,335.50

CREDITS

BODY AND ELECTRICAL.

4 car body doors, at $4.00	$16.00	....	....
4 vestibule folding doors, at $6.00	24.00	....	....
1 United States trolley base, at $3.80	3.80	....	....
1 Standard trolley base, at $18.00	18.00	....	....
90 lbs. scrap copper cables, at $0.12	10.80	....	....
175 lbs. ½-mild steel, at $1.90	3.32	....	....
2 ULTL fenders, at $4.00	8.00	....	....
15 16-cp lamps, at $0.15	2.25	....	....
3 3-light clusters, at $9.60	1.80	....	....
3 enameled shades, at $0.72	2.16	....	....
14 lbs. scrap brass, at $0.10	1.40	....	....
		$91.53	....

TRUCKS

Quantity. Description.	Material.	Labor.	Totals.
8,200 lbs. scrap iron, at $9.00	$32.95	....	....
4,000 lbs. scrap wheels, at $16.80	30.00	....	....
48 lbs. scrap brass, at $0.10	4.80	....	....
		67.75	...
			159.28
Net cost			$1,176.22

The work of conversion also included rewiring of the cars in conduit, installing new light fixtures and cables, adding large electric heaters on the platforms, installing new headlights, hand brakes, air door-operating devices, air gongs and life guards, thoroughly rebuilding the trucks, and painting and varnishing the entire car.. One of the reasons for so thoroughly overhauling these cars was to standardize largely all the minor details which require frequent attention and repair. It was believed that an interchangeability of parts would greatly reduce future maintenance charges. An illustration of one of the reconstructed cars is presented.

The accompanying detail cost figures apply to the conversion of one typical St. Louis double-truck box-type motor car into a standard pay-as-you-enter equipment.

POLE AND TIE PRESERVATION IN THE SOUTH

Although most of the electric railways in the Southern States are conveniently situated with regard to lumber shipments, they have given considerable attention to the problem of securing the maximum life from their ties and poles by the use of preservatives. It may, therefore, be of interest to describe the conditions and practices in several Southern cities, which were visited recently by a representative of the Electric Railway Journal. A summary of tie preservation practice throughout the United States appears elsewhere in this number.

NORFOLK, VA.

The Norfolk & Portsmouth Traction Company is now creosoting 1000 to 1200 poles a year and at this time has about 12,000 treated poles in use. The costs of the treated pine poles of different lengths are as follows: 30 ft. to 35 ft. poles, 20 cents per ft.; 40 ft. to 50 ft. poles, 22 cents per ft.; 55 ft. to 60 ft. poles, 24 cents per ft. In connection with this price, it should be remembered, that Norfolk, Va., has some of the largest creosoting plants in the United States. Although this company itself began with 50 treated poles only about seven years ago, creosoted poles have been in use in Norfolk for over 32 years and they are still in good condition. Throughout the latter period, the same poles were used successively by the fire alarm, gas and telephone companies. The Norfolk & Portsmouth Traction Company also had left over from the Jamestown Exposition work about 30,000 untreated 8-ft. ties, which have since been creosoted. The prevailing price of creosoted pine or gum ties 8 ft. long is 85 cents in Norfolk. This company has also used the superficial method of preservation on a 1500-ft. trestle at Tanner's Creek, the preservative being Avenarius Carbolineum which was imported direct from Germany.

DURHAM, N. C.

The Durham Traction Company is using white oak and chestnut ties. So far it has not treated any as it is found that these woods give a long life when they are well buried. All poles, however, are treated with C. A. wood preserver on the butts and up to 18 in. above ground. The same preservative is applied to fences, posts and other ground work. The principal pole wood is cypress, but juniper is used occasionally.

WILMINGTON, N. C.

The Tidewater Power Company uses both cresote and dead oil of coal tar, but the former is consedered better. The company has had long experience with creosote. For example, on July 16, 1907, it removed a light tie of short-leaf pine which had been creosoted and laid in 1888. This tie was found in perfect condition when taken out, not showing the least signs of rot. The company has followed the practice of buying

for 25 cents apiece sap long-leaf ties which have been rejected by the steam railroads, and then treating them with creosote at a cost of 20 to 25 cents each additional. Some of these ties were laid down three years ago and were taken up in January of this year. They were found in perfect shape, whereas similar untreated ties in the damp soil of Wilmington would have been useless by that time. The creosoting process of the Wilmington company differs from the ordinary method with vacuum and high temperature in which the wood is subjected to as much as 350 deg. F. It is believed that such a high temperature tends to make the wood brittle and affects the life injuriously. The process used is one in which the temperature does not exceed 240 deg. F. A closed tank is employed with means for taking care of the saps as they evaporate. When the ties are put in the retort, the latter is closed to prevent the escape of explosive vapors. By means of steam pipes, the retort is then heated to about 240 deg. F. in six hours. After this, the hot oil is pumped out and the cold oil is pumped in. The hot oil heats the ties and drives out the moisture and saps, whereas the cold oil following contracts the pores and draws in the preservative. The Wilmington retort is used for any pieces up to 16 ft. in length, including ties, crossarms and paving blocks. The poles are of juniper or so-called white cedar. They are treated at their lower ends and for a short distance above the ground with creosote applied with a brush and are then coated with tar.

CHARLESTON, S. C.

The Charleston Consolidated Railway, Gas & Electric Company has determined to use black cypress principally for ties. During this year, for example, it will buy 4000 black cypress and 1000 yellow-pine ties. The cypress ties are 7 in. x 9 in. by 8 ft. long and cost 41 cents, against 35 cents in 1905. This wood is obtained from Southern swamps and has a great partiality for moisture. It is said to last indefinitely under the ground and rots only if exposed to the air. Black cypress ties have been in service in Charleston for 13 years under 7-in. and 9-in. rails in paved streets and are good to-day. Cypress ties are good for about 10 years in open track, whereas untreated pine ties last only 4 years under the same conditions. Poles are treated with creosote at the butts for a distance of 1 ft. above the surface. The treatment is made in three applications with a brush, one coat being applied each day. The cost is about 40 cents and the estimated increase in the life of a black cypress pole is 3 to 4 years. The prices of black cypress poles in Charleston are as follows: Thirty-ft. poles with 8½-in. top, $2.50; 35-ft. poles, $3; 40-ft. poles, $4. An untreated pole, if cut in winter when the sap is down, will last 10 to 12 years, but if cut when the sap is up, will last only 4 years. White cypress is not good for more than 4 to 5 years in any event. Black cypress is very much superior to juniper where heavy loading is required and is also better than pine, because it is a swamp wood which thrives on moisture even after it has been cut, whereas juniper dry rots.

SAVANNAH, GA.

The Savannah Electric Company uses untreated Georgia black cypress ties, of which it intends to lay about 6000 during the present year. These ties are 6 in. x 8 in. x 8 ft. long and cost slightly less than 38 cents each. The company expects that in the sandy soil of Savannah this wood will be good for 15 years in paved and 10 years in open track. This estimate is based on the experience with a former steam dummy line, which is now an interurban extension, where similar ties have been in use for 30 years. In fact, this wood is considered ideal for a moist soil. Experiments were made at one time with long-leaf pine ties, but they had to be taken out in less than 5 years. The poles are also of untreated cypress and cost about $4.50 each for 30-ft. lengths. Recently this company has been treating its poles to the extent of a coating of carbolineum over that portion placed in the ground and a coating of dead oil of coal tar has been used over the balance of the pole, both treatments being applied with a brush. The company has not been treating poles this way long enough to have gained any reliable data as to the results accomplished but feels that the expense undoubtedly is entirely warranted by the increased life it will get from the poles.

AUGUSTA, GA.

The Augusta-Aiken Railway & Electric Company has for its standard untreated ties either black cypress or hard pine, 7 in. x 9 in. by 8 ft. long. In paved streets, however, the company uses a short-leaf, sap pine creosoted tie, 6 in. x 8 in. x 7 ft. long. These sap pines are bought for 20 cents apiece raw and when treated cost 60 cents. In 1908, the city of Augusta paved a street which had been macadamized about 7 years before when the railway company had put in creosoted ties under a 7-in. T-rail. When the ties were examined before the repaving of the street, it was found that they were to all appearances in exactly the same condition as when installed. The poles used are of untreated black cypress. A 35-ft. pole with 10-in. top cost $3.50 or 10 cents per ft., other lengths up to 65 ft. with 7-in. top have been purchased at about the same rate.

ATLANTA, GA.

The Georgia Railway & Electric Company probably has the most elaborate railway creosoting plant in the Southern States. This company began creosoting ties in 1895, and an idea of the extent of this work may be obtained when it is stated that 43,000 ties were creosoted in 1909, 26,000 in 1908 and a total of 163,000 in the last 7 years. At this time, about 50 per cent of the entire trackage is supplied with creosoted ties and no other kind is being used either for renewals or extensions. In 1910, 40,000 ties will be treated for new construction and 12,000 ties for maintenance. Creosoted ties which were installed on Peachtree Street in 1895 were taken out in 1908 on account of the necessity of installing heavier ties for the increased traffic. It was found possible to use fully 50 per cent of them elsewhere. Few of the others were decayed, but quite a number were useless because of the rail wear. It is quite possible that some of the ties which were found decayed really had dry-rot before they were ever placed in the creosoting tank. The original investment for the creosoting plant was about $5,000, but a total of $7,000 to $8,000 will have been expended when the present work of increasing the daily capacity of the plant from 160 to 240 ties is completed. The treated long-leaf sap pine and oak ties, 6 in. x 8 in. x 8 ft. in size, cost about 80 cents and 90 cents each respectively. A sap pine tie requires 4 gal. and an oak tie 3 gal. of creosote. It is figured that the creosote treatment lengthens the life of the ties to a total of 15 years in paved track and 12 years in open track as against 7 and 5 years with untreated ties.

The Atlanta company does not preserve poles. The principal pole wood is chestnut, but some juniper is used. Further particulars of the pole and tie standards of this company will be given in a later article on track standards.

The danger of using untreated ties will be understood from the fact that about 50 per cent of the hewn oak ties which were installed on the Atlanta Northern Railway in 1904 and 1905 are now gone, showing that this wood when not treated is serviceable only for 5 or 6 years in interurban railway work.

MOBILE, ALA.

The Mobile Light & Railroad Company, which operates 59 miles of track, has now creosoted all but 17 miles of track and this trackage will be creosoted as fast as the maintenance goes on. The company has been creosoting on a large scale only for the last 5 years, but the first creosoted ties were placed in service about 10 years ago and are still in service in the sandy soil of Mobile without showing the least deterioration. Untreated pine ties are good only for 6 years in paved and 4 years in unpaved tracks. Short-leaf sap pine and loblolly ties 7 in. x 8 in. x 8 ft. long, are purchased for 30 cents each, and are treated at an additional cost of 47 cents each. The treatment requires about 12 lb. of creosote per cubic foot. In Mobile, which is a great lumber center, untreated heart yellow pine ties now cost 45 cents, whereas they could be bought in

1905 for fully 10 cents less. Treated creosoted poles are purchased for 20 cents per foot for lengths up to 55 ft. They have been in use for about 7 years and are still in good condition.

ASHEVILLE, N. C.

The Asheville Electric Company installed about a year and a half ago a C. A. wood-preserver plant. The company uses white oak, chestnut and red oak ties, which come from within 10 to 15 miles from Asheville, and cost about 35 cents each for the 6-in. x 8-in. x 7-ft. sizes. The cost of treating a tie, including the labor, is 18 to 25 cents. Untreated ties of the same woods have been found to give 7 to 10 years' service in this territory. While it is too soon to make any estimates on the life of the ties subjected to the superficial treatment mentioned, it has been found that treated ties which were put in last year show none of the signs of wear evident in similar untreated ties alongside. The plant installed for this method of preservation is very simple, consisting principally of an 8-ft. x 9-ft. iron tank 17 in. deep. The grate and ash pit are made up of old rails with another row of rails at right angles to the grate to act as a baffler for the first so that the heat will be transmitted equally to both ends of the tank. An iron stack completes the outfit. Ties are kept in the tank for about 20 minutes, during which period about one-third gallon is absorbed per tie. The cross-arms receive double treatment. A six-pin arm costs 7 cents per dipping, or a total of 14 cents. The poles are given two butt treatments with a brush.

LYNCHBURG, VA.

The Lynchburg Traction & Light Company uses chestnut and oak ties, which cost 45 to 50 cents each. These woods have been found to give a life of 8 to 9 years, and the company, therefore, has not considered that it would pay to use a preservative for them.

DATA ON TIE CONSUMPTION AND PRESERVATIVE TREATMENT

In order to present to the readers of this paper some general data on cross tie consumption by the electric railways in the United States a letter of inquiry containing 24 questions was sent out to 95 representative city and interurban companies. Replies to this inquiry were returned by 51 companies. The questions were framed to elicit information regarding the extent to which steel ties and preservative treatments for wooden ties are being used, the cost of ties and the cost of treatment. The 51 roads which answered expected to use a total of 1,307,000 ties in 1910. Based on their mileage, the total demand of all the electric railways of the country for ties may be estimated for the year at 7,100,000. Practically all of the wooden ties purchased by electric railways are of small size, 6 in. x 8 in. x 8 ft. or smaller. Oak, chestnut, yellow pine and cedar are the predominating varieties, oak and chestnut being preferred by companies near the hard wood forests. In the South, yellow pine and cypress are almost universally used. The prices paid for these ties vary from 30 cents to 87 cents delivered; the average price is between 50 and 60 cents. Prices of ties have advanced in nearly all parts of the country during the past five years, although a few companies report no change or even a reduction in cost. An average advance of 25 per cent in five years is a conservative estimate. One company in Massachusetts which bought chestnut ties in 1905 for 45 cents each is now paying 60 cents. The price of cypress ties in Florida has increased from 65 cents in 1905 to 87 cents in 1910.

The life of untreated wooden ties is variously estimated at from 5 to 12 years in open track and from 8 to 28 years in paved track. The kind of ballast used in open track affects the life of ties, the longest life being obtained where broken stone is used.

Sixteen of the 51 companies reporting are using some form of preservative treatment on all or part of the ties laid. A majority of the ties treated are pine, but some companies are also treating white, red and black oak, fir and beech. Many different methods are represented in the replies. The vacuum-pressure straight creosote method is being used by nine of the 16 companies while the open tank creosote method is used by three companies and the open tank method using some one of the many trade preparations of antiseptic dead oils is employed by four companies. One company is using both the vacuum-pressure creosote treatment and the zinc chloride treatment. The quantity of preservative injected into the ties varies with the process used and the kind of wood being treated. For yellow pine ties from 10 lb. to 12 lb. of preservative per cubic foot of timber is injected by the vacuum-pressure process. This is equivalent to about 25 lb. or 2½ gal. per tie. One company uses only 6 lb. per cubic foot for Norway pine and tamarack ties. With the open tank processes much smaller quantities of preservative are injected. From ¼ gal. to ½ gal. is absorbed per tie. The penetration of course is not so deep, but the higher grade of antiseptic oils commonly used with this process affords satisfactory protection against decay, which always begins on the surface.

The cost of treated ties delivered is given at from 67 cents to $1.20, the latter being the cost of a creosoted white oak tie. At the plant of the Indianapolis, Columbus & Southern Traction Company, where the open tank process with low pressure added is used, the cost per tie for 25 lb. of creosote and the necessary labor is given as 32 cents. One company which uses the open tank dipping process states the cost to be from 15 cents upward, depending on the preservative used.

The lowest estimate given of the life of treated ties in open track is 15 years, and one company says 24 years is conservative. A life of from 18 to 20 years can reasonably be expected in almost any kind of ballast and climatic conditions, provided the tie is not disintegrated mechanically by rail cutting or constant respiking. A number of companies are now using tie plates on all wooden ties to prevent rail cutting on tangents as well as to relieve the strain on the spikes on curves. In paved track the life of treated ties is estimated at from 25 to 35 years. They will undoubtedly outlast the rails which are laid on them. The use of steel ties in paved track is making progress although only nine companies reported that they were using them. The cost per tie is more than double that of wooden ties preserved by the most expensive processes but the spacing used is also more than double that used with wooden ties. Four feet is the common spacing but one company reports spacings of 5 ft. to 7 ft. The life of steel ties is estimated by all companies replying to be at least 30 years when embedded in concrete.

THE PHILADELPHIA STRIKE

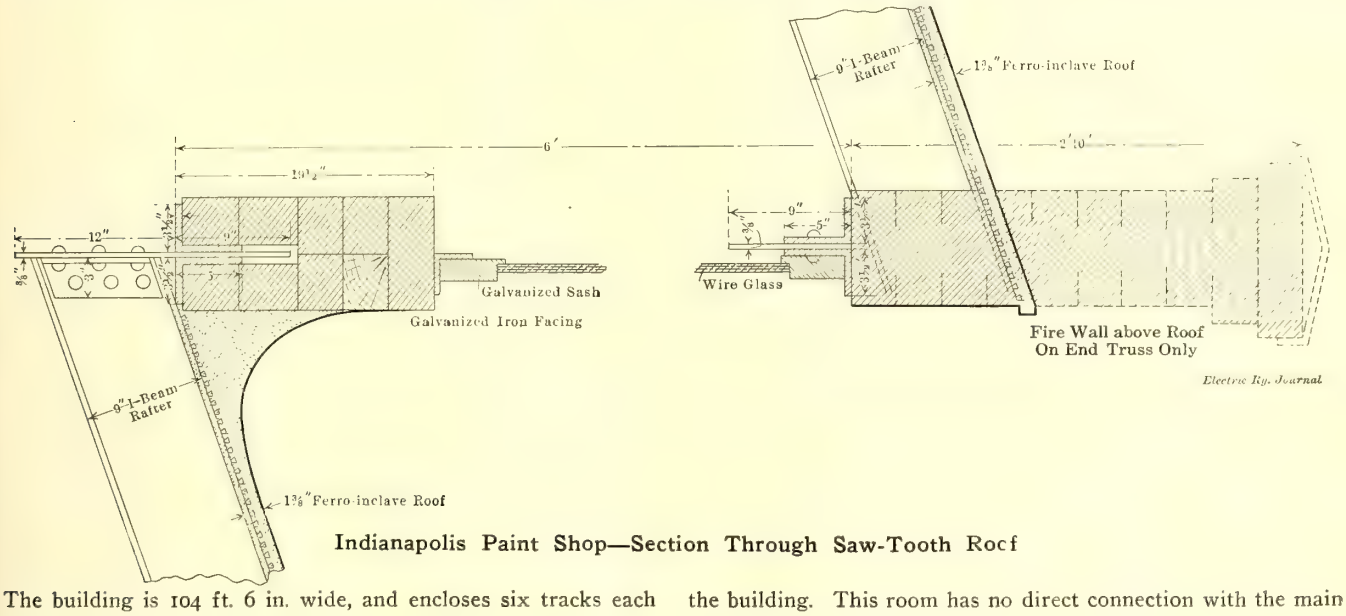
The return to work on March 23 of all the mill and factory operatives in Philadelphia who were on strike in sympathy with the employees of the Philadelphia Rapid Transit Company and the deflections from the ranks of the strikers in the building and other trades virtually forced the committee of 10 in charge of the sympathetic strike to recommend on March 27 that the general strike end at once, and this recommendation was adopted. The sympathetic strikers, however, pledged themselves to support the car men financially. The company reports conditions to be virtually normal on all its lines.

OFFICIAL TICKET PAPER

The Central Electric Traffic Association has officially adopted a safety-ticket paper on which tickets of the members of that association will be printed in the future. This is said to be the first use of a paper of this kind by any single electric line or association of electric railways. The paper is manufactured in 10 different shades to cover the five standard forms of single-trip tickets and five standard forms of round-trip tickets, and carries as a water mark the badge of the association with the words "electric" and "safety" above and below it. The paper is furnished by A. A. Pugh Printing Company, Cincinnati, Ohio, which has agreed to supply it only to members of the Central Electric Traffic Association.

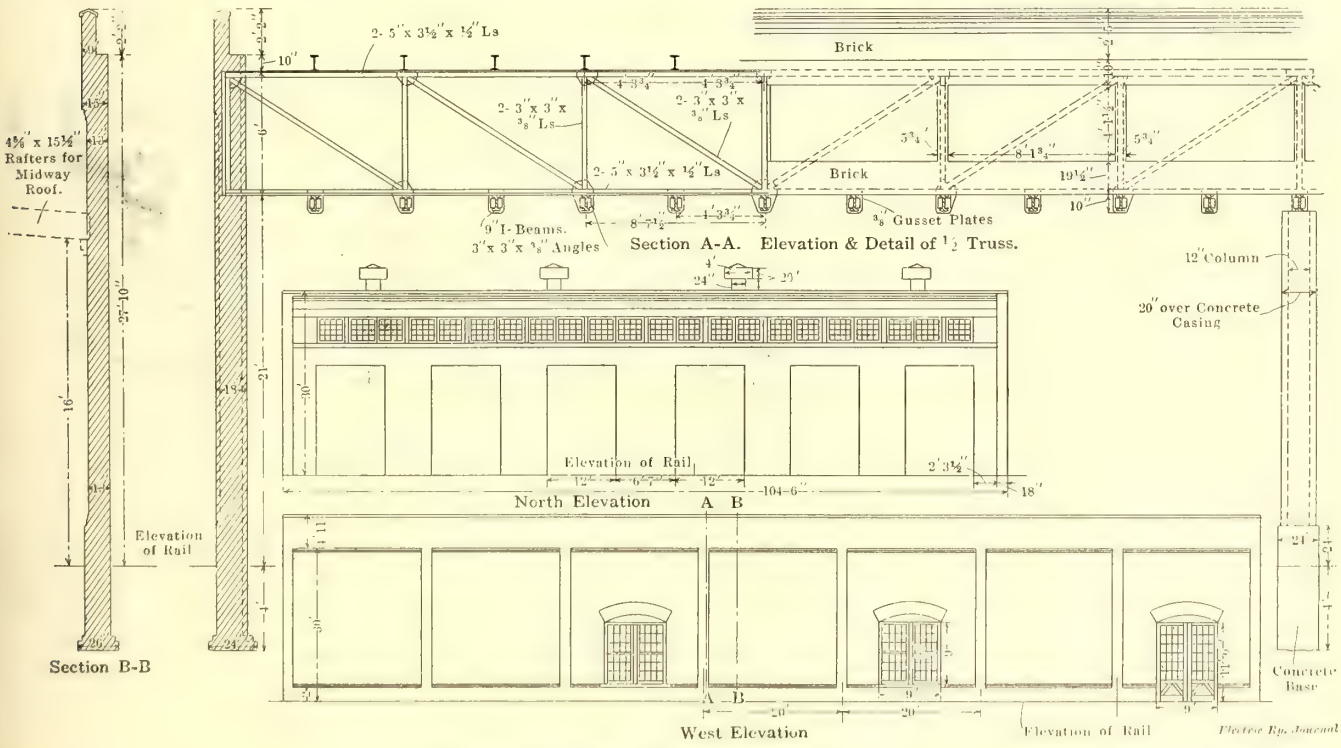
NEW PAINT SHOP OF THE INDIANAPOLIS TRACTION & TERMINAL COMPANY

A paint shop of interesting fireproof construction, occupying the site of one destroyed by fire, has just been completed by the Indianapolis Traction & Terminal Company. The new building has a saw-tooth roof which is supported by brick side walls and a single row of steel-concrete center columns.



Indianapolis Paint Shop—Section Through Saw-Tooth Roof

The building is 104 ft. 6 in. wide, and encloses six tracks each 140 ft. long. All the tracks lead to the shop transfer table which shortly is to be rebuilt so that large interurban cars may be handled with greater facility. The new shop building is 20 ft. longer than the one which it replaces and is built ly fireproof materials and designed for the following uses: One room will be used for paint mixing. A window connects this room with the paint shop and this window is provided with double automatic fire shutters. A room for the storage of paint is equipped with four Bowser long-distance pumps for drawing the oil supply from large storage tanks located underground outside the building. A door in the rear wall of this room will facilitate the handling of paint stock from the track outside into the building. This room has no direct connection with the main paint shop. A third additional room is being fitted up as an office for the master painter.



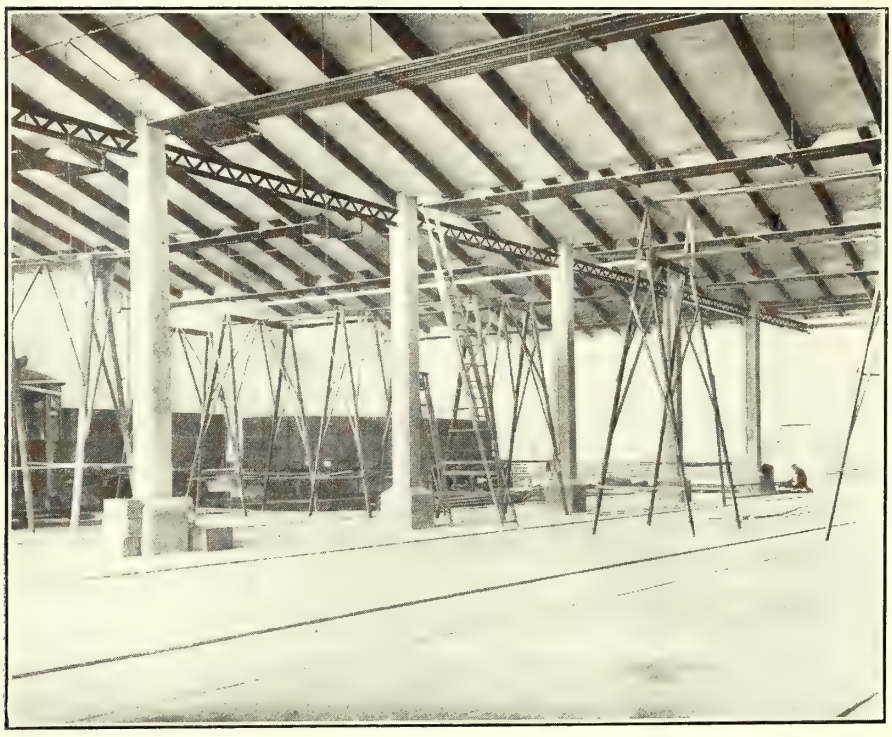
Indianapolis Paint Shop—Structural Details

GENERAL DESIGN

The design for the new paint shop was executed in the offices according to a type of design which it is thought will be adopted when other buildings are reconstructed. The present new building, in event of the erection of other new structures, probably will be used for truck repair purposes and a larger building be erected at a later date for the painting department.

Adjacent to the west side of the new paint shop structure and opening on to it, is a row of smaller rooms built of thorough- of the chief engineer of the Indianapolis Traction & Terminal Company. The building is noteworthy for the excellence of the lighting and the freedom from roof supports. Accompanying illustrations show the principal features of the type of saw-tooth roof structures. Engravings made from photographs taken shortly before the occupation of the building illustrate the appearance of the roof from above and below.

The roof structure is made up of seven saw-tooth sections similar in design. Each of these sections extends across the width of the building (approximately 100 ft. between side walls) and includes a vertical skylight with a clear opening 3½ ft. high by 100 ft. wide. The roof structure is supported by cross members, which are angle-iron trusses 6 ft. in depth. The sloping members are 9-in. I-beams. The main trusses are spaced on 20-ft. centers and each is a continuous structure across the width of the building, supported at the center by a 12-in. steel column resting on a concrete base 4 ft. deep. As a protection against fire these center columns are enclosed in a square casing of concrete 20 in. on a side. This type of construction leaves the entire floor area free of columns, with the exception of the single row extending down the middle of the building between the two center tracks. The side walls are of brick, 18 in. thick, carried to a height of 3 ft. above the roof trusses.



Indianapolis Paint Shop—Interior Just Before Completion

ROOF STRUCTURE

Reference to the cross-section of one of the truss members of the roof will show the method followed in connecting the 9-in. sloping rafters at the bottom of one truss and at the top of the next. The sloping rafters are spaced on 4-ft. 3¾-in. centers across the width of the building. The upper end of each rests on top of the main truss and the lower end is attached to the bottom of the next truss. These rafters are covered with a fireproof concrete roof, using Ferroinclave to support the concrete. A large fillet of concrete is formed at the lower side of each saw tooth. The roof is 1⅜ in. thick and is waterproofed with tar covered with gravel. The slope of the room at right angles to the saw teeth is 6 ft. in 20 ft. and crosswise of the building there is a pitch of 4 in. in 50 ft. to provide drainage away from the center.

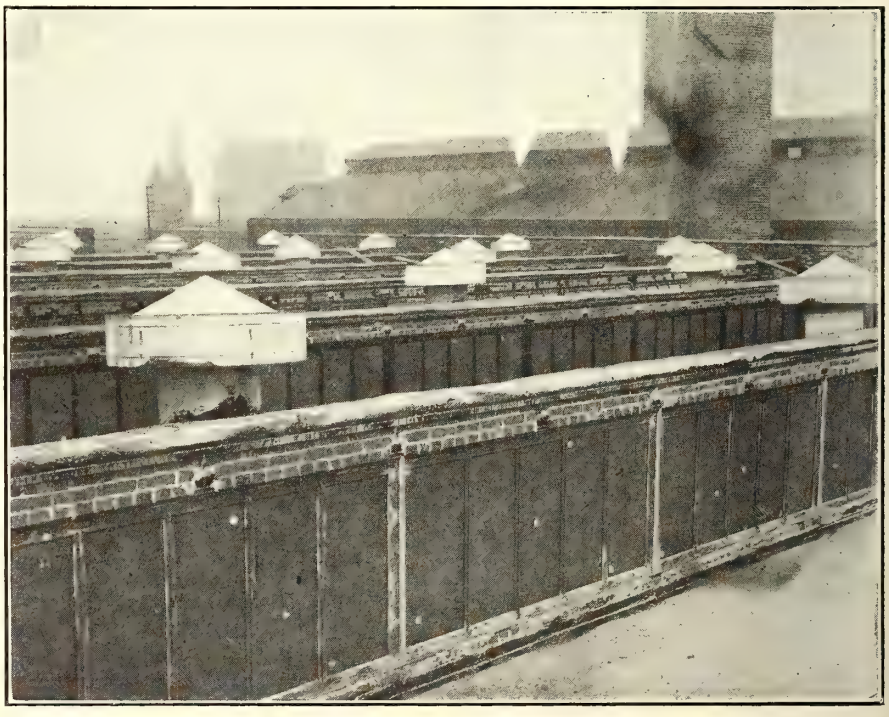
Each of the vertical sections of the roof is fitted with galvanized-iron sash enclosing wire glass. The detail construction of the sash, which are reinforced with angles, is illustrated. The lower sides of the sash rest on a brick coping supported on the lower angles of the large cross trusses. This brickwork forms a tight wall across the gutter at the bottom of each saw tooth. A similar brick wall 8 in. thick extends across the tops of the trusses and fills in the space on either side of the upper ends of the rafters. At the end walls of the building this brickwork is carried to a coping at a height 3 ft. above the tops of the trusses.

The sash in all of the vertical sides of the saw-tooth roof, except two, are permanently fixed in place. The sash in the north and middle trusses are hinged, and the windows may be operated by gearing extending to the floor level. Ventilation is provided by four large ventilator heads in each of the seven sections of the roof. These ventilator heads have brass-wire gauze inserted to protect freshly painted cars from dust.

HEATING

Provision has been made for heating the building with live steam obtained from the power station located on the same property with the shops. Radiation is had from eight wall coils mounted on the three sides of the building, 12 overhead coils and five radiators located in the spaces between the entrance doors. The total radiation approximates 5000 sq. ft. and the equipment is designed to heat the building to 70 deg. Fahr. in zero weather, when the air is completely changed twice an hour.

The live steam received from the power plant passes through a reducing valve which lowers the pressure to 20 lb. The radiation coils are fitted with steam and air traps manufactured by C. A. Dunham & Company. These traps are set to release the drips when the radiator piping reaches a temperature of 160 deg. Fahr. The loss of heat in the return pipe from the



Indianapolis Paint Shop—Saw-Tooth Roof with Ventilators

paint shop to the power house is about 20 deg. and thus the drip is returned to the feed-water heater in the plant at 140 deg.

ILLUMINATION

The general illumination for this paint shop will be obtained from Cooper Hewitt mercury vapor lamps supported 15 ft. above the floor. Local illumination will be had from single lamp drops with cords reaching to within 4 ft. of the floor. This generous length of cord will permit lowering the lamps to the bottoms of the cars without the use of extension plugs. All the wires are enclosed in iron conduit supported from the lower side of the roof purlins and having porcelain-protected outlets. Mercury vapor lamps have been used in the carpenter and older paint shop buildings at Indianapolis for about eight months and no trouble has been experienced because of the peculiarity of colors brought about the violet rays of this light. It is the practice to match all colors in daylight and apply the paint under the mercury vapor lamp, which gives a strong, well distributed illumination.

ELECTRIFICATION OF THE MONT CENIS RAILWAY

According to a recent issue of *Elektrische Kraftbetriebe und Bahnen* the Italian State Railways have begun to electrify the Mont Cenis Railway between Modana and Turin. It is expected that by the spring of 1911 it will be possible to operate electric locomotives into Turin and thereby promote the travel to the international exposition then to be opened in that city. Like the Simplon tunnel line, this road will be operated at 15 cycles, three-phase, with 3500-volt overhead conductors. Power will be purchased from a hydroelectric plant in Turin and transmitted at 50,000 volts, 50 cycles, to a converter station at Bardonnecchia. This converter station, which is to be equipped by the Milan branch of the Brown-Boveri Company, will be the first European trunk line equipment embracing such large units as 2000 kva for changing current from 50 cycles to 15 cycles. The principal apparatus will consist of the following: One 2200-kva, 50-cycle, 48,500/7000-volt oil-insulated, water-cooled, three-phase transformer; one frequency changer made up of one 40-ton fly-wheel, one semi-rigid coupling, one 2000 kva, 500 r.p.m. 3500-volt, 16 2/3 cycle three-phase generator, one rigid coupling, one 2500-hp, 7000-volt, 50-cycle induction motor, one semi-elastic coupling and one three-phase commutator motor for regulating the speed of the asynchronous motor between 400 r.p.m. and 500 r.p.m. The use of the very heavy fly-wheel cuts down the speed of the machines by 20 per cent and stores large masses of kinetic energy to care for line load fluctuations. When the speed drops from 500 r.p.m. to 400 r.p.m., the fly-wheel can give about 1000 hp for one minute. The three-phase commutator motor permits the asynchronous motor, with which it is connected in cascade, to approximate unit load factor.

As the line is to be fed from both ends, the station will also contain a 3000-kva, 3500/3850 volt, 16 2/3 cycle auto-transformer with two induction regulators which will be used to raise the potential at the Modane end by 5 per cent, namely, from 3500 volts to 3850 volts. In addition to the apparatus mentioned, the station will also be supplied with a 450 hp hydroelectric turbo-exciter set, small transformers, etc. The line equipment will be installed directly by the Italian State Railways. It is understood that experiments are to be made also with 50 cycle, three-phase locomotives.

The fourth annual convention of the Missouri Electric, Gas Street Railway & Water Works Association will be held at Jefferson City, Mo., April 14, 15 and 16. The program includes the following papers: "The Luminous Arc Rectifier System," by Louis Fredman; "Securing Profitable Day Load," by J. E. Harsh; "Condensers for Small Central Stations," by Chas. S. Lewis; "Electrically Driven Water-Works Plants," by H. W. Clark; "The Primary Law Relating to Public Utilities," by Geo. McCollum; "Data on Electric Plants," by Prof. H. B Shaw; "Power Plants in Public Service," by Edwin S. Harrison.

ECONOMY IN ELECTRIC CAR PAINTING

BY CARL F. WOODS, ARTHUR D. LITTLE LARORATORY OF ENGINEERING CHEMISTRY

The increasing demands imposed upon electric railways and the necessity of constantly improving the service afforded the public, without in many cases any proportionate increase in revenue, render it essential that the manager of such properties obtain the maximum efficiency from every dollar expended in maintenance. Among the problems of this nature which constantly arise there are few more troublesome than that of maintaining the appearance of the rolling stock to that degree of excellence which the traveling public demands, without expending an amount of money out of proportion to the relative importance of this item of maintenance. The fact that the cost of painting the same type of car varies on different roads from $30 to $60 and that certain companies are forced to repaint every two or three years while others are able to operate cars from 10 to 12 years before complete refinishing becomes necessary emphasizes the need of careful consideration of this important item of maintenance.

There are several factors which render the subject of car painting of particular and increasing importance to the manager who is attempting to reduce maintenance charges. With the advent of elevated lines and subways and the increasing use of cars of the semi-convertible type, the intrinsic earning power of each car and the direct financial loss for every day that the car is out of service are greatly increased. Other contributing causes are the inferior quality of woodwork which is to-day used by car builders owing to the necessity of cheap and rapid construction and the prevalence of adulterated and inferior paints and varnishes. The use of the latter is not due entirely to the desire of the paint manufacturer to deceive, but is very frequently the direct result of false economy by the purchasing department. In paint materials, as elsewhere, the most expensive is not of necessity the best, but it is equally true that the best is not the cheapest in first cost. The attempt to economize in painting by purchasing the cheapest materials usually results in actual extravagance, for first cost is a small item in the actual expense of painting. The purchaser who buys varnish to-day for $1.50 a gallon, when the price of the oil and gum going into it is greatly in excess of this figure, can only blame himself if he obtains a mixture of rosin and benzine. Such conditions are unfortunately very prevalent and many companies whose invoices show astonishingly low prices are actually spending far greater sums in the long run than the company which pays a price in proportion to the grade of material it desires and obtains from it satisfactory service.

It will be admitted by practically all railroad managers that it is essential to run cars which present as good an appearance as possible, but the exact meaning of this to the individual manager differs widely. To one it implies a car of many colors with ornate trimming and lettering; to another, a finish equal to that of automobiles or carriages, while to a third it represents a car of a pleasing color, clean and well kept but without ornamentation and unnecessary work. There is, however, a general tendency to do away with expensive finishing and decorating, as it becomes increasingly necessary to reduce expense, for however handsome a car may appear when fresh from the paint shop, a few weeks of service greatly impair its appearance.

The problem of reducing expense in car painting may properly be divided into two classes; first, the method of applying paints and varnish, and, second, the actual materials used. Both are of importance and both present in many cases considerable opportunity for economy, but the method of application offers an opportunity for greater direct financial savings as the labor and time cost is as a rule much more than the cost of the paint materials themselves.

There are two methods of car painting, essentially different in the principles upon which they are based, which have long been used by painters. These methods may be properly known

as the "lead and oil" process and the "surfacer" process. While there are many other systems in use, differing in one or more details, they all properly belong to one class or the other. There is, however, a third method which has recently come into considerable prominence and is sufficiently different from either to deserve separate classification. It may be distinguished as the "color and varnish" system.

LEAD AND OIL PROCESS

The "lead and oil" process is the oldest of car painting methods and is the direct outgrowth of carriage painting. The principle of the system in brief is the priming and filling of the wood with a white lead and linseed oil paint, the building up of a hard, smooth surface with "rough stuff," the application of the body color on this foundation and the final covering with varnish. The "rough stuff" coats, which are essentially a mineral silicate ground in varnish, dry very rapidly and can be brought to a very hard, smooth surface by rubbing with blocks of pumice. The color coats are ground in japan, and dry rapidly, presenting a "flat" color. The number of coats of each material applied varies considerably with the individual painter, but the principle of the process is the same in all cases.

SURFACER PROCESS

The "surfacer" process on the other hand was devised to reduce the length of time which was consumed by the slow drying paints of the "lead and oil" process. The fundamental idea of this system is the rapid building up of a surface by specially prepared paints, upon which are placed the flat color and varnish. The special paints or, more properly, varnishes known as surfacers, are composed of a mixture of white lead, ochre or some other mineral silicate ground in specially made varnishes which dry very rapidly and thoroughly. There are several well-known systems of this kind in general use in car painting, all of which are essentially the same. The surfacers are usually divided into three classes. The first serves as a priming coat, the second as a loading material, and the third the same purpose as the rough stuff coats of the older process. These can be brought to a very high degree of finish with pumice and are really very little different from rough stuff. It will be seen that the essential difference between the surfacer process and the lead and oil process is in the preparation of a surface, both systems using flat color and varnish for the final ornamentation and protection.

COLOR AND VARNISH PROCESS

The color and varnish process, which as previously stated is of rather recent origin, to a certain extent falls under the heading of a surfacer process, but differs sufficiently to warrant separate consideration. The fundamental idea of this process is that the less number of coats of paint on a given surface, such as a car body, and the more similar these coats are, the less liability will there be for cracking, and, consequently, the more durable will be the finish. With this in view, the system is so devised that the first application serves as a priming coat and the second, of which several coats are applied, depending upon the condition of the work, builds up a surface which can be brought to a reasonably smooth finish with pumice or with sandpaper, preferably the former, on which is applied the body color ground in varnish instead of japan, and followed by a final coat of finishing varnish. It is the intention with this system to use as nearly as possible the same varnish for all of the coats, so that each will have practically the same coefficient of expansion and will so far as possible blend and form an elastic and homogeneous film. As a further economy in time and material, the priming and surfacing coats are generally colored the same as the body color, so that less of the color and varnish is necessary, and, as will be seen, the use of the varnish color does away with the flat color of the other two processes.

SANDING PROCESS

A fourth process which is used to a large extent is sometimes distinguished as the sanding process, but it is really a modification of the lead and oil process, the underlying principle being the same. This method consists in priming with white lead and oil followed by a plaster coat of white lead putty which affords a thick surface of lead that can be brought to a reasonably smooth finish with sandpaper. On the surface so prepared, the flat color and the varnish are applied as in the other processes. This method saves considerable time by omitting the rough stuff coats, but, aside from this and the method of obtaining the surface, which is by sandpaper instead of pumice, the process is really the same as the lead and oil.

MERITS AND DEMERITS OF EACH SYSTEM

It is impossible to pick out one method as being universally better than the others and the choice must depend upon the local conditions to a large extent. There are, however, certain inherent faults and virtues of each system which are not generally understood, but a knowledge of them is of material value in forming a correct idea of their relative value. It should be stated at first that, where time and money are no consideration, the lead and oil process unquestionably produces the best appearance, but the finish obtained is very much better than necessary or even desirable for street car work. This process is designed to prepare a surface of great brilliancy and smoothness and is admirably adapted to carriage and automobile painting. Its use, however, even for this purpose is rapidly diminishing on account of the expense necessarily involved. The process requires time, for white lead is slow in drying and unless allowed to set thoroughly before the next coat is applied will cause trouble later on. Any attempt to hasten this system by diminishing the time allowed for drying always results in inferior work. For the proper application of a system of this kind, from four to five weeks is necessary in finishing a car body, and the greater part of this time is consumed in allowing the various coats to dry. It is obvious, therefore, that with the demand for speed and the limited shop facilities of most railroads this process is not feasible for street car work.

The surfacer process can be properly applied in from two to three weeks, depending upon the facilities, the number of coats which the work at hand requires and other conditions of similar nature. While there is a considerable saving in time by this process, the actual cost of finishing a car by this method is little different from one finished by the lead and oil process, for although less coats are required the surfacers are expensive. If proper materials are used and applied by careful workmen, and there is sufficient time for drying, this method produces very satisfactory resuts both in appearance and durability.

The color and varnish process was devised primarily to shorten the time and to lessen the expense of car painting. It has been applied in eight days with apparently successful results, although the short length of time which it has been used does not warrant a final conclusion regarding its relative value. This method is beset by many dangers. The attempt to quicken the drying of the surfacers and other coats often results in destroying the life, and the alteration of the body of the surfacer in order to lessen the amount of work necessary in rubbing frequently results in producing a material which is not permanent. The body colors ground in varnish as contrasted with the flat or japan colors of the two other processes are an excellent thing if made in a suitable manner, but if carelessly prepared are subject to very severe cracking which obviously destroys the appearance of the remainder of the work, no matter how well done. The theory of this process is, however, more rational than either of the others, for less material is applied. The various paint films are more nearly alike in physical qualities and the cost of application is materially reduced. Although the finish produced is less smooth and less brilliant than that obtained by the more expensive methods, the difference is not noticeable after the car has been in service a short time. Too much attention has been devoted in the past to appearance and too little to durability, and when it is realized that the use of this shorter

method enables a saving of $20 to $30 per car, without impairing the life of the finish, it is very doubtful whether the superior appearance produced by the other processes justifies the added expense.

The durability of car finishes depends to a large extent upon the foundation coats, and special attention should be devoted to this point. White lead paints are excellent but on account of their slow drying properties are not satisfactory. Properly made varnishes, which dry quickly but thoroughly saturate the wood and preserve their elasticity and toughness, are the ideal materials. The same holds true with the following coats: Rough stuff gives excellent results if properly made and applied, but carefully prepared surfacing coats afford an equally satisfactory surface and require far less labor in rubbing, which is one of the most expensive parts of car finishing. There is also no reasonable objection to coloring the undercoats, and in this way reducing the amount of body color required. Japan colors present a handsome appearance after varnishing, but they involve much unnecessary work which can be avoided by the use of varnish colors. The latter serve their purpose equally well and at the same time reduce the labor of applying separate varnish coats.

The employment of the shorter systems is of very recent origin, and there are doubtless many defects which long continued service will reveal, but the common-sense principles involved and the very marked financial savings possible of attainment justify careful and thorough investigation of their merits.

THE PURCHASE OF PAINTING MATERIAL

While the actual amount of money expended in the purchase of material for car painting is not great on most railways, the direct financial loss produced by using inferior materials is very large proportionately. It is a safe statement that few supplies are purchased of which the purchaser has less knowledge than paints and varnishes and as a result the amount of money wasted is excessive. The purchasing agent as a rule has no specific knowledge of the various materials and imbued as he is with a desire to economize is constantly tempted to try the cheapest. On large railroads, experience has proved beyond a doubt that purchase under careful specifications supplemented by thorough inspection saves many times the cost of such work. The condition of the Pennsylvania Railroad system, which is an eminent example of this sort of procedure, is a guarantee of the results possible of attainment. The electric railway, however, which is not sufficiently large to maintain a competent testing department, can save a great deal of money by intelligent selection of materials.

VARNISH

The two items of purchase which cause the greatest trouble are varnishes and body colors. Railway varnishes can be purchased from $1 to $6 a gallon, but the average price for properly made varnish is around $3. Any company paying materially less than this amount is not obtaining a strictly high-grade product, at the present price of raw material. The more expensive varnishes are generally worth the price for certain purposes, but it is doubtful whether the demands of street car service necessitate their use. There is, however, no one varnish which is suitable for all parts of a car. Exterior varnishes are required to withstand exposure to weather and must be elastic and durable. They are generally composed of about 25 gal. of linseed oil to 100 lb. of gum, and dry slowly but maintain their elasticity for a long time. Seat varnishes on the other hand must dry quickly and present a very hard, glossy surface. To obtain these characteristics the proportion of gum is largely increased, the composition usually being from 6 to 12 gal. of oil to 100 lb. of gum. In addition a harder gum is desirable, in order to obtain a dense surface. For finishing interior woodwork, a varnish part way between these two should be used, as a certain amount of hardness is requisite, but at the same time such a varnish should possess sufficient elasticity to withstand the wrenching and twisting of the car body. Many of the complaints regarding poor results are due to the employment of the wrong varnish. A number of roads continue the use of rubbing varnish on exteriors on account of the handsome finish which can be produced, although experience has repeatedly shown its unfitness for this purpose. This varnish is a "short oil" varnish containing hard gum, dries quickly, and is capable of being highly polished with steel wool or powdered pumice, but from its nature is non-elastic, and readily cracks when subjected to the expansion and contraction of the car body. Other companies employ finishing varnish for interior woodwork, on account of its durability, but are constantly annoyed by complaints from passengers regarding soiled clothing, for such varnish does not become hard for a long time, and the heat of the body is sufficient to produce a decided "tackiness."

A large proportion of varnish troubles arises from using inferior or adulterated material. Good varnish should contain nothing but linseed oil, gum, turpentine and the necessary driers, and attempts to reduce the price by substituting rosin for gum or benzine for turpentine invariably result in short life and consequent increase in the actual cost of painting.

SELECTION OF BODY COLOR

In selecting a body color, the first essential is to choose a color which is composed of durable pigments and is suited to the local conditions. No colors are absolutely permanent, but certain ones are very much more so than others. As a general rule, the darker colors are less liable to fade than the lighter and more brilliant ones, mainly because the former are made from natural pigments such as ochre, sienna, lamp black, etc., while the latter are either artificially made, or are produced by the aid of a dye. All chemically produced pigments and dyes are not fugitive—in fact many of the most permanent colors are of this type—but all are subject to imperfections of manufacture which impair their usefulness. For this reason many steam railroads and concerns like the Pullman Company have adopted brown or olive green as the most satisfactory colors available, and there is an increasing tendency among street railroads to adopt the same practice. When local conditions require the use of brilliant colors, as for instance in hot climates where dark colored cars produce an unpleasant effect, those colors should be selected which are least subject to imperfections of manufacture, and which can be most readily matched when repair work becomes necessary. The use of very light colored pigments is particularly undesirable both on account of their inherent tendency to fade and to the dirty appearance produced as the varnish ages. All varnish however light originally grows dark as it dries, and consequently the color seen through this yellow film appears to be much more dingy and faded than it really is. Such a result is produced with all colors, but it is particularly noticeable with the lighter tints.

ORNAMENTATION

The demands of economy necessitate the reduction of expense in the striping and lettering so characteristic of the electric car of a few years ago, and unquestionably a material saving can be properly effected along this line. The only strictly necessary ornamentation is the number in plain figures in a conspicuous place, and in a few instances the name or monogram of the company. Elaborate striping and scrollwork with gold leaf is a needless expense, and in many cases detracts rather than adds to the beauty of the car. The use of transfers for applying small signs to the windows or woodwork offers a further opportunity for reduction of labor. A careful study will reveal many other chances for reducing expense, such as dipping the fenders in a quick drying asphalt paint, and spraying the trucks with a similar paint.

The progressive manager who purchases materials of good quality, adopts such methods of application as are based upon sound principles, and is not afraid to try new ideas simply because they are new, will find few items of maintenance in which greater proportionate savings can be effected than in that of car painting.

SOME THOUGHTS ON TRACK MAINTENANCE AND COST DATA

BY M. J. FRENCH, ENGINEER MAINTENANCE OF WAY, UTICA & MOHAWK VALLEY RAILWAY

The ideal system of maintenance is that under which the tracks are kept in good condition at all times. The old saying, "a stitch in time saves nine," is, in its broader meaning, true in its application to track maintenance. It is certainly not good practice to neglect a piece of track until cars pound at each joint. The rails become cambered and the paving is disintegrated until complete reconstruction is necessary. The increased expense of car maintenance, due to operation on poor track in many cases, would pay for proper maintenance of the track. As soon as a joint pounds under a car it should be repaired to prevent a mashing of the receiving rail. If attention is not given promptly to such joints, the pavement becomes loosened, the bonds broken and the joint plates destroyed. The enmity of residents is developed by low joints as surely as by worn pinions or flat wheels.

The cambering of girder rails as a result of low joints has made it necessary to scrap rails before they were otherwise worn out. In the year 1902, in Utica, N. Y., the ends were sawed from 9-in. girder rails that were cambered at the joints because the rails were otherwise in good condition for use. The rails were then relaid with patented base-plate joints on yellow-pine ties spaced 2 ft. centers, embedded in concrete. In 1906, although the rails were not worn out in the heads, it became necessary to remove them on account of the flat spots that appeared at the receiving ends of rails as a result of the camber. We placed on the same ties new 9-in. girder rails and welded the joints with thermit. As these rails had previously been drilled with six holes, 1¼ in. diameter, they were not well suited for thermit welding. We have had a few breaks on this new rail, but repairs were made promptly and the track now rides as smoothly as when first laid. The point which the writer wishes to make is that the original 9-in. girder rails might still have been in use had the joints been properly maintained after originally installed.

The rails welded with thermit were part of an order for rails which it was the original intention to lay with regulation 12-bolt joint plates. The rest of the rails were used on this same street in 1905, and 590 joints were welded with thermit. About 20 joints have broken each year since then. Repairs have been made with thermit, if the direction of the break was vertical and close to the old weld; otherwise Continuous or Clark joints have been used. The average cost for repairs of these joints, including repaving, is $8. The breaks occurred in very nearly the same places each year and if they had not been repaired promptly there would now be sections of the track which would require early renewal. As the repairs were promptly made the track is in uniformly good condition. Another line laid with the same kind of rail, but with only two holes at each end, located back of the usual point of breakage, has 182 thermit welded joints. Since the first year, when five breaks occurred at defective welds, there has been only one break in two years.

Labor for maintenance of 27.8 miles of track in the streets of the city of Utica, consisting of joint, rail and pavement repairs, resurfacing, repairing switches and derailers and all minor work in connection with maintenance, costs about $560 per mile per year. Track maintenance on private right-of-way costs about $175 per mile of track for labor. This is the cost of work performed by the regular section gangs, such as track walking, ditching, surfacing, lining, shimming, fence and crossing repairs, etc. The estimated cost of materials per mile per year is $468. But this information as a lump sum is of very little value. It would be of great assistance to know the cost for each item of work that makes up the general maintenance schedule.

The problem of compiling accurate cost data on track and roadway maintenance is one that should be given serious and thorough attention. Many roads are adopting standards of construction that differ only slightly from each other in details, such as concrete and steel tie construction with either

FORM 101

Main Street Car House. JOB NO. 6008

ACCOUNT NOS.

HENRY CONOLLY CO. ROCHESTER, N. Y. 12102 YEAR 1910 SHEET NO. 1.

DATE		VOUCH. NO.	QUAN	Account #3.	Account #5	Account #6	Account #8	Acct. #409.	Acct. #411	Acct. #431
Jany.	2	4620	10	7.20			12.20			
Feb.	10					6.50	28.40			
Mar.	20				2.10		9.30			
Mar.	23	5321	100					72.00		
Mar.	25								250.00	
Mar.	30									8000.00

Sheet A—Typical Job Distribution Sheet, Showing all Charges Distributed by Accounts and Forming an Index of Sheet B

FORM 100

Main Street Car House. JOB NO. 6008

HENRY CONOLLY CO. ROCHESTER, N. Y. 12014 YEAR 1910 ACCOUNT NO. 8 SHEET NO. 1

DATE		ITEM	LABOR	MATERIAL	TOTAL CHARGE	FOL.
Jan. 2	1910.	Surfacing #6 Track	12.20		12.20	
Feb.10	1910.	Placing Switch to #2 track	28.40			
Feb.15	1910.	Repairing Joint Plates #3 Track	9.30		37.70	

Sheet B—Typical Detail Job Distribution Sheet, with Description of Account Work and Monthly Totals

9-in. girder rails, high T-rails or heavy sections of the standard steam-road rails. Another group is returning to wooden ties. Some are using inferior ties treated with preservatives, others are employing the best ties that can be obtained, imbedded in concrete as a preservative. The question of the proper joint to use is a vital one with all roads. With a standard system of keeping track accounts, and with concerted effort, track engineers should be able to determine within five years the type of joint that will give best results. It should not require over 10 years to solve our tie, rail and pavement problems in a satis-

factory and conclusive manner, if 20 or 30 of the larger systems will work in concert under some definite plan of keeping costs.

To bring the subject to the attention of the readers of the Electric Railway Journal the writer will describe the system that has been in use by the Utica & Mohawk Valley Railway Company since Jan. 1, 1910, in connection with a job-order system.

Beginning at the Utica terminus of one of the main lines of the system a job number is given to each piece of special work, each piece of track between specials or certain limits, each office building, station, car house, amusement park, bridge or any other structure on that line. Each line is taken up in turn as it radiates from Utica. On private right-of-way the numbered car stop signs form the dividing points of the sections, and each section is given a job number. The plan is that each job number will apply continually to that particular section or object as long as the system is maintained. Each job number may be chargeable with work under any of the numbered construction or maintenance accounts as established by the Public Service Commission of New York State. For example, the Main Street car house is designated as Job No. 6008. The track repair labor in this car house would then be charged to Account No. 8—Job 6008; the track bonding in this car house would be charged to Account No. 23—C—Job 6008; the ties used in the car house would be charged to Account No. 3—Job 6008. It will thus be seen that the job number fixes for all time the location of the charge for either material or labor and it is possible to determine at the end of any week, month or year just what that part of the system has cost for any particular kind of maintenance or for its entire maintenance. To keep this record, a well-defined system of time-keeping and storehouse and office book-keeping must be maintained. A brief description of this system follows:

The foreman of each gang gives the time-keeper a daily report of the nature and amount of work performed. The time-keeper makes a daily report of hours, rates and cost distributed according to account numbers and job numbers. A copy of this report goes to the auditor's office, where the charge is made on the card bearing the job number and in the column headed by the proper account number, the date appearing in the first column at the left. All materials must pass through the storehouse and the stock-keeper is responsible for the reporting of account and job number for all materials sent out. His detail report goes to the auditing department and each charge is properly entered on the job card under the particular account to which it belongs. The auditor's clerk does not make out a job card until he has an item to charge against that job number. In this way the number of job cards to be handled is kept at a minimum. Monthly and yearly statements are drawn off from these cards.

The total cost to date of any piece of construction or maintenance can be readily determined from the job card. Thus it is possible to tell the cost of track maintenance on one type of construction compared with the cost on another kind of construction, as each type of construction on any street may be given a job number. Some items of labor, such as track walking, cleaning and sanding tracks and removal of snow and ice are given separate job order numbers that refer also to the accounts. For instance, removal of snow and ice in the entire city of Utica is charged to one job number, and the same service in another town or track section is charged to another job number. There is no need to keep such work in greater detail. The work of reporting by foreman and timekeeper would also be too burdensome and would not give information of any particular value so far as small zones are concerned.

The time-keeper, foremen, material clerk and auditor's clerk who have to use or fill out these job cards have books giving all job order numbers arranged consecutively under alphabetically indexed headings of each particular street, line or section.

Under the system of accounts adopted by the Public Service Commission of New York State "additions and betterments," or construction work, is embraced under a separate group of account numbers which identify work of that character at once, so that charges may be made under the job number, as already outlined. As an example, an extension to Main Street car house would be charged to Account No. 431—Job 6008; new special work for an additional track would be charged to Account No. 411—Job 6008 and new ties for this track would be charged to Account No. 409—Job 6008. The job and account forms shown on page 612 illustrate the method of entering the maintenance charges described above. If the cost of some particular section not definitely described by job orders already in use is desired, the auditor's clerk will assign a job number to the work after he has been given a proper description of it.

Another essential in the standardization of track accounts is a standard book of rules for the maintenance of way departments, so that each section and company may base costs upon the same practice, so far as possible. The rule book should contain in front the general rules applicable to all employees, with the same wording used by the American Street & Interurban Railway Transportation & Traffic Association in its codes of interurban rules and city rules, so far as they may affect maintenance of way employees in the discharge of duty. Standard practice can be illustrated by drawings showing track construction of the various types in streets and on right-of-way.

COMMUTATOR SLOTTING AND ITS RELATION TO BRUSHES AND MICA

BY C. W. SQUIER, ENGINEER IN MECHANICAL DEPARTMENT, BROOKLYN RAPID TRANSIT SYSTEM

For several years the subject of slotted commutators has been an active one at the meetings of the different electric railway associations. While it is the general opinion that the slotting of commutators, together with the use of a higher grade brush, has reduced to a large extent the trouble due to flashing and flat spots on commutators, there are still some railways which find that the results obtained do not warrant the trouble and expense necessary to keep the commutators properly slotted. This question has been asked several times: "Why should it be necessary to slot our commutators now when for a good many years the very same motors have been running all right without slotting?"

Unless we keep an accurate record of our motor troubles for comparison, we are quite liable to forget the troubles we have had, and to consider only those which we are having at present. Nevertheless, the present conditions of railway service are more severe and the operating voltage is usually much higher than those in vogue a few years ago. Motors which were designed for 500 volts and operated at this potential in the past, now are running at 550 volts and 600 volts. This increased voltage and greater severity of service cause more sparking at the brushes, thereby burning away the copper bars and disintegrating the mica between them. If the various motor troubles be analyzed it will be found that about 50 per cent of them can be traced directly to the flashing from the brush-holders or commutators to the shell or from brush-holder to brush-holder. These flash-overs are responsible for the carbonization of the motor parts, flat or rough commutators and the grounding of brush-holders and commutators. Since the flashing in most cases is caused by sparking at the brushes the problem which we are endeavoring to solve by slotting commutators is to reduce this sparking as much as possible. The slotting of the commutators permits the use of a softer grade of brush, which has better conducting qualities than a brush with the cutting qualities necessary to keep down the mica in an unslotted commutator. This treatment will reduce the sparking at the brushes to some extent. We also are able to provide a better contact between the brushes and the commutator by slotting and thus reduce the sparking brought about by high mica or improper contact. There is little to be gained by slotting the commutators on roads where the brushes used have the cutting qualities necessary to keep the mica down as fast as

the copper is removed without abnormal wear of the brushes and commutator, and where it is found that such brushes have sufficient conductivity to meet the service requirements. However, if an electric railway is troubled with high mica, leading to rough and flat commutators, and it cannot find a brush of proper conductivity to keep this mica down, it should resort to slotting as a means of securing the desired results. In the discussion of this subject at the December, 1909, quarterly meeting of the Street Railway Association of the State of New York (published on pages 1232 and 1233 of the Electric Railway Journal of Dec. 18, 1909), the point was brought out that it might not be necessary to slot commutors if the softest grade of amber mica was used. Soft mica is liable to cause trouble, however, as it does not have sufficient resistance against compression and will squeeze out and distort the shape of the commutator. The best methods seem to be to use mica which is hard enough to prevent the commutator from losing its shape and then to slot out the mica to a moderate depth wherever necessary.

For the past year and a half the Brooklyn Rapid Transit System has been slotting the commutators of its 150-hp elevated service motors. When the commutator is slotted, there is installed a type of brush which, through service tests, has been found to be the best for use on slotted commutators. The total number of motor flashes for the last nine months is 30 per cent less than for the nine months immediately preceding the inauguration of the slotting practice. Furthermore, it is found that the number of cases of motor troubles as a whole has been rapidly decreasing as the number of motors with slotted commutators has increased. Formerly it was found necessary to turn these commutators every time an armature was removed; now, it is not necessary to turn a commutator oftener than once a year. At the present writing, 92 per cent of the Brooklyn 150-hp motors are run with slotted commutators. The company is also slotting as rapidly as possible the commutators of all motors used on the surface lines, but this work has not progressed far enough to allow a comparison of results. The surface motors are from 25 hp to 60 hp capacity.

Several types of machines have been tried for slotting commutators, but it has been found that those equipped with a circular saw or milling cutter are the most efficient. Machines of this type when mounted on a lathe and driven by a motor or belt from the lathe, can be used to good advantage on a road where all armatures are sent to a central point for maintenance. When the slotting is done at branch overhauling and inspection shops it is more advantageous to have a small portable air-driven machine. The armature can then be removed and supported on a couple of stands or by some other convenient method and the machine carried to the work. It is not necessary to use a lathe with this portable tool, a point which is worth noting in shops where the lathes are kept busy all the time on other work. The saws which have been found best are 7/8 in. diameter with 18 teeth, and are of the same thickness as the mica to be removed. The average number of saws used per commutator is 2¾. The slotting is 1/8 in. to 3/16 in. deep, and a man with one of these air-driven machines can slot from 12 to 15 commutators in 10 hours. A great amount of this time, of course, is consumed in changing saws, oiling the machine, etc.

After the commutator is slotted the saw leaves a slight burr on the edge of the slot. This burr is removed and the commutator sand-papered and polished. The slots are then cleaned and blown out with compressed air. It is necessary that the slots should be cleaned with great care, for if any mica is left at the edge of the slot the desired effect of the whole process will be lost. The motors and the commutator slots should also be blown out with compressed air at each inspection after the motor is placed in service, special attention being given to see that no carbon or copper dust is allowed to accumulate. The depth of slot that can be most satisfactorily used will depend on the ability to keep it clean. The shallow slot can be kept free from dirt and dust more easily, but the work of slotting necessarily would have to be done oftener.

MAINTENANCE PROVISIONS OF CLEVELAND ORDINANCE

BY H. J. DAVIES, SECRETARY AND TREASURER, CLEVELAND RAILWAY COMPANY

The new franchise ordinance recently passed by the City Council of Cleveland, granting to the Cleveland Railway Company a renewal of its rights to operate its railroad in that city, contains some unusual and some unique provisions, among them provisions for the maintenance of the physical property of the company.

According to the ordinance, the capitalization—bonds, floating debt and stock—of the company is the value of its property as determined by R. W. Tayler, judge of the United States Court in the Cleveland district, sitting as an arbitrator selected by the city and the company, and not as judge. This value is called in the ordinance "the capital value of the company." Upon this value, and upon additional capital that may be invested in additions, extensions and betterments, interest at limited rates is to be paid.

The property is to be maintained in a condition that will keep it worth at all times 70 per cent of the cost of reproducing it new.

The ordinance provides an allowance of 11½ cents per revenue car-mile, exclusive of car-house and car-yard miles, for operating expenses. The surplus above this allowance, and above the maintenance allowance, is to go into what is called the "interest fund," out of which all taxes, interest and dividends are to be paid; and any surplus in this interest fund above operating expenses, maintenance reserve, taxes, interest and dividends is to be absorbed in the reduction of fare.

The specific provisions in regard to maintenance are the following:

"In addition to the car-mile operating expense allowance, there shall, in the following months, be deducted from the gross receipts the following sums, to wit:

"In January, February, March, April, May and December 4 cents per car-mile, November 5 cents per car-mile and in June, July, August, September and October 6 cents per car-mile, the deductions being made for revenue miles, exclusive of car-house and car-yard miles, made by cars equipped with motors, and 60 per cent of said rates for similar miles made by trailers operated during said months.

"The sum so deducted each month shall be placed to the credit of the maintenance, depreciation and renewal account, and shall not thereafter be expended for any other purpose whatever. The sum so set aside shall, if not needed for immediate maintenance or renewals, be accumulated, and may from time to time be invested in the bonds of the company, or in the payment of its floating indebtedness, to the extent that the same form part of the capital value of the company; and, to facilitate the investment of said fund in such bonds, the company shall, in any bonds hereafter issued by it, stipulate the call price and conditions provided in Section 16 hereof; but if the amount so invested or paid is at any time needed for maintenance and renewals, the company may, for that purpose, issue new mortgage bonds, or incur new floating indebtedness, to the amount of such investment or payment, with the interest that would have accrued thereon, which new bonds or floating indebtedness shall become part of the capital value of the company.

"The amounts per car-mile allowed may be increased or decreased from time to time by agreement between the city and the company, so as to enable the company to meet the legitimate expenses of operation, insurance, accident and damage claims, and to prevent or make good any deficit on account of such operating expenses; and also the amount required to be set aside for maintenance, renewals and repairs may be similarly increased or decreased by agreement; and, in the event of disagreement, any such increase or decrease in either car-mile allowance shall be submitted to arbitration. Any surplus in the hands of the company at the expiration of any period of six months remaining unexpended for operating ex-

penses, as hereinbefore provided, out of the car-mile allowance provided by Section 19 hereof, exclusive of the amount required to be credited to the maintenance and renewal account, shall be placed to the credit of the interest fund.

"The intent hereof with regard to the sum authorized to be set aside for maintenance, depreciation and renewal is to enable the company to maintain, renew, replace, preserve and keep its railway system and property, and every part thereof, and all extensions, betterments and permanent improvements hereafter made pursuant hereto, in good condition, thorough repair and working order, the standard of such condition, repair and working order being an average for the entire system of 70 per cent of its reproduction value; and the car-mile allowance provided for the purpose of maintenance and renewal shall not at any time be diminished, unless the value of the property of the company and the amount accumulated in the maintenance and renewal fund aggregate more than 70 per cent of the reproduction value of the said entire system."

These provisions grew out of similar provisions that were contained in the lease that the company made of its property to the Municipal Traction Company on April 27, 1908, and the discussions that preceded the making of that lease. As the company, in leasing its property to the Traction company, was entrusting it to that company for operation and maintenance, and as the Traction company had a capital stock of but $10,000, only $1,000 of which had been paid in, it was important that the lease contain provisions that would compel proper upkeep of the property. Before the making of the lease, Tom L. Johnson, then Mayor of the city, and F. H. Goff, the company's representative, as arbitrators, appraised the physical property and franchises of the company. The value of the franchises was determined to be the then present worth of the future surplus earnings of the company, and in ascertaining the surplus earnings it was agreed by them that the cost of repairs and renewals of the physical property had been in the past, and would probably be in the future, about 5.85 cents per car-mile. In the making of the lease, the company asked that the lessee be required to set aside as large an amount per car-mile as the arbitrators had determined to be proper in their estimate of franchise value, contending that the fund or reserve should be ample to protect the company against deterioration or waste by neglect or mismanagement at any time within the 50-year term of the lease. The Municipal Traction Company, on the other hand, asked that the maintenance requirement be not more than 5 cents per car-mile. A compromise was agreed upon, and was expressed in the lease in the following language:

"That the Traction company will, during the term of this lease and any renewal hereof, keep an account known as 'maintenance and renewal account,' and will credit to said account and charge to operating expense account each month a sum equal to 5 cents per car-mile during the first year from the delivery of possession hereunder, 5¼ cents per car-mile during the second year, and 5½ cents per car-mile during each year thereafter until readjusted for each car-mile made in the operation of said street railways subject to this lease; and in ascertaining the same the mileage made by trailers not equipped with motors shall be computed at one-half the rate of motor cars. And against this account may be charged all expenditures and disbursements made for maintenance, repairs and renewals."

The rate was to be lower in the first two years than in subsequent years; first, because the Municipal Traction Company claimed that a fund of 5 cents per car-mile would be sufficient to enable it to keep up the property, and, secondly, to give it a better chance to make good its promise to the people of 3-cent fare.

In the discussion of last winter, preceding the passage of the "Tayler ordinance" (the present franchise), the Cleveland Railway Company asked that the maintenance, renewal and depreciation reserve account be credited with 5½ cents per car-mile, basing its request upon these provisions of the lease and the Goff-Johnson valuation of franchises, as expressing the judgment of those gentlemen, and of all concerned, as to the amount necessary for this purpose. As the quotations from the ordinance show, however, the amount fixed is an average of substantially 5 cents per revenue car-mile for the year, divided among the months in the proportions stated, but with a proviso that, if the allowance shall turn out to be inadequate or excessive, it may be increased or diminished.

As the ordinance contains an option to the city to purchase the company's railway at a fixed price at any time that it may have authority to own and operate street railroads, it is to the interest of the city that the system be maintained in good condition and thorough repair, in order that it may, if it purchases, acquire a property equal in value to the price to be paid. It is to the interest of the company, of course, that the property be kept up, and especially so because the ordinance reserves to the city a right to purchase at the end of the grant—in 1934—not at the price fixed in the ordinance for earlier purchase, but at the value at that time of the physical property only. If the property is permitted to depreciate, the company will receive for it less than "the capital value of the company."

THOUGHTS ON SHOP ORGANIZATION

BY A MASTER MECHANIC

The shop foreman is confronted with the problem of making good with the accepted methods of application of various kinds of apparatus, comprising car and other equipment. Most of these methods have been developed to a high state of efficiency through a long and expensive experience and cannot be greatly improved upon. Therefore, the main question with the shop foreman is how to get the best results from them. Loose gears and pinions are not the result of poor design. Manufacturers, as a rule, furnish material that is correct both as to design and detail, but error can be easily made in application. Given an armature shaft and pinion in good condition, there still remains the important fact that the pinion must be put on right and this applies with equal force to all other details of apparatus. First, the items of each detail must be correct and then the detail must be correctly applied. The first must be furnished by the manufacturer and the second by the maintenance force.

The problem is how to train that maintenance force to correct work. This is difficult because of the lack of mechanical training generally found in the class of men available for railway shop work. There are a good many of the "can-do-anything" class of men, and some foremen seem to favor that sort of an organization. The writer greatly desires to be saved from such. In a shop of any size, specialization is the best method to obtain results. If two or 50 pinions are replaced in a day or week, select one man to do it, and keep him at it. If, after being thoroughly trained, he is worth keeping employed, he will prevent loose pinions. If it is not possible to keep him fully employed at special work of the same character, let him work as helper to some one else who is a specialist in adjusting brush holders or wiring the field circuits.

The gear man may be worked as helper with the wheel-press man. He becomes skilled in replacing gears and is responsible for all of them. He will learn to keep the bolts just below the breaking strain, will be sure to report poor fitting keys or keyways, bad gears and seats to the machine shop, and, in fact, will act as a check on the work of the latter.

In the armature and wheel-replacing gangs work should be divided so that the same jobs are done day after day by the same man in accordance with the knowledge of the foreman. One man in each gang should be held responsible for the general inspection of trucks and motors, which should be made every time the car is over the pit. The regular inspectors should not be depended on for this. Make inspectors of the pitmen. Operations such as pressing on wheels, setting gears and pinions, adjusting brush holders, wiring field circuits, connecting motor leads, fitting bearings, etc., require skill and should be specialized. On the other hand, such work as replacing worn or loose bolts, brake rigging, pins, etc., reporting

loose gears and pinions, wheels, armatures or any other defects, should be regarded as within the province of every shop man.

This end, however, can be attained only when the esprit-de-corps of the organization is of a very high order. The cultivation of this spirit of mutual help is the most important function the foreman can perform. He must possess very pronounced characteristics for patience, courtesy and firmness, and be absolutely square in all his dealings with all of his men. Patience is necessary to train those slow of comprehension and generous sympathy must be shown with their small failures. It generally happens that the slow man is very dependable after he once "catches on." Courtesy to every man, from the lowest pitman to the highest skilled mechanic, pays big in the respect awarded the foreman by all rightly constituted men. Firmness is a quality that can be easily abused. It is not the proper quality when exercised to push through some plan or method after being convinced of error. Squareness must be apparent in all the little disagreements that arise between the men and in the allotment of work. There is then an occasional man who cannot be made suitable to the environment. That man must be discharged. Initiate a feeling among the men that their jobs depend only on themselves and that no one can undermine them. Eliminate petty bickerings and produce the co-operation of interest that produces success.

I have in mind a shop organization that has been very successful in carrying out routine work. It maintains about 150 motor cars and some trailers and supplies other shops with wheels, axles, bearings and occasional stock orders for the general storeroom. No extensive car body repairs or painting or winding are done at this shop, as those departments are handled at the main shop. The foreman has charge of the shop, the inspectors and the building. The clerk to the foreman is also the storekeeper. There are two carpenters, one of whom takes care of all minor repairs, such as windows, doors, bell ropes and fare boxes, while the other carpenter, who assists the first when necessary, also keeps up the repairs on drip rails, drawheads, bolsters and such vestibule and body work as does not require a thorough painting operation. Two blacksmiths and one helper attend to all blacksmith work required on cars, some track department work and a considerable amount of stock work for the main storeroom. One machinist does miscellaneous jobs, such as putting keyways in axles and armature shafts, making keys, manufacturing and keeping in repair all jigs and tools for this shop, repairing ratchet drills, gages and track jacks for the track department and all emergency jobs that arise. A second machinist turns commutators, bores bearings, fits all bearings to armature shafts, puts on pinions, straightens and sleeves shafts, makes pinion nuts and oil collars, etc. A third machinist turns axles and bores axle bearings for main storeroom stock. One wheel pressman, who bores wheels for about 325 cars, examines and tests all axles and presses on all wheels. One helper, who assists the wheel pressman, does all gear work and much of the drill-press work. Two electrical and air-brake men repair and clean controllers, circuit-breakers, automatic governors, compressors (do not oil compressors), engineer's valves, pipe brush holders and trolley poles and inspect the sprinkling system daily. Four pitmen, divided into two gangs, for motor repairs, remove and replace armature fields, axle bearings, gear casings and inspect and make light repairs on trucks. Three other pitmen remove and replace wheels, repair trucks and motor suspensions. One working foreman oversees the armature and truck gangs and places cars. The fireman who runs the steam plant is relieved by the night watchman. There are three general utility men whose time is divided between rough work in the machine shop and pit work; they are also used to take the place of absent men. One man is employed to clean the shop, paint fenders and trolley poles and attend to miscellaneous matters of minor importance. One man makes babbitt bearings for 325 cars and keeps shafting, bearings, and belts in repair.

While this organization has many weak spots no doubt, it certainly has its work well specialized and co-operative, harmonious methods have been developed in it to a high degree.

SPECIAL METHODS OF MAINTENANCE

BY ALBERT B. HERRICK

Your journal devotes an annual issue to maintenance, and thus gives special recognition to the importance of this problem for electric railways; and it is important for our industry because the increasing cost of labor and materials against the fixed fare is acting to produce a diminishing return on the investment.

Other industries have studied maintenance more thoroughly than has been the case with electric railways. The writer was privileged recently to examine the graphical records of a steam railroad, the records of which are carried in detail to a practical ultimate. Taking the bridges for illustration, the record showed graphically how much timber was put into each bridge for a series of years past. Further, the manager was able to predicate how many thousand feet of timber would be needed for each of a certain number of future years to maintain the average condition of the bridges, and what share should go into each particular bridge. The same railroad's records showed similar information for the other parts of the property. The operating elements which were plotted even included the individual monthly wage of many thousands of employees for months past, and all within the most compact limits. In approving the pay-rolls the general manager merely glanced down the charts and with the least mental effort saw how each wage payment compared with previous months and what names had been added and omitted, so that his approving signature became an act of really intelligent understanding. The maintenance of this steam railroad was guided by a master mind.

The electrical features of street railway maintenance may seem more elusive, yet they are not beyond control by suitable means. In the medical field we see a great effort made for the prevention of diseases. We see public campaigns carried on to prevent tuberculosis and numerous sanitariums established to avoid the necessity of resorting to hospitals. In railway operation accidents are the parallel to human diseases. Are the railway companies taking the same preventive measures?

The annual maintenance of our electrical railway systems is estimated to cost about $50,000,000, of which a substantial share is in the maintenance of the electrical equipment. Extensive experience enables the writer to predict confidently that one-half of this electric maintenance of cars can be saved by means he will proceed to outline.

What are accidents? The dictionary defines them generally as "anything that happens without design," or as "an unforeseen effect," and specifically as "an unfortunate happening," and finally as "non-essential." Now, the things that happen without design and are unforeseen and are unfortunate happen in the majority of cases from lack of foresight, and are "non-essential." This is particularly true of those accidents which repeat themselves month after month, so that their recurrence in succeeding months can be predicted. Each accident should be analyzed in all its relations, and it should be charted and compared with every previous accident, and the combination of conditions which permitted it should not be allowed to occur again. Improvements in the method of repairs are not needed so much as improvements in the method of prevention. Those happenings which repeat themselves too often should be called carelessness—not accidents.

Too often have breakdowns been ascribed to unavoidable service conditions caused by heavy grades, frequent stops and similar operating conditions. Yet it is evident that other elements control when broad investigation has proved that roads with heavy service conditions in severe climates have the least maintenance charges.

The general manager has records to show how many cars broke down the preceding month and how many cars were still out of service and undergoing repairs, but what does he have to show the dependence to be placed on those in service? The master mechanic may be skillful in making repairs economically and promptly, and probably shows great industry in improving

methods of repair, but does he spend an adequate time in precautions to avoid breakdowns? Most breakdowns occur on a grade or other point of maximum load, and are too often ascribed wholly to the grade. In truth, the grade has simply been the "straw to break the camel's back" and the equipment was overloaded all the while by unequal fields or other maladjustments. The master mechanic cannot be blamed for such a breakdown if he does not have the means to discover the maladjustments in advance.

Maintenance has three principal relations to operation: namely, quality of service to the public, because breakdowns affect quality; safety of transit, because accidents imperil the passengers' safety; and dividends to the stockholders, because improper methods of maintenance diminish dividends. It is the purpose, however, to restrict this article to the electrical maintenance of cars and the circumstances that have led to the writer's present development of special methods and apparatus. Some 25,000 inspection tests have been made for clients by him according to the means described.

In law suits on electrolysis, adverse witnesses would testify to finding a few defective rail bonds and leave the impression that all were poor. To controvert such an impression, it became necessary to measure all the bonds. A man walking along the track could not do it fast enough nor accurately enough, and human elements were involved in recording the measurements. Thus the writer was led to develop an apparatus which could be placed on a car, and while traversing the track measure the individual resistance of each bond and record it on paper without human intervention. This apparatus has been developed so that each bond can be measured accurately and the measurement recorded autographically on paper in one-thirtieth of a second. Track bonding of nearly 200 companies, and over 15,000 miles of track, has been thus measured. The apparatus is adapted for measuring the ohmic resistance from the power station to the test car of the overhead and return circuit, and likewise to record data on physical conditions, such as gage of track, position of trolley wire, poles, etc.

In the inspection of cars it was found necessary to provide apparatus which would make the required tests without disturbing the connections on the car, which could be used by the class of employees available in a car house and yield correct results and without damage to the instruments from improper connections. Such apparatus has been sold to several clients. For example, it is used in Philadelphia in the maintenance of some 3000 cars; by the Public Service Railway Company of New Jersey in the maintenance of nearly as many cars; by the Metropolitan Street Railway Company, New York, and other companies.

The writer has now combined these methods for the purposes of car inspection, the apparatus producing its own record on paper with a high degree of accuracy and at incredible speed. A general inspection of the car can be recorded within 40 seconds in the car-house or on the road. Such apparatus is usually set up for service on a car, and the inspection can be made in the car-house or at the end of a line while the cars are in service, and without delay to the schedule. If a car on the line is found in an unreliable condition it can be turned in.

The measurement is recorded instantaneously by an electric spark, and the apparatus will not act to produce an incorrect record. Each part of the apparatus is measured in terms of its standard, and a simple inspection of the record shows the faults without computation, comparison or other labor. The records can be produced in duplicate, or mimeographed in any desired number for various officials.

The general inspection shows the resistance of each rheostat step and of the motor armatures and fields. The motor resistances are checked by inductive measurements which are necessary and highly valuable to discover unequal pairing of fields, unequal division of load between motors and similar causes so prolific of breakdowns. If a magnetic joint is imperfect through paint, shims or other causes it will be recorded. The general inspection shows if a following detail inspection is needed further to localize any faults. This detail inspection includes the compressor motor, headlight, circuit-breaker and all auxiliary equipment, and measures by magnetic means and records in inches the position of armature in field to the sixteenth of an inch. This detail inspection ordinarily requires less than two minutes.

This apparatus has been designed to produce all needed practical measurements with laboratory accuracy and to record the same mechanically, without human error in observation or record, free from the illegibility of much ordinary writing. A clever employee from the car-house force, thoroughly familiar with all electrical connections of equipments, can operate the apparatus readily. Three thousand cars per month can easily be inspected with ordinary activity. The method and apparatus are not intended primarily to locate and measure damage that has already occurred, but to show up the maladjustments of equipment for preventive treatment against damage, and thereby to raise the condition of equipment to a higher standard and maintain it at a far less cost.

Any art develops along lines of specialization, and the attractiveness of maintaining the dollar invested at its highest physical value has been the motive of producing these mechanical-electrical methods of inspection with automatic features and autographic records. The master mechanic is furnished with a reliable foresight for the prevention of breakdowns; the general manager receives condition reports mechanically registered without human bias of every electrical equipment running or disabled, and rests in the confidence of furnishing a better service and larger dividends.

PREVENTION OF ACCIDENTS*

BY E. F. SCHNEIDER, GENERAL MANAGER, CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY

It costs the people of the United States $125,000,000 each year for preventable accidents. According to figures which I have recently compiled, less than 2 per cent of all accidents upon railroads are due to hidden defects or the acts of God. About 13 per cent are due to the negligence of the public and 85 per cent are due to the negligence of the employees. The time has come, therefore, when we must devise means to prevent accidents because the greater number are the fault of our employees. We can no longer tolerate accidents from either a moral or a financial standpoint. We cannot correct the trouble, nor can we diminish the cost by the ordinary methods which have so long been in vogue. Payments for accidents have increased from year to year on both steam and electric roads. The reason is that with all the safeguards used the number has not diminished and the cost has been greatly increased. The greater cost is reflected not only in the larger judgments against us, but in the legal expenses, because it is a question now when we get throngh with a case whether the victim, the expert surgeon, the expert engineer, the expert detective, or the high-priced lawyer has received the most of our money.

I was brought up in the old school which followed the theory that almost every claimant should be considered a fraud. That day has gone by, but we still do too much fighting and too little thinking. If we had spent one-half of the money preventing that we did fighting, our accident account would not have been so great. In following steam railway practice in the claim department we have overlooked one fact, and that is that the majority of accidents on steam roads happen to employees of the road or trespassers, and the minority to passengers. On the electric lines the conditions are reversed; the majority of accidents happen to passengers and the lesser number to employees or trespassers. Accidents to employees or trespassers are of course much more easily adjusted than with passengers, but even employees are getting harder to deal and settle with than formerly.

As most steam railroad accidents are made up of injuries to employees or property damages, these companies attempted

*Abstract of paper presented at meeting of Central Electric Railway Association, South Bend, March 24, 1910.

to mitigate the accident situation by discipline and the use of appliances designed to remove the human element in railroading. This latter policy I consider incorrect. We want the human element, but that human agency should be educated in the business to be performed. I have heard managers say that a motorman is not a good man until he has had an accident. That is a mistake. All he needs is to have the matter brought to his attention in so graphic a way that it will make a lasting impression upon him. I do not believe in discipline as it is ordinarily meted out, 5 days, 10 days, 30 days, discharge. That kind of discipline does not correct evils any more than a workhouse sentence reforms a criminal; it hardens him. If a trainman is not sure of his position, if he feels that at any time something may happen and he will get discharged, he almost unconsciously acquires a devil-may-care spirit which is reflected in his work. His idea is to keep within the rules of the company if he can and cover up his mistakes if possible when trouble comes. This idea creates the spirit which tends toward the abuse of the machinery with which the man has to work, so long as he can do it without being found out.

I assure our men personally that we appreciate the old men, their services are valuable, their advice is valuable, their experience is valuable, the longer they stay, the better suited we are. We do not want discipline, we do not need discipline, but we do want every man so to do his duty toward his fellow beings and toward his company that there will be no need of punishing men.

Employees do not of themselves nor among themselves take up this question of preventing accidents further than as a matter of gossip. They seem to think it is not a question with which they should bother very much. It is a question for the management to solve. James O. Fagan, the signal tower man, has said, "Railroad managers sooner or later will come to understand that the one thing needed in the railroad business at the present day is to educate employees to appreciate the fact that successful and safe railroading in the future will have to depend, not upon the multiplication of safety devices, nor upon the reconstruction of rules, but upon the personal effort and conduct of conscientious, alert and careful men."

During the year 1907 it was my unfortunate lot to pass through a series of the most harrowing and heart-breaking accidents. I took upon myself at that time, and later, when I had time to collect my thoughts and plan for the future, a large share of the responsibility for those wrecks. I had known something was wrong but did not appreciate it at the time, and I made up my mind that I would get rid of that feeling of responsibility, and would at least try to do my part. Our road was well officered and well operated. Discipline was carefully, judiciously and conscientiously administered. I finally made the suggestion to one of our superintendents that I would like to meet our trainmen and talk the matter of accidents over with them. This was done. I had never made a speech or talk of any kind in my life, but my mind and heart were so full of this question that having prepared a talk for the trainmen I was bound to give them the ideas I had collected. My first idea was to impress upon their minds that we ought to look upon this question primarily from a social, moral and humanitarian standpoint, and secondarily from a financial standpoint. I tried especially to have them put themselves in the places of the victims and their families, and would ask them their feelings toward the negligent trainmen should their wife, sister, brother, father, mother or children be injured or killed under such fearful circumstances. Then I would put the financial loss into average fares, and when they found that we had to carry not only thousands but hundreds of thousands of passengers to pay for one wreck, they appreciated more fully than they could otherwise, the relative cost.

I have worked for over two years, talking to the trainmen every 60 days, giving them the best ideas and thoughts that I could collect, illustrating them with actual cases from our own experience when possible; when this was not practicable, drawing conclusions and illustrations from the misfortunes of other roads. At these meetings we try to keep out all extraneous matter, and as far as possible confine our discussions to the sole topic of accidents and how to prevent them.

Some roads make the mistake of having the meetings which relate to accidents held by the operating department. These meetings should be held by the claim department in order to exclude all operating questions unless they relate directly to the matter at hand. I have tried to hold meetings just often enough not to have them become irksome or burdensome and have spent a great deal of time preparing for them. My talks are usually about 45 minutes long and our meetings last from 2 to 2½ hours. It takes eight meetings to cover our road. I have tried to arrange for them when possible just before special occasions when it is necessary for trainmen to be more careful than ordinarily, such as before the Fourth of July, before fairs, when the leaves commence to fall, before the holidays, etc. I have also had special meetings for employees other than trainmen, namely power house and sub-station men, car barn men, line men and track men, and I want to say, gentlemen, you will feel proud of the men who wear overalls if you ask them to meet with you and discuss with them the moral proposition that they owe a duty to the public and the public is looking to them so to do their work that it may come to no harm. You will see these men interested, and when they promise you, as I hope they will, and as they have promised me, that they would co-operate with the trainmen and with each other to the end that their road would be one without accidents either to the public or to each other, you will feel more kindly toward them, and when you see them shoveling coal, working in the pit, climbing a pole or tamping ties, you will be more apt to exclaim with Robert Burns, "A man's a man for a' that."

In making the assertion that we were eventually going to run the Southwestern without accidents, one of our men said, "What are you going to do about the public?" "What are you going to do if a rig drives in front of the car or school children run in front of the car?" My reply was, "When you take care of your part as employees, without fault or negligence, I will devise ways and means to take care of the public." I wondered then whether I was doing my whole duty or not.

We have had several unfortunate accidents with school children, and there is no more distressing position to put a man in, than to send him to a home where the only child, a little girl of nine, lies dead, and expect him to transform that sad picture into dollars and cents. Would it not have been better to have prevented that accident? How could it have been done? I don't know, but I have gotten rid of a great responsibility. My assistant, Mr. McKissen, or I, and, one of our superintendents, Mr. Nester or Mr. Johnson, have visited every school house, be it public or parochial, city or district, on our 217 miles of road, and have talked to every grade from the kindergarten to the high schools, making in all over 360 addresses, and speaking to upward of 30,000 pupils. These were little talks lasting from 10 to 30 minutes, and we did our utmost to impress upon the minds of all to be careful; be careful when crossing the track. Be careful if you see a wire hanging down, do not touch it, it may be a live wire, explaining what a live wire is. Be careful when you get onto a car; be careful when you get off a car, telling the girls especially how to alight properly from a car; do not coast down hill on streets or cross streets where cars are likely to be; do not jump cars; do not roller skate near the cars; do not throw stones or snow balls at the cars; do not ride on the platform; do not get onto a car when it is moving, etc.

In one of our talks to our men, I said I was tired of hearing the phrase which is so easily and thoughtlessly quoted, namely, "You can't run a railroad without accidents." I say you can, and that is our motto now: "The Southwestern is to be run without accidents."

I have purposely put the figures last, because this to me is more than a question of dollars and cents, to me it means more that I may be the means of saving a life or a limb, saving some human being from suffering, saving some father, some mother, some husband, some wife a heartache. Our company during the last 10 years has paid out 6.35 per cent of the gross

income of those years for accident claims. I have not analyzed this by years, but have taken the gross amount for 10 years. To find out whether we were obtaining any results from the work we had started, I have kept an accurate account of the accidents occurring during the years 1908 and 1909, and the cost for the two years has been less than 1¼ per cent of the gross receipts after making an adequate allowance for any unsettled claims. The largest sum paid for any one accident occurring in these two years is $750. We have not had a lawsuit for damages started against our company in the last 2¼ years. We have no claims as far as we know in the year 1908 that are not settled, and only one claim during the year 1909 that has not been taken care of.

Before the year 1908 25 per cent of all of our accidents were rear platform accidents and when the question was raised that these accidents were caused by the crowding of cars I found that less than 7 per cent of this class of accidents happened upon cars that were crowded, and in the crowded cars I counted all cars having 60 or more passengers upon them. You can imagine my surprise when I found that 50 per cent of this class of accidents happened upon cars that did not carry over 10 passengers, showing conclusively that they were caused by the grossest kind of carelessness and inattention. By repeatedly calling attention to this class of accidents, we have practically eliminated them.

We never have received so many commendatory letters and so many compliments as we have had during the past year, and these are almost entirely due to the greater courtesy, the greater watchfulness, the greater carefulness of our employees, and the kindly feeling engendered by showing to the public concern for the lives and the limbs of the children.

MARCH MEETING CENTRAL ELECTRIC RAILWAY ASSOCIATION

A bi-monthly meeting of the Central Electric Railway Association was held at South Bend, Ind., on Mar. 24. George H. Whysall, the new president, was in the chair and about 100 members and guests attended each of the two sessions. Plans are being made for holding the next meeting in Toledo, Ohio, on May 26.

MORNING SESSION

The first session of the meeting was called to order at 10.30 a. m., by President Whysall. The minutes of the last previous meeting were read by A. L. Neereamer, secretary. Seven associate members were elected.

H. H. Buckman, master mechanic, Louisville & Northern Railway & Lighting Company, presented a report of the standardization committee. Lack of time had prevented the committee from making complete recommendations. After some discussion the association accepted as its standards the 7-in. 91-lb. high T-rail for city use and the 70-lb. A. S. C. E. section rail for interurban use.

The following report on "Loose Leaf Filing System," was presented by L. E. Gould, western editor, Electric Railway Journal, Chicago:

REPORT OF COMMITTEE ON LOOSE-LEAF FILING SYSTEM

"At the meeting held in Indianapolis on Nov. 18, 1909, your committee on the loose-leaf filing system presented a report which summed up a discussion on the feasibility of changing the form of technical publications with a view to making them more adaptable for filing and indexing for current use. The chief points considered were (1) the advisability of having wider binding margins, and (2) a standard punching that would be adaptable to a special set of covers for holding the leaves. The committee recommended that the association refer its report to the publishers of the technical journals devoted to electric railway work, and I was requested to consider the subject for them.

"The publishers of the electric railway papers are agreed that a proper system of filing information greatly enhances the value of a periodical to its subscribers. Probably every one has had the experience of recollecting having seen an account in a technical paper of something which he would like to copy in his own practice, but at the time he read the article he had no need to apply the information, and when he looked for it later he could not find it. Again, the railway man may be considering the purchase or construction of some equipment with which he is not fully familiar, and may be anxious to know what has been done by other companies. Naturally, he will wish to turn quickly to descriptions of such construction work, and for this use a good filing or indexing system is just what is required. As Mr. Hemming said in his paper, there is absolutely no doubt that by the intelligent use of any periodical a subscriber could greatly increase its value to him.

"Each of the publications devoted to the electric railway field issues free a periodical index, with which it is possible quickly to locate any article in a bound volume of the publication. A great many of the railway and engineering associations bind their papers each half year, and thus build up a valuable engineering library and history of the growth of the electric railway industry. Also, there are many readers who clip from the papers information which they desire to keep. These clippings are filed according to that system of indexing with which the subscriber is most familiar.

"On examination it has been found that hardly any two of the many readers who make their own indices follow the same system. The scheme for filing proposed by Mr. Hemming requires the use of a special loose-leaf book, in which the articles to be filed are inserted. This book also includes a number of ruled sheets on which a reference index is written, and each article is filed according to a subject and numerical classification.

"Undoubtedly the most common method of classifying and indexing articles extracted from current publications is by the use of the vertical filing system. Office practice has demonstrated that the vertical filing system is satisfactory for a great many uses. It is suitable for filing not only letters but blueprints and the various kinds of card records of the operating departments of railways. The vertical filing system can be expanded indefinitely. Its adaptability for general office use renders it most satisfactory for filing articles taken from technical papers. With a vertical filing system the articles can be pasted on cards or stored in envelopes, and these cards or envelopes can be indexed by subjects or numerically, as frequently is done in office work. Thus a subscriber in looking over his paper each week could indicate the articles which he desired to have filed, and the routine work could be performed by the office assistant who files the regular correspondence.

"Because the vertical system is flexible and offers great possibilities for classifying and indexing various data, and because the suggested use of wider margins and the punching of each copy would work a hardship on the publishers, and would be of value to but a very small percentage of the readers, it is the opinion of the representatives of the publishers that the association should not request a change in the present methods of issuing publications, but preferably should appoint a committee which would study the subject of filing and present a report that would include a typical index suitable for electric railway use, and outline a plan for using this index in connection with the regular vertical filing systems now used by the electric railway companies."

On motion, this report was accepted and the president instructed to appoint a committee to study the subject of filing information from current periodicals.

PRESIDENT'S ADDRESS

George H. Whysall, general manager, Columbus, Marion & Bucyrus Railway, the newly elected president, presented his address, which was published in last week's issue of this paper on page 538. The suggestions made in the address were received with much interest, and a committee was appointed to consider Mr. Whysall's recommendations in detail and report later to the association how they could be best put into effect.

Edward C. Spring, West Milton, Ohio, complimented the pres-

ident on the firm stand he had taken to improve the programs of the association meetings. He severely criticised several features of railway service. During the last year he had made an interurban trip of more than 2,000 miles, and as an operating official had made mental notes of the character of service and the efficiency of the employees on the lines traversed. He fully agreed with the suggestions regarding improving service set forth in the president's address. He had found that many railway employees, notably those at ticket offices, were poorly informed as to the schedules of connecting lines, and often they were not even courteous in answering inquiries regarding the service of their own lines. Passengers found many inconveniences in riding that were not conducive to long distance interurban travel. It should be remembered that it was necessary to replenish the treasury after the ordeal of a long winter, when operation was costly. This would require strict attention to duty on the part of the entire organization, in order to win the public favor.

Managers and general superintendents as a rule did not spend enough time riding over the properties in their charge and learning firsthand how the passengers were being treated. On some roads he had found that no executive was available after 6 p. m., whereas the most critical time in the day in interurban service was from 6 to 12 p. m. Arrangements should be made so that the manager or general superintendent could be reached quickly during those hours.

E. B. Grimes, assistant general manager, Ohmer Fare Register Company, Dayton, Ohio, spoke of the unreliability of many timetables issued in connection with unofficial advertising schemes. The merchants of Dayton, Ohio, had been solicited so frequently for these and other advertising schemes that it had been agreed by the merchants of Dayton that no publicity schemes of this sort should be used unless the medium had been endorsed by the publicity committee of the Chamber of Commerce. Mr. Grimes thought that some of the larger roads might find it profitable to have their own advertising agents, and solicit advertising, which would be published in connection with correct timetables and might more than pay the cost of printing.

SOLICITING TRAFFIC

C. O. Warfel, general agent, traffic department, Indianapolis & Cincinnati Traction Company, read a paper on "Soliciting Business," which was presented in last week's issue of the Electric Railway Journal, page 540. This paper was discussed by several traffic men.

W. S. Whitney, Ohio Electric Railway, called attention to the need for perseverance on the part of traffic solicitors. Another member spoke of the desirability of quick settlement of damage claims by connecting lines. From the public viewpoint, the electric railways were not considered separately, but the group of roads in one district was usually known as "The Interurban." Thus if a shipper had been treated unfairly by one road, he might work a hardship on all roads in the neighborhood when discussing his grievance with other shippers.

John F. Keys, general passenger agent, Detroit United Railway, spoke of the possibility of getting passenger business in competition with parallel steam lines. His company had secured and handled an eight-car-load excursion in the middle of the winter, carrying the passengers 101 miles from Saginaw to Detroit and return in special cars. The steam railroads did not think the electric roads capable of handling the traffic, and so had a train in readiness, but it was not needed, because the electric cars made the 101-mile trip in four hours. A snowfall of 14 in. occurred during the day, and the steam trains on the parallel route were five hours late.

John Crall, general freight and passenger agent, Terre Haute, Indianapolis & Eastern Traction Company, stated that a lack of co-operation between the operating and traffic departments sometimes hindered the building up of freight and express business. The solicitor was placed in an embarrassing position if he obtained a shipment which the operating department could not handle, or was unable to get over the road on time. A traffic department could not please the shippers fully until the road could promptly handle all the business offered it. Mr. Crall thought favorably of Mr. Warfel's recommendation that the Central Electric Traffic Association consider the adoption of a uniform acceptance sheet to be used by all members of the association.

C. O. Sullivan, general passenger and freight agent, Winona Interurban Railway, emphasized the need for the prompt settlement of all claims. He knew of several cases where considerable amounts of business had been given to the competitive steam roads because some small claim remained unsettled. This was frequently the case when the loss occurred on a connecting line.

Stephen Ridlen, general freight and passenger agent, Ben Hur route, who had just left steam railroad service to take up electric railway traffic work, said that formerly the steam lines did not take electric competition seriously, but the growth of electric railway express and freight traffic had largely changed this attitude. Mr. Ridlen also emphasized the need for prompt settlement of claims. He had found one unsettled claim for $10 that was six months old and had resulted in the loss of several hundred dollars' worth of freight. It was the duty of the traffic department to follow closely the adjustment of claims, so that no obstacles might hinder the possible increase of business.

H. S. Dickey, traffic manager, Chicago, South Bend & Northern Indiana Railway, told of the success that his company had had in using a map of the interurban lines in the C. E. R. A. territory when soliciting freight in competition with steam roads. A display of the map, indicating the great number of points reached, never had failed to command the interest of a possible shipper. Mr. Dickey said that his road operated its freight service in connection with a line of steamers between St. Joseph, Mich., and Chicago. Freight was received in Chicago until 11 p. m., and delivered at South Bend at 7:50 the next morning. He was confident that as soon as through service could be established with the electric lines in the centre of Indiana, a considerable growth of traffic would follow immediately. The possibilities of increasing this traffic would be limited only by the ability of the roads to handle the shipments.

C. E. Morgan, general manager, Indianapolis, Crawfordsville & Western Traction Company, emphasized the need for harmony between the traffic and operating departments. The latter department should make its schedules so that the trains could be kept on time, and when a proper schedule was found to be satisfactory, it should not be changed unless absolutely necessary. The schedule of the freight trains should be advertised. Then the shippers on connecting lines would soon become familiar with it, and business would grow without solicitation if the cars were operated close to schedule.

Charles L. Henry, president, Indianapolis & Cincinnati Traction Company, spoke in complimentary terms of the wonderful advancement made by interurban roads. The substantial growth of traffic should encourage the operators of the road to be energetic in improving the service. Such improvements as Mr. Whysall had outlined as being necessary must follow if the past record of advancement was to be maintained. During the winter just passed the electric railways of Indiana and Ohio, representing a business scarcely 10 years old, had demonstrated the kind of good service that it was possible to give. The results had been most remarkable. Close adherence to schedules by the electric cars was compared with the deranged train service of the steam roads, on which practically all trains were from 1 to 10 hours late during heavy snowstorms. Speaking of the growth of traffic in competition with parallel steam lines, Mr. Henry said that the Cincinnati, Hamilton & Dayton Railway paralleled the line of the Indianapolis & Cincinnati Traction Company for practically the entire length of the electric road from Indianapolis to Connersville. The steam railroad, since the advent of electric service, had discontinued stopping all trains at every station except Rushville, between Connersville and Indianapolis. The abandoned stops included six or eight towns varying in size up to 2,000 population, which do not now

receive passenger and express service from the steam road. On instruction from the Indiana Railroad Commission, the steam road is planning a schedule which will give the least possible number of stops and yet comply with an order issued to prevent discrimination.

Mr. Henry looked upon the freight traffic as a most important means of popularizing the several services which electric roads have to offer. On close examination he had found that the freight business (not including express traffic), based on established steam railroad freight rates, was showing a profit when debited with even more than its proportionate operating and overhead charges. As an example of the profit in serving shippers in the best possible way, Mr. Henry cited the instance of a switch and siding installed at a cost of approximately $150 and used for loading logs. In a few months the shipments from this siding, of which the advisability of installation had been questioned, had amounted to $1,500, and since the logs had been shipped, other traffic, including firewood, had been drawn to this loading point, so that it was now established as a profitable siding.

On motion, the president was instructed to appoint a committee which would consider the recommendations made in Mr. Warfel's paper.

By a unanimous vote, E. C. Spring was instructed to send a congratulatory telegram to the New England Street Railway Club on the occasion of its tenth anniversary.

AFTERNOON SESSION

The first paper of the afternoon was read by H. L. Weber, chief engineer, Columbus, Marion & Bucyrus Railway. This paper, entitled "Permanent City Track Construction for Interurbans," was presented in abstract in the Electric Railway Journal for Mar. 26, 1910, page 537. Following the reading of the paper, several members discussed ways and means for constructing brick pavements along tracks so that the brick would not rise above the rails.

Mayor Allen, of St. Joseph, Mich., was present and issued an invitation to the association to hold its September meeting in his city, which is located at the northern terminus of the interurban lines from South Bend, and which is the center of a popular summer resort district along the eastern shore of Lake Michigan.

A paper entitled "The Prevention of Accidents" was read by E. F. Schneider, general manager, Cleveland Southwestern & Columbus Railway. This paper, which merited the close attention of every railway man at the meeting, is presented in abstract elsewhere in this issue. On motion, the secretary of the association was instructed to have this paper printed and to mail a copy to each member of the association.

PUBLIC UTILITIES AND THE PUBLIC

A discussion of "Public Relations" was introduced by E. B. Grimes, assistant general manager, Ohmer Fare Register Company, Dayton. An abstract of Mr. Grimes' remarks follows:

"For a number of years I occupied the position of managing editor of a daily newspaper, and enjoyed a close relationship to the general public and to the public utilities. It was the best possible vantage point from which to view them. Members of the general public are inclined to find fault with public utilities, largely because representatives of the latter have neither the time nor the inclination to write articles defending themselves or their corporations against charges that are unjust and often wholly unreasonable. It is an inherent satisfaction for certain individuals to have their say, when assured all the while that there is no danger of being 'sassed back.'

"In some instances, the public and the utility are both inclined to be belligerent, and they then occupy the position of two military generals of opposing sides, engaged in a battle, resulting in loss to both. No corporation, however large it may become, ever entirely outgrows some one dominent personality in it, that is reflected in all its relations with the general public. If this dominant factor is of the molasses turn of mind, rather than of the vinegar type of disposition, the utility will be sweetened in temper, and friction with the general public will be largely eliminated. Therefore there is a far-reaching responsibility resting upon the heads of all utilities along this one particular line alone. And to use a railway term, it is a main line.

"The corruption found so generally within municipalities stands as one of the strongest arguments against the public ownership of utilities. As long as the utilities are so ably and successfully managed as at present, there is little danger of any large number of them being taken over by municipal bodies and municipalized into 'soft snaps' for public officials.

"The general public may learn a great many practical things from well-managed utilities that will be well for it to know. The competition among utilities, the strict supervision held over them by shrewd and enterprising managements, bring out all that is best in every department, and the whole is conducted in a business-like manner, insuring maximum results at a minimum cost. That the opposite is true in the conduct of the affairs of the general public is a lamentable fact, evidenced by increasing municipal indebtedness and higher taxation.

"The progressive, far-seeing men who blazed the way for successful public utilities, who have in many instances gone down to financial defeat in doing so, are deserving of the gratitude of mankind in the respective spheres, where their pioneer endeavors were put forth. They did untold good for the development of public interests, and others coming after them have received the reward of their meritorious beginning.

"The people have many reasons to be appreciative of the convenience, of the safety, and of manifold advantages offered by the utilities, which could not possibly be supplied by the individual or by the general government, and of which they are privileged to avail themselves, under most reasonable restrictions, and at comparatively little cost.

"Representatives of the general public who come to know the officials conducting railway utilities find them to be capable, practical men; men of sound judgment, of capacity for doing important things, and men who are giving the people, generally, more for their money than they are receiving from any other distinctive line of public corporations. The efficient and economical managements develop propositions that men of less force would never attempt to touch, even with other people's financial poles. Their pluck, their energy, their brains provide a medium of transportation within reach of the poorest among us, surrounded by the same provisional, protective comforts enjoyed by the rich."

Arthur W. Brady, president, Indiana Union Traction Company, emphatically stated that the improvement of relations existing between electric railroads and the public was a most important problem for the executives. In the operation of a property, the attention of the management was directed toward increasing the operating efficiency, and thereby adding to the net returns. Amicable relations with the public greatly assisted to the realization of this object. No one would doubt that during the last five years there had been a gradual disposition on the part of the public to diminish the incentive for operating railway properties in the way that they should be administered. The continual increase in the load of taxation placed heavier burdens on the road. Another reason assisting toward the straining of railway relations with the public was the increased cost due to regulation either directly by a public service commission or indirectly.

The general public, Mr. Brady said, had a highly exaggerated idea of the profitableness of electric railways. He did not know of another business that required so much ability and energy to gain reasonable profits. Considered in one light, electric railways were monopolies, because they offered services not duplicated by other agencies. Electric railway employees and managements in some instances, had treated the public in an unfair manner, and, therefore, were responsible for their strained relations. Some of the deficiencies as outlined in the president's address were the result of this independent attitude exhibited by the roads themselves. In general the public would not accept from a private corporation service of a character continually offered by municipal organizations. When

the interurban roads were new and offered the people a service that never had been given before, little weaknesses on the part of the roads were overlooked, but now that the popularity had worn off, the people looked for better service, and did not consider the wishes of the interurban roads as they did at the start.

Mr. Brady did not wish to be considered as a pessimist; he was enthusiastic over the possibilities of interurban railroading and held that each company should do everything possible to put the management of its road on a proper basis. Electric railroads were not gold mines and did have serious problems confronting them. One of the factors tending toward the correct solution of the railroad problems was the appointment of public service commissions. Several of these bodies had been the means of bringing about on the part of the electric roads a fuller knowledge of operating conditions.

ENTERTAINMENT FEATURES

At 8 a. m., preceding the first session of the South Bend meeting, 75 convention visitors were entertained with a trolley ride to Berrien Springs, Mich., and an inspection tour over the hydroelectric property of the Indiana & Michigan Electric Company. Officials of the Chicago, South Bend & Northern Indiana Railway Company and the Indiana & Michigan Electric Company acted as hosts. The 22-mile run from South Bend to Berrien Springs was made in 40 minutes in a special car, which took the party to a point within 1000 ft. of the dam of the hydroelectric power company.

The Berrien Springs plant is one of four hydroelectric generating stations owned by the Indiana & Michigan Electric Company. These plants operate in parallel, being connected by high-tension transmission lines which converge at South Bend, Ind., where the company has a steam turbine reserve station. The plant visited by the Central Electric Railway Association has an immediate capacity of 6000 kw, furnished by four Westinghouse revolving field a. c. generators, three of which are now in operation. Each generator is driven by a group of waterwheels operating under 22-ft. head. A hollow concrete dam extends across the St. Joseph River, which is about 2000 ft. wide. The backwater extends 8 miles upstream, thus furnishing a large reserve capacity. The Chicago, South Bend & Northern Indiana Railway Company purchases a portion of the output of this plant for operating all of its 10 substations.

SOUTH BEND-CHICAGO TRIP

At the close of the afternoon session, through the courtesy of C. N. Wilcoxon, general manager, Chicago, Lake Shore & South Bend Railway, about 60 members and guests were taken to Gary, Ind., and Pullman, Ill., over this high-speed single-phase line. The car for the special party was attached to a regular limited three-car train, and the run of 76 miles between South Bend and Pullman was made in three hours.

The attention of the health committee of the Liverpool Corporation, Liverpool, England, having been drawn to the unsightly condition of the streets, caused by tramway tickets being thrown away by passengers after leaving the cars, it has been decided to try on one route the experiment of placing a receptacle on the platform of each car, so that passengers may deposit therein their used tickets.

TABULATING CAR EQUIPMENT PROGRESS ON MASSACHUSETTS ELECTRIC COMPANIES' SYSTEM

The lines of the Massachusetts Electric Companies, covering the system of the Boston & Northern Street Railway Company and the Old Colony Street Railway Company, lying respectively north and south of Boston, include about 1000 miles of track under a single executive administration. About 2000 passenger cars are maintained on this system, and as the two companies are continually adding new equipment in the way of rolling stock, the problem of keeping a close watch upon all shop and assembly progress in connection with cars under contract is one of considerable importance.

FORM I—PROGRESS SHEET OF BUILDERS

Boston and Northern Street Railway Co.

Car No.	Erection Begun	Bottom Frame Erected	Side and End Frame Erected	Flooring in Place	Roof Canvas in Place	Wiring Begun	Outside Painting Begun	Outside Painting and Varnishing Comp't'd	Brake Rigging Comp't'd	Inside Trimmings Completed	Wiring Completed	Ready to Ship	Shipped
1391	10–22	10–27	11–1	10–29	11–9	11–8	11–17	12–10	12–21	12–24	12–16	12–29	12–29
1392	10–28	10–29	11–2	10–30	11–10	11–12	11–18	12–11	12–23	12–29	12–23	12–29	12–29
1393	11–1	11–2	11–6	11–4	11–10	11–12	11–18	12–12	12–24	12–31	12–23	12–31	12–31
1394	11–3	11–4	11–8	11–5	11–15	11–13	11–19	12–13	12–29	1–3	12–24	1–3	1–3
1395	11–5	11–5	11–9	11–6	11–15	11–15	11–23	12–17	12–29	1–5	12–26	1–7	1–7
1396	11–16	11–8	11–10	11–9	11–16	11–16	11–23	12–18	1–5	1–5	1–3	1–11	1–12
1397	11–8	11–9	11–11	11–9	11–18	11–19	11–23	12–20	1–7	1–7	1–5	1–11	1–12
1398	11–9	11–10	11–12	11–10	11–23	11–19	11–24	12–21	1–11	1–11	1–7	1–12	1–12
1399	11–10	11–10	11–11	11–11	11–24	11–20	11–24	12–23	1–13	1–17	1–10	1–17	1–17
1400	11–11	11–11	11–15	11–12	11–26	11–29	11–29	12–24	1–15	1–17	1–11	1–17	1–17

The headquarters of the equipment department are at 84 State Street, Boston, the rolling stock and shops being under the supervision of E. W. Holst, superintendent of equipment, who is responsible to C. F. Bancroft, superintendent of motive power and machinery. In view of the importance of this office being kept informed as to the exact status of all new rolling stock, from the time the contracts are signed to the date when the car is turned over to the operating department, the following system has been devised to show by tabular reports in blue print form the detailed progress of each car and its equipment toward completion.

The general plan of keeping the records is the same whether the information comes from the manufacturer's shops, from the car house where final assembly takes place, or from the headquarters office files. In brief, it consists of tabulating the car numbers in a primary column, with sub-columns headed by each of the more important processes through which the equipment is to pass before it can be placed in service. As fast as a car reaches a given stage of progress the date upon which the given point is reached is placed in the table opposite the car number and beneath the designation of the stage reached. This work is done on a tracing at the shop or office, as the case may be; blue prints are then sent to the proper official, and in this way the organization has the benefit of an exceedingly

FORM II—PRINTS SENT TO COMPANY BY BUILDERS

Number	Date	Title
4419–D	8/10/09	Bolster and Connections.
4347–G	8/23/09	Bottom Framing.
4528–D	9/22/09	Trap and Supports.
4545–G	9/22/09	Vestibule Plan Section.
4555–I	.....	Vestibule Post Section.
4592–E	"	Hood Vestibule.
4530–G	"	Step Tread Shape.
4723–E	"	End Panel (Switch Board).
4555–I	"	Vestibule Post Section.
4519–E	"	Monitor Sill and End Belt Connection.
4452–H	8/20/09	Monitor Sections.
4678–F	.....	Seat, End Corner.
4466–C	12/8/09	Glass for End Side Monitor.
4457–H	"	" " Upper Side Body.
4459–H	"	" " Ctr. Vestibule.
4454–D	"	" " End and Swing Sash.
4469–D	"	" " Vestibule Side.
4467–D	"	" " Center Monitor.
4420–E	"	L. D. Carline.
4468–C	"	Glass for Vestibule Door.
4651–B	12/18/09	Grab Bracket.
4748–C	"	Door Handles (Location of).
4585–C	"	" " Outside.
4654–C	"	" " Inside.
4615–D	"	Bell Cord Bracket.
4613–D	"	Pole Bracket.

graphic record of progress, showing the rate of equipment of each car, the existence of any delays, and anything unusual in the order of equipment.

Form I shows the upper 10 lines of a progress sheet covering the construction and equipment of 44 new semi-convertible cars which are just being completed for the Boston & Northern and Old Colony companies by the Laconia Car Company. The sheet shows the dates for each car on which erection began in the manufacturer's shop, when framing erection was completed, dates of placing flooring, roof canvas, commencement of wiring, painting, trimming, completion of brake rigging installation, completion of wiring and shipment date. This sheet tells at a glance whether any cars are delayed and if so the cause of the failure to complete them. It also gives the time required for each important part of the work and enables the equipment department of the railway company to compare the rates of progress of different cars, and to inquire as to the cause of any indicated delay.

FORM III—PROGRESS SHEET OF EQUIPMENT

Car No.	Car Body Received at Lowell	Trucks Received at Lowell	Motors Mounted	Car Received at Chelsea	Equipping Started	Wiring Completed	Piping Completed	Switches Installed	Equipping Completed	Car Tested	Put Into Service
1391	1–1	12–8	1–3	1–3	1–25	2–9	2–5	1–27	2–9	2–12	.....
1392	1–1	12–8	.....	1–2	1–3	.....	.....	1–21	.....	.....	.....
1393	1–5	12–8	1–8	1–7	1–26	.....	.....	1–28	2–11	2–12	.....
1394	1–5	12–13	1–5	1–5	1–21	2–3	2–3	1–25	2–3	2–4	.....
1395	1–11	12–13	1–11	1–11	1–29	2–9	2–5	1–29	2–12	2–12	.....
1396	1–13	12–13	1–12	1–17	2–1	2–11	2–12	2–3	.....	.....	.....
1397	1–13	12–17	1–13	1–18	.....	.....	.....	.....	.....	.....	.....
1398	1–13	12–17	1–13	1–17	.....	.....	.....	.....	.....	.....	.....
1399	1–18	12–17	1–18	1–22	.....	.....	.....	.....	.....	.....	.....
1400	1–19	12–17	1–19	1–21	.....	.....	.....	.....	.....	.....	.....

On another part of this sheet are two separate tables, one giving the number, title and dates of drawings sent from the manufacturer to the railway company, and the other those sent by the company to the manufacturer. The former is shown in Form II to give an idea of its general arrangement. This method of keeping these records is compact and graphic, and accurately expresses facts which if confined to ordinary correspondence files would be cumbersome, easily overlooked and difficult to keep in proper order. All drawings which pass between the railway company and the manufacturer in relation to the particular order covered by the car numbers are thus indicated, including prints from manufacturers of certain details, if necessary, suggestions of changes in the arrangement of apparatus, or other working particulars. The manufacturer has a tracing of the sheet which he fills in weekly, or at any other interval desired by the railway companies; one copy is sent to the Boston office of the railways, and one copy is given to the inspector at the shops of the manufacturer who represents the purchasing organization, for a check. The inspector may thus follow the work in relation to its time of completion with a minimum of difficulty and, in case of error, can quickly determine the fact and take proper measures to inform the car builder or his own superiors.

Form III shows the upper part of the sheet used to record equipment progress at the erecting shops and car houses of the railway companies. At each important erecting shop the equipment foreman sends in this daily report of the progress of the rolling stock, the blue print being received by the office of the superintendent of equipment at Boston. On the back of the print is stamped the date of its printing. The car numbers appear at the sides as before, and at the top of the several columns are the various steps which have to be taken between the arrival of the car at the point where the motors and trucks are assembled with the car body, and the final equipment for service. The sheet selected shows that of these Boston & Northern Laconia semi-convertible cars, none had been put in service on Feb. 14, although four had been tested out by Feb. 12. All the trucks had been received at Lowell, Mass., but not all the car bodies. A considerable number of cars had been received at the Chelsea erecting shops of the Boston & Northern Railway Company, but while equipment had become well started, little had been done in the way of wiring except in the case of the four tested. These sheets enable the department to follow the work in the railway companies' shops with the same degree of detailed care that obtains at the manufacturer's works, and the concentration of the information in so small a space, with its immediate indication of anything unusual in the conditions surrounding erection, is most helpful. The cost of the blue printing is a trifling matter in relation to the burden of routine correspondence which the use of the prints avoids. As the record is entirely historical, the tracing remains good for indefinite use at the car shops and the erecting point, and it is unnecessary to repeat any records, since these are automatically reproduced for all the previous operations every time a blue print is made.

Form IV is a reproduction in type of the upper part of a summary sheet used in the office of the equipment department, and combining the information received periodically from the manufacturers and the car houses where erection is under way. The sheet is made out regularly from the segregated tabulations shown in Forms I and III, and covers all the rolling stock under construction, regardless of its type and service anticipations. For convenience the two systems of lines north and south of Boston are separated in the summary sheet.

FORM IV—PROGRESS SHEET SUMMARY

Car No.	Erection Begun	Bottom Frame Erected	Side and End Frame Erected	Flooring in Place	Roof Canvas in Place?	Wiring Begun	Outside Painting Begun	Outside Painting and Varnishing Completed	Brake Rigging Completed	Inside Trimmings Completed	Wiring Completed	Ready to Ship	Shipped	Car Bodies Received	Trucks Received	Equipment Received	Equipping Begun	Trucks Equipped and Mounted	Equipping Completed	Tested	Ready for Service
1391	10–22	10–27	11–1	10–29	11–9	11–8	11–17	12–10	12–21	12–24	12–16	12–29	12–29	1–1	12–8	10–11	1–25	1–3	.....	.....	.....
1392	10–28	10–29	11–2	10–30	11–10	11–12	11–18	12–11	12–23	12–29	12–16	12–29	12–29	1–1	12–8	to	1–3	.....	.....	.....	.....
1393	11–1	11–2	11–6	11–4	11–10	11–12	11–18	12–12	12–24	12–31	12–23	12–31	12–31	1–5	12–8	11–9	1–26	1–8	.....	.....	.....
1394	11–3	11–4	11–8	11–5	11–15	11–13	11–19	12–13	12–29	1–3	12–24	1–3	1–3	1–5	12–13	11–9	1–21	1–5	2–3	2–4	2–7
1395	11–5	11–5	11–9	11–6	11–15	11–15	11–23	12–17	12–29	1–5	12–26	1–7	1–7	1–11	12–13	11–9	1–29	1–11	.....	.....	.....
1396	11–16	11–8	11–10	11–9	11–16	11–16	11–23	12–18	1–5	1–5	1–3	1–11	1–12	1–13	12–13	11–9	1–1	1–12	.....	.....	.....
1397	11–8	11–9	11–11	11–9	11–18	11–19	11–23	12–20	1–7	1–7	1–5	1–11	1–12	1–13	12–17	11–9	.....	1–13	.....	.....	.....
1398	11–9	11–10	11–12	11–10	11–23	11–19	11–24	12–21	1–11	1–11	1–7	1–12	1–12	1–13	12–17	11–9	.....	1–13	.....	.....	.....
1399	11–10	11–10	11–11	11–11	11–24	11–20	11–24	12–23	1–13	1–17	1–10	1–17	1–17	1–18	12–17	11–9	.....	1–18	.....	.....	.....
1400	11–11	11–11	11–15	11–12	11–26	11–29	11–29	12–24	1–15	1–17	1–11	1–17	1–17	1–19	12–17	11–9	.....	1–19	.....	.....	.....

POWER STATION LUBRICATION RECORDS FROM BERLIN

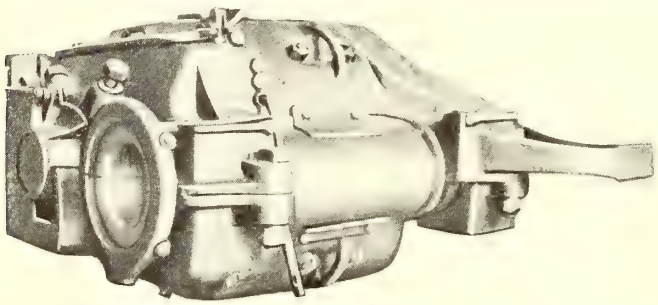
The Berlin (Germany) Electricity Works has recently published some figures showing the saving in lubricating costs due to the displacement of reciprocating engines by steam turbines. In the fiscal year 1905-1906, when the first turbines were installed there were required 252,052 kg (554,514 lb.) of cylinder oil and 93,806 kg (206,373 lb.) of engine oil. The output of the station for the year in question was 166,865,122 kw-hours. In the fiscal year, 1909-1910, the output of the station was about 210,000,000 kw-hours but owing to the fact that the station is now operated entirely by steam turbines the consumption of cylinder oil was only 47,000 kg (103,400 lb.) and of engine oil also 47,000 kg.

ROLLING STOCK IMPROVEMENTS OF BEN HUR ROUTE

The Indianapolis, Crawfordsville & Western Traction Company is now putting all its large interurban cars through the shop for repainting and thorough inspection. Westinghouse 304 A type motors with commutating poles are being placed under all equipments. These motors are rated at 90 hp. Westinghouse K 34 platform controllers are being installed on some of the cars.

The illustration shows the new dust guards which are supplied with the 304 A motors. One guard is made up of two semi-circular collars which fit over the end of the axle bearing on the commutator end. The collars are lined with felt to prevent the intrusion of dust. The larger guard encloses the axle. It is made of sheet steel in the form of a half-cylinder, which fills the space between the two axle bearing housings. The edges of this guard are also supplied with heavy felt which is held tightly in place against the motor casing when the guard is clamped in place. On this axle guard is a riveted angle pierced with two elliptical holes which permit it to be hooked over two bolts set in the motor casing. Two cap screws pass through a similar angle riveted to the lower part of the guard and serve to clamp it tightly in place. The form of the top connection is such that if the lower bolts work loose the guard will not drop to the track. It is thought that this protection for the axle will considerably increase the life of the motor bearings.

When the cars of this road were first equipped a type of air gage without illuminating lamps was placed in the cab. It



Westinghouse 304-A Motor with Dust Guards

since has been found desirable to illuminate the gages and a scheme for doing this without purchasing new gages and without using the miniature gage lamps has been applied to some of the cars which have just been shopped. The motorman's cab of these cars, which are built for single-end operation, is about 3 ft. long and is set off from the baggage compartment by a substantial bulkhead. One of the door posts in the bulkhead is directly opposite the window post which carries the air gage. A 16-cp lamp has been mounted substantially on this door post and is connected with four other lamps inside the baggage compartment. This lamp is enclosed in a cylinder of tin firmly held in place. A pin hole in the front side of the tin cylinder permits a beam of light to fall directly on the face of the air gage. This scheme was adopted because it is economical; it has a low first cost, does not require the miniature lamps, which are troublesome from the point of renewals. The enclosed lamp illuminates the gage properly without giving any stray light to bother the motorman's view ahead of the car.

The trolley wheels used on the cars of this road are 6 in. in diameter mounted in Hensley harps and use grease lubrication. Formerly the trolley poles were 12 ft. 6 in. long and the usual trouble from wheels leaving the wire at high speeds was experienced. As the result of trying poles of various lengths all the poles were shortened at 12 ft. A careful comparison of the life of the trolley wheels shows an increase of about 700 miles. The trolley rope now hangs vertically directly above the retriever. While the old wheels wore a U-shaped groove and the rims were severely cut, now that the poles have been shortened there is practically no undue wear on the rims and the body of the wheels is properly used. The average life of wheels now is 3583 miles.

ANNUAL MEETING OF THE NEW ENGLAND STREET RAILWAY CLUB

The annual meeting of the New England Street Railway Club was held at the Hotel Somerset, Boston, on March 24. In the afternoon the polls were opened for the election of officers, and the officers whose names were published in this paper last week were elected. In the evening the annual banquet was held in the large dining room in the hotel. As it was the tenth banquet of the club, special efforts were made in the way of entertainment. The six governors of the New England States had accepted the invitation of the club to be present, and all were in attendance, except Governor Draper, of Massachusetts, who was detained through illness. He was represented, however, by Lieutenant-Governor Louis A. Frothingham. It was said that only once before in the history of New England had so many of the governors participated in a meeting, and that this was the first time at which so many had met at the invitation of a private association.

After the banquet, Charles H. Hile, assistant to the vice-president of the Boston Elevated Railway, the newly elected president of the association, referred to the rapid growth of the membership of the club. He considered it very fortunate that the constitution of the club provided for the membership in the club of men of all departments of the electric railway industry. He thought that the mutual acquaintanceship thereby fostered was broadening. He urged those in each department to take an interest in all topics concerning the other departments of electric railway work, as thereby they could do better work in their own department. He then introduced Russell A. Sears, of the Boston Elevated Railway, as toastmaster.

Mr. Sears said that it is sometimes dangerous to have five aces or five kings, but he did not think that this applied to five governors, and congratulated the club on their attendance. He then introduced Lieutenant-Governor Louis Frothingham to speak in the interest of Massachusetts.

Lieutenant-Governor Frothingham's remarks related principally to the intimate ties connecting the New England States, dating back to the earliest history of the colonies.

James F. Shaw, president of the American Street & Interurban Railway Association, was then presented. Mr. Shaw extended to the club the congratulations of the American Association, and spoke of the important work which the association was doing for the industry. A step recently taken to foster close relations with the local organizations was the appointment of the presidents of all of the State associations on the committee on public relations of the American Association. Mr. Shaw believed that the work of this committee was one of the most important being undertaken by the association, and in conclusion presented a strong plea to all present who are not associate members of the main organization to join.

Mr. Sears then introduced P. F. Sullivan, president of the Boston & Northern Street Railway Company. An abstract of Mr. Sullivan's remarks follows.

MR. SULLIVAN'S SPEECH

Mr. Sullivan said that the companies represented in the club were 128 in number, operated 5300 miles of single track in the six New England States, and had an investment of over $300,000,000. These companies, which, upon a basis of one passenger for each unit of fare in 1908, carried 906,527,346 revenue passengers. Stated in another form, private capital in 1908 provided $50 for every man, woman and child in New England for the purpose of supplying cheap and safe conveyance for that portion of the population which, as a rule, could not afford any other means. This investment, which was $50 in 1908, was $23 in 1898, and less than $7 in 1888. Lest the amount of the investment might be questioned, Mr. Sullivan added that, while there was in 1888 a mile of track for 6,000 of population, in 1908 there was a mile of track for 1,200 of population.

Comparing New England street railway conditions with those in other places, Mr. Sullivan said that New York and Pennsylvania, which led in the largest street railway mileage of the

United States, had each only a mile of track for 1,800 of population, as against a mile of track for 1,200 population in New England and a mile of track for 11 sq. miles of territory, as against a mile of track for less than 3 sq. miles in Massachusetts. Great Britain, with a population of 38,000,000, had less than 4,000 miles of street railway track, or a mile of track for nearly 10,000 of population; yet in New England, Maine, New Hampshire and Vermont are only partially developed from a street railway standpoint.

Mr. Sullivan said that this was a record of achievement to which the public might point with pride, but not the investor. In Massachusetts, for illustration, no reasonable man would say that the street railway securities were watered, yet the return upon all classes of securities was barely 5 per cent, and this, too, without any allowance for depreciation. The larger number of companies could not sell their bonds upon better than a 5 per cent basis, nor could they, year in and year out, borrow money at better than a 5 per cent rate. Under such conditions, and with both classes of securities ahead of the stock, the speaker asked whether it was unreasonable for the stockholder to expect, even to insist, that he should have more than 5 per cent to compensate him for the risk. As he did not receive this amount in most cases, he hesitated before investing additional capital.

The result of this doubt—this hesitancy—was shown in the last five or six years, for that period showed the least street railway development of the last 20 years. From 1888 to 1898 the increase in investment was 250 per cent, and track extensions nearly 200 per cent. From 1898 to 1903 the increase in investment was 100 per cent; track extensions, 60 per cent, while from 1903 to 1908 investment increased only 13 per cent, and track extensions less than 9 per cent. Some might claim that this falling off was due to overdevelopment, but those on the ground knew better. More capital was needed generally, and even in Boston, for extensions, for double tracking, additional equipment and other improvement, but capital hesitated. In the cases of many of the smaller companies it was not hesitancy but absolute impossibility to find necessary capital. They wanted a fair return from their investment, and this they could not get without radical changes.

Mr. Sullivan referred to his previous statement that the three northern New England States were only partially developed through street railway investment, and believed that these States could well learn a lesson from the experience of others. By this statement he did not mean that he wished to see any substantial changes in the laws providing safeguards around the issue of securities. He meant that if these States expected street railway development they must by their laws offer not only encouragement, but also protection to capital, so that it might at least hope for such return from the investment as would compensate it for the risk. Maine had shown the greatest progress of the three States in the last six or seven years, largely through the efforts of a Massachusetts man who publicly stated he was forced to sell his street railway investments in Massachusetts because of local conditions. While it was not probable that the three northern States would be developed to the same extent as Massachusetts, it was possible, owing to valuable water powers and other natural advantages, that they could and would be developed so as to increase their wealth and population materially. He believed that if Massachusetts was to continue to develop it would be only after realization that a 5-cent unit of fare, while reasonable in some instances, was not a proper measure of service. A distinction should be made between congested centers of large population and high density of traffic and thinly settled communities and low density of traffic. Those in Massachusetts and other States charged with the administration of the street railway statutes must also come to a realization that, while the railway companies did not object to supervision of the issue of securities and regulation of service, they did most strenuously object to interference in operation. Should a State attempt to direct or suggest operation it would be forced to underwrite street railway securities or to purchase and operate the railways.

As New England, Massachusetts and Boston were the pioneers in the application of electricity to street railways, the companies hoped to continue to lead in giving the best and cheapest service, all things considered, not only in this country, but in the world. But, being human, they could not perform impossibilities. They could not do for the public what it was their highest hope to do, unless they had the co-operation of the public—unless the public would bear a just and fair portion of the burden. The companies realized fully that they accepted the charters and franchises under which they did their business under an implied contract to perform a semi-public duty in good faith—to give the public reasonably good service at reasonable rates. The public, on the other hand, entered into an implied contract to expect no more than reasonable service at reasonable rates—and these they are entitled to, no more nor no less. To perform this contract, capital must have a fair return commensurate with the risk, and the public must pay reasonable rates; and these rates must naturally and necessarily vary with the increased cost of doing business.



View of Banquet Room at Annual Meeting of New England Street Railway Club

OTHER SPEECHES

At the conclusion of Mr. Sullivan's remarks Mr. Sears called upon each of the governors for remarks.

Hon. Frank B. Weeks, Governor of Connecticut, congratulated the club on its flourishing condition, and spoke about the diverse functions of steam and electric railways. In his opinion, the property of any community is dependent largely upon good transportation facilities. He also referred to the number of

patents taken out by citizens of Connecticut during the past year.

Hon. Henry B. Quinby, Governor of New Hampshire, said in the strongest terms that he was favorable to the extension of railroad facilities in his State, and considered that he represented the best interests of the citizens of the State in this position. Nothing was more essential to material development. He also paid a compliment to the electric railway system in Boston, which, he said, was the equal of any in the world.

Hon Aram J. Pothier, Governor of Rhode Island, thought the development of railroad facilities essential in New England, and particularly to his own State. He referred to pending legislation in Rhode Island, and then spoke of the responsibility which railway companies owed the public to give good service. This was especially true where territory has been developed by home-builders with the understanding that the railway system would provide adequate and comfortable means of reaching and returning from their employment. This was a right which the people would expect and exact.

Hon. George H. Prouty, Governor of Vermont, said that the statistics given by Mr. Sullivan were a revelation to him. There were now 107 miles of electric railway in Vermont, and he wished that there were more. He thought that there was splendid opportunity in Vermont for new electric railways, certainly so far as right-of-way was concerned. The State was ready to give just and reasonable charters, and had had no unfortunate experience with railroad companies.

Hon. Bert M. Fernald, Governor of Maine, referred to the great opportunities in that State for railway and power development, and said that he thought a community of interest between steam and railroad companies was desirable. He hoped that the railway men would go to Maine and help develop the resources of that State.

William A. Murphy, secretary to Governor Eben S. Draper, presented the concluding speech. He spoke of the unrest prevailing throughout the country, owing to higher cost of living and other economical and political conditions. He did not consider this condition unfortunate, as it led to a study of causes and effects.

NEW JERSEY PUBLIC UTILITY COMMISSION LAW

In signing the New Jersey Public Utility Commission bill on March 24, Governor Fort made a public statement in which he said:

"As to the general features of the bill and its probable value as a law to effectively and authoritatively regulate utilities companies, I have conferred very fully with Frank H. Sommers, the president of the Railroad Commission. He deems the bill to contain many valuable features, and with ample authority to do effective work under it. My own study of its provisions has convinced me that it is in many respects an effective act. It certainly is a long step in advance. If it did nothing else than give the commission power to inquire into and expose unjust exaction and to inhibit unjust discriminations as to rates and charges—which it clearly does—it would be unfortunate if it should fail of enactment. But it does go farther, in that it confers upon the utilities board, in the strongest language possible, power to compel safe and adequate service by all utilities companies.

"Of course, there are serious omissions in the bill. It should contain a rate-making clause, giving the commission power to fix rates upon complaint by a municipal board or a given number of citizens. I have never favored a rate-making power on the initiative of the commission. I so stated when a candidate before the people, but I do emphatically favor some rate-making power under reasonable terms which will assure the good faith of the demand upon the commission that rates be investigated and fixed.

"The thing to do is to insist most vigorously that this bill is only accepted as a basis of additional regulative legislation, and to go steadily on educating the people by letting them see what can be done even under this law; that they may appreciate of what great value a really effective public utilities law would be."

A comparison of the Public Utility Commission law of New Jersey with the New York Public Service Commissions law has been made and is published in this issue. This shows that the New York law contains 50 octavo pages, while the proposed New Jersey law, with the present Railroad Commission law, of which it is an amendment, contains less than 15 octavo pages.

TEXT OF THE BILL.

The New Jersey bill amending the law is, in full, as follows:

"1. The title of the act to which this is a further amendment and supplement is hereby amended to read as follows: 'An act to create a Board of Public Utility Commissioners for the State of New Jersey, and to prescribe its powers and duties.'

"2. The name of the board created by section one of the act to which this is a further amendment and supplement, and which is therein called the Board of Railroad Commissioners, is hereby changed to the Board of Public Utility Commissioners.

"3. The members of said board shall receive a compensation of $6,000 per annum. The secretary of said board shall receive a salary to be fixed by said board, not exceeding $4,000 per annum. The total expenses of the board, including salaries, shall not exceed $50,000 per annum. No employee of said board shall have any official relation with or hold any stock in any public utility as hereinafter defined, operating within the State of New Jersey. No member of said board shall sit or take any part in any proceedings concerning or with regard to any such public utility in which he holds any stock, bonds or other securities, nor shall any member of said board or employee thereof hold any office under the Government of the United States, or any other salaried office under the government of this State.

"4. The jurisdiction of said board is hereby extended to and over all public utilities, which term is herein defined to include every railroad, express, street railway, traction, canal, subway, gas, electric light, heat and power, water, pipe line, sewer, telephone, telegraph or other corporation, association or joint stock company, operating within the State of New Jersey for public use under privileges granted by the State or by any municipality thereof.

"5. Said commission shall have general supervision over all public utilities as herein defined, and shall have power, after hearing upon notice, by order in writing:

"(a) To require every public utility as herein defined to comply with the laws of this State relating thereto, and to perform the public duties imposed upon it thereby;

"(b) To require every public utility, as herein defined, to furnish safe and adequate service;

"(c) To require every public utility, as herein defined, to keep its books, records and accounts so as to afford an intelligent understanding of the conduct of its business, and to that end to require every such public utility of the same class to adopt a uniform system of accounting.

"(d) To direct any public utility, as herein defined, found to be granting rebates, or other unjust, unfair and unreasonable discriminations to immediately cease therefrom.

"Said commission shall also have power to investigate any accident happening in connection with the operation of any public utility, as herein defined; to hear and examine complaints concerning rates charged by any such public utility, and to make such recommendations as it may see fit concerning accidents and rates.

"In furtherance of the foregoing powers, said commission shall also have power to compel the attendance of witnesses and the production of papers, accounts and documents, to swear witnesses and issue subpœnas, all in the manner provided in the act to which this is an amendment and supplement.

"6. No issuance, sale and delivery of its stock or of securities authorized by it and maturing more than 12 months from the date thereof, hereafter made by any such public utility, as

herein defined and created by this State, shall be valid until approved by said board. It shall be the duty of said board to approve of any such proposed issuance, sale and delivery of stock or securities, maturing more than 12 months from the date thereof, upon being satisfied that said proposed issuance, sale and delivery is to be made in accordance with the provisions of law relating thereto. No lease of its property, rights and franchises by any such public utility, and no merger or consolidation of its property, rights and franchises by any such public utility with the property, rights and franchises of any other such public utility shall be valid until approved by said board.

"7. All orders made by said commission pursuant to this act shall be enforceable in the manner provided in the act to which this is a further amendment and supplement, and the right of appeal from all orders of said commission is hereby conferred upon every public utility, as herein defined, to be exercised in the manner now provided in said act.

"8. No privileges or franchise hereafter granted to any public utility, as herein defined, by any local, municipal or county governing body shall be valid until approved by said board, whenever it shall, after due hearing, determine that such privilege or franchise is necessary and proper for the public convenience.

"9. Any public utility, as herein defined, may appeal to said board from any order or regulation made under existing law by any local, municipal or county governing body, and said board is hereby given jurisdiction to hear said appeal and to determine the matter in question on the merits, and make such order in the premises as may seem just and reasonable; and no such public utility, as herein defined, shall hereafter give, grant or bestow upon any local, municipal or country official any discrimination, gratuity or free service whatsoever, but nothing herein contained shall prevent the free transportation of uniformed public officers while engaged in the performance of their public duties.

"10. Nothing in this act shall be held to modify or repeal any of the provisions of the act to which this is an amendment and supplement, except in so far as such provisions are inconsistent with this act."

COMPARISON OF IMPORTANT PROVISIONS OF NEW YORK AND NEW JERSEY COMMISSION LAWS

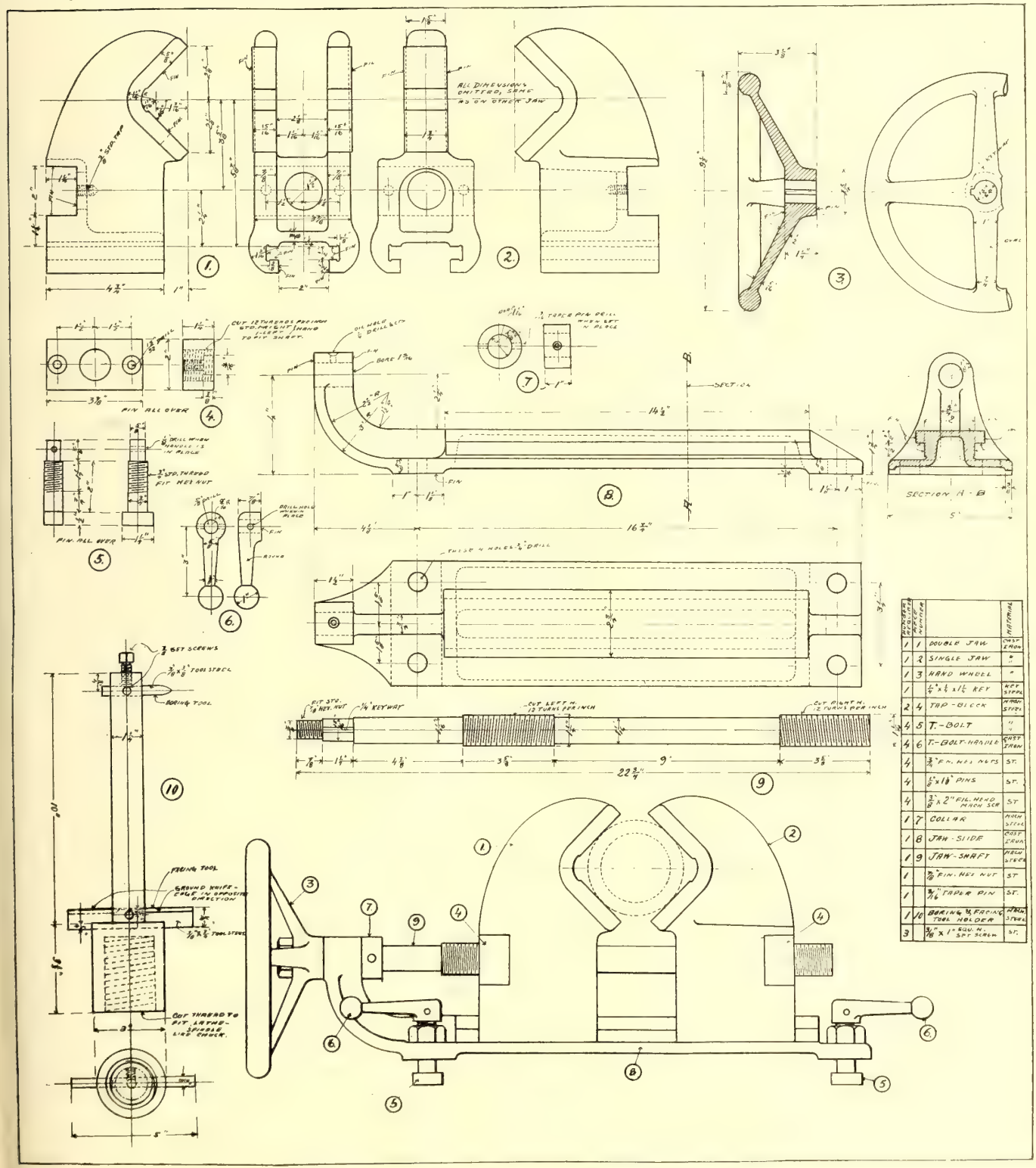
New York Public Service Commissions Law	*New Jersey Public Utility Commission Law*
GENERAL	
NUMBER OF COMMISSIONS	
1. Provides two commissions, one for New York City, the other for the remainder of the State. (Art. I, Sect. 3.)	1. Provides one commission. (P. U. Sect. 2.)
MEMBERS	
2. Each commission to consist of five members with appointments by Governor; term of office five years. (Art. I, Sect. 4.)	2. Commission to consist of three present Railroad Commissioners with appointment by Governor; term of office six years. (R. R. Sect. 1.)
JURISDICTION	
3. Jurisdiction extends over: 1. Railroads. 2. Street railroads. 3. Common carriers, including railroads, street railroads, express, car, sleeping car, freight and freight line companies. 4. Gas companies. 5. Electric light, heat and power companies. 6. Rapid transit railways in New York City. (Art. I, Sect. 5.)	3. Jurisdiction extends over all public utilities, including: 1. Railroad. 2. Express. 3. Street railway. 4. Traction. 5. Canal. 6. Subway. 7. Gas. 8. Pipe line. 9. Electric light, heat and power. 10. Water. 11. Sewer. 12. Telephone. 13. Telegraph. 14. Or other company operating within the State for public use. (P. U. Sect. 4.)
COUNSEL	
4. Each commission shall appoint a counsel with assistant attorneys, counsellors-at-law, stenographers and process servers. (Art. I, Sect. 6.)	4. The Attorney-General shall be the adviser and legal counsel of the Board. (R. R. Sect. 8.)
EMPLOYEES	
5. Each commission shall appoint a secretary and such officers, clerks, inspectors, experts and employees as it may deem necessary. (Art. I, Sects. 7, 8.)	5. The commission shall appoint a secretary, two inspectors, and such other clerical and expert help as may be necessary. (R. R. Sect. 2.)
OFFICES	
6. Offices shall be in New York City and in Albany, in rooms designated by trustees of public buildings. (Art. I, Sect. 10.)	6. Office shall be in the State House in Trenton. (R. R. Sect. 2.)
SALARIES AND EXPENDITURES	
7. Annual salaries of each commissioner $15,000, and of secretary $6,000. No limit to amount of expenditure. (Art. I, Sects. 13, 14.)	7. Annual salaries of each commissioner $6,000, and of secretar $4,000. Total annual expenditures of board shall not exceed $50,00((P. U. Sect. 3.)
ANNUAL REPORT	
8. Each commission shall make an annual reoprt to the Legislature. (Art. I, Sect. 16.)	8. The commission shall report annually to the Governor and Legislature. (R. R. Sect. 8.)
LEGAL PROCEDURE.	
9. Provisions regarding attendance of witnesses, practice before the commissions, court proceedings, preferences, service and effect of orders and action to recover penalties are fully set forth. (Art. I, Sects. 19, 20, 21, 22, 23, 24.)	9. Details as to attendance of witnesses, production of papers, court proceedings, precedences, enforcement of orders, right of appeal and action to recover penalties are set forth. (R. R. Sects. 6, 8, 9; P. U. Sect. 5, 7.)
RAILROADS, STREET RAILROADS AND COMMON CARRIERS	
SERVICE AND FACILITIES	
10. Every common carrier shall furnish safe and adequate, just and reasonable service and facilities, and the commission shall determine just, reasonable, safe, adequate and proper regulations, practices, equipment, appliances and service, and fix same by order. The commission may order common carriers to make repairs, improvements, changes and additions, in order to promote security or convenience of public or employees, or to secure adequate service or facilities. The commission may order changes in time schedules and additional cars and trains. (Art. II, Sect. 26; Art. III, Sect. 49, 50, 51.) General provisions outlined as to railroads and common carriers regarding switch and side track connections, publication of tariff schedules, issuance of passes, connecting lines, distribution of cars, liability for damage in general accordance with the Interstate Commerce Commission act. Each commission shall have general supervision over all common carriers as to adequacy, security and accommodations of service, and also with respect to their compliance with the law, the orders of the commission and their charter requirements. (Art. II, Sects. 27, 28, 29, 30, 33, 35, 37, 38, 39, 40; Art. III, Sects. 45, 49.)	10. The commission shall have general supervision over all public utilities, and shall have power after hearing upon notice, by order in writing, (a) To require every public utility to comply with the laws of the state relating thereto, to perform the public duties imposed upon it thereby, to furnish safe and adequate service, and cease from granting unjust, unfair, and unreasonable discriminations. (P. U. Sect. 5.) The commission shall hear and examine complaints touching railroad service, car service, terminal facilities, switch connections, connecting lines, changes of stations, abolition of grade crossings, and all other matters of railroad operation, and make recommendations to any railroad company as to improvement of service, etc. The commission may order railroad companies to furnish proper and adequate transportation facilities and stations. No public utility shall give any gratuity or free service to any municipal or county official. (R. R. Sect. 8; R. R. Amend. Sects. 1, 2, 3, 5; P. U. Sect. 9.)

New York Public Service Commissions Law	*New Jersey Public Utility Commission Law*
RATES	
11. All charges by a common carrier shall be just and reasonable, and not more than allowed by law or by order of the commission. Every unjust and unreasonable charge, unjust discrimination or unreasonable preference is prohibited. The commission may determine just and reasonable maximum rates and fix them by order. (Art. II, Sects. 26, 31, 32, 34, 35, 36; Art. III, Sect. 49.)	11. The commission shall have power: (a) To direct any public utility to cease from granting rebates or other unjust, unfair and unreasonable discriminations. (b) To hear and examine complaints and make recommendations concerning rates; and, (c) To require compliance with the laws. (P. U. Sect. 5.)
ACCOUNTING	
12. Each commission may examine all books and records of common carriers and may require copies to be filed with it. Each commission shall prescribe the form of the annual report to be made by common carriers under provisions similar to the Interstate Commerce Commission, and also system of accounts, records and memoranda. (Art. III, Sects. 45, 46, 52.)	12. The commission shall have power to require every public utility to keep its books, records and accounts so as to afford an intelligent understanding of the conduct of its business, and to that end to require every public utility of the same class to adopt a uniform system of accounting. (P. U. Sect. 5; also R. R. Amend. Sect. 4.)
RECOMMENDATIONS TO LEGISLATURE	
13. Either commission may when requested by Governor or Legislature conduct hearings and make recommendations regarding changes in the railroad law. (Art. III, Sect. 45.)	13. The commission shall make such recommendations to the Legislature as it may from time to time deem proper. (R. R. Sect. 8.)
ACCIDENTS	
14. Common carriers required to notify commission immediately of accidents and commission shall investigate cause. (Act III, Sect. 47.)	14. Every public utility shall keep its records so as to afford an intelligent understanding of the conduct of its business. The commission shall have power to investigate any accidents of any public utility and to make recommendations concerning accidents. Every railroad shall give immediate notice to the commission whenever an accident occurs on its line, and the commission may investigate it. (P. U. Sect. 5; R. R. Sect. 7.)
FRANCHISES AND PRIVILEGES	
15. Without the approval of the commission no common carrier shall exercise any franchise. The commission shall have power to grant such approval when it shall determine such franchise or privilege is necessary or convenient for the public service. (Art. III, Sect. 53.)	15. No privilege or franchise shall be valid until approved by the commission, whenever it shall after due hearing determine that such privilege or franchise is necessary and proper for the public convenience. (P. U. Sect. 8.)
LEASES, MERGERS AND SALE OF SECURITIES.	
16. Any assignment, transfer, lease or contract, affecting any railroad or street railroad franchise shall not be valid unless approved by the commission. No corporation shall purchase stock of a domestic railroad or street railroad company without the consent of the commission. All issues by common carriers of stock or indebtedness payable at periods of more than 12 months shall be subject to approval by the commission provided. The commission shall have no power to authorize the capitalization of franchises; the capital stock of a merged corporation shall not exceed the sum of the stocks of the corporations so consolidated, and contracts and leases shall not be capitalized. (Art. III, Sects. 54, 55.)	16. No sale by any public utility of its stock or securities, maturing more than 12 months from date, shall be valid until approved by the commission, which before granting such approval shall be satisfied that the sale is made in accordance with the law (see laws of 1907-08 against stock watering). No lease or merger of its property, rights and franchises by any public utility shall be valid until approved by the commission. (P. U. Sect. 6.)
PENALTIES	
17. Any common carrier violating this act or disobeying an order of the commission shall forfeit not to exceed $5,000 for each offense; every violation of every day's continuance thereof shall be a separate offense. Every officer or agent of such common carrier abetting such violation shall be guilty of a misdemeanor. The commission may apply for mandamus or injunction. The penalty for corporations other than common carriers shall not exceed $1,000 for each offense. (Art. III, Sects. 56, 57, 58.)	17. In default of compliance with an order of the commission, the public utility shall be subject to a penalty not exceeding $100 per day. By court proceedings, witnesses can be compelled to attend, testify and produce books and papers, under a jail penalty of not exceeding 90 days. (R. R. Sects. 6, 8; P. U. Sect. 7.)
INTERSTATE TRAFFIC	
18. Either commission may investigate interstate traffic on railroads within the State and may report to the Interstate Commerce Commission violations of the Interstate Commerce Law. (Art. III, Sect. 60.)	18. The commission shall, on request, make report to the Interstate Commerce Commission. (R. R. Sect. 8.)
GAS AND ELECTRIC CORPORATIONS	
SUPERVISION	
19. Each commission shall have general supervision over gas and electric corporations. (Art. IV, Sect. 66.)	19. See No. 10 above as to general supervision over all public utilities.
SERVICE	
20. The commission shall investigate the quality of gas supplied, the methods of manufacture, supply and transmission of gas or electricity, and have power to order such improvements as will promote the public interest, preserve the public health and protect those using or manufacturing; also to fix standard of gas illumination and pressure, and to prescribe methods of regulation of electricity supply and efficiency of incandescent lamps. (Art. IV, Sect. 66.)	20. See No. 10 above as to requiring every public utility to furnish safe and adequate service.
ACCOUNTING	
21. The commission may prescribe uniform methods of accounts, require annual reports and examine the books, property or affairs of gas and electric corporations. (Art. IV, Sect. 66.)	21. See No. 12 above as to every public utility of the same class adopting a uniform system of accounting.
MUNICIPAL GAS AND ELECTRIC CORPORATIONS	
22. Each municipality operating gas or electricity supply shall make an annual report to the commission and otherwise be under its supervision. (Art. IV, Sect. 66.)	22. The jurisdiction of the commission extends to every other corporation or association operating for public use under privileges granted by the State. (P. U. Sect. 4.)
INSPECTION OF METERS	
23. Each commission shall appoint inspectors of gas and electric meters. If meters are not correct within certain percentages, the cost of test shall be paid by the corporation, otherwise by the consumer requesting the test. (Art. IV, Sect. 67.)	23. See No. 5 above as to additional expert help and No. 10 above as to adequate service and unfair discrimination.
FRANCHISES	
24. Without the commission's approval, no gas or electrical corporation shall exercise any franchise, nor shall any municipality operate any public supply of gas or electricity. (Art. IV, Sect. 68.)	24. See No. 15 above as to approval of franchises by the commission.
LEASES, MERGERS AND SALE OF SECURITIES	
25. Same provisions for gas or electrical corporations as for railroads or street railroads; see No. 16 above. (Art. IV, Sects. 69, 70.)	25. See No. 16 above.
COMPLAINTS	
26. Investigations of service and rates shall be made upon complaint in writing of the mayor of a city, trustees of village, town board of town or of not less than from 25 to 100 customers. After hearing, the commission may within lawful limits fix the maximum price to be charged, and may order improvements in service. (Art. IV, Sects. 71, 72.)	26. The commission has power to prevent discrimination, to hear and examine complaints and make recommendations concerning rates, and to require compliance with the laws of the State. (P. U. Sect. 5.)
PENALTIES	
27. Same provisions as in No. 17 above. (Art. IV, Sects. 73, 74.)	27. No. 17 above applies to every public utility.
Note.—Above references are to the Public Service Commissions Law of State of New York, Chap. 429, Laws of 1907.	Note.—In above "R. R." refers to the Railroad Commission, Act Chap. 197, Laws of 1907, and to its amendment by Chap. 169, Laws of 1909; "R. R. Amend." refers to Amendments by Chap. 189, Laws of 1909, and "P. U." to the proposed Public Utility amendment by bill just passed by the N. J. Legislature.

LATHE ATTACHMENT FOR BORING AND FACING ARMATURE BEARINGS

Many electric railway shops do not realize how much the life of an armature bearing can be lengthened if it is properly faced and bored when first placed in service after babbitting. Generally the bearings are put into the lathe for centering and lining-up by hand with a piece of chalk. This method not only requires the services of a good machinist, but also at least half-an-hour's time. With the attachment shown, however, the same work can be done with absolute accuracy in no more than four minutes.

The accompanying detail and assembly drawing shows the apparatus with dimensions to fit an 18-in. lathe. The same idea, of course, can be carried out for other sizes. As the drawing is so complete it is not necessary to explain every detail, but a little advice on a few points may not be out of place. Piece No. 4 must be fitted after the rest is assembled and the thickness will have to be planed until the threads will come in position to set the jaws in the correct center. To do this right it is best to take a 3-in. or 4-in. truing shaft, place it between the centers of the lathe and set the jaws against it. This will show how much must be planed off from piece No. 4. The T-bolts fit into the grooves on the carriage slide of the lathe. Besides these screws, there should be one ¼-in. dowel pin on each slide to get the apparatus in line on the lathe. The dowel pins should be fastened to the jaw slide No. 8 and the holes to receive them should be drilled in the slide on the lathe. No. 10



Assembly and Details of Lathe Attachment for Facing and Boring Bearings

is the boring tool, which fits the chuck threads on the lathe spindle.

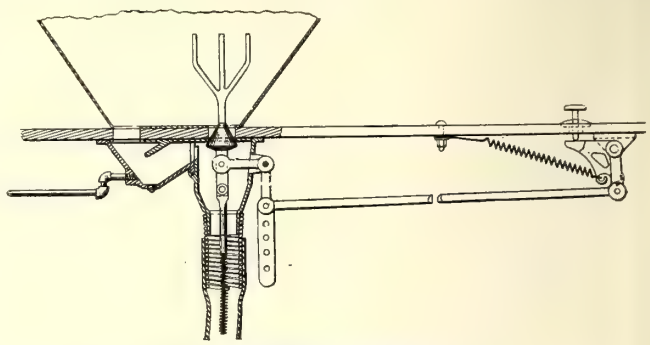
The process of boring is carried out as follows: Adjust the bearing with the large end toward the left or spindle on the lathe and fasten with the hand wheel. This will instantly bring the bearing in line and in center. Then set the tool at the end of the boring bar for a rough cut about 1/16 in. less than the final cut. Set the feed in the carriage and run the tool through from left to right. When through, stop the feed and run the carriage by hand over to the right until the facing tool strikes the bearing. Then press gently and the tool will cut the babbitt in thin ribbons from the bearing until the desired size is obtained. Then set the tool at the end of the boring bar to the exact size, set the reverse feed and run through from right to left. When through, adjust the carriage by hand so that the boring tool will take off the edge. This completes the bearing. The device has been in use in the repair shop of a Southern railway for a year and is not patented.

COST OF MAINTENANCE IN MASSACHUSETTS

In view of the general interest in the subject of maintenance cost, the following figures deduced from the report of the Massachusetts Railroad Commission for 1908 are presented through the courtesy of the Boston & Northern Street Railway Company. They show the cost of maintenance of car bodies, electrical and miscellaneous equipment of all Massachusetts street railways for the year ending Sept. 30, 1908:

A NEW SAND BOX

E. A. Longmire, master mechanic of the Norfolk & Portsmouth Traction Company, Norfolk, Va., has recently patented a sand box which is now in regular operation on the cars of the company named. As shown in the accompanying drawing, the box is designed for operation either by the platform pedal or by air from the motorman's valve. Simultaneous operation by foot and air is recommended only in emergencies. The box



Sand Box Used in Norfolk, Va.

is supplied with an air-trap attachment as well as a conical valve with a fork. The latter extends up into the hopper to break up the sand should the latter become packed. It will be noted that this valve has a small flexible shaft made of a coil spring which works up and down in a hose, thereby insuring a free passage and the elimination of obstructions.

Name of Company.	Cost of Maintenance.	Car Mileage.	No. of Cars.	Avg. Cost Per Car.	Avg. Cost Per Car Mile, Cents.
Amesbury & Hampton Street Railway Company	$2,662.50	139,000	11	$242.04	1.92
Athol & Orange Street Railway Company	4,018.27	147,147	13	309.10	2.73
Berkshire Street Railway Company	46,423.04	1,712,835	65	714.20	2.71
Blue Hill Street Railway Company	12,555.86	375,973	27	465.03	3.34
Boston Elevated Railway Company	1,121,031.08	51,625,143	3,464	323.62	2.17
Boston & Northern Street Railway Company	361,784.83	17,221,440	1,177	307.38	2.10
Boston & Worcester Street Railway Company	54,931.15	1,842,946	77	713.39	2.98
Bristol & Norfolk Street Railway Company	1,673.06	65,665	5	334.61	2.55
Brockton & Plymouth Street Railway Company	11.670.72	467,072	25	466.82	2.49
Citizens' Electric Street Railway Company	7,420.56	340,744	26	285.40	2.17
Connecticut Valley Street Railway Company	9,089.38	790,937	39	233.06	1.14
Concord, Maynard & Hudson Street Railway Company	2,801.02	237,531	16	175.06	1.18
Conway Electric Street Railway Company	1,379.16	26,292	3	459.72	5.24
Dartmouth & Westport Street Railway Company	13,067.26	492,131	24	544.47	2.65
Dedham & Franklin Street Railway Company	3,195.51	132,844	8	399.44	2.40
East Taunton Street Railway Company	2,467.30	149,723	7	352.47	1.65
Fitchburg & Leominster Street Railway Company	12,650.33	985,706	53	238.68	1.28
Gardner, West & Fitchburg Street Railway Company	3,301.74	253,412	12	157.22	1.30
Haverhill & Amesbury Street Railway Company	14,509.86	531,341	44	329.77	2.73
Haverhill & Plaistow Street Railway Company	1,293.40	64,400	..	....	....
Haverhill & Southern New Hampshire Street Railway Company	5,519.46	243,700	11	501.77	2.26
Holyoke Street Railway Company	43,626.70	1,961,346	127	343.51	2.22
Interstate Consolidated Street Railway Company	....	605,332	..	....	....
Lawrence & Methuen Street Railway Company	8,456.18	369,900	12	704.68	2.28
Lexington & Boston Street Railway Company	21,056.58	708,217	61	345.19	2.97
Linwood Street Railway Company	1,526.25	47,213	4	381.56	3.23
Lowell, Acton & Maynard Street Railway Company	....	43,175	..	....	....
Lowell & Fitchburg Street Railway Company	6,798.67	245,468	8	849.86	2.77
Lowell & Pelham Street Railway Company	1,683.72	76,000	9	187.08	2.21
Marlborough & Westborough Street Railway Company	5,254.42	199,868	11	477.67	2.63
Medfield & Medway Street Railway Company	1,547.88	151,072	5	309.57	1.02
Middlesex & Boston Street Railway Company	4,858.98	370,947	13	373.76	1.31
Milford, Attleboro & Woonsocket	12,234.61	430,403	21	582.60	2.84
Milford & Uxbridge Street Railway Company	8,958.70	697,470	45	199.08	1.28
Nahant & Lynn Street Railway Company	786.26	115,684	14	56.16	0.68
Natick & Cochituate Street Railway Company	7,477.48	491,598	39	191.20	1.52
New Bedford & Onset Street Railway Company	7,006.55	439,435	29	241.60	1.59
Newton Street Railway Company	20,219.08	1,538,841	143	141.39	1.31
Newton & Boston Street Railway Company	7,078.88	308,909	17	416.40	2.29
Norfolk & Bristol Street Railway Company	6,115.47	453,306	12	509.62	1.35
Northampton Street Railway Company	14,735.70	803,369	44	334.90	1.83
Norton & Taunton Street Railway Company	6,571.45	371,834	18	365.08	1.77
Norwood, Canton & Sharon Street Railway Company	721.20	68,447	7	103.21	1.05
Oak Bluff Street Railway Company	742.85	23,584	5	148.57	3.15
Old Colony Street Railway Company	222,198.91	10,090,027	728	305.21	2.22
Pittsfield Electric Street Railway Company	29,689.79	889,926	37	802.42	3.34
Plymouth & Sandwich Street Railway Company	696.90	47,612	4	174.22	1.46
Providence & Fall River Street Railway Company	11,902.27	245,232	19	621.17	4.85
Shelbourne Falls & Colrain Street Railway	1,083.65	56,239	4	270.91	1.92
Springfield Street Railway Company	122,968.28	5,649,401	284	432.98	2.17
Taunton & Pawtucket Street Railway Company	6,253.17	264,756	15	416.87	2.36
Templeton Street Railway Company	5,821.64	236,130	15	388.11	2.46
Union Street Railway Company	30,436.29	1,730,441	140	217.40	1.75
Uxbridge & Blackstone Street Railway Company	2,688.89	315,389	5	537.77	0.85
Ware & Brookfield Street Railway Company	4,279.73	158,199	12	356.64	2.70
Warren, Brookfield & Spencer Street Railway	2,466.17	321,337	17	145.07	0.77
Westborough & Hopkinton Street Railway Company	953.93	79,480	..	....	....
Western Massachusetts Street Railway Company	5,169.91	857,777	37	139.72	0.60
Worcester & Blackstone Valley	6,701.36	362,584	18	372.29	1.85
Worcester Consolidated Street Railway Company	143,064.97	5,909,117	343	417.09	2.42
Worcester & Holden Street Railway Company	4,559.98	185,419	7	651.42	2.45
Worcester & Southbridge Street Railway Company	20,162.30	1,215,523	63	320.03	1.65
1909 —					
Boston & Northern Street Railway Company	427,501.53	17,491,555	1,165	367.03	2.44
Old Colony Street Railway Company	228,367.43	10,209,504	713	320.29	2.24

TURN-OUT SELECTOR MECHANISM FOR ELECTRIC RAILWAY DISPATCHING

The Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., which is well known to electric railways through its telephone dispatching system, recently has added to this line the interesting dispatcher's selector mechanism described in the following paragraphs.

The master selector is at the train dispatcher's office arranged so that the dispatcher can operate it conveniently without rising from his chair. This master selector has a dial upon which is shown the number of each turn-out on the division and immediately under these numbers are holes for inserting a removable plug when selecting and operating a signal. A selector very similar in appearance to the master is located at each turn-out in a booth. This selector, when aided by a semaphore trip, operates the semaphore from the "clear" to the "stop" position at the will of the dispatcher. There is also a tape recorder on the train dispatcher's desk which is operated by impulses created by an individual station when the semaphore at that particular point has gravitated to "full danger." To illustrate, when semaphore No. 5 is set to "danger" by the dispatcher, the semaphore at station No. 5 automatically releases the mechanism at station No. 5. This causes five impulses to go forth on the line. These are immediately recorded as five perforations on the dispatcher's tape. In the same way, station No. 6, when operated, would generate six impulses on the line. The mechanism which controls this "answer-back" is not released to operate until the semaphore actually has been set to the full "stop" position. The answer-back device is mounted in the same case with the trip mechanism.

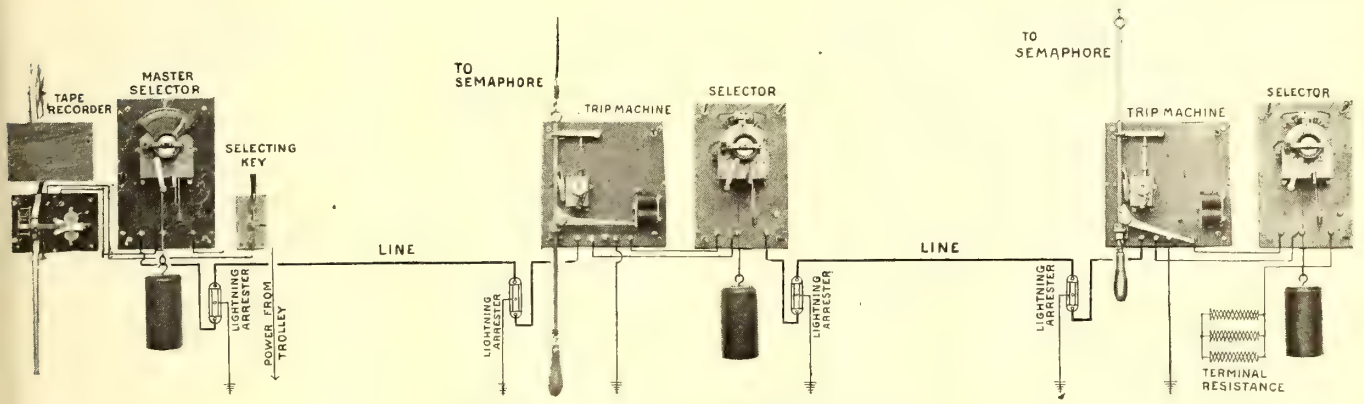
To set a signal against a car at some point on the line, the dispatcher throws a controlling switch to the battery. This starts the beating of the mechanisms with all clocks in the same relative position. The effect of this battery current is to energize a magnetic coil, which causes an armature to pull up and release the driving wheels of the clock movements at each of the stations. The wheels in all of the stations are rotated at the starting position by suspended weights. The dispatcher then inserts the plug in the dial hole of the master device corresponding to the station for which the danger signal is to be set. Then he throws to the firing position the controlling switch previously mentioned.

When the switch is thus thrown the battery current through the line is broken. Consequently, the magnets in the selectors release their armatures so that the friction wheel comes into contact with the moving wheels or disks. As all the clock movements are in operation, the contact-carrying disks continue to move together and pass over the contacts for the various stations in their order until the master selector touches the plug which had been inserted in the dial hole corresponding to the desired station. As soon as this contact with the plug is established, the corresponding local station selector moves the contact-carrying disk into contact with the springs and completes the circuit for operating the trip mechanism. The movement of the trip releases the semaphore, cuts the trip from the circuit and also closes the circuit which permits the answer-back mechanism to send back the tell-tale impulses for the dispatcher's tape. This occurs because the semaphore upon reaching the full danger point has automatically set the answer-back mechanism in operation. The moving disk of each clock also is restored to the starting position, leaving every selector ready for further operation.

Aside from the apparatus described, with which 30 to 40 signals can be operated straight away selectively, there is required only one bare iron line wire and a source of power.

The power for the battery is generally obtained from the trolley circuit at the dispatcher's office. There are no local batteries along the line. Only a small voltage is required for the operation of the selectors, and this is used only momentarily while actually operating a signal.

The value of this apparatus may be better understood by assuming an operating case. For instance, a dispatcher wishing to give two crews orders to meet at a certain turn-out would set the signal to "stop" position at that point. His answer-back at once would be automatically thrown upon the wire at the distant station and automatically recorded on the dispatcher's tape register. He would then set the semaphore to "danger" at other selected points to get in touch with the two respective crews and give them orders to meet at the selected point, where, as a preliminary move, he had set the signal to danger to enforce obedience to the orders which he issued later. The first crew of the two arriving at the meeting point, finding the signal set against them communicate by telephone with the dispatcher and are reminded of the order to wait for the other car. They are also instructed to restore the signal to "clear" to avoid any delay to the other car. The purpose of the signal is served, of course, when the first crew has been checked.



Apparatus for Selector Dispatching System

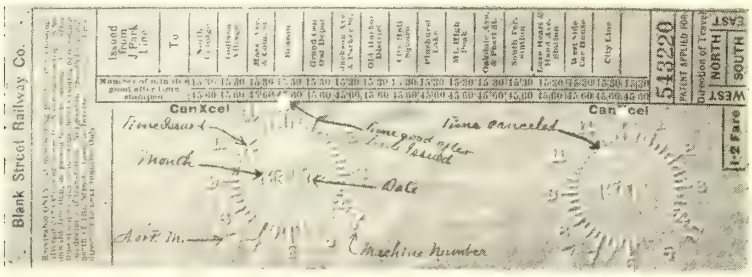
Mishaps can almost invariably be traced to the unusual meeting points which a disarranged schedule had made necessary and which are repeatedly overrun by the crews. The object of the dispatcher's signals described is to reinforce the dispatcher's orders at such points, as well as to provide a means whereby the dispatcher can establish immediate telephonic communication between himself and any crew at any turn-out.

The report of the directors of the Costa Rica Electric Light & Traction Company, London, England, for the year ended June 30, 1909, shows that the net earnings in Costa Rica amounted to £13,938, as compared with £14,402 in the previous year. The decrease in profits was due to the heavy repairs required to the rolling stock, some of the cars having been rebuilt. The Guadalupe extension was inaugurated by the President of Costa Rica on Oct. 12, 1908, and the line is proving a valuable addition. The auditors of the report point out that no provision has been made for depreciation. The company also has received a concession for a 3000-kw hydroelectric plant at El Brazil.

AUTOMATIC TIME PUNCH FOR TRANSFERS

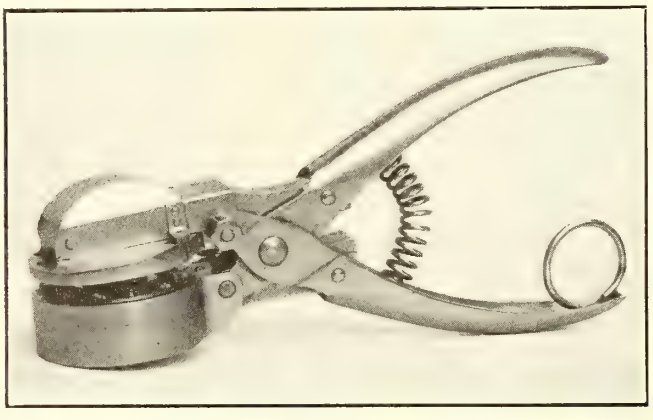
A new system for the control of transfers has been recently perfected by the Transfer Issuing Machine Company, of Boston, Mass. This device, known as the Smith punch, takes the place of the ordinary punch used by street railway conductors. The use of this punch enables conductors with only one operation to indicate upon the transfer the month, date, time of day, number of punch and destination of passenger. It is, therefore, a large time saver, as a conductor is now frequently obliged to punch a transfer from two to five or more times to accomplish the same result. The time saving, however, is only one of the minor gains made by the use of the punch. The date and time are stamped on the transfer automatically so that transfers cannot be timed or dated ahead of the time of actual issue. Thus it tends to prevent the misuse of the transfers.

The punch also places upon the transfer the time beyond that of actual issue within which the transfer may be used by the passenger. This time limit being automatically placed upon the transfer enables the receiving conductor to see at a glance whether the transfer is being used within the time limit or not, and as the time limit is placed by machine the receiving conductor can with safety decline to receive a transfer beyond the limit indicated upon it. This places a positive check upon the passenger and makes the time-limit feature of a transfer of real value. It thus effectually prevents the use of a transfer as a stop-over ticket.



Sample Transfer Stamped with Time Punch

The illustrations show the method of printing upon the transfer the various indications mentioned above. The receiving conductor also cancels the transfers received and in so doing prints upon the transfer the time of receipt, thus compelling him to make a record of the actual time at which he receives the transfer, and forcing him to regard the time limit. The transfer, therefore bears upon it a complete history of its use, both by the issuing conductor, the passenger using the transfer and the receiving conductor. The checking up of transfers is, therefore, very easy and rapid.



Automatic Transfer Time Punch

The punch contains a strong, reliable time mechanism and dating wheels so arranged that they can be easily changed in the office from day to day. The indications made by the punch cannot be changed except by an authorized person, as the operating mechanism is sealed after being wound for the day.

The illustration of a hypothetical transfer, under this system, shows it was issued from J Park Line to Beacon by Punch 00 on March 10 at 10:15 a. m., and that it is good for 45 minutes beyond that time, or until 11 a. m. The second impression gives the number of the punch carried by the receiving conductor, the time at which the transfer was received and that the transfer was received within the proper time limit. The same punch is used both in issuing and receiving the transfers. Each conductor carries but one punch. This punch can be used as an ordinary punch also if desired.

EXPANSION BORING BAR

The expansion boring bar shown in the accompanying cut is made for steel and cast-iron wheels by the Buck Boring Bar Company, Huntington, W. Va. It is stated that this expansion borer will complete the boring of a steel wheel in five minutes and a cast-iron wheel in less time. The principal feature of the bar is embodied in its four cutters, each of which has separate expansion. Each cutter is adjusted so as to divide into four parts the metal to be bored out. This makes the work easier for the cutters, gives longer life to the cutting edge and results in securing a standard size hole. The bar has a water attachment which supplies a small stream direct to the point of the cutting tools, thereby keeping the cutters cool and allowing the machine to be run at high speed. As the water is applied through the bar, there is no piping around the machine to encumber the operator. It has been found that with this bar one set of tool-steel cutters can bore 2000 steel wheels.



Expansion Borer

While the bar was designed for speed in taking two operations, the roughing cut and finishing cut separately, it will bore in one operation all that a boring mill can pull. It is being operated in this way. To take two operations with the bar, the finishing cutters are removed and, after taking the roughing cut, are replaced to take the finishing cut. It is asserted that this can be done in one-half the time required by other bars.

To adjust for the size of hole wanted, a gage is placed over the full width of the cutters, the latter being expanded to the gage. This has been found to be more correct than to graduate the expansion adjustment as provided on some other bars, for, in graduating the adjustment, the cutters must be kept ground perfectly square and exactly the same length. Since the cutters become shorter every time they are ground, the starting point is lost when they are replaced in the tool. This company's method of boring by gage makes the bar particularly applicable in railway shops where boring is required to fit various size wheel seats. Another important feature is that the cutters have a 2-in. range of expansion, so that one bar will answer for wheels with two sizes M. C. B. standard bore.

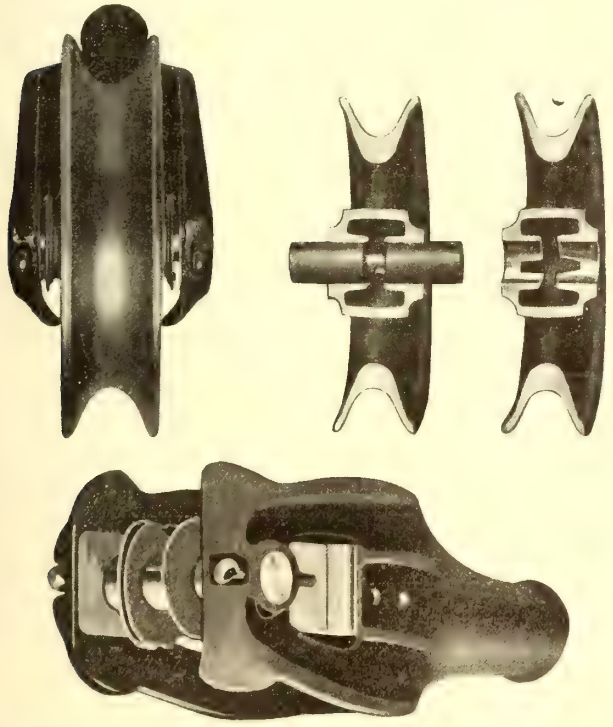
A CLAMP DERAILER

The Freeland derailer, manufactured by the Hobart-Allfree Company, Old Colony Building, Chicago, which has given satisfactory service on some of the largest interurban railway systems, has recently been improved by the addition of a "derail protection." The latter, when the derail is in the open position, secures it against damage from dragging brake-beams or other parts of the equipment. The derailer is so designed that it can be operated either mechanically or as a hand throw and thus may be adopted as standard by a railway which requires either or both methods of operation.

AN IMPROVED TROLLEY WHEEL AND HARP

Trolley wheels and harps of improved types manufactured by the Hensley Trolley Company, Detroit, Mich., are making excellent records in all classes of electric railway service. These devices are noteworthy because they have very few parts, each of which is designed so that the efficiency of any one is not sacrificed for another.

The Hensley trolley wheels are made of "Resisto" bronze, a composition which is said to afford especially long life to the wheel without unduly wearing the trolley wire. Several sizes of wheels are supplied, each for a particular class of service. The wheels are cast in one piece and provided with a large hub cored out to retain the lubricating material. No bushings are used and the wheels are mounted directly on machine-steel spindles ¾ in. in diameter, which are firmly held in the harps by cotter pins. The bearing is designed to outwear the rim of the wheel and that such results are obtained is said to be due to the improved method of lubrication. Continuous lubrication of the bearing is effected by a supply of grease or graphite compound enclosed in an annular well cored out of the wheel hub. This well surrounds the spindle and is connected to the wearing surfaces by several slots. The lubricating material is forced into the well through a hole drilled into the end of the spindle and terminating in a grease retaining ring cut around the center of the spindle. One advantage which this design of wheel has in addition to that of long life, is that a considerable amount of lubricant can be forced into the lubricant chamber through the end of the spindle without removing the wheel or uncapping an orifice. Other advantages credited to this device are the non-leakage of the lubricant, a small number of parts, simple method of lubricating, small liability of breakage and the resulting low maintenance cost.

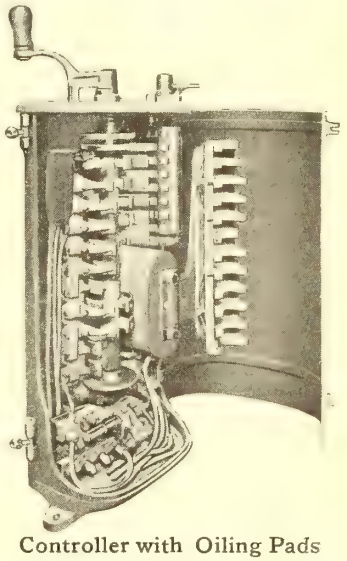


Trolley Wheel, Harp and Wheel Sections, Showing the Means for Lubrication

The Hensley trolley harps which carry the wheels of the same name are designed in several types suitable for all services. The contact washers used are made of half-tempered copper, which is tough, giving long service and high conducting capacity. The washers are provided with ears which bend back to form guideways for the springs, the combination of the two being self-adjusting and permitting a free movement on the spindle without any wedging action. The contact springs are made of tempered copper riveted firmly to the harp and the outer ends of these springs have straight edges to carry the contact washers in a central position so that they will mate with elongated openings in the spindles. The ends of the trolley harps have aprons which extend inwardly close to the web of the trolley wheel. These aprons protect the contact washers from damage in case the wheel leaves the wire and so the harp can be jockeyed into position without fear of damaging the overhead construction.

LUBRICATING CONTROLLERS WITH OIL PADS

Ever since car controllers have been used, it has been the custom to hand-lubricate the fingers and segments with vaseline to avoid wear and cutting. This method has worked fairly well where controllers were inspected, say, every three days. It is known, however, that the tendency of the fingers is to push the vaseline along until it lodges back of the segments from whence it is difficult to remove. Furthermore, after a few applications of the controller, the vaseline is burnt off of the points of contact where the lubrication is needed most. As the result, blistering and cutting sets in and unless frequent inspections are made, the metallic dust, roughened segments and bent fingers will result in the production of short-circuits and other expensive troubles.



Controller with Oiling Pads

To overcome these hindrances toward placing the controller on the same long mileage inspection basis as less sensitive electrical equipment, the Third Avenue Railroad Company, New York, began to install last summer a novel felt-oiling device for the controller on about 350 cars. As shown in the accompanying illustration this contrivance consists of a board carrying a row of oil pads spaced so as to come directly opposite the fingers and segments.

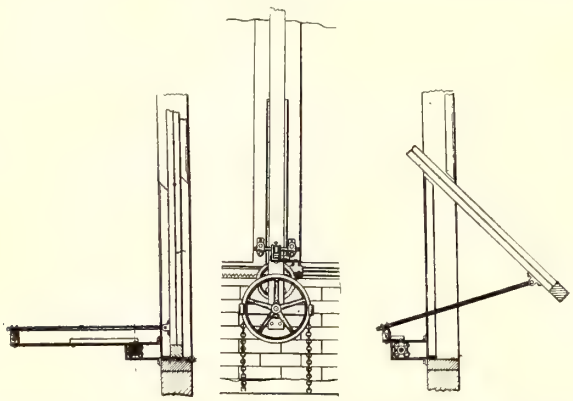
This board is set between the main and reverse cylinders on the back of the arc deflector, so that in turning the controller handle the segments lubricate themselves by rubbing against the oil-soaked felt pieces. The entire contrivance consists of the felt, a backboard of ¼ in. or ⅛ in. thickness, and a flat spring to hold the board in position. It has been found in the case of the Third Avenue Railroad's installation that controllers equipped with this device can easily be run for 3200 miles without lubrication. The controller shown in the illustration is used on a transfer table at the One Hundred and Twenty-ninth Street car house, and is operated, of course, on resistance points only. Despite this condition, the segments and fingers have required no attention after one year's service. It is the experience of the mechanical department of this company that this method of lubrication will at least double the life of fingers and segments.

This method was invented and has been patented by W. P. Wiswall, general foreman of the Third Avenue Railroad. Mr. Wiswall has already supplied a number of these lubricators to the Ithaca (N. Y.) Street Railway Company, United Railways & Electric Company, Baltimore, Md.; Union Railway Company, New York; New York & Queens County Traction Company, etc.

Consul Alonzo B. Garrett reports that a new electric street railway is about to be built in Nuevo Laredo, Mexico. The steel rails and ties are on the ground and the right-of-way secured. The line will extend from the tramway bridge to the custom house, and it is planned to extend it a little later to the machine shops of the National Railway Lines of Mexico.

SASH OPERATING DEVICE

The G. Drouvé Company, Bridgeport, Conn., the maker of the "Anti-Pluvius" puttyless skylight and the "Lovell" and other types of sash operators, recently has added to its lines the "Straight-Push" operator illustrated for the mechanical control of pivoted or hinged sash. Pivoted windows are not always made to fit their frames without binding and changes of weather and swelling of the wood often make a chisel and hammer necessary to open them. The man operating the sash sometimes does not take these facts into consideration and when the device refuses to answer to his efforts he either gets assistance or reinforces his own strength with an iron-bar. Something is sure to break under such conditions, particularly where worm and gear devices are used. In the design of the new "Straight-Push" operator, the direct pushing outward of

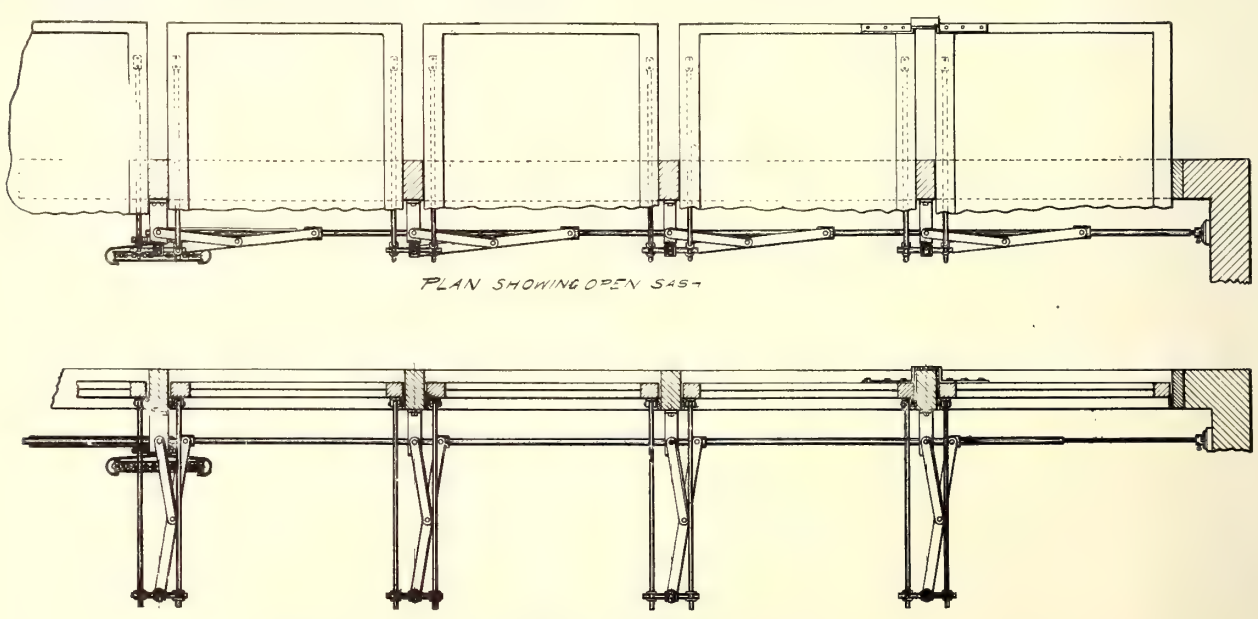


End Elevation of Window Operator, Open and Closed

the sash with two ½-in. steel rods by leverage, one arm being fastened to each side of the sash at the lower part of the side rail, insures the opening of the window. These two arms are adjustable to give a 30 deg. or 45 deg. opening. A line of ¾-in. pipe shaft to which the main lever is fastened at each sash with an open coupling is moved backward and forward between spool roller brackets at each interval between the windows. A rack and pinion with geared wheel, controlled by a floor chain, gives the forward and return movement. A guide lever is secured to the top of each bracket and in turn is fastened to the main lever. The unattached end of the main lever has a U-chair riveted to it which supports the shaft connecting the two steel arms. While the arms bind to the connecting shaft, the latter works freely in the U-chair support, allowing the arms to follow the inclination of the sash. The movement of the main shaft back or forth operates the levers at each window. As the arms are directed straight at each side of the sash and work simultaneously, the windows open or close as desired and with the same power of application throughout. Several different sizes of wheels are made for operating any number of sash from 10 to 100 under one control. The operating parts cannot rust together as the connections are phosphor bronze to iron.

This apparatus is adapted for pivoted side or pivoted top-and-bottom sash, top-hinged and bottom-hinged sash. The device is also adapted to meet unusual conditions as where a crane, while not interfering with the hinged or pivoted sash when opened, does interfere with the installation of operating parts in the usual positions. Instead of pushing the sash outward from the bottom, the sash are pulled inward from the top and are pushed closed; thus reversing the ordinary directions of opening and closing. In monitor or lantern construction where it would ordinarily be necessary to bring the operating chain down the underside slope of the roof and then to the floor, the operating wheel can be placed at the end of the building, with the chain coming down the end wall to give direct floor control. Idlers or pulleys can be used with this window operator to make corners with greater ease than is afforded by torsion shafts.

The sash can be opened as much as may be required for proper ventilation and held at any position. The straight arms act as a brace against wind pressure. In case of fire, rain or dust storms drafts, can be checked at once by the quick-closing characteristic of this sash operator. The safety valve of the device is the chain, which controls the operating wheel. This chain is heavy enough to operate any number of sash on the line and will stand a reasonable strain, yet it will part under an abnormal weight. Nevertheless it is easy to close an open link and to replace the chain on the wheel. The opening of the link will direct attention to the trouble. Only the offending binding windows need be dropped off the line until they have been planed by the carpenter. The working parts of the apparatus, therefore, are not broken nor are all the windows put out of commission. Otherwise replacements of vital working parts might be put off from time to time and bad conditions endured indefinitely.



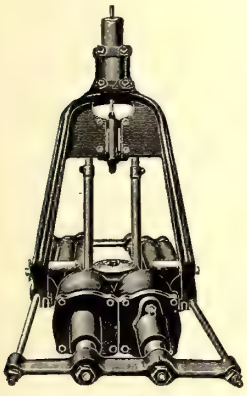
Plan and Side Elevation of Window Operating Mechanism, Open and Closed

An agreement has been entered into between the Mayor and the Anglo-Argentine Tramway, Buenos Ayres, Argentina, for the construction of an underground railway in Buenos Ayres in connection with the surface system.

A PNEUMATIC TROLLEY RETRIEVER

A novel combination trolley base and retriever which has been in use between Lockport and Buffalo, N. Y., since August, 1909, has been placed on the market by A. L. Prentiss & Co., of Buffalo. The basic features of this device are the application of compressed air from the air-brake system to operate the retrieving mechanism in the trolley base; and the hinged attachment of the harp to the pole by which the automatic control and connection of the air pressure system is assured. No light tension springs and dogs are necessary to make this retriever operate. The rope is used only to guide the trolley wheel back to the wire, so that it makes no difference whether it is taut, wet or frozen. There is no coiling drum at the end of the car, because the retrieving device is entirely self-contained in the base.

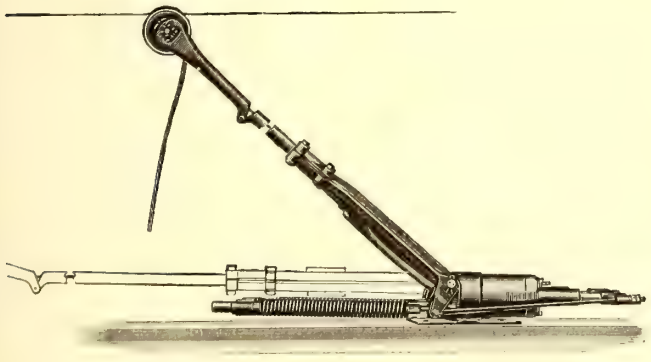
A very important point is that the pole does not have to ascend several feet, with the possibility of causing damage before it retrieves itself. The instant the wheel leaves the wire, the pole is drawn down on the top of the car, no matter what the height of the wire, the length of the pole or the pressure may be. The pole remains flat on the top of the car until the rope is pulled, when it immediately rises and is guided to the wire.



Trolley Base

The damage caused by jumping poles and wheels is so great that, rather than have the wheel leave the wire, it is necessary to use a much greater tension on the wire than is advisable, in spite of the fact that a high tension wears out the wire and wheel faster. Hence the use of a reliable retriever should result in the material reduction of maintenance charges and expenses for damages. It is hardly necessary to point out that when using a retriever the conductor can pay more attention to the care of his passengers, as he does not have to drop all other matters and rush for the rope when the wheel leaves the wire. The pole is out of the way until the conductor can reach the rear platform to restore it to its place.

The trolley base part of this mechanism works with powerful tension springs, after the manner of all standard trolley bases, and operates without reference to the air connections.

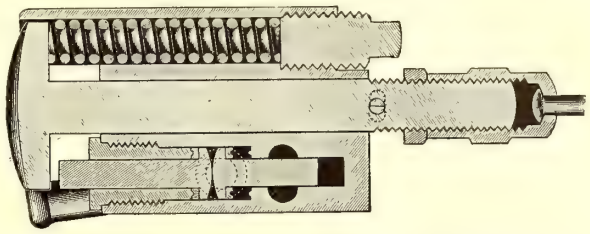


Hinged Pole Used with Pneumatic Retriever

It conforms in outline to the common standard, and may be as easily attached. The stand is of malleable iron with a 5-in. stud, over which is forced a hardened steel sheave 2⅞ in. in diameter. It is screwed to the running board in the usual manner. The base is of cast iron, having the center hole fitted with a hardened steel bushing in which are thirty-eight ¼-in. tool steel rolls to give it a very sensitive lateral motion. This feature gives easy adjustment between the pole and the wire, no matter what outline the wire may take, and also takes off all lateral pressure from the wheel and wire on curves.

Two 4¼-in. diameter cylinders extending forward are fitted with cylinder heads having long stems to support the piston rods on which a cross-head is fitted. This cross-head is connected to the toe of the yoke by the two side rods that have free movement in the cross-head, allowing the piston to remain stationary as the pole moves up or down to adjust itself to varying heights of the wire. From the base there extend rearward two standards which are threaded and fitted with nuts, and against these a cross-head rests for tensioning the springs.

The toe is arranged so that several connections can be made,



Section Showing Spring Which Elevates Harp, Spring-Tension Screw, Air Valves, Etc.

each affording a different leverage to allow the retriever to be properly connected to air-brake systems having pressures ranging from 60 lb. to 100 lb., and irrespective of the wheel pressure. The yoke is of malleable iron and is hinged to the base by two ⅞-in. steel studs held by cotter pins. The pole is screwed to the yoke in the usual manner. There is bolted to the yoke, near the pole end, a valve section made of solid cast bronze, which eliminates the question of rust, and which is so situated as to be free from dust and grease. This valve section is connected to the base by two flexible tubes, one of which leads to a port entering both cylinders and the other through the base to the air-brake system. The springs are of the expansion type, four to a base, 1⅞ in. outside diameter, 15 in. long, and 13-32 in. round. Nuts are screwed into the ends, to expand the springs.

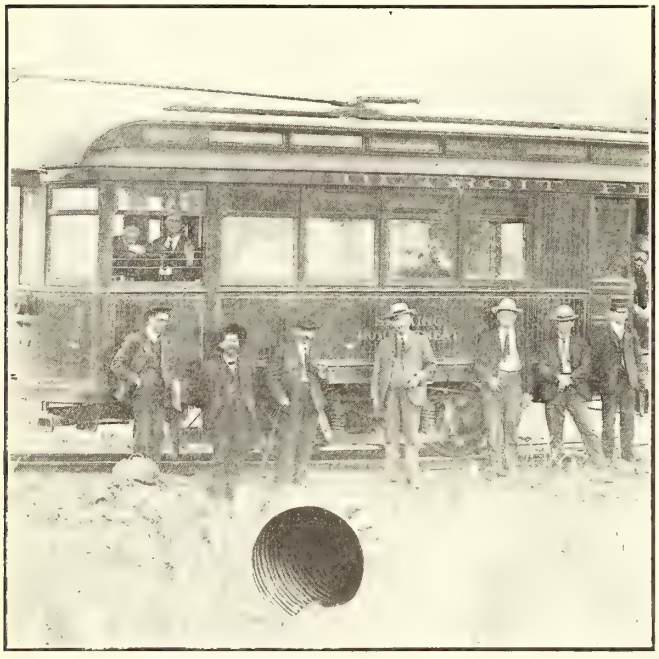
The pole is of the standard tubular pattern. The harp, instead of being attached rigidly to the pole, is hinged to it. Running from the harp through the center of the pole is a rod that manipulates the valves to the air chambers of the cylinders in the trolley base. When there is a pressure on the wheel or harp, the valve that admits the compressed air is closed and an exhaust valve is opened. The tension spring then keeps the wheel on the wire. When the pressure is removed from the wheel or harp, as when the wheel leaves the wire, the valve admitting the air to the cylinders opposite to the tension springs opens, the exhaust closes, and the air pressure is regulated to be more powerful than the spring, the pole is instantly forced to a horizontal position on the top of the car. From this position a slight pull on the rope attached to the hinged harp shuts off the air pressure, when the tension springs cause the pole to rise, and it is readily guided to the wire.

NEW PRUSSIAN SINGLE-PHASE RAILWAY

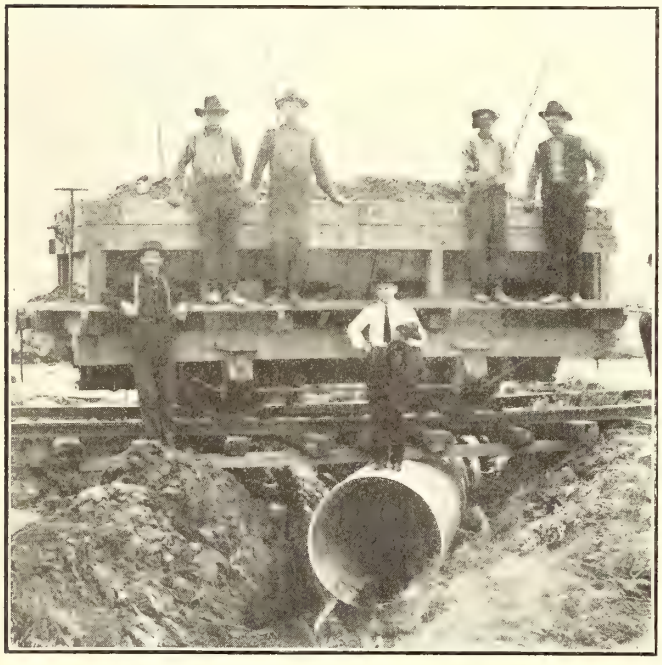
The Prussian State Railways are preparing to equip for single-phase operation a 30-km (18.6 miles) section of steam railroad track, comprising the main line division between Bitterfeld and Dessau. The general design of the overhead construction and car equipment is to follow that of the Hamburg-Altona line with the significant difference that the motors will be built for 15 cycles instead of 25 cycles. The power house, which will be located at Bitterfeld, is to have a two-pole, 900 r.p.m., 3000-kw turbo-alternator. The present electrification will cost about 2,000,000 marks ($480,000) and if successful will be followed by the electrification of the lines between Leipzig, Magdeburg and Halle at an additional cost of 26,000,000 marks ($1,248,000).

CORRUGATED IRON CULVERT PIPE

Cast-iron and vitrified clay pipes and reinforced concrete structures up to the present time have been commonly used for small drainage openings in embankments. Cast-iron pipe combines strength with reasonable durability, but is expensive and difficult to transport and set. Vitrified tile, while it does not decay, is fragile and requires a deep cover over it in order to withstand concentrated loads. The economy of reinforced concrete structures depends very largely on the local conditions under which they are built. Since the recent production on a commercial scale of iron sheets of 99.94 per cent purity and remarkable rust-resisting properties it has been possible to manufacture corrugated culvert pipes of this metal which weigh only about one-tenth as much as cast-iron pipes of the same size, with equal or greater strength against crushing. The cost is less than half that of cast-iron pipe and the life is estimated at not less than 40 years under the most unfavorable conditions.



Corrugated Iron Culvert Pipe, 36 in. in Diameter, with Shallow Cover Supporting Interurban Car Without Deflection



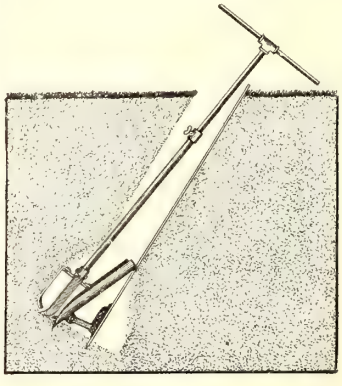
Corrugated Iron Culvert Pipe Supporting Track Laid Directly Upon It

The American Rolling Mill Company, of Middletown, Ohio, is now rolling from ingots made by a special process sheets of iron containing less than 0.06 per cent of impurities, and is furnishing these sheets to a number of manufacturers throughout the country, who are making from them corrugated pipe of all sizes and thicknesses. The iron from which these sheets are made is purified in the molten state and the slag formed during the process rises to the surface. The removal of this slag leaves the metal free from entrained impurities and improves its physical properties of tensile strength, elongation and reduction of area. This almost chemically pure iron has the quality of resisting corrosion to a marked degree, due to its homogeneity and freedom from manganese and carbon, which impurities set up local electrolytic action, the primary cause of rust. As an example of the comparative resistance to corrosion of this new product and ordinary steel, the loss in weight of a sample of steel immersed for 24 days in a 5 per cent solution of sulphuric acid was 14.41 per cent, while a sample of iron lost only 0.21 per cent, or but one-seventieth as much as the steel sample.

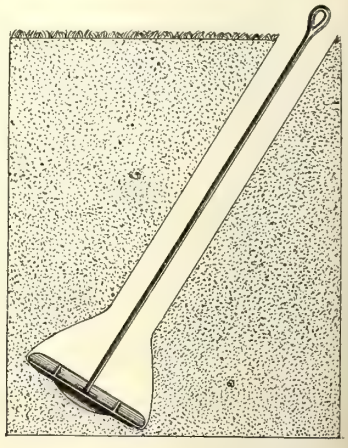
Corrugated pipes made from sheets of this rust-resisting iron combine great strength with light weight and long life. They may be used under depth of cover or set so close under the rails as to bear the direct downward thrust of the ties. Their light weight is an advantage as the cost of hauling and difficulty of setting is materially reduced. They may be embedded in an earth embankment without end protection or finished at the ends with concrete face walls, as desired.

NON-CREEPING POLE GUY ANCHOR

The accompanying engravings illustrate a new anchor for pole guy wires and a special auger deflector for placing the anchor in the ground. The anchor plate is large enough to resist any pulling strain up to the tensile strength of the rod and it bears against solid ground in the enlarged bottom of the hole; the anchor, it is claimed, will not creep. To install these anchors a hole of uniform diameter is bored to the desired depth with an ordinary dirt auger. The special deflector is then inserted in the hole and the points pushed well into the ground to hold it in place. By turning the auger in the deflector one-half of the bottom of the hole is enlarged. To enlarge the other half the deflector is turned half-way around in the hole and the operation repeated. The bottom of the hole can be enlarged in from 5 to 10 minutes.



Enlarging Bottom of Hole with Deflector



Safety Guy Anchor Set in Enlarged Hole

These anchors are made in five sizes with either galvanized or black finish. The deflector is adjustable and may be used for setting any size of anchors. Both devices are made by the Miller Anchor Company, Norwalk, Ohio.

LONDON LETTER

(From Our Regular Correspondent)

The thirteenth annual meeting of the Tramways & Light Railways Association was held in February, 1910. Arthur Stanley, who presided, referred to the satisfactory financial condition of the association, and said that the chief events in the history of the association during the year were the adoption by the inland revenue authorities of the standard allowances for depreciation for income tax assessment, and the appointment by the board of trade of an arbitrator to determine who should bear the cost of fuses and heat coils inserted in the post office telegraphs. The arbitrator's decision was unfavorable to the association. Three special committees were at work at present. One was a reconstituted and enlarged committee on brakes and braking arrangements; the second was a committee to test various speed indicators designed for tramways, of which there were 16 under trial; the third was a committee to consider the advisability of the association taking up the case of the Blackpool & Fleetwood Company's appeal in regard to rating. At the annual dinner and smoker held at the Gaiety restaurant, the Duke of Argyll occupied the chair. Sir Henry Cunyngham proposed the toast, "The Tramways and Light Railways Association." The amount of capital invested in tramways and light railways in Great Britain was £70,000,000, the length of the lines 2526 miles, and the number of passengers annually 2,660,000,000. The annual congress of the association will be held at Dublin on May 12 and 13, 1910, as announced in the Electric Railway Journal of March 19, 1910, page 501.

Reference has previously been made to a proposed bill to be promoted in Parliament this year for an underground railway from the Strand to the Crystal Palace, to be operated by the Kearney underground system, which was demonstrated recently at the Crystal Palace. The system is a modification of the monorail, with an overhead rolling contact to retain the cars in an upright position. It is intended to use one tube, with a double tube turn-out or siding at the stations. The road as proposed would extend from the Oval to Cricklewood, with stations at Vauxhall, Pimlico, Victoria, Hyde Park Corner, Marble Arch, Edgware Road, Lord's and Brondesbury, and from the Oval, via Kennington Road and Waterloo, to the Strand. It is also intended to construct a line on the surface from the Oval to the Crystal Palace, with stations at North Brixton, East Brixton, and Herne Hill.

As mentioned in the Electric Railway Journal of March 5, 1910, the recent London County Council elections have resulted in a large amount of literature being issued on the subject of tramways, in favor of both the Progressives and the Moderates. It is now maintained that the tramway system of London has decreased the death rate of the city. In 1905 the death rate was 159 per 10,000, whereas in 1909 the rate was only 142 per 10,000. The efficient and cheap service of the tramways is said to have enabled hundreds of thousands to move from the overcrowded districts in the heart of the metropolis to cheaper, better and healthier homes in suburban districts. Of course, the improvements in drainage, supply of pure milk, etc., have all helped to decrease the death rate, but electric railways without doubt have been the most important contributing factor.

The mileage of the tramways in London has increased from 58½ miles in 1907 to more than 110 miles in 1910. In 1909 nearly 413,000,000 passengers were carried, an increase of nearly 122,000,000 since 1907. During the same period the number of cars in operation has been increased from 671 to 1170. About £1,500,000 is being expended annually on new tramways. The number of workmen's tickets which are used has also increased. The cheap fares now commence at 1:30 a. m. instead of at 5 a. m. Under the new system of keeping the tramways accounts the balances go to the reserve fund instead of being applied for the relief of the rates. In 1907 the debt outstanding was £6,133,564, the renewal fund £141,855, and the total reserve £141,855. In 1909 the total debt outstanding was £8,126,697, but the renewal fund had increased to £264,837 and the total reserve to more than £300,000. In the system used by the Progressives the renewal fund was used for the ordinary purposes of the undertaking, but as the auditors held it should be properly invested, the Reformers have invested the money in securities. The lines do not show a greater profit because it has been decided to reduce the fares to a point where the revenue would build up substantial renewal and reserve funds and nothing more.

The Wigan Corporation, which was considering a proposal from the Lancashire United Tramways to purchase the electrical undertakings belonging to the Corporation, which include trams in majority of the townships in the Wigan Union, has refused to entertain the proposal for the time being. The Lancashire United Tramways is said to feel that many economies could be worked in the operation of the lines of the Wigan Corporation through joint management and operation. The Lancashire United Tramways took over the Farnworth Tramways some time ago when that system was losing £2,000 a year and has so managed the property since then that the deficit has been converted into a surplus. If the proposal to purchase the Wigan tramways should be accepted, it is understood that a new company would be formed.

While the cable tramways of Edinburgh are, perhaps, the most successful in Great Britain, the inflexibility of the system is strikingly emphasized where short extensions are to be built. Heretofore, all efforts to induce the Corporation to introduce electricity have failed, but in March, 1910, the tramway committee of the Council finally agreed to recommend the construction of an overhead electric railway from Ardmillan Terrace to the new Markets at Gorgie. The amount of the contract is £12,265 and the contractors are Dick, Kerr & Company, who have guaranteed to finish the work by May 14, 1910. The proposal to construct an electric tramway was brought before the committee two months ago, and the action recently taken marks the beginning of electric traction in Edinburgh.

The scheme for the electrification of the Isle of Wight railways and the alternative scheme for the construction of light railways or electric tramways, which have been under consideration by a representative committee composed of the members of the different public bodies in the island, have been abandoned. It was reported by the chairman of Isle of Wight Central Railway at the last conference that the advantages of electrical working of a mixed traffic of passengers, goods and minerals have not yet been demonstrated by the experience of other railway companies in the country, and in the absence of such experience the companies were not prepared to propose the conversion of their lines. Such a contention is, of course, wrong, as the North Eastern Railway operates such a railway at Newcastle, but the report is sufficient to kill the project for the time being.

One of the most up-to-date generating stations in Great Britain has just been opened by Prof. Ewing of the British Navy at Dundee. For many years Dundee has struggled with a totally inadequate power supply from its electric lighting station, built many years ago and increased by small units until it has become a heterogenous mass of machinery, representing various stages of the art. The new Stanergate station is the result of the advice of Mr. Richardson, electrical engineer, who was formerly at Newcastle. It has been built on the water side and is equipped with the most modern boilers, coaling machinery and turbines.

The Belfast Corporation has decided to extend its generating plant by adding a 1500-kw Willans impulse disk and drum type turbine, coupled to a direct-current dynamo, in view of the opposition to the adoption of direct-current turbines when the previous contracts were settled during February, 1907. On that occasion two 1000-kw units were required. After the matter had been twice referred back from the Council to the tramway and electric lighting committee, it was finally decided to place an order with Willans & Robinson for the supply of the two 1000-kw direct-current sets. These units have now been in daily operation for two years, and their performance compares favorably with dynamos running at more moderate speeds. Mr Bloxam, the city electrical engineer of Belfast, has also recommended the Council to install a further unit of 1500-kw capacity, and as it is intended to obtain this output from one dynamo, the present unit will be the largest single direct-current turbine set installed in England, the largest sets at present being the two 1200-kw units which Willans & Robinson have in hand for the Admiralty for the Devonport Dockyard.

A. C. S.

News of Electric Railways

Hearings on Subway and Elevated Service in New York

Hearings were held before William R. Willcox and John E. Eustis, of the Public Service Commission of the First District of New York, on March 28, regarding the service on the elevated lines of the Interborough Rapid Transit Company and the extension of the Broadway express and local service in the subway. A rehearing was held on the same day regarding service in the subway. H. H. Whitman acted as counsel for the commission. The Interborough Rapid Transit Company was represented by T. L. Waugh, of counsel; Frank Hedley, vice-president and general manager, and George Keegan, assistant to Mr. Hedley.

Mr. Hedley said that the new service in the subway provided a seat for every passenger during the non-rush hours, and that during the rush hours the company was running as many trains on both its local and express tracks as was physically possible. The headway on the local trains during the non-rush hours was 2½ minutes, 3 minutes and 3½ minutes at different times of the day. It takes about 30 days to equip a car, and the company was putting new cars in the service as fast as possible.

E. G. Connette, transportation engineer of the commission, presented figures which substantiated the statements made by Mr. Hedley.

Regarding the elevated lines, Mr. Hedley said that the service now given was in accordance with the schedule which he had proposed at the previous hearing. During the non-rush hours sufficient cars were operated to provide seats for every passenger and during the rush hours the company was running as many trains as possible. The longest headway was about 4 minutes. The new schedule had increased the service materially, but Mr. Hadley was not prepared to say just what the increase was in percentage.

Mr. Connette said that observations showed that cars were operated on the elevated lines in accordance with the proposal previously made by Mr. Hedley.

In conclusion, Mr. Hedley said that he did not think that the commission ought to issue a formal order regarding the operation of trains on the elevated lines, as such an order would require him to operate strictly in accordance with the schedule from day to day, whereas traffic frequently fluctuated and the necessity existed for withdrawing trains at short notice. The hearing on the elevated service was then closed.

The hearing regarding the extension of the Broadway express and local service was called as a result of a petition to the commission by the Washington Heights Property Owners' Association. It had to do largely with the details of the operation of trains from the district represented by the association. Charts were presented by Mr. Connette to show the distribution of traffic, the number of trains, the number of seats provided and the headway of trains.

Cleveland Traction Situation

Officers of the Cleveland Railway and G. H. Dahl, street railway commissioner, have failed to agree upon the proportion of the cost of reconstructing tracks that should be charged to capital account. The representatives of the company contend that the difference between the Goff-Johnson valuation of the tracks and the cost of replacing them should be charged to capital, but Mr. Dahl insists that the difference between the cost of the new track and the first cost of the track now down should be charged to capital, the remainder to be taken from the profits. The discussion was precipitated by the announcement of the company that plans were being made to renew the track on 10 lines of the system at an estimated cost of $734,173. The City Council was requested to approve the proposed betterments and add $525,300 to the capital value.

On March 21 Commissioner Dahl was officially notified by the company that the 3-cent fare would not be extended to Collinwood. The company stated that it could not grant a fare different from what is provided in the Tayler ordinance to any part of the city or the suburbs; that a new ordinance, amending the original, would be subject to a referendum vote; that any concessions made to Collinwood would have to be repeated in the case of the admission of other suburbs to the city, and that as the company was now operating under the initial fare fixed by the Tayler ordinance, within the limits prescribed at the time of its adoption, the officers believed it unwise to modify conditions until the expiration of the eight months stipulated for experimental operation.

Following a suggestion from Mr. Dahl notices have been placed in all the cars to the effect that full fare will be charged in the suburbs unless passengers inform conductors at the time they pay their fare that they desire a suburban fare slip.

The company has declined to negotiate with the Humphrey Company on the subject of reducing the fare to Euclid Beach. Smith, Taft & Arter, attorneys for the Humphrey Company, claim that the franchise granted by East Cleveland provides for the lower fare to Collinwood and Euclid Beach, just as it does for Euclid Avenue in the other direction and that, if cars are routed by way of Euclid Avenue, as formerly, the company cannot refuse. Council has control of the car routing. The attorneys make their claim under a franchise granted in 1896, when Collinwood and Euclid Beach were both within the boundaries of East Cleveland.

Retail merchants of Cleveland propose to take up, at once, actively, the question of securing a union depot for the interurban lines entering Cleveland. A ticket office and waiting room are maintained in the Forest City Building, but the merchants desire something more commodious. Reports of the Chamber of Commerce show that 4,600,000 passengers were handled in 1909 by the electric railways operating into Cleveland.

Tom L. Johnson, ex-Mayor of Cleveland, has sailed from New York on the *Mauretania*. Other than that he was going to Europe in the hope of benefiting his health, Mr. Johnson refused to make any statement.

Association Meetings

Missouri Electric, Gas, Street Railway & Water Works Association.—Jefferson City, Mo., April 14, 15 and 16.

Central Electric Traffic Association.—Lima, Ohio, April 16.

Iowa Street & Interurban Railway Association.—Sioux City, Ia., April 21, 22 and 23.

Arkansas Association of Public Utility Operators.—Pine Bluff, Ark., April 27, 28 and 29.

New England Street Railway Club.—Boston, Mass., April 28.

Oklahoma Public Utilities Association.—Sapulpa, Okla., May 10.

Southwestern Electrical & Gas Association.—Beaumont, Tex., May 12, 13 and 14.

Pacific Claim Agents' Association.—San Francisco, Cal., May 20 and 21.

Central Electric Railway Association.—Toledo, Ohio, May 26.

Central Electric Accounting Conference.—Toledo, Ohio, June 25.

Street Railway Association of the State of New York.—Cooperstown, N. Y., June 27 and 28.

Colorado Electric Light, Power & Railway Association.—Glenwood Springs, Col., Sept. 21, 22 and 23.

Franchise Question in Toledo.—W. W. Miller, representing the bondholders' committee of the Toledo Railway & Light Company, Toledo, Ohio. has informed the City Council of Toledo that Albion E. Lang, president of the company, has been requested to communicate directly with the Council relative to negotiations for a new grant..

Franchise Extension Granted a Canadian Company.—A by-law was carried by the ratepayers of Sherbrooke, Que.,

on March 21, 1910, extending the franchise of the Sherbrooke Street Railway 28 years. In return for the franchise the company promises to spend $500,000 in extensions and in developing a power plant. The company has an option on the water power of the Magog River, which runs through the city.

Announcement of Underground Line for Montreal.—W G. Ross, president of the Montreal (Que.) Street Railway, has announced that an underground railway will be constructed in Montreal underneath St. James Street from St. Lawrence Street to Victoria Square, as soon as the necessary legislative authority is obtained. Mr. Ross places the cost of the construction of the first section of the proposed line at about $1,500,000 per mile.

Entertainment of New Jersey Employees.—The third annual smoker of the New Jersey Street Railway Employees Benevolent Association, composed of employees of the Public Service Railway, Newark, N. J., was held at Newark on March 25, 1910. Delegates were in attendance from every division of the company. Thos. N. McCarter, president of the company, addressed the men. Mr. McCarter said that the officers keenly appreciated the service which the men were called upon to perform. He referred to the increase in wages granted on Jan. 1, 1910, and said that the details of a pension fund for the men were now being arranged. Mr. McCarter paid a special tribute to the work of Newton W. Bolen, superintendent of transportation of the company.

Convention of the Engineering Society of Pennsylvania.—The second annual convention of the Engineering Society of Pennsylvania will be held at Harrisburg on June 1, 2 and 3, 1910. The program of the meeting is still to be announced. It has been decided, however, to follow the practice begun last year of holding an exhibition in connection with the convention, and arrangements have been made for displaying apparatus in the new reinforced concrete building of the Central Pennsylvania Traction Company at Cameron and Forster Streets, Harrisburg, where approximately 26,000 square feet will be available. Fred W. Cohen, of the bridge and construction department of the Pennsylvania Steel Company, is chairman of the exhibition committee, and has prepared a circular showing the location of booths for the proposed exhibits and also a circular giving complete details regarding the arrangement of the booths, exhibition hours, the transportation of goods to and from the exhibit hall, etc.

Subway Plan Proposed in Providence.—A plan has been submitted to the Council of Providence, R. I., for the construction of a subway to relieve congestion on the lines of the Rhode Island Company in the downtown section of the city. The lines at present have their terminals at either of two places less than 300 yards apart, Market Square or at Dorrance and Westminster Streets. The business center of Providence lies on Weybosset Street and Westminster Street, mainly, and they form a bow, about half a mile long, with Westminster Street as the connecting link. Westminster Street is very narrow and only one track is laid there. Consequently all cars on Westminster Street run out of the city, while Weybosset is used in either direction. Additional lines of the Rhode Island Company are operated on Washington Street, so that the out-going traffic on Westminster Street is practically the same as the total incoming traffic. The subway as proposed provides a tunnel from the junction of Weybosset and Westminster Streets at Cathedral Square, under Weybosset Street to Dorrance Street, thence under Westminster Street with a loop near the Union station. The line would be 2200 ft. long and would cost about $752,000.

Decision Sustaining Franchise in Portland, Ore.—The Oregon Supreme Court has handed down a decision which in effect sustains the franchise covering parts of 40 streets passed over the Mayor's veto on April 28, 1909, by the City Council. The case which was appealed from Multonomah County involves the construction of the initiative and referendum laws of the State and of Portland. The ordinance was passed by the City Council on April 14, 1909; vetoed by the Mayor on April 26, 1909; passed over the veto on April 28, 1909. The company accepted the ordinance on May 14, 1909, and began building the tracks authorized by the ordinance. Within 30 days after the passage of the latter by the Council a petition to refer it to the people was filed with the City Auditor. The charter of Portland provides that initiative petitions shall be filed within 15 days of the passage of a franchise ordinance, while section 11 of the State Laws of 1907 provides that such petitions shall be filed within 30 days. The Supreme Court holds that in cases of this kind the city charter, and not the State law, controls, and that, therefore, the ordinance became effective on May 13, 1909, and the referendum petition filed on May 25, 1909, was not filed within the time prescribed by law, and for that reason insufficient to prevent the enforcement of the ordinance.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Illinois.—The special session of the Legislature of Illinois, convened by order of Governon Deneen on Dec. 14, 1909, adjourned on March 2, 1910. Twenty-two bills were passed and positive action was taken on 16 of the 24 subjects included in the call. The most important measure to the electric railway interests, the Chicago subway bill, was permitted to languish after being advanced to third reading in the Senate. A commission of six employers and six employees was authorized to consider the question of employers' liability and report all such recommendations as four of each group can agree upon not later than Sept. 15, 1910. The members of the commission representing the employers follow: Ira G. Rawn, president of the Chicago, Indianapolis & Louisville Railroad, Chicago; E. T. Bent, secretary of the Illinois Coal Operators' Association, Chicago; P. A. Peterson, furniture manufacturer, Rockford; Charles Piez, president of the Link Belt Machinery Company, Chicago; Mason B. Starring, president of the Northwestern Elevated Railroad, Chicago; Robert E. Conway, manufacturer, East St. Louis.

Maryland.—The Marbury public utility bill, recently introduced in the Legislature, has been so amended that the number of commissioners is reduced from five to three, and $5,000 is added to the working fund of the commission. The commission is also empowered to examine into the management and conduct of public service corporations, take such testimony as may be deemed advisable by it, require the attendance of witnesses and the production of books and papers, and order examinations by expert accountants. The commission is to recommend to the Governor and Legislature such change in rates, tolls and fares as may be thought necessary, and to prepare bills to carry out these recommendations, which are to be submitted to the Legislature.

Massachusetts.—The committee on street railways has reported against the bill limiting street railway locations at the side of a highway in towns of specified size. The bill to authorize railroads to operate their lines by electricity or other power subject to the approval of the Railroad Commission has passed to a second reading in the Senate. An attempt has been made to revive the bill accompanying the petition for legislation to provide for State and city ownership of street railways. The bill was reported unfavorably by the committee on street railways, but the report has not yet been acted upon by the House. The committee on metropolitan affairs has heard the bill for locating the terminus of the Riverbank Subway near the intersection of Beacon Street and Commonwealth Avenue instead of at Charlesgate East. The House has accepted the report of the committee on street railways against the bill authorizing the transportation of baggage, express matter and freight over the lines of street railways, elevated railways and electric railways. The House has accepted the adverse report of the same committee on the bills for legislation to prevent the issuing of passes and tickets at reduced rates by railroads and street railways and to provide for the establishment of waiting stations for passengers by street railways.

New Jersey.—The Governor has signed the Wakelee public utility bill, and the complete text of the measuse is printed on page 626 of this issue. A bill has been introduced in the House to make it a misdemeanor to sell or give away a transfer. An effort is being made to revive the rights granted some time ago to the State Line Trolley Company, which proposes to build an electric railway from Paterson to Rutherford.

Financial and Corporate

New York Stock and Money Market

March 29, 1910.

After several days of depressive inactivity prior to the Easter holidays, and after a rather sharp break yesterday the stock market to-day gave some evidence of a return to confidence. Prices were better and trading more active. Traction stocks were as active as any other issues. This was especially true with regard to Interborough-Metropolitan. Large blocks of this stock have been traded in and the prices have held steadfast in the face of a declining market.

The money market continues satisfactory. The banks are well equipped with cash and rates are unchanged. Rates to-day were: Call, 2¾ to 3 per cent; 90 days, 4 to 4¼ per cent..

Other Markets

There has been practically no improvement in the market for traction stocks in Philadelphia, except that the pressure to sell has been removed in a measure and transactions have been fewer.

In the Boston market there has been no change in the situation. Small blocks of Boston Elevated and Massachusetts Electric continue to find their way into the market, but prices are practically unchanged.

In the Chicago market, the traction stocks have been almost entirely ignored during the past week. Except for a few shares of Metropolitan Elevated preferred, at former prices, there have been no sales.

There have been no traction stocks traded in on the Baltimore Exchange during the past week. The bonds of the United Railways continued to be reasonably active. Prices are unchanged.

Quotations of various traction securities as compared with last week follow:

	Mar. 22.	Mar. 29.
American Railways Company	a45½	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	129	128
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	a76	a76
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a46	a46
Brooklyn Rapid Transit Company	77½	77
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84¾	84⅛
Capital Traction Company, Washington	*133	a133
Chicago City Railway	*195	a185
Chicago & Oak Park Elevated Railroad (common)	*3½	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a106	a106
Chicago Railways, ptcptg., ctf. 2	a33	a33
Chicago Railways, ptcptg., ctf. 3	a19	a16
Chicago Railways, ptcptg., ctf. 4s	*0⅛	a9
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76½	a76½
Consolidated Traction of New Jersey, 5 per cent bonds	a105½	a106½
Detroit United Railway	*62	*65
General Electric Company	154½	150
Georgia Railway & Electric Company (common)	107	109½
Georgia Railway & Electric Company (preferred)	a88	a90
Interborough-Metropolitan Company (common)	23½	22¾
Interborough-Metropolitan Company (preferred)	59⅛	58¼
Interborough-Metropolitan Company (4½s)	82	81¼
Kansas City Railway & Light Company (common)	a30½	28
Kansas City Railway & Light Company (preferred)	*75	a78
Manhattan Railway	137⅛	136⅞
Massachusetts Electric Companies (common)	a18	a18
Massachusetts Electric Companies (preferred)	a84	84
Metropolitan West Side, Chicago (common)	a16½	a16½
Metropolitan West Side, Chicago (preferred)	a53	a52
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*81¼	76½
Northwestern Elevated Railroad (common)	a17	a16
Northwestern Elevated Railroad (preferred)	60	a68
Philadelphia Company, Pittsburg (common)	a51¼	a51¼
Philadelphia Company, Pittsburg (preferred)	a44	a44½
Philadelphia Rapid Transit Company	a22	a21½
Philadelphia Traction Company	87	a87
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs.	a105½	a105½
Seattle Electric Company (common)	a115	a114
Seattle Electric Company (preferred)	*102	a102
South Side Elevated Railroad (Chicago)	a53	a53
Third Avenue Railroad, New York	7½	6½
Toledo Railways & Light Company	*11¾	11
Twin City Rapid Transit, Minneapolis (common)	115¼	115¼
Union Traction Company, Philadelphia	a49	a49¼
United Rys. & Electric Company, Baltimore	a13½	a13⅝
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*67	*67
Washington Ry. & Electric Company (common)	*40	a39½
Washington Ry. & Electric Company (preferred)	*90½	a91
West End Street Railway, Boston (common)	a94½	a92
West End Street Railway, Boston (preferred)	a106	a106
Westinghouse Elec. & Mfg. Company	a70	64
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

aAsked. *Last Sale.

New York State Railways Reorganization

The Public Service Commission of the Second District of New York has authorized the New York State Railways in carrying out its plans of financial reorganization to increase its capital stock from $25,140,200 to $25,860,200 and to issue the increased amount of $720,000 for the following purposes:

1. To purchase and acquire 3340 shares of preferred stock of Rochester & Suburban Railway, $334,000.

2. To purchase and acquire 668 shares of common capital stock of Rochester & Suburban Railway, $66,800.

3. To purchase and acquire 1739 shares of stock of the Rochester Railway, $173,900.

4. To purchase and acquire 1000 shares of stock of Ontario Light & Traction Company, $100,000.

The stocks above described being now owned by the Mohawk Valley Company and the purchase thereof being made by exchanging stock of the New York State Railways to the amount of $674,700, par value, for the same.

5. To purchase and acquire 160 shares preferred stock of the Rochester & Suburban Railway, $16,000.

6. To purchase and acquire 32 shares of common stock of Rochester & Suburban Railway, $3,200.

7. To purchase and acquire 261 shares of stock of the Rochester Railway, $26,100.

The stocks described under conditions 5, 6 and 7 are owned by persons or corporations other than the Mohawk Valley Company and with the stocks owned by that company make up the entire stocks of the companies named. The stock of the New York State Railways to the amount of $43,500, par value, may be exchanged for said other stocks par for par or may be sold at par and the proceeds used for such purposes.

The New York State Railways is authorized to purchase, acquire and hold the entire capital stocks of the Rochester & Suburban Railway, Rochester Railway and Ontario Light & Traction Company.

The New York State Railways is authorized to execute and deliver a first consolidated and refunding mortgage upon all its property, to secure not more than $35,000,000 of 50-year 5 per cent gold bonds.

The New York State Railways is authorized to issue its bonds upon the security of this mortgage to the amount of $2,435,000, the bonds in question to be used for the following purposes:

a. To refund the outstanding bonds of the Rochester & Eastern Rapid Railway, $1,500,000.

b. To discharge certain notes of the Rochester Railway, $200,000.

c. For the purchase and acquisition of Rome City Railway bonds, $200,000.

d. For the purchase and acquisition of certain promissory notes or their renewals of Utica & Mohawk Valley Railway, $300,000; or Oneida Railway, $235,000.

The bonds in question shall not be sold or disposed of at less than par.

The commission has also authorized the New York State Railways to issue bonds to the amount of $2,073,634 for the following purposes:

a. For the acquisition of certain obligations of the Syracuse Rapid Transit Railway, $1,460,000.

b. Of Rochester & Suburban Railway obligations, $613,634.

The bonds in question are not to be sold or exchanged for these obligations at less than par.

This latter authorization is upon the express condition that upon any consolidation or merger of the Syracuse Rapid Transit Railway and the Rochester & Suburban Railway, or either of them with the New York State Railways the capitalization of the expenditures represented by the obligations of these companies may be taken up with the same force and effect as upon an application by each of the debtor companies to capitalize the same, and the authorization shall not have any force or effect until the New York State Railways shall have filed with the commission an acceptance of the authorization order containing said condition.

There are some remaining matters now before the commission for consideration, which when disposed of will complete the commission's action on the reorganization plan of the New York State Railways.

Chicago City & Connecting Railway, Chicago, Ill.—Participants in the syndicate which underwrote the $22,000,000 of 5 per cent bonds of the Chicago City & Connecting Raliway, it is stated, have been requested to pay about one-third of their subscriptions.

Johnstown (Pa.) Passenger Railway.—The stockholders of the Johnstown Passenger Railway on March 16, 1910, ratified the lease of the property of the company for 18 years to the Johnstown Traction Company, effective as of Jan. 5, 1910. The lessee agrees to pay all charges and guarantees dividends as follows: First year, 7 per cent; second year, 7¼ per cent; third year, 7½ per cent; fourth year, 7¾ per cent; thereafter, 8 per cent, and, in addition, to spend $200,000 in improvements within the next three years and maintain the property in good condition. The lessee has the privilege of purchasing the road at any time within five years. The incorporation of the Johnstown Traction Company was recorded in the Electric Railway Journal of March 5, 1910.

Joplin & Pittsburg Railway, Pittsburg, Kan.—The Harris Trust & Savings Bank, Chicago, Ill., and E. H. Rollins & Sons have purchased $1,750,000 of first mortgage 5 per cent bonds of the Joplin & Pittsburg Railway.

Lehigh Valley Transit Company, Allentown, Pa.—It is stated that the holders of about $2,000,000 of the $2,500,000 of consolidated 4 per cent bonds of the Lehigh Valley Transit Company have assented to the refinancing plan, which gives 5 per cent bonds out of the new $15,000,000 issue to be authorized on April 21, 1910, for 90 per cent and common stock for 10 per cent of par of the present bonds.

Mahoning & Shenango Valley Railway & Light Company, New Castle, Pa.—The stockholders of the Mahoning & Shenango Valley Railway & Light Company will vote on May 16, 1910, on increasing the capital stock of the company from $10,000,000 to $11,000,000 by issuing $1,000,000 of additional 5 per cent cumulative preferred stock, the proceeds to be used for improvements. There will then be outstanding $6,000,000 of common stock and $5,000,000 of preferred stock.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has signed an order directing Adrian H. Joline and Douglas Robinson, as receivers of the Metropolitan Street Railway, to expend out of the moneys in their possession $313,900 to rehabilitate the property of the Fourth & Madison Avenue Railway.

Ocean Shore Railway, San Francisco, Cal.—V. G. Bogue, A. W. Foster and W. H. Heuer, who constitute the board of engineers appointed by Judge Van Fleet of the United States District Court to investigate the physical condition of the Ocean Shore Railway, asked the court on March 10, 1910, for $750, and announced that their report would be rendered by April 1, 1910. Although notice was served by the Mercantile Trust Company, as trustee of the first mortgage bonds of the Ocean Shore Railway, that the sale of the property under foreclosure would take place on March 9, 1910, the sale will be delayed until after the court receives the complete report of the board of engineers.

Pittsburg & Allegheny Valley Railway, Leechburg, Pa.—George W. Hosack, Pittsburgh, representing the bondholders of the Pittsburgh & Allegheny Valley Railway, purchased the property of that company under foreclosure at Kittanning on March 21, 1910, for $50,000.

Toledo & Indiana Traction Company, Toledo, Ohio.—The property of the Toledo & Indiana Railway was formally conveyed to the Toledo & Indiana Traction Company on March 25, 1910. As noted in the Electric Railway Journal of Jan. 29, 1910, the property of the Toledo & Indiana Railway was sold under foreclosure on Jan. 18, 1910, to S. C. Schenck in the interest of the bondholders. Mr. Schenck, who has been elected president of the Toledo & Indiana Traction Company, has announced the appointment of the following officers: H. C. Warren, general manager; C. B. Kleinhaus, auditor; King, Tracy, Chapman & Wells, counsel. The company has increased its capital stock from $10,000 to $400,000.

Twenty-eighth & Twenty-ninth Street Crosstown Railroad, New York, N. Y.—The sale of the property of the Twenty-eighth and Twenty-ninth Streets Crosstown Railroad under foreclosure was postponed from March 23, 1910, to March 30, 1910.

Traffic and Transportation

Ohio Electric Railway Beneficial Association

At the annual meeting of the grand council of the Ohio Electric Railway Beneficial Association, held at Newark, Ohio, on March 17, 1910, as mentioned briefly in the Electric Railway Journal of March 26, 1910, page 550, the following officers were elected for the ensuing year: E. J. Kisler, Lima, grand president; William Robinson, Newark, first grand vice-president; John Maier, Zanesville, second grand vice-president; F. L. Boyer, Dayton, third grand vice-president; George Heckethorn, New Paris, grand secretary-treasurer; W. E. Weghorst, Dayton, sergeant-at-arms.

The report of the grand secretary-treasurer showed that since the organization of the association on Feb. 5, 1908, more than $18,000 had been received by donation from the Ohio Electric Railway and through the collection of initiation fees, dues and death assessments, and that more than $14,000 had been disbursed in operating expenses, sick benefits and death claims, leaving a surplus on hand of $4,177. The association has 1103 members in good standing.

The organization is formed exclusively of officers and employees of the Ohio Electric Railway. It has local chapters at Hamilton, Dayton, Columbus, Newark, Zanesville and Lima, each with its own president, vice-president, secretary and treasurer. The four officers of each chapter compose the grand council, which meets in March and September of each year. The March meeting is the annual meeting for the election of officers. Every employee of the Ohio Electric Railway is eligible to membership. The cost is $3 per year for dues, payable quarterly; $1 must accompany each application for initiation, and $1 must be advanced as a death assessment. The association pays a sick or disabled member $7.50 a week for the first 16 weeks, $3.75 per week for the next 16 weeks, and $2 per week for 16 weeks thereafter within a period of one year from the time of notice of his sickness. It also pays a death benefit of $800.

The Ohio Electric Railway makes a liberal contribution each year to the support of the association. At the meeting of the association on March 18, at which more than 500 members were present, W. Kesley Schoepf, president of the Ohio Electric Railway, proposed to the association that for every $20,000 it accumulated in the reserve fund the company would contribute $5,000 and give the association $5 per annum for each member, based on the number of members in good standing on March 17.

A buffet lunch was served after the meeting. Special cars of the company from all parts of the system transported the members to Newark. The car from Lima, with more than 50 members, left Lima at 1:05 p. m., arrived at Springfield—65 miles—at 2:50 p. m.; Columbus—150 miles—at 4:10 p. m.; Newark—37 miles—at 5:55 p. m., making a total of 132 miles in 4 hours and 50 minutes. This car was operated through Lima, Bellefontaine, Urbana, Springfield, Columbus and Newark, in all of which care had to be exercised not to exceed the speed limits.

Subway Station and Car Lighting Order Modified

The Public Service Commission of the First District of New York has adopted the following order which modifies a previous supplementary order regarding the lighting of its cars and stations by the Interborough Rapid Transit Company:

"An order known as supplementary order having been duly made in the matter of the lighting of the cars and stations of the Interborough Rapid Transit Company on Feb. 15, 1910, which provided among other things

"'Ordered, That the Interborough Rapid Transit Company shall hereafter install and maintain in every subway passenger car operated by it, except those now or heretofore operated by it, a storage battery lighting appliance of sufficient capacity to operate four 12-cp lamps at their rated candle power for at least three hours, such storage battery lamps to be instantly and automatically available whenever the other lamps in the car shall for any reason fail to furnish light.'

"And the Interborough Rapid Transit Company having applied to the commission in writing under date of March

16, 1910, for a modification of the terms of the foregoing paragraph of said order, and sufficient reason for the modification of said supplementary order having been made to appear, now, therefore, it is

"Ordered, That said supplementary order of Feb. 15, 1910, be, and the same hereby is, amended and modified so as to read as follows:

"Ordered, That on or before April 1, 1910, the Interborough Rapid Transit Company shall so illuminate by electricity its subway stations that passengers may read conveniently therein, such illumination to be not less than the present illumination over the east platform of the Brooklyn Bridge Station; and it is further

"Ordered, That the Interborough Rapid Transit Company shall hereafter install and maintain in every subway passenger car operated by it, except those now or heretofore operated by it, a storage battery lighting appliance of sufficient capacity to operate two 12-cp lamps at their rated candle power for at least three hours, such storage-battery lamps to be instantly and automatically available whenever the other lamps in the car shall for any reason fail to furnish light;

"And it is further ordered, That this order shall take effect immediately and shall continue in force until modified or abrogated by the commission."

Accidents in New York During February

The Public Service Commission of the First District of New York has issued the following summary of accidents which occurred in February, 1908, 1909 and 1910, on the railways within its jurisdiction:

February.	1908.	1909.	1910.
Car collisions	203	102	113
Persons and vehicles struck by cars	945	855	922
Boarding	412	511	551
Alighting	286	421	559
Contact electricity	36	15	28
Other accidents	2069	1676	1772
Totals	3951	3580	3945
INJURIES.			
Passengers	1219	1391	1545
Not passengers	462	407	403
Employees	476	390	457
Totals	2157	2188	2405
SERIOUS (INCLUDED IN ABOVE)			
Killed	26	27	23
Fractured skulls	15	7	2
Amputated limbs	5	2	1
Broken limbs	24	15	24
Other serious	69	115	95
Totals	139	166	145

Communication from Indiana Commission on Crossing Signs

The Railroad Commission of Indiana has addressed the following communication on signs at highway crossings to all the railroads in Indiana:

"On Feb. 3, 1908, this commission issued its Circular No. 21 requesting and directing the companies to put up highway crossing signs.

"Some of the carriers promptly complied. Others are still engaged in this work, while some have failed altogether to follow the directions of our circular.

"For the year ended June 30, 1908, 70 travelers on the highway crossings of the railroads were killed; for the year ended June 30, 1909, 55 were killed. We are inclined to attribute the decrease, partly at least, to the effect of such warning signs as were erected.

"The commission has come to the conclusion after full consideration to enforce the putting up of these signs at every one of the unprotected crossings outside of incorporated towns and cities in this State. This expense is not great, and that much protection at least should be offered at these dangerous places.

"The commission again requests and directs the carriers to commence at once the work of putting up highway crossing signs, substantially similar to the blue print enclosed with this circular. The words "Danger" and "Two Crossings" must be used, adding them to the old signs which do not contain them. The best and most durable paints should be used.

"And the commission gives notice that it has directed its inspectors to report all carriers who do not promptly proceed with this work, and to report all crossings not so protected, the purpose being to make formal orders and recommendations, in all such cases, and to enforce these orders in the courts wherever it may be necessary.

"The commission requests a response from each company, as to what it will do to carry out this order."

Increase in Wages in Easton.—The Easton (Pa.) Transit Company has increased the wages of all motormen and conductors who have served the company four years or more from 22 to 23 cents an hour.

Buffalo Southern Railway Fare Modifications.—On April 1, 1910, the Buffalo Southern Railway, with the consent of the Public Service Commission of the Second District of New York, placed on sale 60-trip commutation tickets, good between Hamburg and Orchard City and the city line of Buffalo at Seneca Street, for $3.50, a reduction of $1 over the previous rate. On the same date the company also placed on sale 46-trip school tickets, good between the same points, for $3, a reduction of 50 cents over the previous rate.

New Wage Scale in Allentown.—On April 1, 1910, the Lehigh Valley Transit Company, Allentown, Pa., increased the wages of all who have served the company for more than five years from 22 cents to 23 cents an hour. In October, 1909, the company increased the pay of employees who have served one, two, three and four years a cent an hour. R. P. Stevens, president of the company, announced the increase in a communication addressed to the men on March 18, 1910, as follows: "A new wage scale for conductors and motormen will take effect April 1, making the new scale as follows: Nineteen cents the first year, 20 cents the second year, 21 cents the third year, 22 cents the fourth year, 23 cents the fifth year. We wish to take this opportunity to express our appreciation of your good work and conscientious co-operation during the hard winter just passed."

Toronto Railway Negotiating for New Contract for Carrying Postmen.—R. J. Fleming, general manager of the Toronto (Ont.) Railway, and Chief Post Office Superintendent Ross interviewed Rodolphe Lemieux, postmaster-general, in Ottawa, on March 21, 1910, in reference to the payments made by the department to the Toronto Railway for carrying postmen upon the cars. The present rate of $400 per month has been in force for some time. Mr. Fleming thinks the service worth $25,000, while Mr. Ross believes $6,000 per annum to be a sufficient sum. There are 200 postmen in Toronto. It has been estimated that 75 men cover the business district and that in riding to and from their routes six times a day, together with 125 men who ride three times a day, a total of 516,450 trips are taken during the 313 days in the year. At 4 cents per ride the cost of this transportation would total $20,658 per year.

As a part of the work of converting the suburban lines of the Southern Pacific Company on the east side of San Francisco Bay for electrical operation, a force of engineers from the engineering department of the company has been set to work completing surveys and estimates for the electric railway which is to be built between Elmhurst and San Leandro and which will be a part of the electric loop system planned by the Southern Pacific Company to tap the newly annexed district of Oakland on the north and south sides. It is not known whether the company will build a complete loop system embracing San Leandro or extend the loop as far as Stonehurst where a right of way has been secured. Several pieces of property between the Stonehurst terminal and San Leandro have not been secured. The Southern Pacific Company has already secured a right of way to the north of Melrose, Fitchburg and Elmhurst for the continuation of its line which now ends in Melrose. Work is being rushed on the power plant at Fruitvale, from which the electric system will be operated. The Southern Pacific Company has let the contract for the tunnel through Northbrae, in its Berkeley loop, connecting the western and eastern sections of the city, through North Berkeley and Albany. The building of this tunnel will complete the last link in the construction of the loop, the tracks of which are all laid as far as it has been possible to do so, until the tunnel is finished.

Personal Mention

Mr. B. J. Fallon, heretofore engineer of maintenance of way of the Metropolitan West Side Elevated Railway, Chicago, Ill., has been appointed assistant general manager of the company.

Mr. O. H. West, formerly a division electrician with the Indiana Union Traction Company, Anderson, Ind., has been placed in charge of the construction of a 20,000-kw station for the Indiana Steel Company, Gary, Ind.

Mr. E. F. Stone has been appointed superintendent of light and power distribution of the Pueblo & Suburban Traction & Light Company, Pueblo, Col. Mr. Stone was formerly superintendent of distribution of the Norfolk & Portsmouth Traction Company, Norfolk, Va.

Mr. Mason B. Starring, president of the Northwestern Elevated Railroad, Chicago, Ill., has been appointed a member of the committee of six employers and six employees authorized by the Legislature of Illinois to consider the question of employers' liability and report not later than Sept. 15, 1910.

Mr. L. H. McCray has been appointed general manager and purchasing agent of the Atlantic Shore Line Railway, Kennebunkport, Me., to succeed Mr. E. B. Kirk, who sailed recently for London, Eng., to become connected with the operating department of J. G. White & Company, Ltd., as announced in the Electric Railway Journal of March 12, 1910.

Mr. William H. Wadsworth, whose resignation as master mechanic of the Boston & Worcester Street Railway, South Framingham, Mass., was announced in the Electric Railway Journal of Feb. 26, 1910, has become connected with the Chickasha (Okla.) Street Railway, which has been incorporated to construct a 6-mile electric railway in Chickasha.

Mr. A. A. Anderson has resigned as general manager of the Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., to become general manager of the Springfield (Ill.) Consolidated Railway, in which position he will succeed Mr. Emil G. Schmidt, whose resignation from the Springfield Consolidated Railway was announced in the Electric Railway Journal of March 5, 1910. Mr. Anderson will assume his duties some time before June 1, 1910. In the meantime he will visit various places where public service properties are operated by Hodenpyl, Walbridge & Company, New York, N. Y., who control the Springfield Consolidated Railway.

Mr. James Walker, consulting engineer of the Metropolitan West Side Elevated Railway, Chicago, Ill., has been appointed chief engineer of the company. Mr. Walker was graduated from the Sheffield Scientific School, Yale College, in 1894. For two years following graduation he was engaged in consulting engineering work in New Haven, Conn., and from 1896 to 1899, inclusive, he had charge of mining engineering work in Maryland. For five years, beginning in 1900, Mr. Walker was advisory engineer for the Michigan Board of State Tax Commissioners. In 1905 he took up consulting engineering work in Chicago, and since 1907 has been engaged in general railway engineerig work, particularly an investigation of the capacity of the Union Elevated Loop, which is used jointly as a downtown terminal by the elevated railways of Chicago.

Mr. Franklin P. Wood has been appointed general manager of the Colorado Railway, Light & Power Company, which has succeeded the Southern Colorado Power & Railway Company, Trinidad, Col. Mr. Wood was graduated from the University of Colorado in 1898 with the degree of electrical engineer. Immediately thereafter he became electrician for the Cripple Creek District Electric Railway. In 1899 and 1900 he served as electrician of the La Bella Mill, Water & Power Company, Cripple Creek, Col., and from 1901 to 1903 he was engaged in contracting work. During 1904 and 1905 Mr. Wood held the position of electrical engineer of the Liberty Bell Gold Mining Company at Telluride, Col. In 1907 Mr. Wood re-entered electric railway work as manager and superintendent of the Black Hills Traction Company, Deadwood, S. D., with which he continued until March 1, 1910, when his appointment as general manager of the Colorado Railway, Light & Power Company became effective.

Mr. Clarence P. Hayden, who for the last eight years has been connected with the New Hampshire Electric Railways, Haverhill, Mass., as superintendent, has resigned, effective on April 15, 1910. Mr. Hayden has purchased the Island House, at Oak Bluffs, Mass., formerly owned and managed by his father, and in the future will devote all his time to that property. Mr. Hayden entered street railway service with the Union Street Railway, New Bedford, Mass., in 1891 as a conductor, under Mr. Franklin Woodman, who is now general manager of the New Hampshire Electric Railways. He was afterward promoted to the position of stable foreman, and was transferred to Haverhill soon after Mr. Woodman assumed the management of the Haverhill & Groveland Street Railway in 1892. Mr. Hayden was appointed superintendent of the Hampton, N. H., division of the New Hampshire Electric Railways in 1902, and continued in that position for five years. He was next transferred to the Salem division of the company.

Mr. Charles H. Hile was elected president of the New England Street Railway Club at the annual meeting of the club held at the Hotel Somerset, Boston, Mass., on March 24, 1910. Mr. Hile is assistant to Mr. C. S. Sergeant, the vice-president of the Boston Elevated Railway, which position he has held for five years. Previous to that time he was superintendent of wires for the Boston Elevated Railway for about eight years, and previous to holding that office he was for about three years engineer in charge of underground conduit construction. Mr. Hile was graduated from Pennsylvania State College in 1892, as a mechanical engineer. He then took a post-graduate course at the University of Wisconsin, making street railway engineering the chief subject of his studies. After completing his work at the university Mr. Hile became connected with the Philadelphia Traction Company as an engineer in the work of electrifying the company's horse car lines. After serving this company one year he entered the employ of the Boston Elevated Railway.



C. H. Hile

Mr. James R. Chapman, who retired as chief engineer of the Underground Electric Railway, London, Eng., at the recent semi-annual meeting of the company, has been connected with engineering work in the United States and in England for more than 35 years. Mr. Chapman was associated with the late Chas. T. Yerkes in the management of the Union Traction Company, Chicago, Ill., and went to London in 1901 when Mr. Yerkes became connected with the Metropolitan District Railway. The organization of the Metropolitan District Electric Traction Company with a capital of £1,000,000 followed, and in 1902 the Underground Electric Railways Company, Ltd., capitalized at £5,000,000, was organized as the successor to this company. Then began the development of the underground lines of London, the details of which all devolved upon Mr. Chapman. He was a witness in the arbitration between the District Railway and the Metropolitan District Electric Traction Company, Ltd., as to what system of electric traction should be adopted on the Inner Circle Railway, which is partly owned by the District Railway and the Metropolitan District Electric Traction Company. Mr. Chapman advocated the direct-current system as against the three-phase system, and Mr. A. Lyttleton, K. C., the arbitrator, decided in favor of the direct-current system. The erection of the Chelsea power station was begun in 1902, and with it was carried on simultaneously the work of electrifying the District Railway and the construction of the tunnels of the three tube railways. Mr. Chapman expects to return to the United States shortly.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Maryland & Washington Traction Company, Washington, D. C.**—Application has been made in Maryland by this company for a charter to build a 12-mile electric railway between Washington, Baltimore and Ellicott City. Capital stock, $1,000,000. Incorporators: Harold Hardinge, F. O. Rapanier, J. B. Clark and James Clark.

Charles City & Western Railway, Charles City, Ia.—Incorporated in Iowa to build a 40-mile electric railway in Charles City and extending into the surrounding country. Capital stock, $300,000. C. W. Hart, Charles City, president and A. W. Dennis, Charles City, is interested. [E. R. J., Feb. 5, '10.]

***Garrett County Railway, Annapolis, Md.**—Application has been made by this company for a charter to construct an electric railway from Oakland to Mountain Lake Park, Deer Park, Thayerville, Accident, Grantsville and Frostburg, Md.; also from Accident to Friendship and from Grantsville to the Pennsylvania line. Capital stock, $200,000. The bill was introduced in the Legislature by Senator Speicher.

***Elkton, Fair Hill & Oxford Electric Railway & Power Company, Elkton, Md.**—Application has been made in Maryland to build an electric railway from Elkton, Cherry Hill and Fair Hill to the Pennsylvania line. Capital stock, $60,000, which may be increased to $500,000. Incorporators: C. P. Canriet, Geo. E. L. Hess, John Lungren, H. Eugene Mackin and Heister Hess.

Ottawa, Rideau Valley & Brockville Railway, Ottawa, Ont.—Incorporated in Ontario to build an electric railway from Chelsea to Hull and across the interprovincial bridge and on to Brockville. Directors: A. McDiarmid, R. G. Elliott, Montreal; F. E. Henning, E. N. Clark, G. E. Kidd and D. H. McLean, Ottawa, and James Gilmour, Brockville. [E. R. J., Dec. 18, '10.]

***Buckhannon & Clarksburg Traction Company, Clarksburg, W. Va.**—Application has been made for a charter by this company in West Virginia to build an electric railway from Clarksburg to Buckhannon. Capital stock, $100,000. Incorporators: U. G. Young, E. W. Martin, W. H. Fisher, G. O. Young and R. I. Perine, Buckhannon.

***East Thermopolis (Wyo.) Power Company.**—Application has been made in Wyoming by this company for a charter to build an electric railway in Thermopolis. Incorporators: H. P. Rothwell, Martin McGrath and Ira E. Jones.

FRANCHISES

***Coalinga, Cal.**—The Town Council has granted a franchise to C. L. Morrill to build a 6-mile railway in Coalinga. It is planned to extend this proposed railway 15 miles beyond Coalinga north and east to the oil territory.

***Donaldsonville, La.**—John Marks and associates have been granted a 99-year franchise to build an electric railway on the batture of Bayou Lafourche from Donaldsonville to Lockport.

Mount Vernon, N. Y.—The Public Service Commission, Second District, has given its approval to the Westchester Electric Railroad to exercise franchises granted by the Board of Aldermen of Mount Vernon on Sept. 27, 1909, and by the Board of Trustees of Pelham Manor on Nov. 8, 1909.

***Stillwater, Okla.**—The City Council has granted a franchise to L. J. Lampke, who is said to represent New York capitalists, to build an electric railway over certain streets in Stillwater. This is part of a plan to build a line between Stillwater, Yale, Morrison and Perkins.

***Medford, Ore.**—The American Development Company has applied to the County Court for a franchise to build an electric railway along roads of Jackson County.

Sherbrooke, Que.—The ratepayers have granted a 28-year franchise to the Sherbrooke Street Railway, in return for which the company will spend $500,000 in doubling the present system of 7 to 14 miles in Sherbrooke and in developing a water power on the Magog River.

Regina, Sask.—The City Council has granted a 20-year franchise to J. W. D. O'Grady, J. A. Anderson and John Geddes, Winnipeg, to build an electric railway over the principal streets in Regina. The city is to have the privilege of taking over the system at the date of the franchise expiration. [E. R. J., Feb. 12, '10.]

***Greenville, Tex.**—S. A. Price, H. J. Meyers and their associates have applied for a franchise to build a five-mile electric railway in Greenville.

Fair Haven, Vt.—Application has been made by the Rutland Railway, Light & Power Company, Rutland, for a franchise to extend its electric railway through Fair Haven and over the Evergreen road to Poultney.

TRACK AND ROADWAY

***Florence, Ala.**—Thurston H. Allen, Florence, is actively interested in promoting a 75-mile electric railway between St. Floridan, Bailey Springs, Muscle Shoals Canal, Rogersville, Athens and Huntsville.

Little Rock Railway & Electric Company, Little Rock, Ark.—This company advises that it will soon rebuild and pave 2 miles of track. D. A. Hegarty, general manager.

Power, Transit & Light Company, Bakersfield, Cal.—This company reports that it has recently laid 2½ miles of 60 and 87-lb. steel rails, and that it will rebuild 2½ miles of new track. Harry S. Jastro, purchasing agent.

Bayboro Investment Company, St. Petersburg, Fla.—This company has begun building its railway from Bayboro to St. Petersburg. It is reported that Snell & Hamlet are negotiating to secure a 2½-mile extension of this line from St. Petersburg through the Bay Shore and North Shore subdivisions. A. Welton, superintendent. [E. R. J., Feb. 12, '10.]

Atlanta (Ga.) Northeastern Railroad.—This company is planning to begin actual construction within two weeks on its proposed electric railway which will connect Atlanta, Roswell and Alpharetta. At Alpharetta two lines will diverge, one to Cumming, 42 miles, and the other to Creighton, 18 miles. J. B. Brooke, Alpharetta, president.

Macon Railway & Light Company, Macon, Ga.—This company advises that it will soon place contracts for building a 2-mile extension. J. H. Hertz, Macon, secretary and treasurer.

Hammond, Whiting & East Chicago Electric Railway, Chicago, Ill.—Preparations are now being made by this company to begin active construction on its proposed extension between Hammond and Harvey. D. M. Cummings, Chicago, president.

Illinois Oil & Coal Belt Railway, McLeansboro, Ill.—This company advises that the contract is awarded and preliminary survey will begin shortly by the Western Indiana Construction Company on the projected 170-mile electric railway which is to connect Terre Haute, Ind., Robinson, Olney, Fairfield, McLeansboro, Marion and Cairo, Ill. Construction of the road is scheduled to begin in about four months. Maximum grade will be 1 per cent and the maximum curvature 4 deg. The line will operate through 120 miles of coal fields and 50 miles of oil fields. Two bridges will be constructed. It will be bonded at $20,000 per mile. The company plans to build a power plant and repair shops at McLeansboro. Several amusement parks are also contemplated. Capital stock, $1,000,000. Officers: James R. Campbell, McLeansboro, president; Joseph B. Crowley, Robinson, vice-president; I. H. Webb, McLeansboro, secretary; J. H. Lane, McLeansboro, treasurer, and Allen T. Russell, McLeansboro, general manager and chief engineer. [E. R. J., March 12, '10.]

Dixon, Rock Falls & Southwestern Electric Railway, Tampico, Ill.—This company has increased its capital stock from $50,000 to $300,000. This railway is now being built from Sterling to Moline. Track has been laid from Tampico to Yorktown.

Evansville (Ind.) Electric Railway.—This company has begun work surveying the proposed extension of its electric railway from Rockport to Grandview. Construction will begin in a few weeks.

Centerville Light & Traction Company, Centerville, Ia.—This company has resumed work on the 7-mile extension to Mystic.

Kansas Union Traction Company, Altamont, Kan.—This company advises that it will commence construction this summer and that engineering work will begin in a few days on its proposed 40-mile electric railway between Parsons, Altamont, Edna, Valeda and Coffeyville. Barney McDaniel, Altamont, secretary. [E. R. J., Jan. 8, '10.]

Union Traction Company, Coffeyville, Kan.—This company states it expects to build a 5-mile city line in Independence. D. H. Siggins, Coffeyville, president.

Portland, Gray & Lewiston Railroad, Lewiston, Maine.—W. S. Libbey and H. M. Dingley, Portland, who have purchased the controlling interest in this company from E. L. Gross, Auburn, and L. A. Goudy, Portland, announce that work will be started on the proposed railway between Auburn and Portland during the next few weeks. Preliminary arrangements have been completed. [E. R. J., Sept. 25, '09.]

Hagerstown (Md.) Railway.—This company has made surveys for an extension of its railway into the northern suburbs of Hagerstown. W. C. Hepperle, Hagerstown, purchasing agent.

***Ortiz, Chihuahua, Mex.**—A. R. Cadena and Serveriano Calderon have obtained a concession from the government to build a three-mile electric railway between Ortiz and Meoqui, and also on the principal streets of these towns.

Electric Traction Construction Company, Kansas City, Mo.—This company is in the market for 2,550 tons of 60-lb. relaying rails, also spikes, bolts and nuts, for work on 25 miles of railway work in Kansas.

Buffalo, Lockport & Rochester Railway, Rochester, N. Y.—Press reports state that this company is planning an extension of its line to Niagara Falls.

Ashtabula (Ohio) Electric Street Railway.—Preliminary surveys have been completed and contracts let to A. F. De Mayo & Company, New York, N. Y., to build this proposed 6-mile electric railway over the principal streets of Ashtabula. Connection will be made with interurban lines to Cleveland, Erie and Jefferson. Local and Eastern capital are interested. Chapin & Bryson, Ashtabula, engineers. [E. R. J., Jan. 22, '10.]

Ohio & Southern Traction Company, Columbus, Ohio.—This company advises that it will place contracts during the next few weeks for building 2½ miles of track. W. J. Baker, Columbus, purchasing agent.

Niagara Falls, Welland & Dunnville Electric Railway, Welland, Ont.—This company which was recently incorporated to build an electric railway from Niagara Falls through Stamford, Thorold, Crowland, Welland, Humberstone, Wainfleet, Moulton and Sherbrooke, elected the following officers at its first meeting: F. R. Lalor, Dunnville, president; George Arnold, Ridgeville, vice-president; F. E. Misener, Marshville, secretary; George H. Burgar, treasurer; H. A. Rose, Welland, solicitor. J. C. Gardiner, Niagara Falls, will begin making surveys at once, starting at the Dunnville end. [E. R. J., March 26, '10.]

Austin (Tex.) Electric Railway.—This company advises that it will build 2½ miles of track during the year. W. J. Jones, president.

Toronto & York Radial Railway, Toronto, Ont.—It is reported that this company will extend its Searborough division to Markham. W. H. Moore, Toronto, general manager.

***Denton-Fort Worth Interurban Railway, Denton, Tex.**—This company recently effected formal organization with the election of the following directors and officers: A. C. Owsley, president; W. B. McClurkan, vice-president; H. F. Schweer, treasurer, and C. E. Scruggs, secretary. Directors: A. C. Owsley, J. C. Colt, B. H. Davenport, U. B. McClurkan, J. N. Rayzor and B. W. Blewett. The proposed railway is to connect Denton and Fort Worth.

San Benito (Tex.) Interurban Railway.—This company is said to have financed its projected 50-mile gasoline-motor railway from San Benito to the Rio Grande, and work has been started by the Hidalgo Construction Company, which has been awarded the contract for grading, bridging and track-laying. S. A. Robertson, San Benito, engineer and contractor. [E. R. J., Jan. 29, '10.]

Twin City Light & Power Company, Centralia, Wash.—This company has awarded a contract to A. M. Hewes, Monadnock Building, Chicago, Ill., for the construction of a 5-mile electric railway between Centralia and Chehalis, and also for the reconstruction of its water and electric lighting plants. The railway company has recently been reorganized by Guy M. Walker, 15 Wall Street, New York City. [E. R. J., Jan. 29, '10.]

Sparta-Melrose Electric Railway & Power Company, Sparta, Wis.—This company reports that it has completed grading to Trout Falls, and will start construction during the summer on its projected 30-mile electric railway from Sparta to Melrose. The work is being done by the Western Transportation Company. [E. R. J., March 19, '10.]

Wisconsin Southern Railway, Fond du Lac, Wis.—This company has secured right-of-way and completed surveys for its proposed 119-mile electric railway which is to connect Madison, Sun Prairie, Columbus, Beaver Dam, Juneau, Horicon, Mayville, Knowles, South Byron, Brownsville, and Fond du Lac, and from Knowles will connect Lomira, Ashford, Campbellsport and Plymouth. Capital stock authorized, $3,500,000 preferred, $1,500,000 common. Bonds authorized, $25,000 per mile, not to exceed $5,000,000. Officers: Charles D. Smith, Fond du Lac, president, manager and contract agent; M. A. Jacobs, Beaver Dam, vice-president; M. W. Smith, Fond du Lac, secretary. Headquarters, 16 South Main Street, Fond du Lac.

Middle Island Railroad, Middlebourne, W. Va.—This company has been formed for the purpose of building an electric railway from Sistersville to Middlebourne, McElroy Creek and Clarksburg. Incorporators: T. Moore Jackson and C. P. Stout, Clarksburg; I. M. Underwood, T. P. Hill and J. E. Shore, Middlebourne. [E. R. J., Jan. 8, '10.]

***Clarksburg & Weston Traction Company, Clarksburg, W. Va.**—This company has been organized in Clarksburg to build an electric railway from Clarksburg to Weston. S. G. Monroe, Clarksburg, is said to be interested.

SHOPS AND BUILDINGS

Little Rock Railway & Electric Company, Little Rock, Ark.—This company advises that it will build an extension to its car house in Little Rock to be used as a club room for its employees. The repair shop will be equipped with complete set of wood-working machines. D. A. Hegarty, Little Rock, general manager.

Los Angeles & Mt. Washington Railway, Los Angeles, Cal.—This company expects to place during the next two months contracts for building a repair shop in Los Angeles. John A. Rivers, superintendent.

Vicksburg (Miss.) Traction Company.—This company advises that it will soon place contracts for constructing a new car house in Vicksburg. W. B. Moorman, Vicksburg, general manager. [E. R. J., Oct. 2, '09.]

POWER HOUSES AND SUBSTATIONS

Los Angeles & Mt. Washington Railway, Los Angeles, Cal.—This company advises that during the next 60 days it will place contracts for building a small power plant. John A. Rivers, superintendent.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill.—This company states it intends soon to purchase an electrically driven gravel loader with a capacity of 100 yd. per hour. W. J. Cram, Jr., general manager.

Tri-City Railway & Light Company, Davenport, Ia.—This company has let the contract to the Westinghouse Electric & Manufacturing Company for the installation of a 12,000-hp turbo-generator at its power plant in Moline.

Winona Railway & Light Company, Winona, Minn.—This company states it has just completed the installation of an additional 600 boiler at its Winona power house.

Delta Electric Light, Power & Manufacturing Company, Greenville, Texas.—This company has purchased and will install at once a 150-kw. General Electric belted generator.

La Crosse & Winona Traction Company, La Crosse, Wis.—This company, it is stated, will soon call for bids for the erection of a dam 33 ft. high, with a 350-ft. spillway. W. J Ferris, president. [E. R. J., March 12, '10].

Manufactures & Supplies

ROLLING STOCK

Guthrie (Okla.) Railway expects to buy fenders for its nine cars.

Austin (Tex.) Electric Railway is in the market for two open and three closed cars.

Williamsport (Pa.) Passenger Railway is in the market for two cars, it is reported.

Elmira Water, Light & Railroad Company, Elmira, N. Y., is planning to purchase six cars.

Mobile Light & Railroad Company, Mobile, Ala., is building three open trailers in its shops.

Cumberland Railway, Carlisle, Pa., is said to have ordered three cars from The J. G. Brill Company.

Birmingham Railway, Light & Power Company, Birmingham, Ala., is in the market for nine cars.

Ohio & Southern Traction Company, Columbus, Ohio, is in the market for one 60-ft. combination car.

British Columbia Electric Railway, Vancouver, B. C., has ordered 100 trucks from The J. G. Brill Company.

Los Angeles & Mt. Washington Incline Railway, Los Angeles, Cal., expects to buy some brakes within the next 60 days.

Little Rock Railway & Electric Company, Little Rock, Ark., is rebuilding 15 open cars as semi-convertible and closed-side cars.

Columbus, Urbana & Western Electric Railway, Columbus, Ohio, has ordered one interurban car from the Jewett Car Company, Newark, Ohio, to be mounted on McGuire-Cummings trucks.

Georgia Railway & Electric Company, Atlanta, Ga., mentioned in the Electric Railway Journal of Jan. 29, 1910, as contemplating the erection of 18 cars in its shops, is now constructing 20 cars.

New Orleans Railway & Light Company, New Orleans, La., reported in the Electric Railway Journal of March 26, 1910, to be in the market for 25 cars, has decided to purchase from 35 to 50 cars.

Cleveland (Ohio) Railway, reported in the Electric Railway Journal of March 26, 1910, under the name of its predecessor, the Municipal Traction Company, to be in the market for 100 new cars, will order 50 cars at once.

Pittsfield (Mass.) Electric Street Railway reported in the Electric Railway Journal Feb. 19, 1910, to be in the market for a number of motor cars, has placed an order for two cars with J. M. Jones Sons' Company, Watervliet, N. Y.

Interborough Rapid Transit Company, New York, N. Y., which was reported in the Electric Railway Journal of Feb. 19, 1910, to be in the market for 75 side-door cars, has ordered 75 all-steel car bodies from the Pressed Steel Car Company.

New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y., which was stated in the Electric Railway Journal of March 26, 1910, to have ordered 10 open cars from The J. G. Brill Company, has only purchased one 10-bench open car.

Winona Interurban Railway, Warsaw, Ind., reported in the Electric Railway Journal of March 19, 1910, to be in the market for a number of new cars, is having the Jewett Car Company, Newark, Ohio, build six 13-bench open and two closed city cars and one 60-ft. baggage car.

Danbury & Bethel Street Railway, Danbury, Conn., recorded in the Electric Railway Journal of March 12, 1910, to be in the market for two cars, has contracted with The J. G. Brill Company for three 30-ft. closed cars with trucks and two 14-bench Narragansett cars with No. 39-E trucks.

Peoria (Ill.) Terminal Company, reported in the Electric Railway Journal of March 19, 1910, to have ordered five interurban cars from McGuire-Cummings Manufacturing Company, has prepared the following specifications:

Seating capacity..... 60	Hand brakes ..... Peacock
Weight .....30,000 lb.	Headlining ..... Composite
Wheel base.....6 ft. 6 in.	Board Co.
Length of body.....55 ft.	Heating system .... Cooper
Length over all.....56 ft.	Headlights ... Crouse-Hinds
Width inside .....8 ft. 5 in.	Journal boxes ...Symington
Width over sill.....9 ft. 2 in.	Motors .. Westinghouse 302
Height inside.....9 ft.	Sanders...Elec. Service Sup. Co.
Sill to trolley base..9 ft. 11 in.	
Height rail to sills..3 ft. 6 in.	Sash fixtures...Edwards No. 13-o-1.
Body ..... wood	Seats ..... Walkover
Underframe ..... steel	Trolley retrievers .....Earll
Air brakes ...Allis-Chalmers	Trucks ..... McGuire-Cummings heavy interurban.
Brakes ..McGuire-Cummings	
Car trimmings .. pol. bronze	Varnish ... Globe Paint Co.
Control sys. ..Westinghouse	Vestibule ..... one end only
Curtain fixtures .. Schroyer	
Curtain material.. Pantasote	

Central Kentucky Traction Company, Frankfort, Ky., has ordered four cars from The J. G. Brill Company of the combination passenger and baggage type which will have the following details:

Seating capacity..... 52	Gongs.....E. S. S. Co.
Weight with trucks.26½ tons	Hand brakes ..... Peacock
Wheel base.....6 ft. 6 in.	Heaters ..... Consolidated
Length of body....46 ft. 1 in.	Headlights.....G. E. arc
Length over vest..51 ft. 8 in.	Journal boxes....Symington
Length over all....52 ft. 8 in.	Lavatory fittings....A. & W. No. 6.
Sill to trolley board.9 ft. 1 in.	
Height rail to sills..3 ft. 7 in.	Motors.....4; GE-210
Body ..... wood	Registers ..... Ohmer
Underframe .. wood, I-beam stringers.	Sanders .....Ohio Brass Co.
	Sash fixtures ..... Brill
Air brakes..Nat'l A-4, M. S. A., Type C.	Seats ..... Winner
	Springs ..... Brill
Car trimmings..... bronze	Trucks...Brill 27 M.C.B., E2
Couplers....Van Dorn No. 8	Vestibule...round end, drop sash, folding door.
Curtain fix....Curtain S. Co.	
Curtain material ..Pantasote	

TRADE NOTES

Lord Electric Company, New York, N. Y., has changed its name to the Lord Manufacturing Company.

William Welling, for 14 years connected with The Hunter Illuminated Car Sign Company, New York, N. Y., as superintendent, is dead.

Consolidated Car Heating Company, Albany, N. Y., will move its New York office on May 1, 1910, to the 31st floor of the Singer Building.

Burton W. Mudge & Company, Chicago, Ill., are handling exclusively the Garland ventilator and the Garland heating and refrigerating appliances, for both passenger and freight equipment.

Railway Brake Shoe Company, Washington, Pa., has been incorporated by J. L. Cohnagan, G. O. De Vaughan and Eli Gray, of Washington, to manufacture a patent brake-shoe for railways.

Griffin Wheel Company, Chicago, Ill., will move its general office from the Western Union Building to the McCormick Building at Michigan Avenue and Van Buren Street on May 1, 1910.

Heywood Bros. & Wakefield Company, Wakefield, Mass., announce the appointment of R. F. Fowler as their representative for railway car seats, with headquarters at 1415 Michigan Avenue, Chicago, Ill.

Van Dorn & Dutton Company, Cleveland, Ohio, has absorbed the Van Dorn Electric & Manufacturing Company, and the latter company will be known hereafter as the Electric Department of the Van Dorn & Dutton Company.

Cortland F. Ames, Chicago, Ill., has been elected vice-president and manager of the Railway & Traction Supply Company, under which names the business of Cortland F. Ames will be conducted hereafter at 404 Rector Building, Chicago, Ill.

O. M. Edwards Company, Syracuse, N. Y., announces that hereafter it will manufacture gates, globes, angles, hoes, checks and radiator valves in brass, but that it expects in the near future to engage extensively in the manufacture of iron and steel valves.

Peter Smith Heater Company, Detroit, Mich., announces the second successful test of the Peter Smith hot-air forced-draft heater in Detroit on March 19, 1910. A large number of heaters has been ordered by the Detroit United Railway, to be installed as rapidly as possible.

McCord & Company, Chicago, Ill., have purchased the window fixture and accessory business of the Grip Nut Company, Chicago, Ill., and will in future conduct the business. The Grip Nut Company, however, will continue the manufacture of grip nuts, the demand for which is so great that its plant is overtaxed.

Wonham, Sanger & Bates, New York, N. Y., report the receipt of orders from Edmonton (Alta.) Radial Railway and the Long Island Railroad for the equipment of their new cars with "H. B." life guards; also from the Roanoke Railway & Electric Company, Roanoke, Va., for equipping all of its cars with this appliance.

Hobart-Allfree Company, Chicago, Ill., announces that the following officers were elected at its annual meeting on March 7, 1910; B. F. Hobart, president; J. B. Allfree, vice-president and general manager; Frank P. Smith, second vice-president, and W. H. England, secretary. The company has opened a New York office in room 1824, at 50 Church Street.

Titan Steel Castings Company, Newark, N. J., will be represented by R. B. Clark, Jr., in Chicago with offices at 757 Monadnock Building. Mr. Clark was formerly assistant general manager of the Merchants' Despatch Transportation Company, and later was sales agent of the Scullin & Gallagher Iron & Steel Company, St. Louis, Mo., in Chicago and New York. Mr. Clark represents several other companies in Chicago.

Cambria Steel Company, Philadelphia, Pa., advises that at its annual meeting on March 15, 1910, Charles S. Price, vice-president, was elected president to succeed Powell Stackhouse, who retired after 53 years connection with the company. A. P. Robinson has been elected to succeed Mr. Price as first vice-president, and G. Leon Replogle, heretofore assistant to the general manager, has been appointed assistant to the president.

Massachusetts Chemical Company, Walpole, Mass., for the convenience of workmen and to meet the demands of those who desire a smaller quantity of tape in an individual package, is packing 20 feet of its Walpole brand in a small round tin box labelled "Walpole Junior." This tape is identical in quality with that bearing the same brand name put up in 80-ft. length, and is subject to the same guarantee. The company is building an addition to its factory at Walpole, which, when completed, will increase the capacity of the plant 40 per cent.

Francis A. Vaughn has resigned from the engineering department of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and has become associated with Hans J. Meyer under the firm of Vaughn & Meyer, with headquarters in Milwaukee, who will act as consulting engineers. Mr. Vaughn was graduated from the University of Wisconsin as an electrical engineer in 1895. He immediately entered the employ of the testing department of the Standard Telephone Company's factory at Madison, Wis. Later he became connected with the Gibbs Electric Company, Milwaukee, Wis., in the design of motors. For the last 14 years Mr. Vaughn has been identified with the Milwaukee Electric Railway & Light Company in the electrical engineering department. Mr. Meyer began his career as an apprentice with the Milwaukee Electric Railway & Light Company and advanced through the various electrical departments of the company until, after seven years of service, he had charge of the drafting department under Mr. Vaughn. Subsequently he became associated with the Bullock Electric Company and the Wagner Company in Chicago. He was then appointed superintendent of the Shreveport Gas, Electric Light & Power Company, Shreveport, La., and entirely remodeled the power plant of the company. Since 1906 Mr. Meyer has been associated with the Westinghouse Electric & Manufacturing Company as commercial engineer in its New Orleans office.

Walter M. McFarland, who has been associated with the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., since Jan. 1, 1899, has resigned to accept an official position with the Babcock & Wilcox Company in New York. Mr. McFarland has been acting vice-president of the Westinghouse Electric & Manufacturing Company for more than 10 years, having supervision of the large contracts of the company and being the advisory head in all the co-operative movements of the company with the associated Westinghouse companies involving literature, advertising and exhibition work. Mr. McFarland was born in Washington, D. C., in 1859, and was educated in the public schools of that city, the preparatory department of Columbia University and the United States Naval Academy, which he entered as a cadet engineer in 1875 and from which he was graduated second in his class. In 1881, Mr. McFarland was commissioned as assistant engineer; in 1891 as past assistant engineer, and 1898 as chief engineer. In 1899 he resigned from the navy to enter the employ of the Westinghouse Electric & Manufacturing Company. He was detailed for service while in the navy to the bureau of steam engineering in 1882, and as assistant professor of mechanical engineering at Cornell University from 1883 to 1885. From 1889 to 1894 he was again attached to the bureau of steam engineering. Mr. McFarland was vice-president of the American Society of Mechanical Engineers in 1907 and is vice-president of the Society of Naval Architects and Marine Engineers. He is also a member of the Engineers' Club of New York, Duquesne Club of Pittsburgh, the Army and Navy Club of Washington, and the Army and Navy Club of New York.

ADVERTISING LITERATURE

Graphite Lubricating Company, Bound Brook, N. J., is mailing a circular letter calling attention to its graphite and bronze bushings.

Northern Engineering Works, Detroit, Mich., has issued Booklet No. 93, in which its foundry machinery and equipment are described and illustrated.

Joseph Dixon Crucible Company, Jersey City, N. J., is distributing a circular in which attention is called to the merits of Dixon's solid belt dressing.

Scully Steel & Iron Company, Chicago, Ill., has issued its Blue Book, which is a complete catalog for 1910. It contains 304 pages and is bound in flexible leather.

Arnold Company, Chicago, Ill., is mailing a post-card on which is a map of the United States showing points where it was engaged in construction work for various railroads in 1909.

James G. Biddle, 1114 Chestnut Street, Philadelphia, Pa., has published a 20-page bulletin (No. 710) entitled "Evershed Meggers and Bridge-Meggers," written by Prof. A. J. Rowland, Drexel Institute. The Evershed instruments are direct-reading for resistance just as a voltmeter indicates e.m.f.

Snow Steam Pump Works, Buffalo, N. Y., and the **Power & Mining Machinery Company, Milwaukee, Wis.,** have issued jointly catalog No. 104, entitled "Gas Power Plants," which covers Snow gas engines and Loomis-Pettibone gas producers. The publication is profusely illustrated with views which show gas power installations in various parts of the country. It is printed on coated paper and contains 64 pages.

Lagonda Manufacturing Company, Springfield, Ohio, has issued a 16-page booklet, entitled "The Weinland Quick Repair Head," devoted mainly to a discussion of the merits of the new Weinland head which the company has recently placed on the market. Directions are also given for taking the head apart quickly and installing the new sharp cutter wheels. The publication also contains a brief description of the various other appliances built by the company.

J. G. Brill Company, Philadelphia, Pa., in *Brill's Magazine* for March, publishes the third of a series of biographical sketches of prominent street railway officials in the United States. C. Loomis Allen, president of the Syracuse & Suburban Railroad and director of the New York State Railways, is the subject of the present sketch. The article is accompanied by an excellent portrait of Mr. Allen. The magazine also contains the fifteenth of a series of articles on the type of car adopted for use in large cities of the world. In the March issue, conditions are described in Milan, Italy. The following articles also appear: "Equipment for Elevated Service for the Interborough Rapid Transit Company," "Cars for the Northern Texas Traction Company," "New Equipment for Detroit," "Interurban Equipment for the Pittsburgh Railways," "Two All-Steel Baggage Cars," "Cars for Elevated Service in Chicago" and "Single-End Pay as You Enter Cars for Topeka, Kansas."

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table sh be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various fina years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit. xIncludes other income received.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Feb. '10	146,207	*92,513	53,693	43,292	10,402
	1 " " '09	136,504	*80,541	55,963	43,731	12,232
	2 " " '10	311,151	*187,014	124,137	86,583	37,554
	2 " " '09	284,399	*165,251	119,148	87,683	31,465
BANGOR, ME. Bangor Ry. & Elec. Co.	1m., Feb. '10	39,921	*18,805	21,116	13,102	8,014
	1 " " '09	35,518	*19,730	15,788	13,085	2,703
	8 " " '10	383,422	*162,045	221,377	104,901	116,476
	8 " " '09	362,386	*167,992	194,394	97,698	96,696
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Jan. '10	36,202	22,741	13,460	8,957	4,503
	1 " " '09	33,348	19,749	13,599	8,820	4,779
	12 " " '10	409,721	231,085	178,636	99,936	78,700
	12 " " '09	363,062	209,646	153,416	100,214	53,201
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Jan. '10	27,180	16,724	10,456	8,921	1,535
	1 " " '09	26,293	14,415	11,878	8,904	2,974
CHARLESTON, S. C. Charleston Con.Ry., Gas & Elec. Co.	1m., Feb. '10	63,260	41,325	21,935	13,859	8,075
	1 " " '09	59,024	37,658	21,366	13,992	7,375
	12 " " '10	782,689	503,367	279,322	166,942	112,380
	12 " " '09	756,327	489,512	266,815	165,800	101,015
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., Jan. '10	101,784	77,998	23,786	31,964	†8,178
	1 " " '09	99,637	61,938	37,699	28,190	9,510
	7 " " '10	959,791	522,900	436,890	209,539	227,351
	7 " " '09	880,682	470,689	409,993	194,668	215,326
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Feb. '10	18,702	*11,183	7,519	8,640	†1,121
	1 " " '09	16,482	*10,587	5,895	8,134	†2,239
	2 " " '10	39,786	*22,677	17,109	17,369	†260
	2 " " '09	35,408	*21,110	14,358	16,246	†1,888
Lake Shore El. Ry.	1m., Feb. '10	70,877	*47,276	23,601	34,847	†11,246
	1 " " '09	60,471	*44,019	16,452	34,520	†18,068
	2 " " '10	149,871	*95,815	54,056	69,118	†15,062
	2 " " '09	134,062	*89,594	44,469	68,912	†24,443
DALLAS, TEX. Dallas Electric Corporation.	1m., Jan. '10	118,721	80,752	37,969	26,407	11,562
	1 " " '09	102,252	65,799	36,454	28,839	7,615
	12 " " '10	1,336,591	836,444	500,146	335,379	164,767
	12 " " '09	1,183,619	784,569	399,050	347,567	51,483
DETROIT, MICH. Detroit United Ry.	1m., Feb. '10	619,979	398,422	221,557	159,140	62,417
	1 " " '09	530,314	348,711	181,603	154,457	27,146
	2 " " '10	1,291,733	824,183	467,550	317,798	119,752
	2 " " '09	1,101,322	703,408	397,914	308,159	89,755
DULUTH, MINN. Duluth-Superior Traction Co.	1m., Feb. '10	73,077	*45,723	27,354	14,417	12,937
	1 " " '09	66,353	*43,659	22,694	13,417	9,277
	2 " " '10	155,628	*96,134	59,494	28,833	30,661
	2 " " '09	138,558	*91,084	47,474	26,833	20,641
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Feb. '10	175,234	*94,765	80,469	49,602	30,867
	1 " " '09	148,833	*83,343	65,490	49,235	16,255
	2 " " '10	363,427	*193,082	170,345	99,477	70,868
	2 " " '09	302,373	*175,892	126,481	98,295	28,186
EL PASO, TEX. El Paso Elec. Co.	1m., Jan. '10	57,958	29,489	28,469	8,633	19,836
	1 " " '09	51,512	30,282	21,230	7,903	13,327
	12 " " '10	607,404	359,310	248,094	98,955	149,139
	12 " " '09	538,933	383,035	155,898	87,593	68,305
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Jan. '10	123,255	68,863	54,392	43,759	10,634
	1 " " '09	109,673	64,273	45,401	41,149	4,252
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Jan. '10	105,849	61,134	44,715	18,190	26,525
	1 " " '09	88,938	54,543	34,394	17,183	17,211
	12 " " '10	1,276,463	699,326	577,137	205,145	371,991
	12 " " '09	1,095,313	641,240	454,073	192,652	261,421
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Feb. '10	78,468	40,170	38,298	19,756	18,542
	1 " " '09	71,452	35,656	35,796	18,937	16,859
	2 " " '10	164,820	84,556	80,264	40,483	39,781
	2 " " '09	149,040	74,076	74,964	37,883	37,081
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Feb. '10	58,146	46,122	12,024	.....	.....
	1 " " '09	52,871	42,039	10,832	.....	.....
	2 " " '10	120,233	94,416	25,817	.....	.....
	2 " " '09	110,196	86,012	24,184	.....	.....
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Jan. '10	25,340	15,156	10,183	6,341	3,824
	1 " " '09	23,561	15,737	7,824	5,297	2,527
	12 " " '10	321,745	171,971	149,775	74,369	75,405
	12 " " '09	270,459	151,354	119,105	60,098	59,007
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Jan. '10	46,880	24,976	21,904	9,223	12,681
	1 " " '09	37,936	22,222	15,714	9,400	6,314
	12 " " '10	495,722	271,950	223,772	112,740	111,082
	12 " " '09	435,914	255,335	180,579	111,301	69,278
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., Jan. '10	611,919	324,451	287,468	155,405	132,063
	1 " " '09	550,948	329,157	221,791	155,562	66,229
	8 " " '10	4,785,616	2,720,656	2,064,960	1,264,931	800,029
	8 " " '09	4,418,573	2,520,190	1,898,383	1,262,135	636,248
LIMA, OHIO. Western Ohio Ry.	1m., Feb. '10	35,341	*19,964	15,377	15,276	
	1 " " '09	30,551	*19,736	10,815	15,301	†
MILWAUKEE, WIS. Milwaukee Elec.Ry. & Lt. Co.	1m., Jan. '10	386,716	285,388	101,328	45,415	5
	1 " " '09	344,636	232,671	111,966	45,816	6
Milwaukee Lt., Ht. & Traction Co.	1m., Jan. '10	112,483	48,044	64,438	55,648	
	1 " " '09	103,207	39,392	63,815	50,454	1
MINNEAPOLIS, MINN. Twin City Rapid Transit Co.	1m., Feb. '10	536,955	281,618	255,337	140,229	11
	1 " " '09	483,101	273,785	209,317	133,963	7
	2 " " '10	1,120,917	584,250	536,668	280,458	25
	2 " " '09	1,008,762	559,610	449,152	267,926	18
MONTREAL, CAN. Montreal St. Ry.	1m., Feb. '10	303,977	204,256	99,722	39,875	
	1 " " '09	284,090	196,912	87,178	35,037	
	5 " " '10	1,656,040	996,194	659,845	171,911	4
	5 " " '09	1,514,615	945,752	568,863	159,142	4
NASHVILLE, TENN. Nashville Ry. & Lt. Co.	1m., Feb. '10	136,439	76,417	60,022	33,690	
	1 " " '09	131,313	76,514	54,799	32,450	
	2 " " '10	285,038	160,578	124,460	67,380	
	2 " " '09	270,283	160,100	110,183	64,900	
PADUCAH, KY. Paducah Traction & Light Co.	1m., Jan. '10	22,741	14,476	8,266	7,070	
	1 " " '09	19,048	12,253	6,795	7,043	
	12 " " '10	231,037	137,975	93,062	81,671	
	12 " " '09	225,746	132,944	92,803	82,573	
PENSACOLA, FLA. Pensacola Electric Co.	1m., Jan. '10	20,608	12,158	8,450	4,785	
	1 " " '09	19,784	11,591	8,193	4,407	
	12 " " '10	247,488	141,905	105,583	53,009	
	12 " " '09	210,811	144,253	66,558	51,402	
PHILADELPHIA, PA. American Rys. Co.	1m., Feb. '10	268,455	.....	.....	.....	
	1 " " '09	248,714	.....	.....	.....	
	8 " " '10	2,124,508	.....	.....	.....	
	8 " " '09	1,997,892	.....	.....	.....	
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Jan. '10	6,875	6,861	14	1,799	
	1 " " '09	7,086	6,074	1,012	2,156	
	12 " " '10	130,575	93,735	36,840	21,311	
	12 " " '09	122,765	87,187	35,578	26,563	
PORTLAND, ORE. Portland Ry., Lt. & Power Co.	1m., Feb. '10	393,075	170,616	222,439	130,778	
	1 " " '09	335,002	167,376	187,606	119,986	
	2 " " '10	824,087	352,661	471,426	259,773	2
	2 " " '09	694,229	353,254	340,975	236,755	1
POTTSVILLE, PA. Eastern Penn'a Ry.	1m., Jan. '10	51,048	30,772	20,276	.....	
	1 " " '09	43,246	27,606	15,640	.....	
ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Power Co.	1m., Feb. '10	79,271	43,419	35,852	22,067	
	1 " " '09	73,251	38,665	34,586	20,938	
	2 " " '10	168,579	90,325	78,254	44,084	
	2 " " '09	152,686	80,503	72,183	41,575	
ST. LOUIS, MO. United Rys. Co. of St. Louis.	1m., Feb. '10	807,439	562,924	244,515	233,276	
	1 " " '09	808,161	531,779	276,382	234,917	
	2 " " '10	1,693,221	1,159,068	534,153	467,063	
	2 " " '09	1,637,197	1,076,531	560,666	470,486	
SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Jan. '10	627,666	363,751	263,915	.....	
	1 " " '09	566,373	348,215	218,158	.....	
SAVANNAH, GA. Savannah Elec. Co.	1m., Jan. '10	48,898	31,068	17,831	17,818	
	1 " " '09	49,986	32,256	17,730	17,509	
	12 " " '10	602,725	391,162	211,563	210,002	
	12 " " '09	599,484	383,400	216,084	207,009	
SEATTLE, WASH. Seattle Elec. Co.	1m., Dec. '09	481,893	289,036	192,858	103,709	
	1 " " '08	415,079	253,801	161,278	95,313	
	12 " " '09	5,854,175	3,394,538	2,459,638	1,242,663	1,
	12 " " '08	4,520,489	2,670,252	1,850,237	1,090,646	
TACOMA, WASH. Puget Sound Electric Ry.	1m., Jan. '10	144,369	*105,824	38,545	50,236	
	1 " " '09	122,858	*98,441	24,417	44,054	
TAMPA, FLA. Tampa Elec. Co.	1m., Jan. '10	53,361	30,309	23,051	4,566	
	1 " " '09	50,978	29,965	21,014	4,509	
	12 " " '10	598,685	346,449	252,237	56,025	
	12 " " '09	558,259	368,039	190,219	42,167	
TOLEDO, OHIO. Toledo Rys. & Lt. Co.	1m., Feb. '10	237,544	138,757	98,787	76,083	
	1 " " '09	214,813	117,889	96,294	70,911	
	2 " " '10	496,014	290,520	205,494	151,296	
	2 " " '09	439,500	247,949	191,551	141,924	

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The Pennsylvania Terminal Station

The magnificent terminal station of the Pennsylvania Railroad on Manhattan Island will be completed and ready for use within a few weeks. It is a fitting monument to the constructive genius of the late A. J. Cassatt, who as president of the railroad conceived and planned the system of tunnels, yards and bridges which are to unite New Jersey with Manhattan and Long Island and provide for an all-rail route to New England from the South and West. The plan in its entirety is a great piece of railroad civil engineering, but it is one that would have been impossible to execute a decade ago. The whole success of the stupendous undertaking, involving an expenditure of nearly $160,000,000, depends on the safe and reliable operation of trains by electricity through the river tunnels and into the underground station. The art of heavy electric traction was in its infancy when the scheme was first proposed, and it required true courage to stake so much on future developments in an entirely new field. However much credit may be given the engineers and their "sand hogs" who bored the tunnels, the achievements of the engineers who perfected and built the electrical apparatus to move trains are equally worthy of the highest praise.

Another Example of the Everybody Busy Principle

Four years ago this paper presented articles on the "everybody busy" principle. It was then intended to encourage more careful attention to the details of shop practice and thus obtain higher efficiency from the employees. Since the presentation of the earlier articles we have commented on many shop labor schemes that have served to increase the labor efficiency of mechanical plants. Some of the accepted methods have warranted elaborate articles. Among them were the accounts of how good results had been obtained by the piece work system. Other plans, though less elaborate, have given comparable results for certain phases of the work for which railway repair shops are organized and operated. A good example is the method for lessening the cost of manufacturing armature coils by the use of the otherwise idle time of substation attendants, put into practice by the Chicago, South Bend & Northern Indiana Railway Company some months ago. Coil winding forms and material are distributed to the substations and when the men are not attending to their principal tasks they occupy their time by winding armature coils. This scheme has a three-fold value: An economy in the manufacture of coils over that hitherto in force, and ranging from $7 to $10 per set, is realized; the attendants now do not idle away their time by reading novels, and the class of substation attendants which the railway company wishes to have in its employ feel more satisfied with their positions, because of their increased duties and opportunity for service.

Fast Schedules and Minor Delays

Fast schedules are an important factor in promoting long-distance passenger traffic and an appreciable reduction in the running time between terminals is usually followed by a gratifying increase in through travel. In competition with the service given by parallel steam roads the interurbans are handicapped in the matter of running time by unavoidable speed restrictions within cities and fast time can be made only on the long stretches in open country. The limit of safety and capacity of the equipment has already been reached by many roads wherever opportunities are afforded for high-speed running and but little further improvement can be expected in that direction. The elimination of every unnecessary stop or slow-down, however, would save many valuable minutes in the aggregate, even on the fastest runs. Many of the physical causes of minor delays would cost little or nothing to remove; others are the result of engineering mistakes made in the construction of the road and would require a considerable expenditure to remedy them. There are, also, the delays caused by sluggishness or indifference on the part of trainmen and employees. An exchange of pleasantries in taking orders from the dispatcher consumes time; the fact that the agent at a station waits for the car to arrive before loading up a truck with outgoing baggage and express causes another short delay. A sluggish conductor can lose five seconds at every stop by fumbling for the bell cord. It is always an instructive object lesson to a railway man to watch the change of engines on one of the 18-hour flyers between New York and Chicago. Every man is alert and not a second is lost in useless words or motions. The same degree of intelligent activity if exercised by all employees concerned would save many minutes on a 100-mile interurban run.

There is an old adage which might be paraphrased for the occasion into "Save the seconds and the minutes will take care of themselves." Any manager who is desirous of improving his schedules cannot do better than to examine into the reason for making every slow down and stop and add up the seconds wasted in unnecessary delays. How to save 10 or 15 minutes on a long run will be quickly apparent.

Eliminating the Special Car

The customary method of handling pleasure traffic when the excursionists are all members of one organization is to furnish special cars for a specified amount, say $12 per double-truck car for any period up to three hours, and $3 per hour thereafter. The fact that chartered cars will be furnished is often considered to be a strong inducement to get the business. Nevertheless, it is reasonable to consider whether it is not possible to secure as much if not more of this traffic by carrying it on the regularly scheduled cars under certain conditions. The practice on one road where this view is taken is for the company to sell to the treasurer of the excursion party a definite number of specially-marked tickets good on any car on a certain day, at a slight reduction from the single fares. Where there are concessions at the park it is, of course, possible to sell a ticket covering transportation and admission into one or more concessions at a slight reduction so as to avoid any actual lowering of the rate of fare, if this plan should be considered more desirable. The principal point made is that the sale of individual tickets renders it easy for individual excursionists to leave for and return from the picnic grounds at their own convenience. In many cases it is not possible for many of the older folks to go out in the afternoon. Probably most of the members could be taken out in groups during the hours of light regular traffic. Of course, there is a certain advertising value accruing from the employment of special cars, but the drawback of their omission can be more than overcome by placing the society's bunting on all or most of the cars on the division effected. This manner of handling the pleasure travel of organizations avoids all interference with the schedules and saves the expense of extra crews and cars.

One use of special cars which may easily become an abuse is when they are chartered by merchants to bring shoppers to town free of charge, by giving them shopping rebate coupons. This practice brings into being a certain amount of new travel, but the use of exclusive cars should not be encouraged. The objection toward them is two-fold—if pushed too far. The railway loses the full-price fare of those who would travel anyway, and again if many people are carried in this way without individual expense, they become dissatisfied with the regular rates.

The Gas Engine in Railway and Lighting Service

The paper on "Gas Engines in City Railway & Lighting Service," presented by E. D. Latta, Jr., before the Charlotte, N. C., meeting of the American Institute of Electrical Engineers held March 30 to April 1, inclusive, is one of the few comprehensive accounts which have appeared on American gas engine practice. The plant operated by Mr. Latta is not a large one as the principal units comprise only two 540-kw, 60-cycle, 2300-volt, three-phase generating sets. The apparatus was novel, however, and was used under extremely unfavorable conditions as regards ultimate fuel economy. At the same time the low load factor was advantageous so far as reliability of operation was concerned. It is questionable whether the Charlotte Electric Railway, Light & Power Company would have installed a gas engine plant at all if it had not been intended chiefly to be a stand-by plant for a contemplated water-power development. The unexpected competition of other hydroelectric interests restricted the field for the sale of current and therefore led the Charlotte company to rely exclusively on the gas station. The load handled by this station comprises the rapidly fluctuating demands of railway and elevator service besides lighting and small motors. The engines are of the horizontal, twin-tandem, double-acting, four-stroke cycle type and are so well governed that even when a heavy load is suddenly thrust upon or taken from the engine, there is only a momentary swing of 2 per cent below or above the mean speed for the given load. The engines can run in synchronism with the cranks in almost every possible relation. Even a 42 per cent over-load has been carried momentarily without causing a troublesome drop in speed. Mr. Latta adds that the temperatures of the alternator above room temperatures do not indicate an excessive synchronizing current, and there has never been any tendency from either the 300-kw or 500-kw rotaries to fall out of step. The larger rotary does hunt slightly, but only when one generator is running. However, this converter is practically as large as the alternator and the fly-wheel effect of its rotor is not enough to take up the greater speed variations of a single engine.

The actual service operation of novel machinery naturally brings to light some defects which were not foreseen by the

designers or discovered during the experimental runs. The early difficulties with piston packing for combustion engines of this type have been eliminated in this case by using segmental iron rings, which together with their castings are removed monthly for renewal and cleaning. Neither the lubrication nor the cooling system has given any difficulty. As to gas troubles, it was found that pre-ignitions would take place owing to the heating up of the engines when 25 per cent over-load was carried for several hours. Back-fires and muffler explosions also occurred, but practically all interruptions of this kind were momentary. It is very creditable, indeed, both to the manufacturer and to the user of this apparatus that the sum of all the delays caused by the gas engine equipment in a 24-hour a day plant should have been only 2 hours and 45 minutes during the first year's operation. Furthermore, there is reason to believe that the record for the second year will be much better. It may be of interest to add that the noise of the gas engine exhaust, which some expected to prove a nuisance, cannot be heard within 50 ft. of the engine building. In fact, the noise of the machinery itself actually is greater than that of the exhaust.

The regulating qualities and reliability of the gas engine station having been demonstrated, it is interesting to examine the operating and maintenance costs. The total annual output of the two 810 brake-hp engines was 12 403 engine hours which was equivalent to about 3,356,000 kw-hours from the two 540-kw alternators. These figures give the poor average load factor of 45 per cent based on the output divided by the product of the engine hours and the capacity of one engine. The amount of fuel per kw-hour, including the coke required for starting the producers, was 1.97 lb. Assuming an efficiency of 85 per cent for the alternators at 45 per cent load, only 1.275 lb. of coal was used per brake hp-hour. The kw-hour production cost, including the auxiliaries, was 0.9759 cent, of which 0.349 cent went for coal, 0.170 cent for power house labor, 0.131 cent for producer labor, 0.085 cent for all lubrication and waste and .076 cent for all repairs and maintenance. These figures are low when compared with steam plants of similar output, but a fair parallel is impossible because the items of interest, depreciation and taxes, which are certainly larger for the gas engine station, have been omitted. It is proper to point out, however, that Mr. Latta did not give these latter figures because the installation was arranged for three units instead of two and all the buildings, producers, gas holders, and piping were put in for the ultimate capacity. Thus the relatively small additional cost of one generator set and foundation will increase the capacity by 50 per cent while raising the fixed charges only 18 per cent. The author concludes that the gas engine has a wide field of usefulness, but doubts whether it is best adapted to a plant operated under conditions like those obtaining in Charlotte unless storage batteries are used to permit the engines to be operated at constant load. The three principal conditions under which the gas engine is at the greatest advantage are: Where natural or blast furnace gases are available; where low grade coal can be purchased very cheaply; and where a source of power at low prices but of uncertain continuity is available. In the last case, provided the character of the service will warrant the cost of reserve power, the gas engine is ideal for a railway and lighting company, because it may be started and put under load in less than two minutes.

Tickets vs. Cash Fares

An engineering contemporary has recently expressed the opinion that a ticket system is essential with prepayment cars to avoid the delays on the rear platform and expressed the opinion that if American street railway companies had adopted 3-cent fares and the ticket system 15 years ago instead of extending their transfer privileges they would to-day be in a far better financial position and the public would have been better served and better satisfied. We are far from defending either the logic or the results of the transfer system as now in force in most cities in this country. Whatever might have been the effect upon the earnings of electric railway companies of a reasonably restricted use of transfers, the companies have not been responsible for the excessive issue of transfers which has been a marked feature of electric railway operation during the past 10 years, nor have they introduced the system voluntarily. In practically every case it has been forced upon them either by State or municipal enactment, usually against their strong protest and after all legal means to prevent its establishment have been exhausted. The substitute proposed, however, of a 3-cent fare by cash or ticket, would, we believe, be worse than the disease, if that were possible, nor do we consider that it is at all necessary to secure successful results with prepayment cars.

One of the fears generally expressed before this type of car came into general use in this country was that it would be slow in loading, but this has not been found to be the case. When prepayment cars were first operated in Buffalo, one of the earliest if not the earliest city in the United States to adopt this style of car, the management as a precautionary measure installed change stations at several points in the downtown section of Buffalo so that persons who did not have small change could secure it at these stations before boarding cars. The company soon found, however, that the public recognized the advantages of having the change ready and this experience has been duplicated in other cities. When a service of this kind is inaugurated a little popular education is advisable and this plan has nearly always been followed. But the public is quick to learn and appreciate the improvement in service which the cars afford and they are in use in so many cities now that a few preliminary instructions only are necessary. For instance, in a case which occurred last week in which prepayment cars were operated for the first time in a city of about 200,000 inhabitants, 80 per cent of the fares on one car observed were in nickels and a 25-cent piece was the largest coin presented to be changed. We do not mean to say that at very crowded crossings there may not be some slight loss of time in the prepayment type as compared with the old type of car, but this delay is more than made up by shorter stops elsewhere on the route.

Undoubtedly the prepayment car has introduced new problems particularly in the best method of collecting fare, for example, whether it is better to use a fare box which returns change to the conductor or not, or whether the fare should be collected by the conductor without a box. It would be surprising if all questions of this kind should have been completely solved in the short space of time in which this type of car has been in general use. But experience is constantly being acquired in regard to these matters and we should know more about the relative advantages of the different methods before long.

RECENT PRACTICE IN MOTOR MAINTENANCE IN BOSTON

The headquarters of the department of rolling stock and shops of the Boston Elevated Railway Company have for many years been located at 439 Albany Street, in the South End district of the city. Upon a tract of land once occupied by the Hinckley Locomotive Works, the Boston Elevated organization has long maintained a centralized installation for the maintenance of equipment. On this site also stands the company's "Central Power Station," and the offices of the generating and distributing departments, as well as those of the electrical engineering staff, are located upon the premises. An

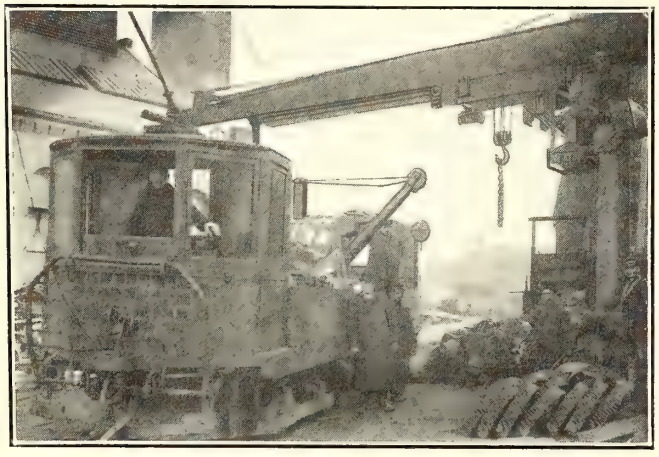


Fig. 1—Boston Elevated Shops—Supply Car and Hoist

extensive stores depot has also been maintained by the company at this place. In addition to the Albany Street shops, the company maintains an extensive repair plant for car-body work at Bartlett Street and a special shop for the maintenance of elevated cars at Sullivan Square. In general, however, the maintenance of surface car motive power has been centralized at Albany Street.

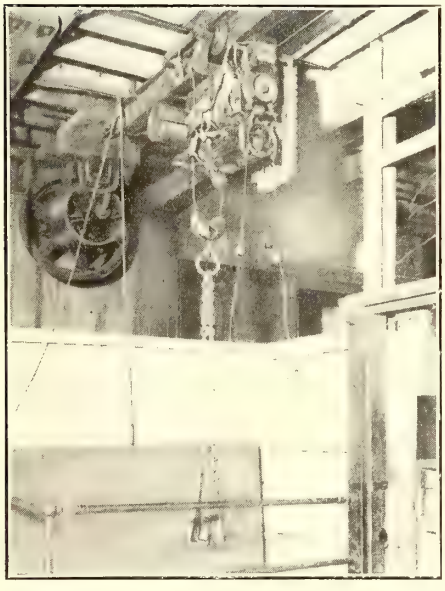


Fig. 2—Boston Elevated Shops—Electric Hoist Between First Floor and Shop

The Albany Street shops represented the growth of an existing installation to meet the requirements of a rapidly expanding system. Interest in their work centers in the utilization of special appliances of a labor-saving character rather than the design of the shops as a whole. On March 12 the shops were destroyed by fire. Preparations had just been completed for the publication of an article describing the labor-saving tools operated in these shops in connection with armature repairs, and through the kindness of the company, it is still possible to review some of the methods and appliances employed previous to the destruction of the plant. These methods and appliances are of established value, and in the formation of new facilities for armature maintenance there is no question that many of the means of working which proved acceptable in the old shop will be continued in the future plant.

The maintenance of armatures and field coils, with the handling of all special winding and insulation work in connection with motor and generator service, repairs on electric track swiches, escalator, fan and shop motors was conducted in the "Armature Department," which occupied the second floor of the machine shop building at Albany Street. The department shared with various store rooms an L-shaped area about 320 ft. long and 75 ft. wide, there being separate sections for different classes of work, including a taping and insulating room for lighter work, small coil winding, etc. Fig. 1 shows the method by which armatures and other equipment and supplies were handled at the entrance of the shops. The same view shows one of three stock cars used in handling material and equipment between the shops and different car houses and power plants on the system. Each of these cars is equipped with four motors and weighs about 20 tons. A 1-ton Sprague revolving hoist with a 7-ft. boom is installed in each car. A cab and separate trolley at each end, with a central gondola type space, facilitated rapid handling. All heavy material received at the shop entrance was handled in and out of the shops so far as necessary by a 2-ton Sprague telpher hoist running upon a monorail 15-in. I-beam half way into the machine shop, with a spur leading to an elevator way by which all heavy apparatus and material was hoisted into the armature department. Maximum facility in handling wheels, axles, etc., was afforded by the combination of the telpher and the stock car crane at the shop entrance.

Fig. 2 illustrates the provision which was made for handling material between the ground floor and the armature shop, a 1-ton electric hoist of the telpher type being in service. This was equipped with chains and grips by means of which an armature could be rapidly raised from the street floor to the repair department and thence carried to the proper machine or winding division by the telpher runway. In order to increase the safety of the hatchway leading to the lower floor the company had installed a railing composed of three wrought-iron pipe lengths at the opening, the top rail being hinged and provided with a pin lock so that it could be quickly raised in handling material, while remaining free from any danger of accident at other times. The telpher traverse was effected by hand power. The starting and stopping switch handles of the

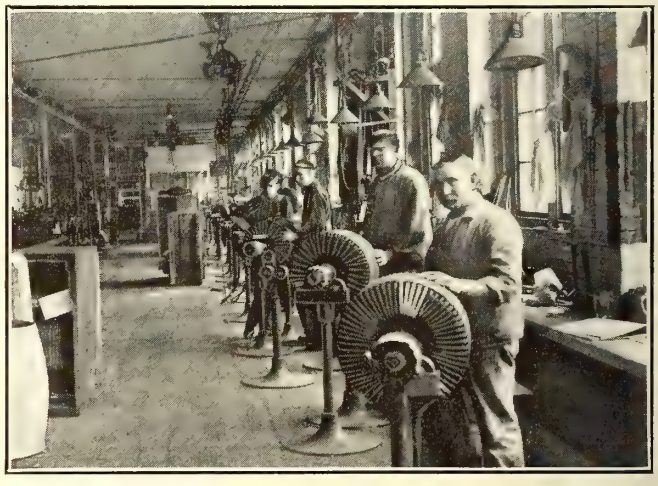


Fig. 3—Boston Elevated Shops—Armature-Winding Shop

telpher were tied together by a wooden rod to save the time often lost by the operator in reaching after swinging grips. Strain insulators were installed in the wires leading to the motor controller.

A view of the armature winding stands in the shop, taken just before the fire, is shown in Fig. 3. The shop was liberally provided with traveling hoists, and this section was served by a line running directly above the stands. The winding was carried on at the south side of the shop, close to unobstructed windows, giving a maximum of daylight for the service. The usual bench tools were provided, and each stand was furnished

with a separate 16-cp incandescent lamp for local illumination, the general lighting of the department being effected by 11 Cooper-Hewitt mercury vapor lamps. An armature stand of this type consists of a pedestal and column supporting a box fitted with 7/8-in. half openings with roller bearings 5 in. in diameter and 1 5/8 in. in thickness. The rollers are placed 5 in. apart on centers and carry the armature shaft with ease, regardless of the type of motor undergoing repairs. The stands are adjustable as to height and ordinarily carry the armature center line of shaft at from 3 ft. to 4 ft. above the floor. The rollers are not fastened into place, but are held simply by gravity.



Fig. 4—Boston Elevated Shops—Method of Dipping Coils in Large Numbers

The following motors are in service on the Boston Elevated system:

WP-50.

GE-58, 70, 73, 74, 86, 202, 800, 68.

Westinghouse, 12, 12A, 68, 121, 312, 301.

Of these the GE-202 and Westinghouse 312 and 301 motors are of the interpole type. Before the fire there were about 57 persons on the payroll of the armature department. The number of employees required in this work has been considerably reduced in the past two or three years by the improvement in operating condition effected on the road itself and by the betterment of work in the department. In a recent month the department repaired 316 armatures, 357 field coils, made 2714 new armature coils and also performed a large number of miscellaneous repairs on control and other apparatus. Practically all the work is handled on a piece-work basis. The results of this policy have been to give the company a larger output for a given expenditure of time and money, as well as to afford the employees an opportunity to earn higher wages.

Fig. 5 illustrates the equipment which was in use in the shop for blowing out armatures received from the various car houses. As soon as an armature reached the department by the hoist indicated above, it was transferred to a place in front of a 24-in. exhaust fan driven by a 3-hp 550-volt motor, and held in position by a traveling hoist for blowing out by a nozzle piped to the regular compressed air service of the shops. The fan was mounted in the wall and arranged to deliver the dust and dirt to a sheet-iron stack rising on the outside of the building to a point about at the roof level. This arrangement enabled the work of cleaning out to be performed with a minimum accumulation of dust, whereas before the fan was installed the amount of dust and dirt thrown around the premises was a decided inconvenience.

So far as practicable in this shop, all similar work was performed in multiple operations, a typical instance being shown in Fig. 4, which illustrates the method of coil dipping used. Thirty coils were dipped simultaneously in the compound tank by two men, and the standards at the side of the tank permitted the multiple drainage of the coils back into the supply. The compound tank was fitted with an inclined cover to save loss of the asphaltic material used.

The Boston Elevated Railway Company was one of the first railways in the country to recognize the value of undercutting commutators for increasing their life and service reliability. About 3000 commutators have now been slotted by this company, the maximum depth used being 1/16 in. Every type of motor used on the system has been slotted, and it is estimated that the life of commutators has been increased from 300 per cent in the case of the newer motors to 800 per cent in the older machines. The company used a lathe with a special tool, Fig. 6, and found this advantageous on account of its ability to move the tail stock over a little and follow the commutator groove in case the bars get a trifle out of line. Experience showed the wisdom of not slotting too deeply on account of the serious character of burns when they occur in deep grooves. It is estimated that 11 tons of copper were saved last year through the reduction of copper wear brought about by reduced sparking. All commutators are undercut by a saw-toothed sheet steel disc 32 mils thick, the disc diameter being 1 in. The discs are blanked and milled by the company in lots of 50 or 75, and are then case hardened. They are used on a square arbor and cost about 1.5 cents each, ready for service. After use on four commutators the disc can be resharpened for 0.5 cent and used to undercut four commutators more.

It is the company's practice to coarse-file all commutators after the undercutting is done, leaving a slight burr or fin on the inside of the slot, which is then removed by hand with the use of a steel knife. This cleans out particles of mica. The slotting is performed with an air jet blowing upon the tool. The commutator is gone over with a fine file and sandpaper, and the air jet is used continually while the sandpapering is in process. The slotting tool is driven by a spindle belted to the counter-shafting above the lathe, tension being provided by two idlers carried on a spring rod held above the head of the operator as illustrated in Fig. 7, which also shows the air and electric hoisting facilities which were provided at these lathes. Two lathes were set apart for this work alone. The company has

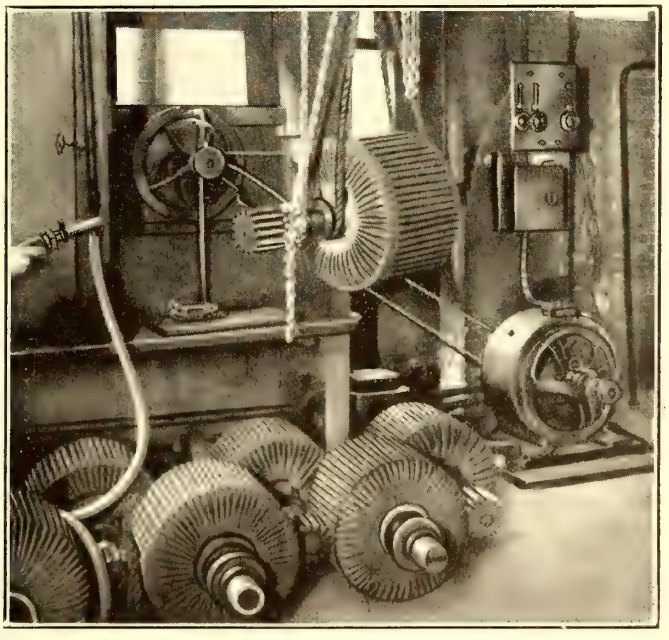


Fig. 5—Boston Elevated Shops—Equipment for Blowing Out Armatures

found that the most scrupulous care needs to be taken in doing undercutting work, and that hasty slotting is apt to lead to more trouble than the process saves. For this reason no special effort has been made to perform undercutting in quicker time than is the case elsewhere. It has been found desirable to allow an hour for cleaning out the undercut channel between the bars. If the work is hurried too much it is likely to leave thin edges of the mica next to the undercutting, with the result that

the brushes ride unevenly on the commutator and cause severe sparking. Besides the wear of copper through sparking which is saved the longer life saves labor in cutting off sleeves, disconnecting leads, withdrawing the commutator, machining new commutators, rebuilding with new mica, replacing the commutator, reconnecting, fitting new sleeves, turning down to dimensions, transporting the armature back to the car house and assembling it in the motor.

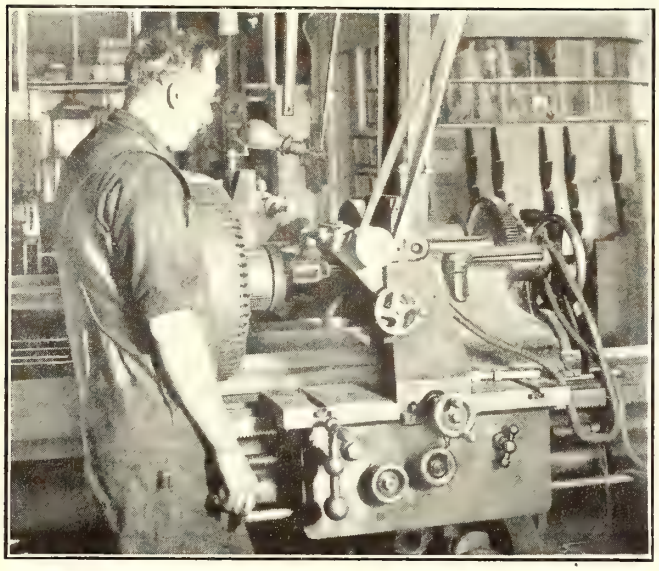


Fig. 6—Boston Elevated Shops—Lathe Used for Undercutting Commutators

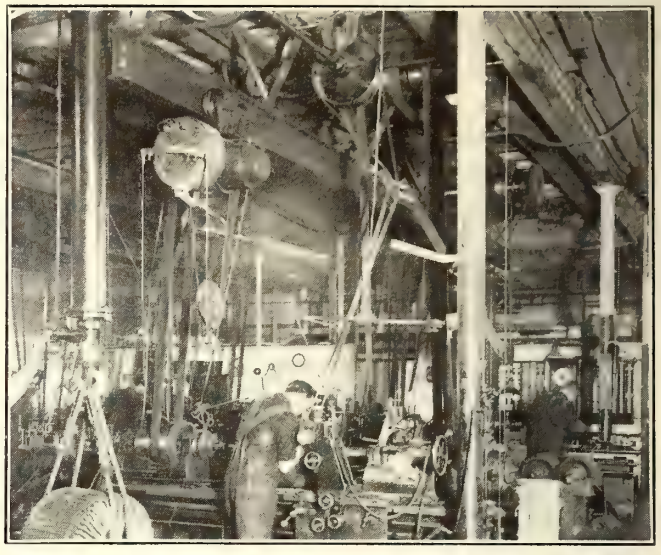


Fig. 7—Boston Elevated Shops—Hoisting Facilities at Commutating Undercutting Lathes

The company has found that with the grooved commutator it is advisable to use a high-grade brush and a low brush tension, reducing the wear of the commutator to a minimum. A treated brush is unsatisfactory with an undercut commutator, for the reason that the dust given off by the wear of the brush adheres and accumulates in the slot and causes short-circuiting of bars; the treated brush also tends to become gummy and cause friction and sticking in the brush holder. Several of the high-grade brushes have reached the point where the wear on the commutator is so slight as to indicate a life of several years. Of equal importance with the undercut is the securing of closer fits in brush holders, maximum bearing surface, and a brush spring with which the pressure applied to the brush is always radial to the commutator.

Fig. 12 illustrates a gas heater which was used in the department in connection with the heating of commutators to drive out shellac before pressing, to give an even commutator. Air and gas were supplied through valved pipes leading to the burners in the bottom of a sheet-iron chamber, and, to facilitate more rapid work, the commutator was covered with a cylindrical shell after being set upon the heater. On the same bench was located another gas and air heater used in connection with soldering coils, melting glue, etc. Thirty-six coils were dipped at once here. For setting commutators in a lathe for machining the department made use of a tapered split ring into which the commutator was first placed, the ring then being fitted into a solid outside tapered ring which was set into the lathe chuck.

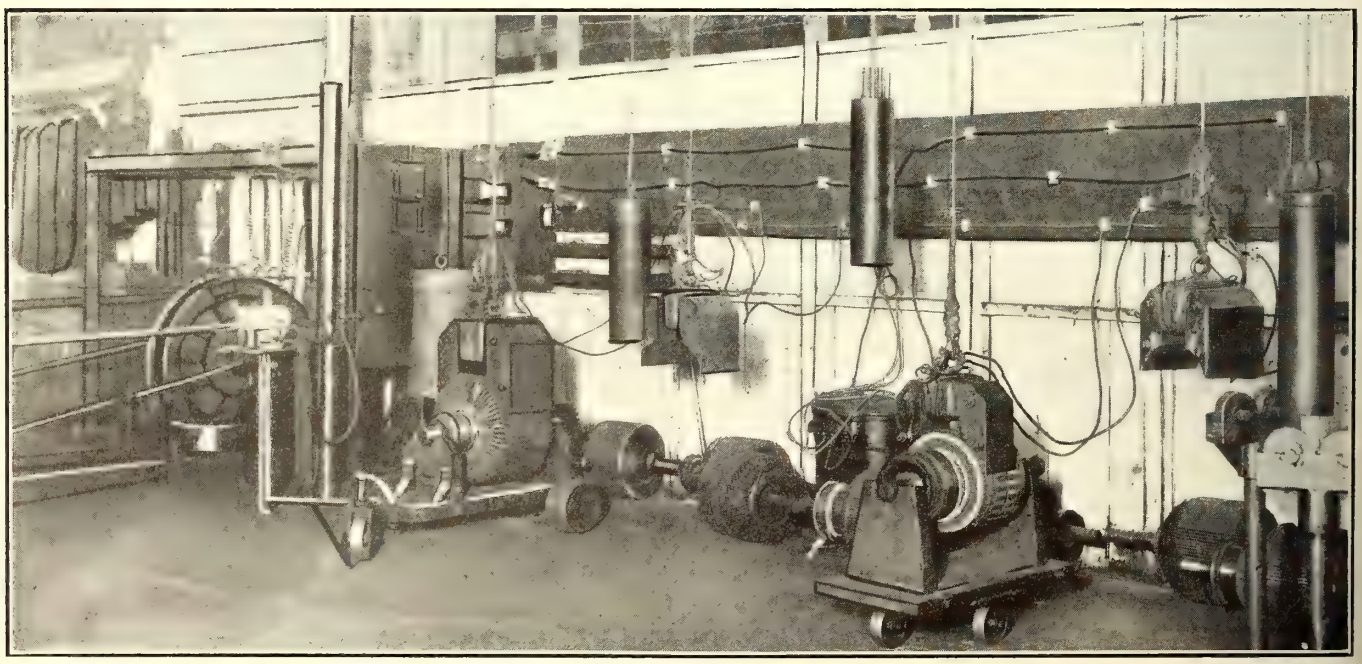


Fig. 8—Boston Elevated Shops—Testing Plant for Armature Department

Completed armatures were tested as illustrated in Fig. 8. The plant consisted of an old a.c. generator belt-driven by a 20-hp, 550-volt motor. This alternator furnished through a stationary transformer current for testing the condition of the coils in the armatures repaired, the current being applied to a

wound core built of laminated plates in the shape of pole pieces, arranged to set over the completed armature with a small air gap. When alternating current was applied to this coil, the coil and core acted as the primary of a transformer, inducing electromotive forces in the armature coils beneath. Any short circuit existing in the winding was immediately manifested by flashing and heating upon a momentary application of the al-

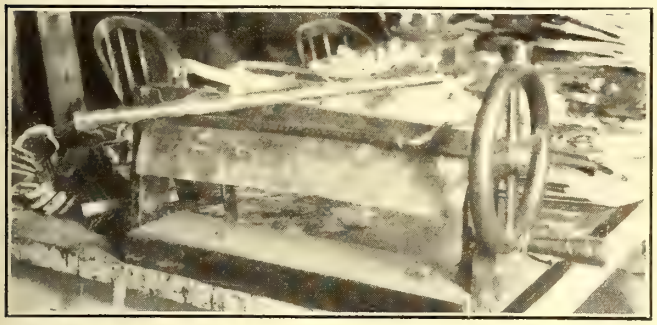


Fig. 9—Boston Elevated Shops—Insulating Machine for Forming Tubes

ternating e.m.f to the core above the armature coil. The alternating e.m.f. was usually 700 volts to 750 volts for this short-circuit test, which was used during the completion of armatures and also in the process of banding and painting. The primary cores were easily movable up or down, being counterbalanced by suitable weights and hung from pulleys.

In addition to the short-circuit testing equipment the department utilized the following standard bench tests, making several momentary applications in each case:

Between commutator bars	200 volts
Between bars and shell	2,000 volts
Between new armature coil and core	1,600 volts
Between old armature coil and core	1,000 volts

Field winding insulation now will stand 5000 volts under the company's methods of construction. In winding motor field coils the company uses a fluid hardening compound put on in a thickened condition, depending upon the space available. This is interposed between successive layers. In addition to its insulating properties this compound acts as a heat conveyor and

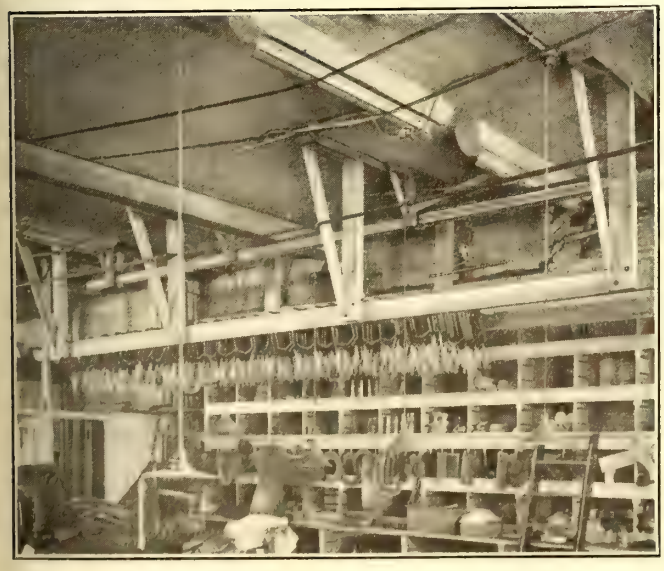


Fig. 11—Boston Elevated Shops—Armature Coil Storage Rack in Insulating Room

prevents the mechanical chafing of coils under service conditions. Whenever the company uses an asbestos field coil it is still invariably necessary to have the winding impregnated. Cotton asbestos coils are generally used. Common practices are followed in winding field coils and in banding armatures.

Fig. 13 illustrates a device which was used in the department for the straightening of shafts. It consisted of two hollow cylindrical castings 14 in. in diameter when assembled, with a central hollow core 5 in. in diameter in which the shaft was placed. The length of the device was 7½ in., and the thickness of the cast-iron shell was ½ in. Each half of the assembled

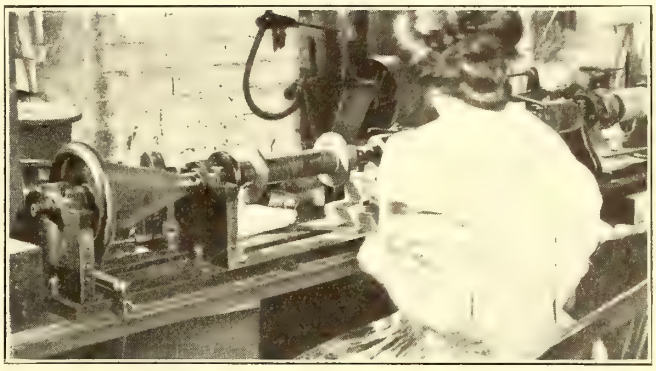


Fig. 10—Boston Elevated Shops—Winding Machine for Track Switch and Other Coils

collar is supplied with a mixture of gas and air through pipes leading to appropriate controlling valves on a post near by. Curved brass leads were used beyond the Y where the two supplies were joined, to avoid frequent breakage of hose lines carried around sharp corners, etc. The core holes were plugged with pipe plugs. On the inside of each half cylinder were rows of 1/32-in. holes used as flame apertures, there being a total of 96 in the complete collar. The device was set on a metal plate across the bed of a lathe for convenience, the gas and air being served through ½-in. pipes on each side. A latch was provided to hold the halves together in service. In operation the shaft was placed inside the collar and the jets lighted, the shaft being left by itself until red hot. Special points were used in the lathe to hold the shaft in position, and to save injury to the regular pointers. Shafts were formerly bent in cold condition by one man and a helper, the work requiring from two to three hours, according to the nature of the distortion. By this means it was done by one man in one-half to three-quarters of an hour, and the shaft was left in better condition than when bent cold. Formerly trouble was experienced from the crystallization and subsequent breakage of cold-bent shafts. The heating was not detrimental to the wearing value of the metal and the resulting strength improved the service materially.

The insulating room of the armature department was about

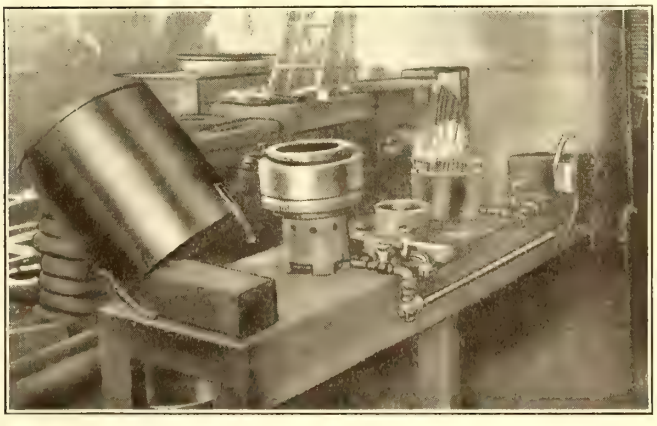


Fig. 12—Boston Elevated Shops—Gas Heaters for Heating Commutators

50 ft. long and 30 ft. wide. The work covered cutting of insulation for all purposes, taping armature coils, coil storage, winding solenoid and magnets, and in general the lighter repairs of the electrical equipment. A recently completed feature of this room was the armature coil storage rack shown in Fig. 11. This rack had a capacity of about 2000 coils, weighing

approximately 2 tons, and was built of timber framing carried from the ceiling by 2¾-in. x 6-in. pieces. The coils were carried on 1-in. wrought-iron pipes laid across the framing, and in the center a runway was provided upon which a block and tackle with a pipe carrier were suspended to facilitate handling the coils in groups. The framing was about 4 ft. wide, and was hung about 8 ft. above the floor line. A special advantage of its use was the storage of coils in an out-of-the-way location but in a manner preventing the distortion of coils by their own weight or by contact with other articles. Apart from the saving in bench space effected and the absence of distortion, the coils were provided with much better drying facilities on this frame, which was made by the company at moderate cost for this service.

Fig. 10 illustrates a coil-winding machine which was used in the insulation room. Its chief features of interest were the adjustment of speed by a conical friction contact and a foot brake, by means of which the winding of any given layer of turns could be instantly stopped in case the operator wished to shut off the work. A large number of solenoids for electric track switches were wound in this division of the armature department.

The company uses the Cheatham track switch and has improved its construction by removing the ordinary fiber head and replacing it with a ¼-in. threaded brass head with a ¼-in. fiber collar upon which the winding is carried. This is sealed inside and outside with solder and much trouble from moisture is thereby prevented. The coil is rewound in hardening paste and this paste is also put on the outside of the coil. The brass collar is made a little higher than the winding, with a fillet of paste at the corner. The reliability of the switch has been notably increased by this change.

A device which was used in the formation of insulating tubes shown in Fig. 9. The tube stock was made of fullerboard 10 mils thick, the length of the completed tube for grid service being about 10 in. and the diameter ¾ in. In operation the fullerboard was rolled in the machine, a wooden clamp being held on the top of the rolling material. Mica cloth 10

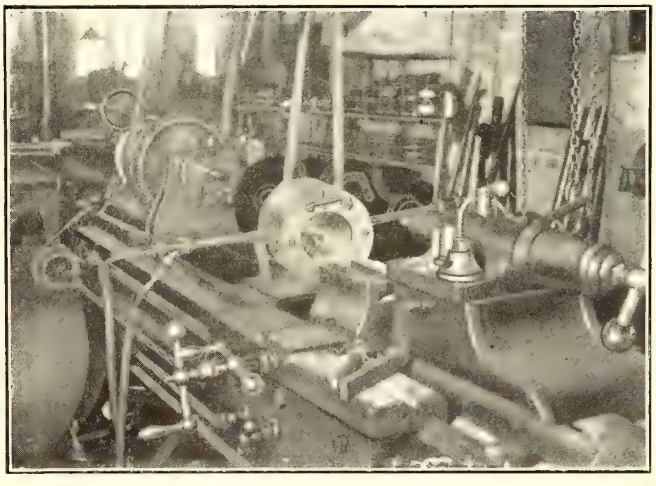


Fig. 13—Boston Elevated Shops—Shaft Straightener in Armature Department

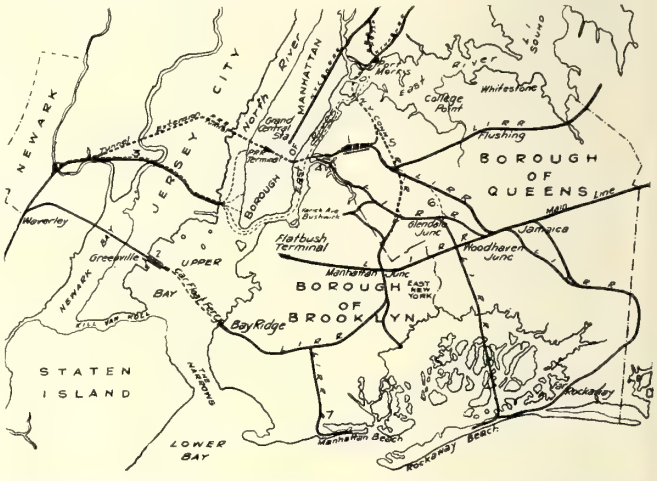
mils in thickness was put on for the last two turns and shellacked. The company made its own tubes in lots of 500 each. In this machine 300 tubes a day could be made, allowing half a minute per tube.

Another machine was also used in this division of the shops for forming insulation for use in various sized slots. This device consisted of a bar pressed down by a foot lever upon the insulating material according to the form beneath the bar. A spring restored the bar to the normal open position when not in use. The machine was designed to handle commutator slot insulation of any size up to a maximum length of 12½ in.

TERMINAL STATION OF THE PENNSYLVANIA RAILROAD IN NEW YORK CITY

The enormous Manhattan terminal station of the Pennsylvania Railroad is rapidly nearing completion, and by midsummer electric trains will be running through the tunnels under the North and East rivers. The new station will be used by all through and suburban trains of the Long Island Railroad which now run to Long Island City, and by through and suburban passenger trains of the Pennsylvania Railroad. An initial daily service of 600 Long Island Railroad trains in and out and 400 Pennsylvania trains has been planned.

The New York tunnel extension begins at Harrison, a short distance east of Newark, N. J. At this point through passenger trains from the South and West will change from steam

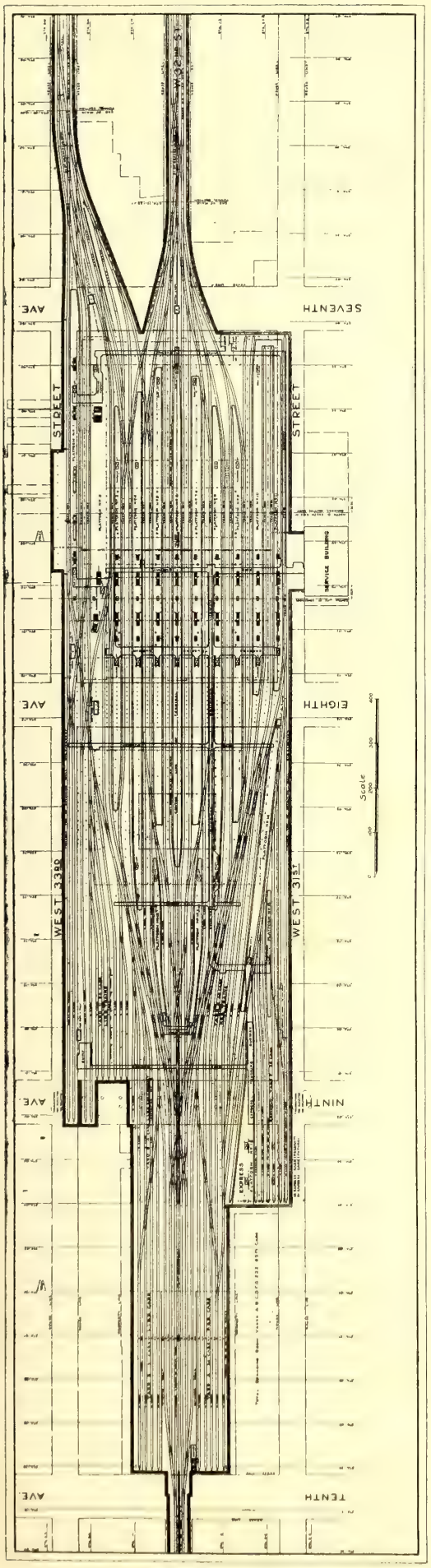


Pennsylvania Terminal—Map of Tunnels and Long Island Lines

locomotives to electric locomotives. Transfer platforms for passengers, a car yard and a locomotive yard for the steam and electric locomotives have been built here. From Harrison a double-track line on a high embankment extends across the Hackensack Meadows to the Bergen Hill portal of the tunnels which lead under the North River, into the terminal station.

When the two tracks emerge from the tubes under the North River at the entrance to the terminal station yards at Tenth Avenue they begin to spread out. From Ninth Avenue, and extending into the station, the number of tracks increases from 2 to 21. Leading out of the station yard to the east are four main line tracks, passing under Thirty-second and Thirty-third streets, and thence under the East River to the Sunnyside yard on Long Island. The crosstown tunnels end at the river shaft, situated in the block between Thirty-third and Thirty-fourth streets east of First Avenue. From this point four tubes extend under the East River to Long Island City and Sunnyside yard—the terminus of the tunnel extension.

Sunnyside yard has many unique features. Provision is made for running all trains around a loop, pulling them into the coach-cleaning yard at one end and departing from the other end, thus turning the entire train and avoiding the necessity for switching baggage cars and sleeping cars to opposite ends of the train and turning of combination cars separately. The arrangement of tracks on different levels permits crossover movements without grade crossings and eliminates interference with high-speed traffic. The yard is 5500 ft. long and 1550 ft. wide, embracing some 153 acres of land. It contains 73 miles of tracks which have a storage capacity of 1550 cars. There is additional space for extending the trackage of the yard to provide for more car standing room whenever it is required. From Sunnyside yard tracks lead to the New York Connecting Railroad, which will form a junction with the New York, New Haven & Hartford Railroad at Port Morris after crossing the East River by the steel-arch bridge to be built over Ward's and Randall's Islands.



Pennsylvania Terminal—Plan of Station at Track Level

TERMINAL STATION

The main entrance to the terminal station in New York City is from Seventh Avenue, between Thirty-first and Thirty-third streets. The station tracks are 40 ft. below the street surface, and the station is divided into three levels. The Seventh Avenue entrance is for foot passengers only. It leads to the main waiting room through an arcade 225 ft. long by 45 ft.



Pennsylvania Terminal—Interior of General Waiting Room

wide, flanked on both sides by shops and booths. At the farther end of the arcade are the restaurant, lunch rooms and café, and beyond is the general waiting room and concourse.

On the first level below the street is the general waiting room, 277 ft. by 103 ft. Along the walls are located the ticket offices and baggage-checking windows, all so arranged that a passenger may proceed from one to the other. Adjoining the



Pennsylvania Terminal—Corner of Loggia

general waiting room on the west are two smaller waiting rooms, 58 ft. by 100 ft., for men and women. The main baggage room, 450 ft. long, is on the same level with the general waiting room. It covers the full area occupied by the arcade and restaurants on the floor above. Baggage is delivered and taken away through a special subway. From the baggage room trunks are delivered to the tracks below by motor trucks.

Parallel to and connecting with the main waiting room by a wide thoroughfare is the concourse, a covered assembling place over 200 ft. wide, extending the entire width of the station and under the adjoining streets. Stairs descend from the concourse to each of the train platforms on the track level. The concourse and adjacent areas are open to the tracks, forming a courtyard 340 ft. long by 210 ft. wide, roofed by a lofty train shed of iron and glass. In addition to the entrances to the concourse from the waiting room there are also direct approaches from the streets.



Pennsylvania Terminal—General View of Concourse and Train Platforms

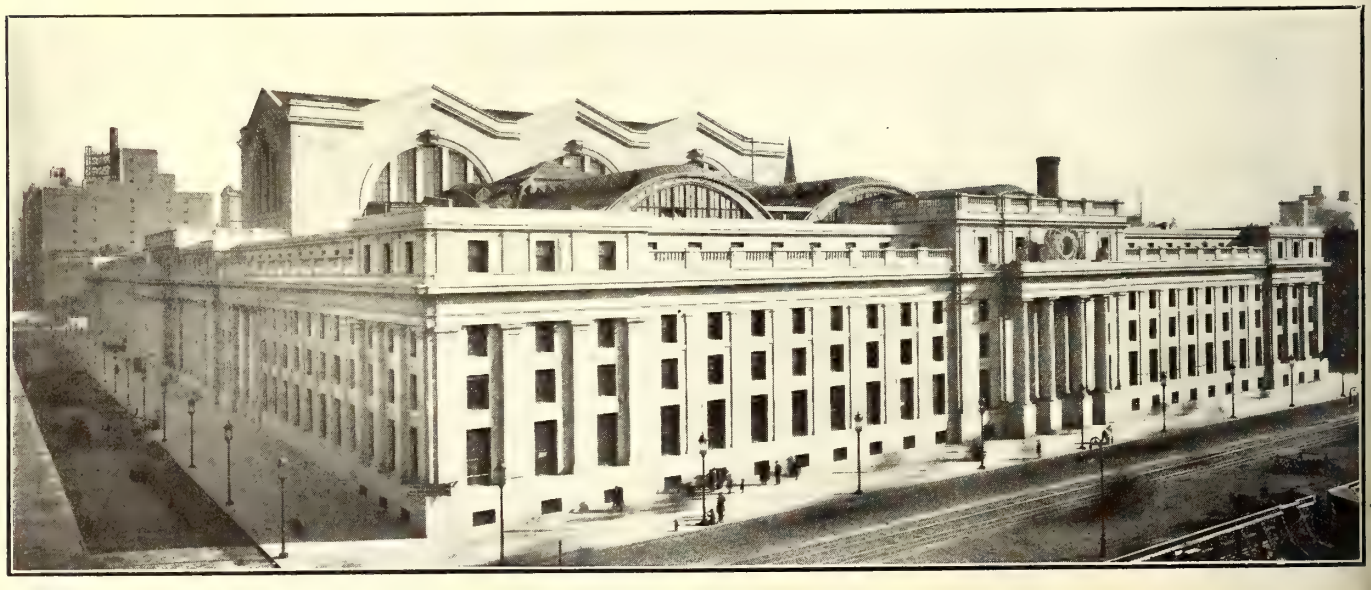
In addition to the main concourse, and located between it and the tracks, is a sub-concourse, 60 ft .wide, which will be used for exit purposes only. This exit concourse is 18 ft. above the tracks, but is connected with each of the track platforms by two stairways and one elevator. From it ample staircases and inclines lead directly to the street.

The north side of the station, extending along Thirty-third Street, has been assigned to the Long Island Railroad. Into this part of the station trains will run from all points on Long Island by way of the East River tunnels. Ample entrances and exits are provided so that this traffic can be handled independently.

The stone work of the station, enclosing about 8 acres of ground, was completed on July 31, 1909. Built after the Roman Doric style of architecture, the building covers the entire area bounded by Seventh and Eighth avenues and Thirty-first and Thirty-third streets. The length of the building is 788 ft. 9 in. and the width 430 ft. 6 in. along the Seventh Avenue facade. The plan of the station was designed to give the greatest number of lines of circulation. The structure is really a monumental bridge over the tracks, with entrances to the streets on the main axes and on all four sides. In this respect the building is unique among the railway stations of the world, affording the maximum entrance and exit facilities.

The Seventh Avenue facade is composed principally of a Roman Doric colonnade. Above the central entrance is an entablature surmounted by a clock with a dial 7 ft. in diameter. This facade of the building was conceived especially to express a monumental gateway. Entrances are formed through each of the two corners of the station on Seventh Avenue for carriage drives; each is about 63 ft. wide.

Midway along the sides of the building are the entrances on Thirty-first and Thirty-third streets, which are flanked by series of columns of the same dimensions as those on the Seventh and Eighth Avenue facade. Above these colonnades are also sculptured groups supporting large ornamental clocks. The Eighth Avenue frontage is finished with pilasters, except at the spacious entrance to the main floor of the concourse from this side of the building. The accompanying engravings, from recent photographs of the station, give a good idea of the magnitude of the building and its dignified architectural treatment.

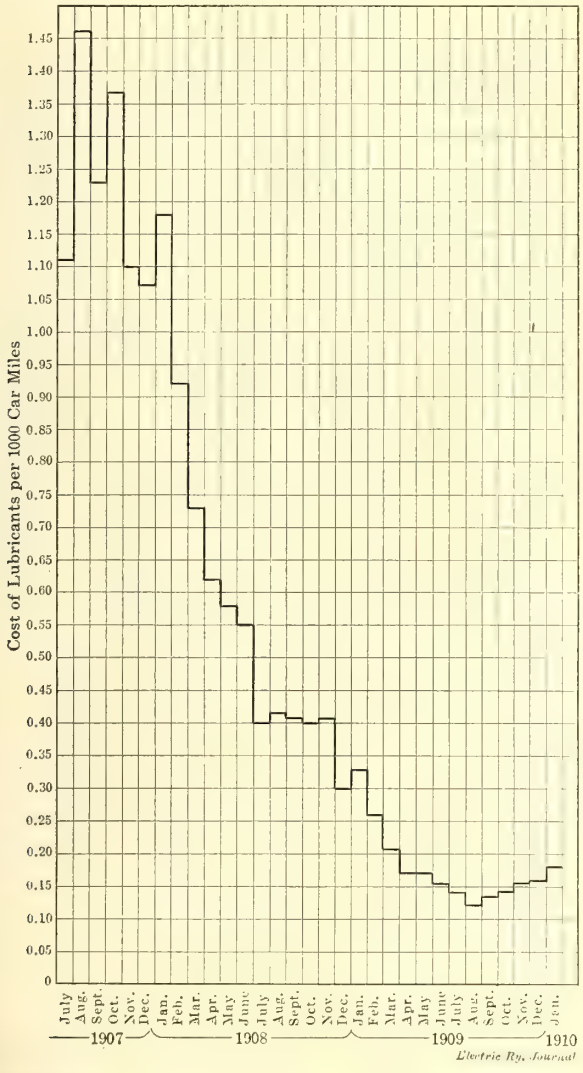


Pennsylvania Terminal—Eighth Avenue Façade

The Western Railway of France is preparing plans for the electrification of its lines between Saint-Germain and Argenteuil at a cost of $12,000,000. It is planned to begin work this year and complete the change by 1914.

IMPROVEMENTS IN THE DEPARTMENT OF ROLLING STOCK AND SHOPS OF THE METROPOLITAN STREET RAILWAY

A description was published last week of the organization of the department of rolling stock and shops of the Metropolitan Street Railway and of the work done in rehabilitating the cars and shops. As stated in that issue, before these improvements were begun, a careful study was instituted of the possibilities of economical maintenance, with the purpose of



Metropolitan Rolling Stock and Shops—Cost of Car Lubrication by Months

establishing standards in this department which could be followed consistently in the future rehabilitation of the system. The program included, besides the broad principles outlined last week, a great many detailed improvements which it is the purpose of this article to describe.

LUBRICATION

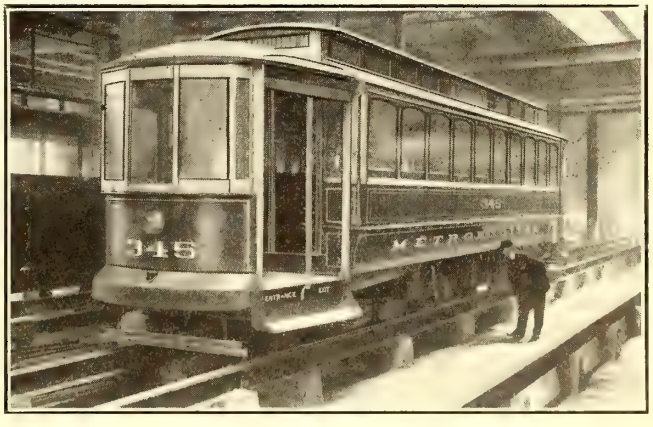
At the time of the appointment of the receivers practically all of the truck and motor bearings on the cars of the Metropolitan Street Railway Company were lubricated with grease. The cost of lubrication was high and the results poor. On Oct. 1, 1907, the work of changing over to oil lubrication was begun. The oil now is used with wool waste as a truck journal-box packing, and in the older types of motors it is placed in oil cups, which regulate the feed of the oil to the bearing. In the modern type of motors, the oil is used with wool waste and so arranged that it comes directly in contact with the bearing surface.

Careful record has been kept of the cost of motor and truck lubrication per 1000 car-miles that has been attained by this system and the results are striking. As shown on the accompanying diagram the cost has been reduced from $1.46 per 1000 car-miles to that of 18.19 cents in January, 1910. The figures for August, 1909, show the minimum cost of 12.38 cents per 1000 car-miles.

Every precaution is taken to prevent the waste of oil, and in this connection a number of improved oil-storage facilities have been installed. The general arrangement followed is that a tank is buried in the ground or stored in a fireproof vault, and is connected by a system of piping to an oil pump placed in a fireproof oil-room. It is possible with these pumps to draw a small or large quantity of oil as may be required. Explicit instructions are also issued from time to time according to changes in the season or local conditions as to the amount and kind of oil to use for different purposes. The accompanying bulletin is a typical one.

To All Car House Foremen:
It is imperative that all bearings shall be inspected and lubricated according to the following instructions.

Type		Date of Inspection	
		ARMATURE BEARINGS	
GE	57	Inspect even numbered cars on even dates. Inspect odd numbered cars on odd dates.	Keep oil cups filled to within ¾ in. of top of cup.
GE	1000	Same as GE 57.	Keep oil cups filled to within ½ in. of top of cup.
GE	210	Inspect on regular 700-mile inspection.	Oil in well not to gage less than 2½ in. or more than 3½ in.
GE	80	Inspect on regular 700-mile inspection.	Keep waste saturated with oil.
WH	310	Inspect on regular 700-mile inspection.	Oil in well not to gage less than 2½ in. or more than 3½ in.
		AXLE BEARINGS	
GE	57	Inspect on regular 700-mile inspection.	Keep waste in oil cup saturated.
GE	1000	Inspect on regular 700-mile inspection.	Keep waste in oil cup saturated.
GE	210	Inspect on regular 700-mile inspection.	Lubricate on 5000-mile basis.
GE	80	On every 700-mile inspection waste must be pressed up to the axle, and more saturated waste added if necessary.	On each 5000-mile inspection take saturated waste out of axle cap. Tease the waste, then repack the cup and lubricate if necessary.
WH	310	Inspect on regular 700-mile inspection.	Lubricate on 5000-mile basis, remove waste every 3 months and after teasing same repack the cup.



Metropolitan Rolling Stock and Shops—Depressed Aisle in Car House

GEARS JOURNALS	
Gears—Inspect on regular 700-mile inspection.	Lubricate on 5000-mile basis.
Journals—Inspect and lubricate on 5000-mile basis.	
PLOW BARS, BRAKE RIGGING AND SIDE BEARINGS	
Plow bars—Clean and lubricate on 700-mile inspection.	Clean and lubricate nightly during wet weather.
Brakes—Clean and lubricate on 700-mile inspection.	
Side bearings—Clean and lubricate every 30 days (jack up car).	

Another method used to attain economy was to create a friendly rivalry among the groups of men who did the actual lubrication, to see who could make the best records. This contest was kept up by furnishing the men, month by month, with statements showing the amounts used and so arranged as to give a comparison between different car houses, also between the Northern and Southern districts. This assisted greatly in reducing the cost.

WHEEL GUARDS

A long chapter could be written upon the study which has been given this subject, but no attempt will be made here to print more than a brief outline. Platform fenders were abandoned in the summer of 1907 as unsuited to the conditions in New York, especially because of their liability to damage from vehicles. Experiments were then conducted with wheel guards, both automatic and non-automatic. The former were found most efficient and accordingly all cars have been equipped with devices of this character. The types most used are the Hudson & Bowring and the Parmenter 1909 model, but there are a few Sterling-Meekers. The company is also testing the Hipwood wheel guard.

BRAKE SHOES

Brake shoe design and wear constituted another question which was given very careful consideration. During the first part of 1909 a system of records was established by which the results of the wear of brake shoes of various types could be systematically compared. With this information it was possible to take up intelligently the plan of obtaining brake shoes on a mileage basis and a contract was entered into with the National Brake Shoe Company, Chicago, upon a mileage basis. The resulting cost has been considerably below any figure that the company had been able to reach in actual practice previous to the time of signing of the contract.

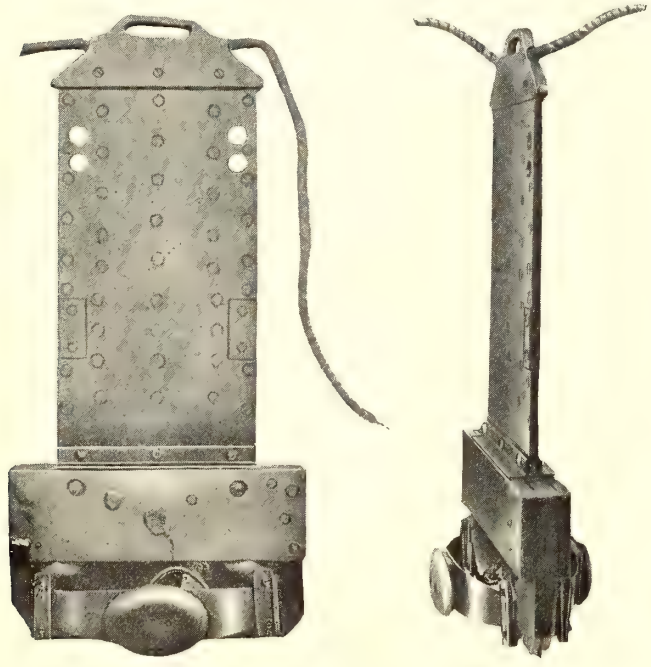
The brake shoe data, like that of other parts of the car equipment, are kept in such a manner that it is possible to compare the results of one car house against another, or of one district against another, for each type of shoe. In this way a spirit of rivalry has been created by which better results have been secured

CONTACT PLOWS

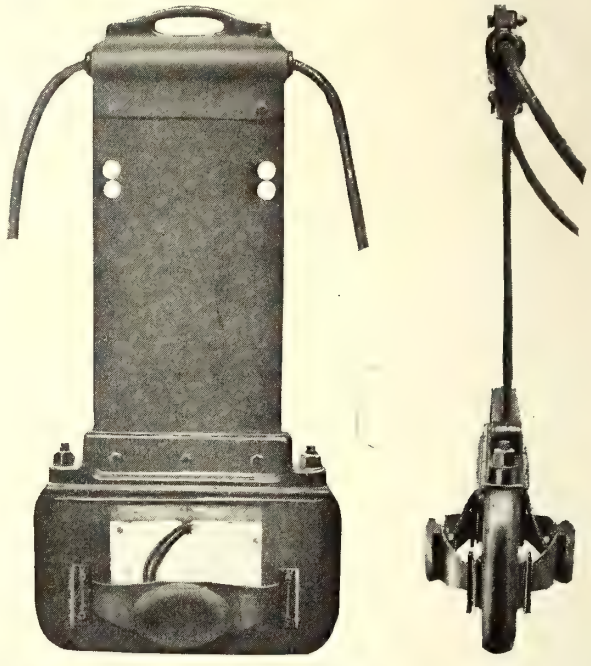
In perhaps no part of the work of the department of rolling stock and shops has greater improvement been made than in that of contact plows. This substitute in New York for the overhead trolley has always been a source of trouble and expense. These can never be eliminated, but at least a betterment has been effected. Some of the changes have been along the line of reduction in initial cost, others have been in the way of improvements of mechanical and electrical features of the plow. One of these latter has been the substitution of a flat copper lead in place of the more expensive stranded lead formerly used.

Considerable difficulty was experienced with the old type of plow, because the wooden parts would dry out and open up, and this would permit moisture to work into the body of the plow. To eliminate this difficulty as far as possible, all the wooden parts are now thoroughly saturated with linseed oil before they are assembled, and after assembling they are completely coated with pitch. Another difficulty experienced was that a large number of surplus plows were accumulated during the summer for use during the bad weather in the winter. These plows, while standing in storage, would crack in the wooden portion. During the past winter a smaller surplus of plows has been maintained.

Another improvement was a new method of fastening the fuse wire. The old fuse wire was attached to the back of the contact plate by means of a cap screw and flat washer. This type of fuse gave considerable trouble by breaking or becoming disconnected beneath the washer. With the new fuse the wire is soldered into a copper terminal at each end, this terminal being in turn fastened to the back of the contact plate and to the end of the plow lead, respectively. The results obtained from this new type of fuse have been vastly superior to those obtained with the old lead.



Metropolitan Rolling Stock and Shops—Side and End View of Old Plow



Metropolitan Rolling Stock and Shops—Side and End View of New Plow

RUBBER CONTACT PLOWS

In 1908 a new plow was developed and 10 were tried out. Five were made with a body composed of a molded fiber compound and the other five with a body composed of rubber compound. The shape of the body of these new plows was quite different from that of the old plows, on account of the different nature of the material, and they were designed with a view of having a substantial structure and as large a creepage surface as possible in the limited space available.

Views of the old and new plows appear herewith. As will be seen the connections of the flexible lead from the shoe to the conductors in the bottom of the plow are substantially bolted together in a recess. This recess is filled with an insulating waterproof compound, and the whole body of the plow is thoroughly coated with at least four coats of good quality japan, thus making a thoroughly waterproof construction. The rubber apron shown weighs approximately 13 lb.; the head of the plow, which is of cast iron, weighs 10¼ lb.; the shank plates, which are of steel, weigh 17 lb. each, and the copper lead, which runs through the shank of the plow, about ½ lb. This makes the total weight of the plow approximately 60 lb.

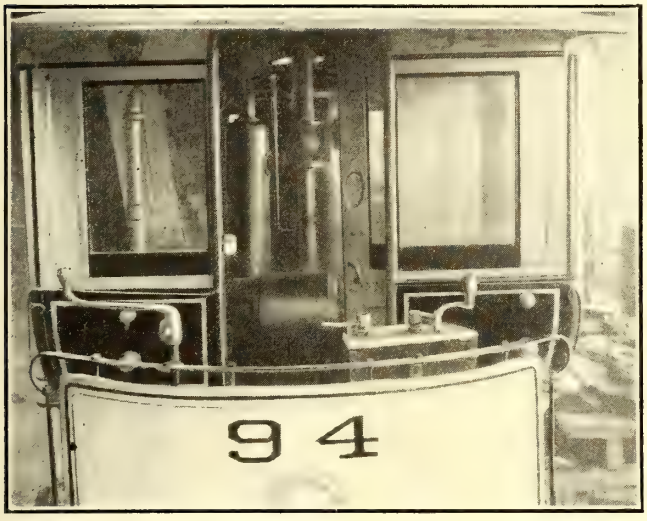
Experiments are now under way in the use of the rubber plow, and a lot of 500 have been ordered and are being put into service at the present time. The expense of a plow of this character is somewhat more than that of a wooden plow, but

the management anticipates that much better results will be attained.

NEW MACHINERY

Concurrently with the introduction of these various improvements the management, as described, has steadily pursued a policy of centralizing the shop work, so far as practicable, and of modernizing its shops. During this work considerable new machinery has been purchased and installed. Much of it has paid for itself in a short time because of the economies which it has made possible. A list of some of the larger machine tools added to the equipment follows:

At the car house at Fiftieth Street and Sixth Avenue a 15 ton pneumatic crane has been installed. This crane serves



Metropolitan Rolling Stock and Shops—End View of Vacuum Cleaner Car

the two west northerly tracks on the Fifty-first Street side of the building.

The following machines have been added to the carpenter shop mill since the receivership:

1 10-in. four-sided moulder.
1 variety moulder or shaping machine.
1 jig saw.
1 swing cut-off saw.
1 chain mortising machine.
1 36-in. triple drum sand-papering machine.

At the present time an exhaust system is being installed for the removal of shavings and sawdust from the various machines.

In the machine shops the following equipment has been added:

1 No. 1½ Acme bolt cutter.
1 turret bolt cutter, Niles-Bement-Pond.
1 shaper, 24-in. stroke, Niles-Bement-Pond.
2 14-in. emery grinders, Norton Company.
2 No. 4 shop saws, Quincy-Manchester-Sargent.
1 cold saw for pipe cutting, Columbia Machine Works.
1 shaper, 14-in. stroke, Niles-Bement-Pond.
1 22-in. x 26-in. drill press, Hooper Manufacturing Company.
1 20-in. x 22-in. drill press, Hooper Manufacturing Company.
1 22-in. x 30-in. drill press, Aurora Tool Company.
6 cranes and trolleys, Quincy-Manchester-Sargent.
6 16-in. air hoists, Quincy-Manchester-Sargent.
6 10-in. air hoists, Quincy-Manchester-Sargent.
1 crane, 10,000 lb., Quincy-Manchester-Sargent.
12 10-in. air jacks, Quincy-Manchester-Sargent.
1 24-in. x 96-in. lathe, Niles Machine Company.
1 26-in. x 36-in. drill press, Aurora Tool Company.
1 24-in. x 32-in. drill press, Curner Tool Company.
1 24-in. x 28-in. drill press, Aurora Tool Company.
1 shaper, 16-in. stroke, Stockbridge Machine Company.
1 large wheel lathe for the turning of rolled steel wheels, installed at Fiftieth Street.

In the blacksmith shop 12 forges were installed and arranged with hoods connected to the stack in the boiler-room. An oil furnace with blower, a new 200-lb. Bradley strap hammer, a large No. 2 Hillis & Jones combination shear and punch and a case-hardening furnace and file sharpener have also been installed.

A compressed-air system with Stillwell-Bierce-Smith-Vaile Company compressor and piping carried throughout the building has been added to the Fiftieth Street shops. This compressor supplies air for the air hoists and air-operated tools.

A 30-ton Fairbanks track scale has been installed at the Ninth Avenue and Fifty-fourth Street car house, partly so that the company can keep careful check on the weight of the various parts of the equipment and rolling stock and partly for the weighing of heavy material and scrap.

At the 146th Street and Lenox Avenue armature-room a complete impregnating plant was installed about June 1, 1909. A commutator slotter has also been put in service.

SAND-BLAST MACHINE

Another machine at the Fifty-third Street shops not often owned by an electric railway company is a sand-blast machine. This was installed because the amount of sand-blast glass used in the car is large and it was found cheaper to purchase the clear glass and "grind" it. Consequently, a sand-blast outfit was built in a small room on the fourth floor of the Sixth Avenue and Fiftieth Street building which takes care of all the work of this character. It is also possible with this machine to manufacture all of the chipped glass which is required in the ventilators of a large number of the company's cars.

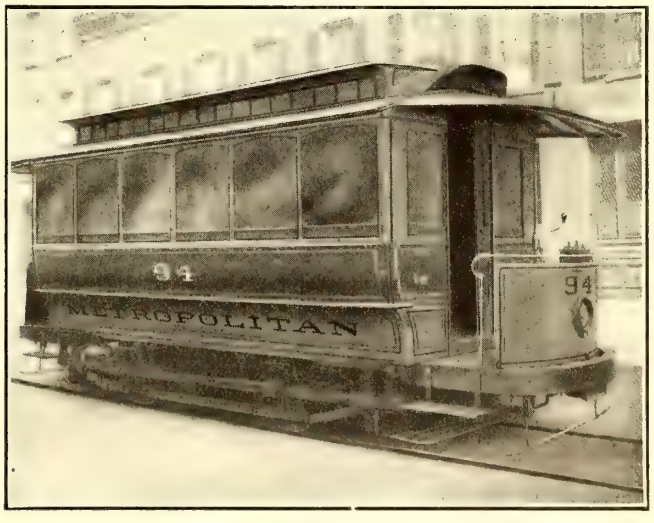
VACUUM-CLEANING CAR

A novel car is one devoted to vacuum cleaning, principally used in connection with the carpets employed on the seats of a large number of the cars on the system. This car contains a vacuum-cleaning machine, complete with motor. The headquarters of this car are at the main repair shop, but it is sent to the various car houses at regular intervals.

TEST CAR

Another special car is No. 1205, which carries a Herrick testing set. This set was purchased in February, 1909, and is employed for testing the old and new car equipments and, being mounted in a car with other testing apparatus, can easily be taken from depot to depot. The usual electrical tests of circuits, controllers, motors, armatures, fields and resistances, etc., can be made with it.

Since this car has been in service it has thoroughly tested 2300 cars. As the testing force is becoming more expert in



Metropolitan Rolling Stock and Shops—Side View of Vacuum Cleaner Car

the use of this set the prospects are that during the next 12 months a larger number of cars will be inspected than has been the case during the past 12 months.

Last winter the test car was found very serviceable in testing the electrical equipments of snow sweepers. This is done immediately after each snow storm in which the sweepers have been used.

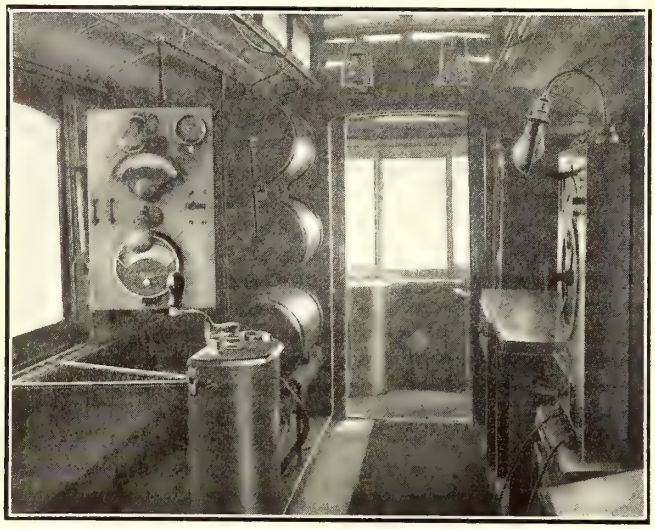
BRAKING TESTS

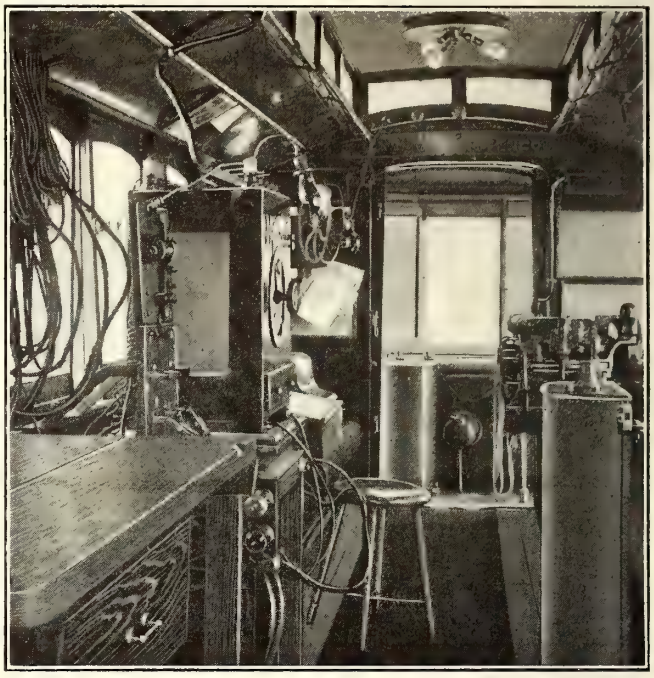
In connection with braking tests and for the requirements of the transportation department a car has been equipped with a speedometer. The instrument is located in the center of the car on one of the posts, so that it can be conveniently ob-

served, and shows the speed in miles per hour. The transportation department uses this car to show motormen the speeds at which they run and by measuring the distance, the lengths in which stops can be made when running at various speeds.

EDUCATIONAL WORK

Monthly meetings of the car-house foremen have been inaugurated, at which not only the routine subjects of maintenance are discussed, but topics of general interest are brought up for consideration. To enable the various foremen to see something beyond their own immediate work visits have been arranged of the foremen of one car house to the other car houses and shops of the system. It was found that some of these





Metropolitan Rolling Stock and Shops—Interior Views of Test Car

men were ignorant of the work that was being done at other portions of the system, and excellent results were obtained from these visits. It is also proposed to have the various foremen of both the car houses and shops visit the systems of the railways in the territory immediately adjacent to New York.

Meetings have also been held of the shop men at which addresses upon technical subjects have been presented. Regulations for their guidance have also been issued in book form and a copy given to each employee. These rules are 34 in number. A few of them are reproduced below to give an idea of their character and scope.

RULES

"The foreman of each shop or car house will be held responsible for the condition of the same, and the machinery and tools in his charge.

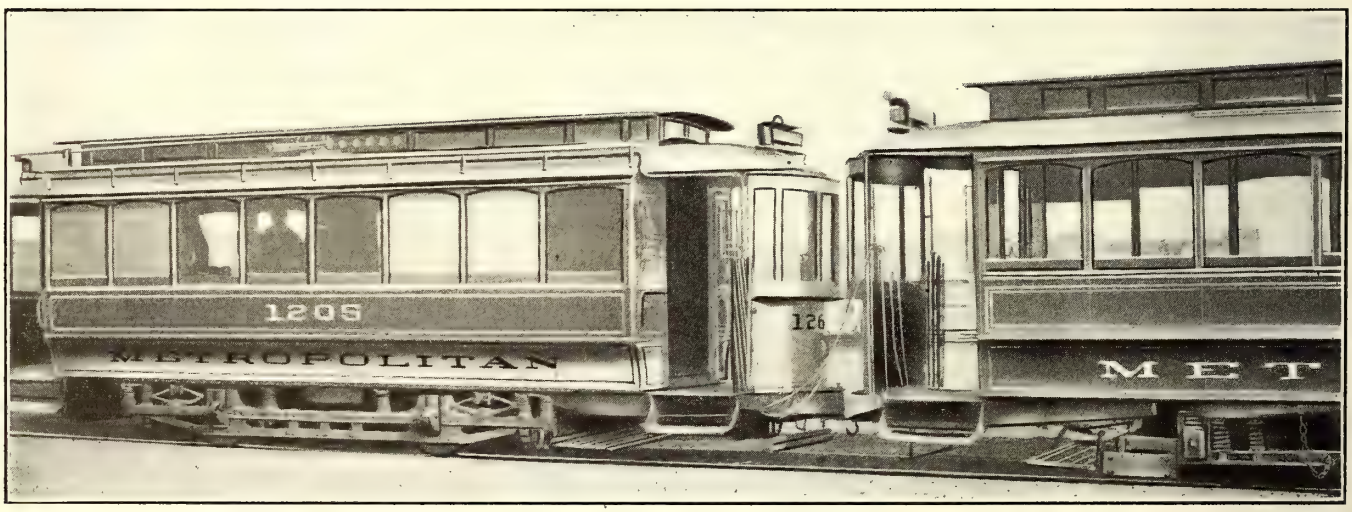
"It is imperative that the shops, car houses and pits be kept clean. Oily waste, rubbish and other inflammable waste material must be kept in covered steel cans provided for the purpose. Overalls must be kept in lockers when not in use. Spilled oil must not be allowed to remain on the floors or in the pits.

"Cars shall be moved only by authorized persons; and before any car is moved, careful examination will be made to see that no one is working around, beneath or above such car.

"Cars shall be run only from the platform nearest the point to which the car is to be moved; or, if this is impracticable, the car, or cars, shall not be moved until a man has been stationed as a guard on the forward platform; and before starting a signal shall be given both by the conductor's bell and platform gong.

"After a car has been moved the controller and reverse handles must be removed, the hood switches and circuit-breakers thrown off.

"Workmen are cautioned not to commence work around, inside, beneath or above any car before ascertaining that the circuit-breakers have been thrown 'off,' that the plow is clear of the channel rail, and the car is 'dead'; that warning signs provided for the purpose have been hung conspicuously on each dash.



Metropolitan Rolling Stock and Shops—Test Car Coupled to Regular Passenger Car

"Warning signs may not be removed except by the workman who placed them in position, and must be removed by him immediately the work upon the car has been completed.

"Transfer tables shall be operated only by authorized persons, and the same precautions observed in the starting and running of them as in the moving of cars."

ACCOUNTS

It has been difficult to obtain comparative figures as to the cost of maintenance of rolling stock as applied to the various periods, because of the fluctuation in the amount of work which has been performed during the last two years. Records have been kept, however, from Jan. 1, 1908, indicating the cost of maintenance of rolling stock, per car-mile, by months.

JOB NUMBERS

On Jan. 1, 1909, a system of job numbers was started for the purpose of compiling figures to indicate the amount of money expended in labor and in material for the maintenance of car bodies, wheels, brake shoes, trucks, wheel guards, electrical equipment and other miscellaneous items. Under each of these main headings are subdivisions, such as, in the case of car bodies, painting, registers and fixtures, destination signs, sand boxes, heaters, etc., etc. When a sufficient time has elapsed for the purposes of comparison, it is expected that these figures will be of great value as indicating the cost of maintenance per car-mile or ton-mile, or, in the case of motors, per motor-mile. At the same time they will give a fair indication of the relative merit of similar devices supplied by different contractors, as viewed from the standpoint of maintenance, and be of great value in purchasing new equipment.

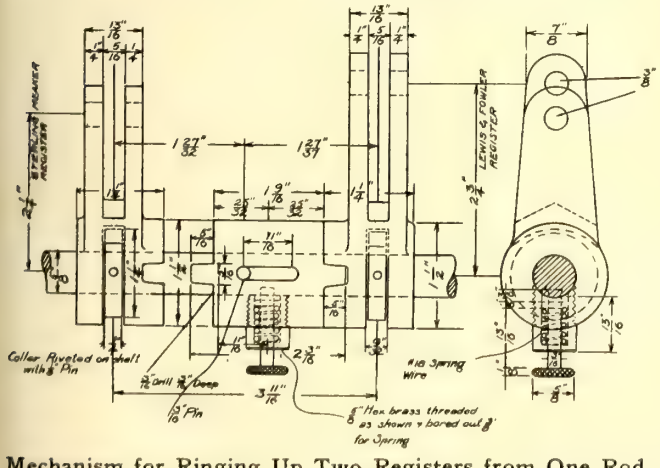
The work of the department of rolling stock and shops may be briefly epitomized by the statement that during the first six months of 1908 the number of cars removed from service because of defects developed in operation was more than four times as great as the number of cars removed for similar causes during the six months ended Dec. 31, 1909.

OTHER ARTICLES

In an early issue of this paper particulars will be given of improvements made in other departments of the Metropolitan Street Railway Company.

RINGING UP TWO REGISTERS FROM ONE ROD

Owing to a peculiar condition in connection with its Lakeside line, the Virginia Railway & Power Company, Richmond, Va., is obliged to use two distinct fare registers. One of these registers records all fares received up to a given point after which the conductor rings up his collections on the other register. As it was desirable to operate both registers from a single



Mechanism for Ringing Up Two Registers from One Rod

center rod and to have both machines at the same end, the mechanical department devised the clutch and lever arrangement shown in the accompanying drawing. The clutch has a radial lug on each end to fit into a corresponding slot in the lever casting on either side. By pulling down its spring latch, the clutch can be pushed along the rod and locked into the lever connections of the machine which is to register the fares.

ISSUE OF SECURITIES TO PROVIDE WORKING CAPITAL IN MASSACHUSETTS

One of the acts passed by the Massachusetts General Court of 1909 provided for the issue of stock by street railway companies to raise working capital, under the supervision of the Board of Railroad Commissioners. The object of this act, Chapter 485, Acts of 1909, was to enable operating companies of varied resources to raise ready money without the necessity of constant borrowing upon notes, and, in the case of companies of limited resources, to overcome conditions which in the past have sometimes led to receiverships. Under the laws of Massachusetts street railway companies are forbidden to issue bonds in excess of their total outstanding capital stock. The previous absence of a specific provision for the issue of working capital was often a serious inconvenience.

The act of 1909 provided that in addition to the purpose for which a street railway company may increase its capital stock or issue bonds under previous legislation, a company of this character to supply working capital may increase its capital stock to an amount not exceeding 5 per cent of the par value of its capital stock then outstanding or may issue bonds, secured by mortgage or otherwise, to an amount beyond the amount fixed and limited by its agreement of association, or by the provisions of any general or special law, and not more than the Board of Railroad Commissioners shall determine will be properly required for such purpose, and as said board shall approve as being consistent with the interest of the public and of the stockholders of such company and as not unreasonably reducing the security of any bond previously issued.

Under this act three companies have asked the commission for authority to issue stock for use as working capital: the Boston & Northern Street Railway, the Old Colony Street Railway and the Boston & Worcester Street Railway. Orders granting the issues have been made by the Board of Railroad Commissioners in all of these cases.

Table I gives the total and average amount of working capital the Boston & Northern and Old Colony companies required during the fiscal years 1904 to 1908, inclusive, covering the items of cash, prepaid interest, insurance, etc., and materials and supplies.

TABLE I.

Boston & Northern Street Railway.

Approximate Average for Year.

Sept. 30.	Cash.	Prepaid interest, insurance, etc.	Materials and supplies.	Average working capital for year.
1904.....	$275,855	$51,884	$525,375	$853,114
1905.....	250,045	46,783	384,168	680,996
1906.....	302,590	82,072	400,254	784,916
1907.....	276,796	96,010	489,836	862,642
1908.....	242,865	84,026	451,006	777,897
Old Colony Street Railway.				
1904.....	$217,766	$38,392	$268,814	$524,972
1905.....	219,067	39,745	240,320	499,132
1906.....	314,342	63,325	267,683	646,351
1907.....	201,432	76,428	303,230	581,190
1908.....	187,448	59,595	261,485	508,528

Comparatively little similarity is found among the figures for the same seasons of the different years. Table II shows the mileage of each company, the amount of securities outstanding, and the earnings for each of the five years named.

TABLE II.

	Boston & Northern			Old Colony		
	Miles main track operated.	Total securities.	Gross income.	Miles main track operated.	Total securities.	Earnings.
1904...	471	$19,092,500	$3,766,413	350	$12,479,600	$2,417,829
1905...	474	20,019,500	3,961,954	352	13,743,400	2,509,611
1906...	513	21,301,700	4,426,107	352	15,023,800	2,795,480
1907...	513	21,375,700	4,670,306	352	15,213,700	2,906,663
1908...	512	21,358,700	4,662,562	353	15,209,200	2,935,599

The companies have done nothing so far in regard to the issue of this stock, but are waiting until they have use for the money. The order of the board approving the issue of stock for these companies designated it as "an issue of stock properly required for the purpose of supplying itself with working capital under the provisions of chapter 485 of the acts of the year 1909." The board authorized the issue at a price of 115 of 6 per cent cumulative preferred stock as follows: Boston & Northern, 5883 shares; Old Colony, 4042 shares.

Detailed figures for the different items comprising the working capital required by the Boston & Northern Street Railway

in the months of the fiscal years 1904-08, inclusive, are shown in Table III.

TABLE III.

Boston & Northern Street Railway.

Average Monthly Cash Balance.

Fiscal year ended Sept. 30.	1904.	1905.	1906.	1907.	1908.
October	$486,710	$456,862	$409,247	$418,894	$271,052
November	310,674	285,700	128,798	239,261	214,580
December	230,870	207,305	112,291	187,657	254,436
January	77,993	139,593	292,279	177,742	234,451
February	82,602	204,405	311,892	247,781	216,770
March	215,209	209,944	361,829	238,648	246,531
April	193,798	217,678	392,185	279,627	157,542
May	233,939	163,739	188,755	240,236	214,063
June	136,600	270,424	254,876	268,207	306,602
July	540,382	203,174	261,990	377,126	287,659
August	359,406	304,659	451,483	295,901	318,267
September	442,082	337,063	465,461	350,479	192,434
Totals	$3,310,265	$3,000,547	$3,631,086	$3,321,559	$2,914,387
Average monthly balance	275,855	250,045	302,590	276,796	242,865

Prepaid Interest, Insurance, etc.

Fiscal year ended Sept. 30.	1904.	1905.	1906.	1907.	1908.
October	$100,439	$98,731	$112,059	$89,953	$112,391
November	65,645	69,495	104,984	75,500	101,217
December	34,463	36,107	88,757	108,093	92,355
January	69,706	64,866	85,931	104,785	99,504
February	60,726	46,188	81,560	112,227	91,118
March	40,978	27,005	76,388	107,545	83,585
April	65,513	56,363	72,498	103,985	76,246
May	43,446	36,743	69,877	98,304	69,947
June	22,630	16,596	66,366	93,343	63,762
July	46,002	44,686	64,002	89,507	61,836
August	27,529	25,630	63,454	85,173	58,318
September	45,531	38,997	98,993	83,706	98,039
Totals	$622,608	$561,407	$984,869	$1,152,121	$1,008,318
Average monthly balance	51,884	46,783	82,072	96,010	84,026

Materials and Supplies.

Fiscal year ended Sept. 30.	1904.	1905.	1906.	1907.	1908.
October	$608,045	$373,599	$306,848	$413,666	$526,764
November	601,403	380,063	326,718	402,563	481,143
December	596,342	400,929	322,623	433,450	492,591
January	569,528	404,549	328,874	445,952	481,688
February	544,904	399,045	363,304	457,092	466,451
March	538,352	393,213	397,623	490,655	467,638
April	514,401	371,774	431,528	522,265	449,897
May	506,959	385,832	515,880	579,028	430,577
June	511,012	395,233	495,644	555,959	429,607
July	482,220	427,890	462,231	544,694	407,742
August	437,405	368,407	427,270	519,374	394,861
September	393,934	309,486	424,509	513,340	383,121
Totals	$6,304,505	$4,610,020	$4,803,052	$5,878,038	$5,412,080
Average monthly balance	$525,375	$384,168	$400,254	$489,836	$451,006

The commission authorized the Boston & Worcester Street Railway to issue 3470 additional shares at $100 a share for the following purposes: To pay floating debt, 1580 shares; to pay land damage, 370 shares; for permanent additions, 1400 shares; for working capital, 1020 shares. The company filed with the board a statement, shown in Table IV, of its average working capital requirements for the two years ending Oct. 31, 1909.

TABLE IV.

Boston & Worcester Working Capital.

Cash on hand	$62,137.07
Bills receivable	28,376.66
Prepaid interest and insurance	20,632.76
Materials and supplies	80,109.50
Total	$191,255.99

	1908.	1907.	1906.
Mileage	80	76.5	75.3
Capital stock	$2,025,000	$1,725,000	$1,725,000
Funded debt	2,016,000	1,716,000	1,717,000
Totals	$4,041,000	$3,441,000	$3,442,000
Gross income	$546,886	$523,642	$507,261

The income, mileage and securities of the Boston & Worcester for the three years ending Sept. 30, 1908, are shown in Table V.

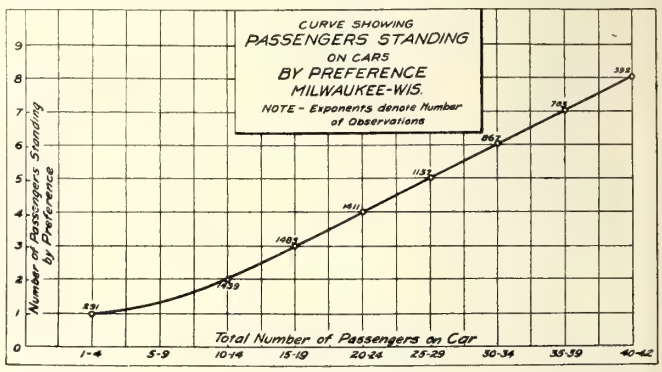
TABLE V.

Boston & Worcester.

A simple scheme which has been found useful by the Indianapolis, Crawfordsville & Western Traction Company is to paint the car number on the baggage compartment partition directly over the telephone instrument which is mounted thereon. The members of the crew write their orders on a shelf which is below the transmitter and so find it convenient to have the car number directly in sight.

REPORT ON MILWAUKEE TRAFFIC

The preliminary report of the Wisconsin Railroad Commission, just issued, contains among other matters a report of an investigation into the traffic conditions on the Milwaukee street railway system, conducted between October, 1908, and January, 1909, under direction of Prof. W. D. Pence, the commission's engineer, and R. W. Harris, field electrical inspector, assisted by other members of the staff and by suggestions of George Weston, consulting engineer of Chicago. The time required in field and office in making and compiling these observations was 560 working days, equivalent to a force of five men working constantly for a period of 4½ months. The report was directed principally to an investigation of the service given



by the company, the service required by the public and the necessary reroutings of various lines to avoid congestion in the downtown districts. After preliminary observations of the traffic as a whole it was decided to confine the observations to the periods of maximum travel, which were from 6 a. m. to 9 a. m., 11 a. m. to 2 p. m. and 5 p. m. to 8 p. m.

PASSENGER STANDING FROM PREFERENCE

The report states that "from a total of 9000 cars observed it was noticed that quite a number of the people riding preferred to stand even when seats were available, and this tendency seemed to follow a fixed law. In fact, observations showed that in 1499 cars an average of two people stood by preference when only 10 to 14 people were on the car. In 1483 cars observed, three people stood when there were only 15 to 19 passengers. In 1411 cars observed, four people stood out of 20 to 24 riding. Five were observed to stand in 1137 cases where there were from 25 to 29 people on the car. Six stood in 867 cases when the car contained 30 to 34 people. An average of seven remained standing in 703 cars observed which contained from 30 to 39 people, and finally in 392 cases, in which there were from 40 to 42 passengers on the car, eight of these stood by preference. Therefore, for a car having a seating capacity of 42 people (the size of the street car in general use in Milwaukee) a 'comfortable load' was taken as 50 passengers, on the assumption that if eight people preferred to stand, even if seats were provided for them, it was therefore unnecessary to provide seats for these eight people. A car which afforded seats for 42 people could then be called upon to carry a load of 50 people 'comfortably' under these conditions. A number of reasons might be suggested as explaining this preference of a number of passengers to stand rather than to sit down in available seats. The passengers may wish to stand on the rear platform and smoke, they may prefer to stand on the front platform for observation, or they may have been sitting down all day and prefer to stand for that reason, or, having only a short distance to ride, they may not care to go to even the slight trouble of searching for one of a number of available seats. In fact, there is a wide variety of reasons why a number of the passengers should prefer to stand rather than avail themselves of seats, and this tendency, as shown above, seems to obey a general law which is graphically illustrated in the accompanying diagram."

REROUTING

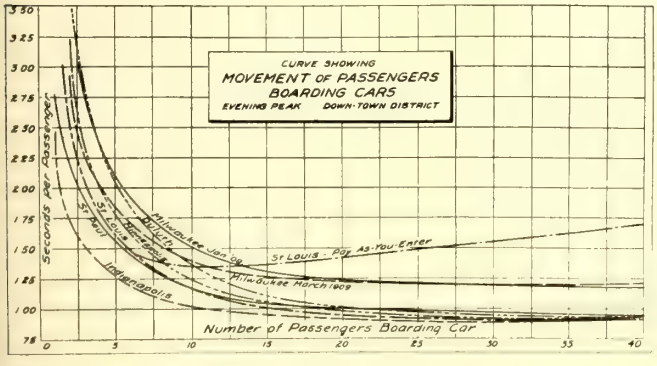
The engineers then compiled a series of "car demand curves" showing the average loading of cars on different points of the

different routes during the periods of maximum traffic. An attempt was then made to determine the amount of traffic between different districts in the city by means of these curves and also by going over a complete set of transfers for an entire day to establish the origin and destination of the majority of the passengers on each line. The study proved that there was considerable through traffic between the western and northwestern and the southwestern part of the city. This traffic was being taken through the city, but the company had requested permission to construct tracks over the Sixteenth Street viaduct connecting these sections of the city. If this should be done considerable congestion in the center of the city and time to the passengers traveling between these points would be saved and the report contains a recommendation that a grant of this kind be made.

TIME IN BOARDING AND ALIGHTING

Another point covered in the investigation was the time required by passengers in alighting from and boarding cars. It was noted that passengers in Milwaukee were slow in alighting from and boarding cars as compared with the average passenger in other cities. From observations made in St. Louis, St. Paul, Minneapolis, Duluth and Indianapolis, as well as Milwaukee, it was determined that during the evening peak in the downtown districts of these cities it required an average of 1½ seconds per passenger in Milwaukee to board a car when 10 passengers were getting on. This contrasted with 1.37 seconds in Duluth and St. Louis (pay-as-you-enter), 1.25 seconds in Minneapolis, 1.20 seconds in St. Louis and St. Paul, and 1.02 seconds in Indianapolis. When five people boarded a car, the average in Milwaukee was also longer than that of any other city. At Indianapolis five people would board a car in an average of 1.25 seconds per passenger, while at Milwaukee 2.12 seconds were required. Even when 15 passengers were boarding a car there was considerable difference in the time required by the average passenger between Milwaukee and the other cities investigated. The commission found that the best time made at Milwaukee was approximately 1.20 seconds per passenger, no matter how large the crowd, while the other cities attained an average of approximately 0.8 seconds per passenger when from 15 to 20 people or more boarded the car. In a general way, this same feature was noted in the movement of passengers in leaving cars. The report contains a diagram, reproduced herewith, which illustrates graphically the relative promptness of passengers in boarding cars in the various cities mentioned.

The engineers of the commission believe that the time in



Milwaukee could be cut down by various ways, among which they mention the plan of marking definite stopping places in the city, by making service stops at both sides of important transfer points, by soliciting the co-operation of the public and endeavoring to train passengers to move on and off cars in a more systematic manner, etc.

CONCLUSIONS

The commission adds that since the report was submitted the city has granted the company the use of the Sixteenth Street viaduct as recommended in the report, and that the company has received additional franchises on certain streets to facilitate better car routing and for the construction of a line in the northern part of Milwaukee, north of the present North Avenue line, and that other changes have been agreed upon between the city and the company. Some of these were put in operation before the final report was submitted. The commission believes that its investigation, with the physical valuation of the property as made by the commission in 1907, will form a basis for reaching a conclusion as to the final disposition of the present controversy between the city and the street railway company.

DISCUSSION OF PUBLIC SERVICE COMMISSION LAW

A brief account was published in the issue of March 26 of the hearing held at Albany, March 16, 1910, before the Assembly committee on railroads, on the act to amend the Public Service Commission law of New York State. Among the points brought out was the history of the clause in Section 38 of the New York Railroad law which provides that "the legislature * * may from time to time alter or reduce the rate of freight, fare or other profits upon such road; but the same shall not, without the consent of the corporation, be so reduced as to produce with such profits less than 10 per centum per annum on the capital actually expended; nor unless on an examination of the amounts received and expended, to be made by the Board of Railroad Commissioners they shall ascertain that the net income derived by the corporation from all sources, for the year then last past, shall have exceeded an annual income of 10 per centum upon the capital of the corporation actually expended."

This phase of the subject was discussed by Prof. Charles A. Collin, attorney for the Brooklyn Rapid Transit Company. An abstract of Professor Collin's remarks follows:

"For 62 years these provisions have stood on the statute law of this State. This section first appeared in the first general railroad law enacted in this State, in the early stages of the constructive period of railroad building, and of railroad legislation. The act of 1848, Chap. 140, Section 30, provided substantially, as Section 38 does now, that the rates, fares and tolls charged by railroad companies would not be reduced by the Legislature unless such reduced rates, with other profits, would in the future allow 10 per cent profit upon the capital actually paid in, nor unless on an examination made by the State Engineer and Surveyor and the State Comptroller of the amounts actually expended and received during the preceding year such examination would show that during said preceding year the company had made a profit of 10 per cent upon the capital actually paid in.

"Four times since, these provisions have been repeated in the legislation of this State. The first repetition was in the great railroad act of 1850, Chap. 140, which is substantially the backbone of the railroad law of to-day. The only material change of language was that instead of a profit of 10 per cent upon the capital actually paid in, the companies should have a profit of 10 per cent upon the capital actually expended. The third declaration was in the act of 1883, one year after the State Board of Railroad Commissioners had been established, by substituting the Board of Railroad Commissioners for the State Engineer and Surveyor. Then the second of the two provisions was added—namely, that the rates charged should not be reduced unless on an examination of the amounts received and expended during the preceding year it was shown that the company had earned upon all income from all sources and upon a comparison of expenditures from all sources during that preceding year 10 per cent upon the capital actually expended. The fourth repetition by the Legislature of this limitation upon its own powers was made in 1901, when the act of 1883 was repeated without a change of a word so far as these two provisions were concerned, but with the addition of some extra matter as to sales of tickets by unauthorized agents. So during the last 60 years, on an average of every 15 years, the Legislature has solemnly repeated this declaration. And what was the reason? It was

because our forefathers in 1848, in their wisdom looked forward to the inevitable result of the building of these great public highways and of the development of the great industries which would be dependent upon them. They could not guarantee to private investors in the construction of these roads a profit, or even that they would not lose their original investment, as many of them did. But it could assure them on the word of the State, as a gentleman's agreement if no more, that if they did invest their money in these great public enterprises they should be allowed such profit as they could make up to 10 per cent.

"I do not pretend to say that the Legislature of 1848 could bind all subsequent Legislatures, as though they were enacting a constitution. I am not undertaking to say whether or not this was in the nature of a contract or the grant of a vested right. Probably none of us know what is the constitutional import of these four times repeated declarations by the Legislature of this State, and none of us will know until the Court of Appeals or, as it may be, the United States Supreme Court finally decides whether it is contractural in its nature, or not.

"Has the time for the encouragement of the investment of capital in business enterprises gone by? Are we altogether right, in reversing the constructive and encouraging legislation of the 50 years from 1848 onward, and adopting instead the obstructive and destructive legislation of the last 10 or 15 years? I am not advocating the proposition that there should be no protection, restraint or conservative supervision over both the construction of new railroads and the operation of railroads already constructed. The State never has adopted that policy. In the very first act of 1848 were elaborate provisions for reports to be made to the State Engineer and Surveyor; they were made more elaborate with the establishment of the State Board of Railroad Commissioners. But hasn't the time come for a reconsideration of the wisdom of the reversal to the policy of encouraging the investment of capital in enterprises so important? The foundations of prosperity in this State are the transportation systems whose development has not yet reached its climax, indeed it is still in its initial stage, yet what encouragement is offered for their extension? For sixty-two years there has been a gentleman's assurance from the State of the most solemn nature, that if the railway companies were able to make 10 per cent upon the capital actually expended, their rates would not be reduced. But now the State, by the act under consideration, is planning to say, not only that this agreement is expressly repealed, but that the Public Service Commission, as though they were a company of angels from heaven, are to have none of the restrictions which the Legislature four times in the last sixty-two years has said it will put upon itself in fixing rates.

"It is true, that neither the Legislature nor the Public Service Commission can take away the constitutional provision that property cannot be confiscated, but is this a valuable protection? Would business men be encouraged to invest their money in an enterprise upon the sole assurance that a body of five men can take all the profits away so long as they don't confiscate the property, or that they could reduce the rate until it becomes confiscatory, leaving the burden upon the owner to show to a jury that the reduction will put the profits below a reasonable amount—5 per cent or 6 per cent, or 7 per cent—and with experts on the other side swearing that with this reduction the owner can make 7 or 8 or 10 per cent.

"Is it not time to reverse this movement of legislation and to heed the evident reaction of public sentiment in favor of more railroad building, of business enterprise, of the promotion of industrial enterprises along lines of justice and honesty, and with no more obstructive and destructive legislation than is necessary to secure justice and honesty without undue interference with the promotion of the enterprise? In so doing my suggestion is either that Section 38 of the law be left as it is, and clearly established in force, without any ambiguity, or that it be redrafted and adapted to the situation of business to-day and made fairly and honestly a limitation upon the Public Service Commission where it will be effective.

"Public service business is not like private business. It requires publicity; it requires regulations of rates, because in some instances the privileges granted are necessarily monopolistic in their nature, and the same principles cannot be applied as to private corporations. But all the more is the necessity at this stage of affairs of encouraging investments in this line, and this can be done by making an assurance that to the Public Service Commission has been delegated the right to regulate fares only so long as it allows a rate of profit which will be fixed and which has stood for 62 years at 10 per cent, on the theory that no set of men is wise and good enough to be trusted with absolute power, and that whenever we have attempted to rely upon a benevolent despot, the benevolent despot has been either unwise with good intentions, or wise with bad intentions, with equally unfortunate results in either case. If we need constitutions to control our wise and good and great executive, if we need constitutional limitations put upon our judges whom we select with such care, if we need limitations put upon our Legislature, whose members are as wise on the whole as those in any of the other two departments of government, why are they not good enough for the Public Service Commission?

"The cycles of fat years and lean years are just about what they were in the times of Joseph and Pharaoh, and when during the future years the seventh is reached and great profits are being made and an accelerative rise in them is indicated, popular excitement rises. Then with a snap of a finger, as it were, the Public Service Commission can put down rates and the inevitable result follows, whether rates are put down or whether there are high tariffs or low tariffs, and the cycle comes around again, the panic and hard times, and it is then just about as easy to put the rates back as it is to take back the grant of suffrage after it has been granted.

BEARING METALS IN RICHMOND

The Virginia Railway & Power Company, Richmond, Va., formerly used for its armature and axle bearings a tin base metal which proved unsatisfactory as the bearings broke frequently before the metal was worn away to any considerable extent. The old metal ran from 12,000 miles to 26,000 miles in the armature bearings and 11,000 miles to 19,000 miles in the axle bearings. It has now been replaced by a bronze bearing composed of 77 per cent copper, 15 per cent lead and 8 per cent tin. Some of these new bearings have already given over 50,000 miles and are still in service. This composition costs 4 cents to 5 cents per lb. more than copper, but whatever scrap is left has the same value as copper. The net cost of the alloy varies between 5 cents and 6 cents per lb. for the material used. It may be of interest to add that all armature bearings are bored with a self-centering machine and afterward rolled under pressure which gives a remarkably smooth finish, and thereby tends to increase the life of the bearing since, at the start, there are no inequalities in the surface.

On Jan. 28, 1910, Travis H. Whitney, secretary of the Public Service Commission of the First District of New York, sent a letter to Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, asking him if the company would voluntarily agree to place destination signs on the side of each car on the elevated lines, the same as are now displayed in the subway cars. Mr. Hedley immediately took the matter up with President Shonts, and the executive committee passed a resolution ordering an appropriation of $28,000, which is the estimated approximate cost of the improvement. The action taken by the company was communicated to Mr. Whitney by Mr. Hedley on April 1, 1910. The signs have now been ordered and will be installed as fast as possible.

EUROPEAN PROGRESS IN HEAVY ELECTRIC TRACTION

The March number of the *Bulletin of the International Railway Congress* contains a lengthy review of European progress in heavy electric traction by Dr. Gleichmann, state councillor of the Bavarian Board of Public Works. Most of the material presented by the author has appeared in various earlier issues of the Electric Railway Journal, but the following résumé will include the novel facts in Dr. Gleichmann's report. After referring to the Oranienburg single-phase test line and earlier experiments of the Prussian-Hessian State Railways, the author mentions the work done in Bavaria. The Bavarian

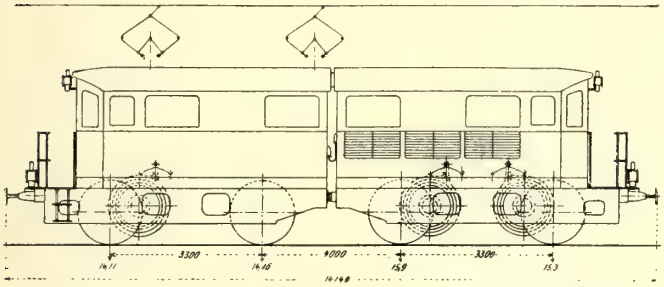


Fig. 1—Oranienburg Experimental Freight Locomotive

State Railways have no experimental lines, but have operated commercially since 1908 a 7.8-mile, 1000-volt d.c. railway from Berchtesgaden to Schellenberg on the Austrian frontier. The traffic is chiefly passenger service and is handled by nine cars, each carrying two 60-hp motors, presumably connected in series. The Bavarian Government has several electrification projects in view, all contemplating the use of water-power. The Prussian-Hessian, Baden and Bavarian State railways have decided to use single-phase current at 15 cycles for all important electrifications.

A table is presented to cover the construction and operation of the Berlin-Grosslichterfelde d.c. railway and the Hamburg-Altona 6300-volt, 25-cycle line as compared with the projected 10,000-volt, 15-cycle Wiesental and Saltzburg-Berchtesgaden lines. An abstract of the more important data follows:

Line.	Berlin-Grosslichterfelde.	Hamburg-Altona.	Wiesental.	Saltzburg-Berchtesgaden.
Length in miles	5.74	6.57	30.60	25.09
Maximum speed in miles per hour	31.00	31.00	43.50	49.70
Cost in cents per kw-hour at own power station	....	1.26	....	0.70
Cost in cents per kw-hour when purchased	1.68	....	.36	....
Watt-hours per ton-mile:				
1. At power station	*59.00	†86.30 ‡62.10	‡46.40	†96.50 †89.90
2. At current collector	*54.80			
Cost per ton-mile in cents	.2008	.2854	.1570	.3130
1. Power at station	.1004	.1088	....	.0678
2. Feeders and transformers		.0098	....	.0138
3. Overhead equipment	.0106	.0252	....	.0612
4. Maintenance of cars	.0644	.1076	....	.1298
5. Trainmen's wages	.0156	.0168	....	.0388
6. Supplies	.0098	.0172	....	.0016

Note—One ton is equal to 2240 lb.

* Not including lighting. † Including lighting and heating. ‡ Not including lighting and heating.

Several illustrated descriptions are then presented of single and multiple catenary suspensions, including a method for the simultaneous automatic regulation of both the catenary conductor wires, as described in the Electric Railway Journal of March 5, 1910. It is recommended that for all supporting wires, silicon bronze should be used in preference to steel because it does not rust, and besides it increases the conductive cross-section. The height of the conducting wire over the rails should not be less than 19 ft. 8 in., even in the open country. As to pole spacing with the multiple catenary, it is pointed out that while 327 ft. would represent the most economical spacing, 246 ft. would be preferable in order to keep the wind displacement of the wires within reasonable limits. It is assumed that the poles would be double channels or square poles made up of four angles. For German trunk lines a wire of 100 sq. mm (197,350 circ. mil) cross-section has been accepted as standard for the trolley. The conductivity of this wire is 57 at 15 deg. C. (59 deg. Fahr.), and the ultimate tensile strength 38 kg per square millimeter (54,050 lb. per square inch). Such a

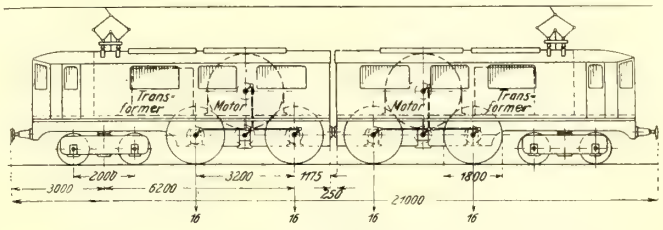


Fig. 3—Proposed High-Speed Locomotive

large cross-section is considered advantageous from the two-fold standpoint of running wear and durability.

Particular attention is given to various present and proposed designs of electric locomotives. The Oranienburg test locomotive, which was described in the Electric Railway Journal of Dec. 25, 1909, is offered as a typical example of the later

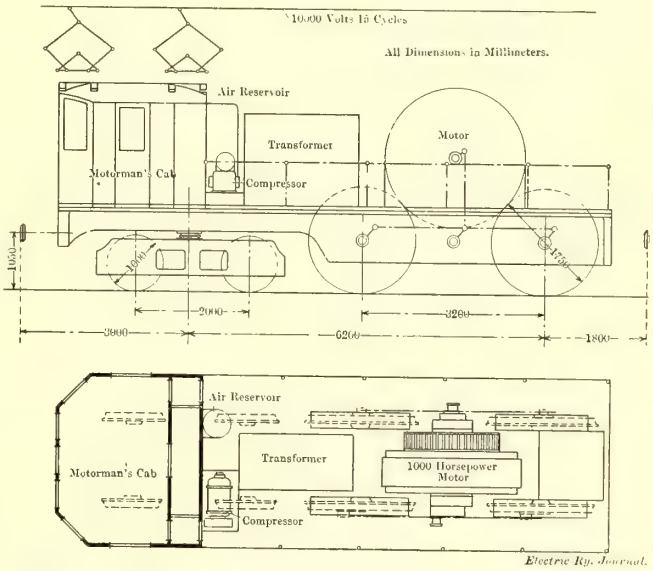


Fig. 4—Proposed Freight and Passenger Locomotive for Prussian-Hessian State Railways

geared types. In discussing coupling-rod transmission for electric locomotives, Dr. Gleichmann points out their principal advantages as follows: The motor can be entirely removed from the space between the wheels and hence as size limitations are practically abolished the number of motor units can be reduced; increased tractive effort secured by coupling up axles

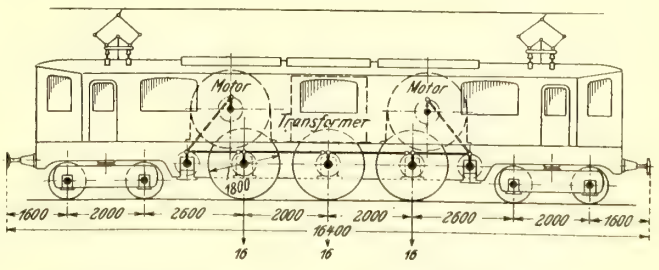


Fig. 6—Proposed Heavy Freight Locomotive

for driving from one motor; accessibility of motors; natural cooling of motors.

The first coupled-rod electric locomotive in Europe was designed by K. de Kando for the Italian State Railways, but in this type it was still necessary for the motors to be placed comparatively low relative to the locomotive frame. In several German designs a jack-shaft is placed between the trail-

ing axle and driving axle at each end of the locomotive. This jack shaft is at the same height as the driving axles and is placed in the frame. As shown in Figs. 2 to 8 inclusive, the jack shaft is connected with the axles proper by horizontal coupling rods and with the motors by vertical or oblique coupling rods. The advantage of this construction is that by the shortening or lengthening of the coupling rods between the

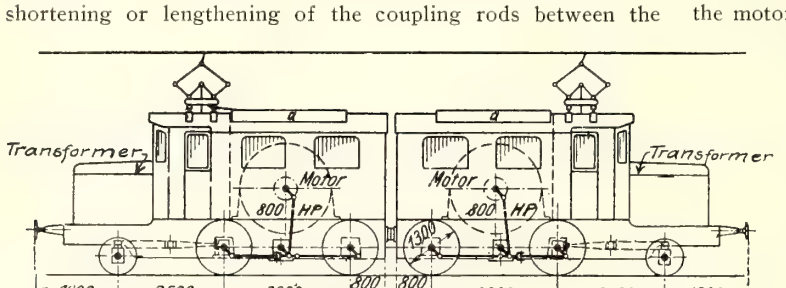


Fig. 2—Freight and Passenger Locomotive for the Bernese Alps

motor and the jack shaft, the motor can be located in any desired position. The disadvantage of the jack shaft is that another rotating member is required, thus producing additional friction.

Fig. 2 shows a freight and passenger locomotive intended for the Lötschberg tunnel, Switzerland. The locomotive is being built by the Krauss Locomotive Works, Munich, Germany, and the Allgemeine Elektricitats Gesellschaft. The locomotive is divided into two close-coupled sections having a common controller. Each section has two driving axles and one carrying axle. The latter is connected with the adjoining driving axles to form a truck; the coupling rod is articulated to allow for the lateral displacement of the driving axle. This locomotive will carry two 800-hp Winter-Eichberg single-phase motors with which to develop an initial tractive effort of 29,760 lb. The maximum speed is to be 46.6 m.p.h. Fig. 3 has been developed by the Allgemeine Company for two 1200-hp motors and a maximum speed of 74.6 m.p.h. Each section of the locomotive is fitted with a truck. One advantage of this coupled design, in addition to easy running around curves, is that each half of the locomotive can be used separately. Fig. 4 shows the type of locomotive proposed for the Madgeburg-Leipzig-Halle section of the Prussian-Hessian State Railways. One 1000-hp motor is to drive the jack shaft by means of a vertical coupling rod. The motor and transformer are to stand exposed as illustrated. In case of heavy loads, these locomotives can be used as double units.

Fig. 5 shows an Allgemeine symmetrical locomotive now being built to haul freight and passenger trains for the French Southern Railway. This locomotive has three driving and two trailing axles. The load on each driving axle will be about 18

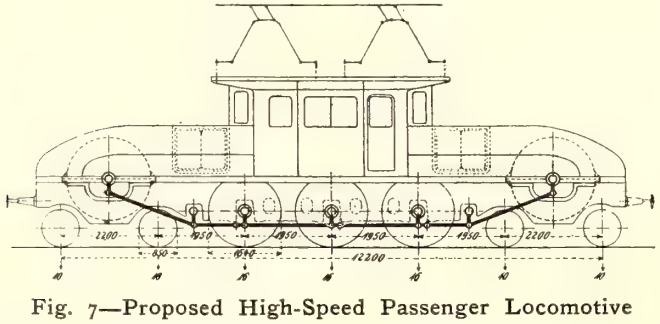


Fig. 7—Proposed High-Speed Passenger Locomotive

tons. The trailer axles have radial play while the driving axles are rigid except the middle one which has a little lateral play to facilitate running around curves. This locomotive will have two 800-hp motors to give a maximum speed of 46.6 m.p.h. In this design only one transformer is used for the two motors. The design Fig. 6 has been developed along the lines of Fig. 5, but for higher speeds and greater loads. It will carry two 1200-hp motors and have a speed of 74.6 m.p.h.

Fig. 7 illustrates a design worked out jointly by the Siemens-Schuckert Works, Berlin, and the Maffei Locomotive Works, Munich. In this case, each of the two 1200-hp motors is placed directly over the pony trucks. The transformers are next to the motors and the engineer's cab is in the middle. To permit the motors to be of ample width and have good bearings, the frame plates above the ponies are cut away and the frame is extended by a trough consisting of a steel casting. This locomotive is to develop a maximum speed of 74.6 m.p.h. Fig. 8 is similar to Fig. 7, but is intended for smaller loads and a speed of 46 m.p.h. Owing to the low maximum speed of 46 m.p.h. the ponies are replaced by single axles having a lateral play of 1 9/16-in. on each side. The two 390-hp motors are placed nearer the center than is the case in Fig. 7 and the transformers are in the center of the motorman's cab. This locomotive will develop a continuous tractive effort of 6610 lb. at 46 m.p.h. and a tractive effort of 8820 lb. for one hour at a speed of 37.9 m.p.h. The initial tractive effort is figured at 17,640 lb. Ten locomotives of this type are being built for the Wiesental Railway.

The motors for this locomotive are series wound and the armature has a short-circuited winding and auxiliary excitation. The external diameter of the motors is 7 ft., 1 13/16 in.

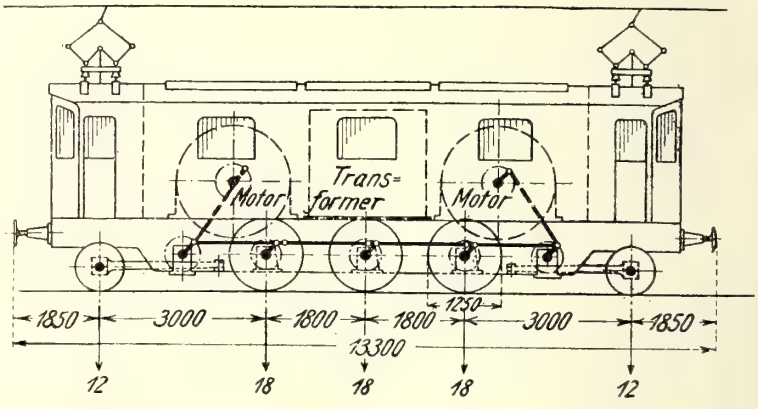


Fig. 5—Freight and Passenger Locomotive for the French Southern Railway

and that of the armature is 4 ft., 11 in. The commutator has an external diameter of 4 ft. 7⅛ in. and a width of 11 13/16 in. The carbon brushes have a cross-section of 31/64 in. x 2⅜ in. and are 1 31/32 in. high. The air space between the armature and the stator is 3/32 in. The transformers have a ratio of

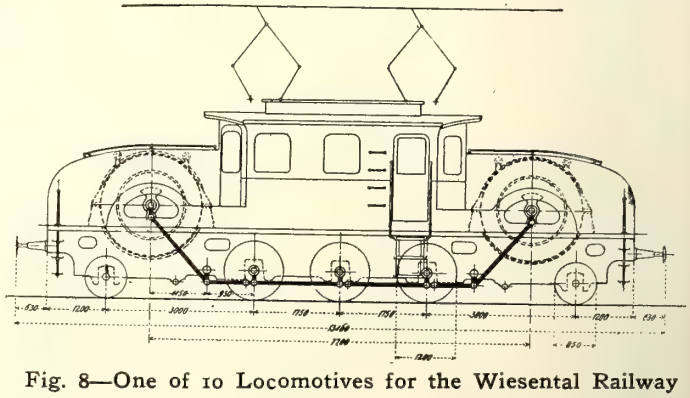


Fig. 8—One of 10 Locomotives for the Wiesental Railway

10,000: 300. The two current collectors consist of pantographs which can be raised or lowered by compressed air. Each pantograph carries a light bow with a sliding contact of aluminum.

The various dimensions shown on the preceding drawings are in millimeters (1000 mm = 39.37 in.) and the axle weights are in metric tons (1 metric ton = 2204 lb.).

PROPOSED PUBLIC UTILITIES COMMISSION IN OHIO

The substitute bill introduced in the Legislature of Ohio by Representative Frank W. Woods and known popularly as the "Woods Public Utility Bill," was passed by the House of Representatives on March 30, 1910, by a vote of 91 to 16. It combines the most drastic features of the provisions of the New York and Wisconsin laws, and on account of its inquisitorial features is decidedly objectionable to interests operating public utilities in Ohio. A digest of the principal provisions of the bill follows:

The Public Utilities Commission of Ohio shall succeed the Railroad Commission of Ohio. All members of the commission shall give their undivided attention to the work of the commission, and neither members of the commission nor their wives shall be pecuniarily interested in any public utility subject to the provisions of the public utilities law. All sessions of the commission shall be open to the public. Each commissioner shall receive an annual salary of $5,000. On the second Monday in February in each odd numbered year the commissioners shall elect a chairman to serve for two years. The majority of the commissioners shall constitute a quorum to transact business and the permanent office of the commission shall be at Columbus. Sessions may be held at any other place in this State when the members of the commission deem it advisable. The commission shall employ a secretary and such other assistants as it may deem necessary, but the salaries and expenses of the commission shall not exceed $100,000 in any one year.

The law defines what constitutes an express company, a telegraph company, an equipment company, a sleeping car company, a natural gas company, a water works company, a heating or cooling company, a water transportation company, a messenger or signal company, a street railroad, a railroad, a suburban or interurban railway, a common carrier and a union depot company, and the terms of the act are made to apply to all of them. Section 501-2 of the act vests the commission "with the power and jurisdiction to supervise and regulate every public utility in this State and of all things necessary and convenient in the exercise of such power and jurisdiction." On complaint of any organization or municipality or by 25 companies, firms or individuals the commission shall be empowered to investigate and hear charges relating to rates or to service, and shall consider complaints from public utility companies and order municipalities or others to carry out such work as the commission deems just.

If any rates, tolls, charges, service, schedules or joint rates are found to be in violation of any law, resolution, ordinance or contract under which a public utility operates the commission shall have the power to substitute such rate or rates as are provided for under the circumstances. Decisions of the commission shall be subject to review by the courts, but every public utility shall furnish reasonable, adequate services and facilities. The charge made for any service shall be reasonable and just, and any unjust and unreasonable charge is prohibited.

Public utilities having conduits, subways, tracks, poles, wires or other equipment on, over or under any street or highway shall for a reasonable compensation permit the use of the same by any other public utility where public convenience is deemed to require such joint use. The commission is empowered to "prescribe reasonable conditions and compensation for such joint use."

Schedules showing all rates, tolls, fares and charges and all rules and regulations that affect rates, or tolls charged shall be filed with the commission. Complete schedules of joint rates shall also be filed with the commission, and no change shall be made in any scheduled charge or rate except upon 30 days' notice to the commission, which shall approve the change before it is put into effect. All changes in rates and tolls shall be posted for 10 days in a conspicuous place in every depot, station and office. The commission may prescribe such changes in the forms in which the schedules are issued by public utilities as may be found expedient, and such schedules shall as far as practicable conform to the forms prescribed by the Interstate Commerce Commission.

Any public utility or other party dissatisfied with any order of the commission may within six months commence an action in the Court of Common Pleas against the commission as defendant to vacate and set aside any such order on the ground that the order is not lawful or reasonable. If upon trial, evidence shall be introduced by the plaintiff which is found to be different from that offered at the hearing before the commission, the commission can stay the proceedings for 15 days and modify its ruling and report its action to the court within 10 days from the receipt of the evidence, in which case the action shall be dismissed. Either party to an action in the lower courts shall have the right to appeal to the higher courts.

All freight tariffs relating to interstate traffic shall be filed with the commission within 30 days after passage of the act, and all such tariffs shall be filed with the commission when issued.

Section 516 defines the right of the companies to give free transportation over their lines. Section 555-I says "every public utility shall furnish to the commission all information required by it to carry into effect the provisions of this act and shall make specific answers to all questions submitted by the commission." Every public utility company, except suburban and interurban railroads and express companies, shall file with the commission on or before April 1 each year a report for the year ended December 31 preceding upon a form prescribed by the commission. All railroad accidents attended with loss of life shall be reported to the commission, which shall investigate such accidents as the public interest would seem to require. Every public utility shall on the first Monday in February in each year file with the commission a verified list of all railway tickets, franks, telephone books, telegraph books or tickets, passes and mileage books issued free during the preceding year, together with the names and addresses of the recipients and the reasons for issuing the same.

Each railroad, suburban and interurban railroad and express company shall on or before September 15, 1910, and on the same day thereafter each year, file a report for the year ended June 30 preceding similar in character and detail to the annual report required to be made by railway companies to the Interstate Commerce Commission. The commission shall ascertain and determine what are the proper and adequate rates of depreciation of the several classes of property of each public utility. The depreciation fund is to be used for new construction, extensions and additions as approved by the commission. Every employee of a public utility defined in the law who shall refuse to fill out the blanks of the commission or wilfully give a false answer to the questions propounded shall be guilty of a misdemeanor and shall be fined not more than $1,000. The principal provisions of the bill regarding the issuance of securities follow:

"Section 602-24. No public utility shall issue any stocks, certificates of stock, bonds or other evidences of indebtedness for money, property, or services in payment of the same, either directly or indirectly, until there shall have been recorded upon the books of such public utility the certificate of the commission herein provided for, unless payable within one year from the date thereof.

"Section 602-25. No public utility shall declare any stock, bond or scrip dividend or divide the proceeds of the sale of any stock, bond or scrip, among its stockholders.

"Section 602-26. No public utility, domestic or foreign, shall hereafter purchase or acquire, take or hold, any part of the capital stock, bonds, notes or other evidences of indebtedness, of any public utility, unless authorized so to do by the commission, which is empowered by this act to give such consent as in the following section provided.

"Section 602-27. No corporation of any kind, domestic or foreign, shall purchase or acquire, take or hold, under any circumstances, more than twenty-five per centum of the total capital stock issued by any public utility, except where such

stock is transferred or held for the purpose only of collateral security, and in such case only with the consent of the commission. Nothing in this act contained shall be construed to prevent the holding of stock heretofore lawfully acquired. Every contract, assignment, transfer or agreement for transfer of stock by or through any person or corporation to any person or corporation in violation of any provision of this act shall be void and of no effect.

"Section 602-28. In case of the consolidation, under any law of Ohio, of any two or more public utilities, the aggregate amount of the capital stock, and the aggregate amount of the debt of the consolidated companies, shall not, by reason of such consolidation, be increased.

"Section 602-29. Any public utility as herein defined, or any agent, director or officer thereof who shall directly or indirectly issue or cause to be issued any stock, certificates of stock, bonds or other evidences of indebtedness contrary to the provisions of this act, or who shall apply the proceeds from the sale thereof to any purpose other than that specified in the certificate of the commission, as herein provided, shall be guilty of a felony and upon conviction thereof shall be imprisoned in the state penitentiary for not less than one year or more than ten years. All stocks, bonds or other evidences of indebtedness issued contrary to provisions of this act shall be void."

On December 15 of each year the commission shall deliver to the Governor a full report of its operations and make such recommendations to the General Assembly as it may deem proper.

AMENDMENTS TO THE NEW YORK PUBLIC SERVICE COMMISSION LAW

The committee of the Assembly of New York State in charge of the bill revising the Public Service Commission act has concluded its hearings and on April 1 presented its report to the Assembly and it was advanced to the third reading April 5. The principal final revisions so far as they relate to electric railways compared with the present bill follow:

The commission has the right to increase the fares if they are "insufficient to yield reasonable compensation for the service rendered . . . with due regard among other things to a reasonable average return upon the capital actually expended and the necessity of making a reservation out of income for surplus and contingencies . . . notwithstanding that a higher rate, fare or charge has been heretofore authorized by statute."

The commission can establish or discontinue transfer points between different companies and can establish fares and charges for this service, and prescribe rules and regulations affecting the use of transfers when the existing practice is "unjust and unreasonable either as to persons transported by the said surface railroads or to any such street railroad corporation." It can also require the establishment of switch connections and the operation of through cars.

Exemption is made to the provision that no company can acquire more than 10 per cent of the capital of any other railway company of those corporations which now lawfully hold a majority of the stock of another corporation. Such a corporation may acquire the rest of the capital stock.

The commission is authorized to permit companies to issue securities for money actually expended during the past five years for construction, extensions and improvements, or for expenditures prior thereto if application is made before Jan. 1, 1912. In the original amendment this period was limited to three years. The companies are required to show vouchers for the expenditure of this money and securities cannot be issued for money spent for maintenance of service or replacements. All security issues must also be for money, property or labor procured or paid for by the issue of such securities and such as is or has been reasonably required. In the original act the words "has been" did not appear.

THE PHILADELPHIA STRIKE

On April 5, 1910, the Philadelphia (Pa.) Rapid Transit Company posted in its car houses the announcement which is reproduced herewith and which contains new rules to govern employees to supplant the agreement which the company made with its men in June, 1909, and which was rendered inoperative by the strike declared on Feb. 19. As stated in the announcement all conductors and motormen in the service of the company on Jan. 1, 1910, who remain continuously in the service, will receive an increase to 23 cents an hour from July 1, 1910, and a further increase of ½ cent an hour on July 1 of each year until 25 cents an hour has been reached. All men who went on strike on Feb. 19 and who have been reinstated will be considered to have been continuously in the service of the company and the increase will apply to them. All men who entered the employ of the company after Jan. 1,

Announcement.

The following are the general rules governing the employes of this Company on and after this date.

PHILADELPHIA RAPID TRANSIT COMPANY,
April 5, 1910. CHAS. O. KRUGER, President.

1. Whenever hereafter an employe is suspended or discharged, and upon investigation it is found that he has been unjustly suspended or discharged, he will be reinstated to his former position and paid for all time lost.

2. Employes are free to join or not to join any organization, and there will be no intimidation or discrimination against any employe so doing by any officer of the Company or their subordinates, nor in favor of one organization over another. There shall be no discrimination or intimidation among employes by reason of the fact of their membership or non-membership in any organization. The first duty of every employe is to the Company, and any form of discrimination, intimidation or boycott among employes tending to create hard feeling among them or dissatisfaction with the management will be the subject of discipline.

3. Any employe with a grievance shall first take it up with his Superintendent, either personally or through any Committee of our employes which he may designate to represent him. If the matter cannot be so adjusted, the General Manager, or an officer designated by him, will hear appeals on certain days to be fixed. Committeemen presenting appeals to the General Manager hereunder will be excused from service (without pay) on the days of such hearings without loss of standing.

4. Wages of all conductors and motormen in the service of the Company January 1, 1910, and who remain continuously in the service (time out on the strike of February 19, 1910, not to be counted against them) will receive an increase to 23 cents an hour on July 1, 1910, and a further increase of ½ cent an hour each July 1 thereafter, until a wage of 25 cents per hour is reached. Those taken into the employ of the Company after January 1, 1910, will receive 22 cents an hour for the first year of continuous service, 23 cents an hour for the second year and thereafter be entitled to yearly advances of ½ cent per hour until a wage of 25 cents an hour is reached. Wages of employes on the Elevated section shall be as announced January 1, 1910, except that increases shall be ½ cent yearly instead of 1 cent each two years, and new men will serve out one year only before being entitled to an increase.

5. The work-day for all motormen, conductors and train service men shall not be less than (9) nor more than (10) hours in any one day; the full day's work to be completed within as nearly twelve (12) hours as possible to complete it, and the percentage of runs on the entire surface system shall be as follows: 85 per cent. to be completed within twelve (12) consecutive hours, and 15 per cent. to be completed within thirteen and one-half (13½) consecutive hours; provided, however, that on no one schedule shall runs making over thirteen and one-half (13½) hours exceed 10 per cent. of the total number of runs on such schedule; with the further proviso that not more than two (2) runs on any one schedule may be tripper runs, the pay of which shall be per hour for actual platform labor. If, however, a majority of the motormen and conductors on any division shall petition the Company, in writing, to provide schedules which will give them longer working hours than above provided, and, therefore, greater earnings, the Company may then put into effect such schedules.

6. All extra and tripper work shall be performed by extra men when extras are available, and motormen, conductors and trainmen that have completed their regular day's work shall have the right to refuse extra or tripper work, providing that extras are available. The conditions and pay of trippers as now prevailing shall continue, and where regular men are called upon to do tripper work they shall receive the same rate of pay for the tripper work that the extra men would have received. All reporting time over ten (10) minutes shall be paid for at the regular rate as herein provided.

7. The Company will continue to give its employes a choice of places at which to purchase uniforms, as has been the case since June 1, 1909.

Philadelphia Rapid Transit Company's Announcement

1910, will receive 22 cents an hour for the first year of continuous service, 23 cents for the second year and an increase of ½ cent an hour each year thereafter until 25 cents an hour is reached. The wages of the employees on the elevated division of the company will be continued as announced on Jan. 1, 1910, except that the increases will be ½ cent yearly instead of 1 cent every two years. New men on the elevated division will be required to serve only one year, however, before being entitled to an increase.

Defections from the ranks of the former employees have been small and constant, but on April 5, following the announcement of new conditions of service by the company, it was reported that about 400 men had indicated their desire to return to work.

The strikers as a body rejected on April 3 the proposal of the company presented to them through Mayor Reyburn and decided to continue the strike indefinitely.

COMMUNICATIONS

EXPENSES OF PUBLIC SERVICE COMMISSIONS

STATE OF NEW YORK PUBLIC SERVICE COMMISSION FOR THE FIRST DISTRICT

New York, April 1, 1910.

To the Editors:

After reading with interest the editorial on the New Jersey public service law in the Electric Railway Journal of April 2, I feel impelled to call your attention to what, undoubtedly, is an involuntary misrepresentation of the cost of the Public Service Commission for the First District of New York; or rather, an unjust comparison of its expenses with the expenses of a commission like that established in New Jersey, for the actual expenses of the New York commission are not misrepresented.

The editorial in question says:

"The constant observance of affairs in New York by the many residents of New Jersey whose business is on Manhattan Island makes it apparent that this feature of the law arises from a studied determination to prevent any such excessive burden for salaries and expenses as has been imposed by the Public Service Commission of the First District of New York upon the public that it was designed to serve."

The writer of the above compares the First District, New York, commission with the New Jersey commission as if their powers and duties were similar. Such a comparison is most unjust for the reason that the commission in New Jersey is charged simply with the general supervision and regulation of public utilities, while the First District commission in New York is, in addition, charged with carrying on the work of rapid transit development formerly performed by the old Rapid Transit Commission. While it is a fact that the expenses of the First District commission for 1908 were more than $1,000,000, as your editorial states, it is also a fact that fully 66 per cent of the total was due solely and entirely to the rapid transit work of the commission.

It is, therefore, not fair to cite all of the expenses of the First District, New York, commission in comparison with the amount of annual expenditure allowed the New Jersey commission. Whether the $50,000 limit in the New Jersey statute will be sufficient to cover the work of the new commission remains to be seen, but in any event the emphasis placed by some writers upon the cost of the First District commission in New York is misleading as an index to the cost of a regulatory board.

In justice to the commission I hope that you will call attention to the dual character of the work of this commission and the large cost of its rapid transit activities.

James Blaine Walker,
Second Assistant Secretary.

COST OF MAINTENANCE IN MASSACHUSETTS

South Framingham, Mass., April 2, 1910.

To the Editors:

I was interested to observe the list of Massachusetts street railways published on page 630 of your edition of April 2, giving the cost of maintenance per car-mile, etc. The table is interesting and instructive, but needs to be read with a knowledge of the methods used in making up the reports of the Massachusetts Railroad Commission.

The car mileage given is the mileage run by cars on the tracks belonging to the companies indicated, whereas the cost of maintenance is the cost of maintaining the cars owned by the several companies. In a case where the cars owned by a given company run on its own tracks exclusively and no foreign cars run on these tracks, the figures for the cost and maintenance per car and per car-mile are correct, but in perhaps the majority of cases the figures are not strictly correct, on account of the running of the cars of one company over the tracks of another company.

In the case of the Boston & Worcester Street Railway Company the car mileage which should be charged to cost of maintenance is about 400,000 miles greater than given in the table, which would reduce the average cost per car-mile from 2.98 cents to 2.45 cents. In the case of the Providence & Fall River Street Railway, which has next to the greatest cost per car-mile as given in the table, I happen to know that the ratio of miles run by its cars on foreign tracks to the miles run on its own tracks is much greater than in the case of the Boston & Worcester Street Railway, and a proper correction would probably bring their cost of maintenance per car-mile down to much more nearly the average cost.

Unfortunately the reports of the Massachusetts Railroad Commission, while more complete than are available from most of the States, are nevertheless very misleading in many particulars unless all the circumstances in regard to the particular railways being investigated are known. The cost of power per car-mile, for instance, is very difficult to arrive at with any degree of accuracy because the cost of power given in the table is made up by subtracting from the operating cost of producing the power, the price received for all power sold and adding to it the price paid for all power bought. The result of this method is in at least one case that the power cost actually figures out less than nothing to one of the railways in the eastern part of the State, because the road in question has a very small car mileage and a large power house furnishing power to several other railways which pay it more for power than the entire cost of running the station. There is nothing in the report of the Railroad Commission that makes it possible to figure out the proper correction for conditions of the kind outlined.

There is certainly need of a great many more statistics of a very much more reliable character than we now find available with regard to the cost of operating electric railways.

Milan V. Ayres,
Electrical Engineer.

CAR AND WINDOW WASHER

A self-feeding brush for cleaning passenger cars, as well as windows in shops, round houses, factories and industrial plants, is made by George R. Stanton, of Decatur, Ill. The device consists of an all-bristle, copper-tied brush, to which is attached a cold-drawn Shelby steel tube handle, which is lighter than the ordinary wooden handle. At the other end of the handle is a water valve, and a standard hose connection.



Car Window Washer

To use the device, the handle is connected to a hose from a hot or cold-water supply, and the water goes up through the handle and is then sprayed through the brush, very evenly, onto the object to be cleaned. The valve is arranged to admit just enough water to wet the surface or else enough to thoroughly flush the wood, as may be desired. An ingenious form of "goose neck" prevents any water running back down the handle of the operator's sleeve. One man with this brush can clean the entire side of an electric car more quickly and quite as thoroughly, if not more so, than two men working in the ordinary way. The thorough flushing which the side of the car receives washes away the grit and dust in a manner not possible with the usual method except by scouring and friction, which is detrimental to the exterior finish. The flushing

is very effective also in cleaning the corners of the windows, and ventilators which are often passed over by the usual method.

Cleaners of this kind are in use by the Illinois Traction system and by other roads. They are made in 2-ft., 4-ft., 6-ft., and 8-ft. lengths.

THROUGH RATES AND JOINT ROUTES

The Committee on Interstate and Foreign Commerce of the House of Representatives has agreed upon and on April 1 reported to the House the bill to create an interstate commerce court upon which it has been engaged for the past two months. The wording has been changed greatly from that contained in the original bill submitted by Mr. Townsend on Jan. 10.

The interest of electric railway companies lies largely in the original proposal to exempt from the province of the Interstate Commerce Commission the authority to establish through routes and joint rates between steam and electric roads. As finally reported the bill reads, "The commission shall not, however, establish any through route, classification or rate between street electric passenger railways *not engaged in the general business of transporting freight in addition to their passenger business* and railroads of a different character." In the original bill the words printed above in italics did not appear, and the words "suburban and interurban" occurred between the words "street" and "electric."

In explanation of this change, the committee says:

"The original bill as introduced provided that the commission should not establish any through route, classification or rate between street, suburban or interurban electric passenger railroads and railroads of a different character. In the substitute bill, as recommended by your committee, this provision is stricken out and the section as recommended will authorize the commission to establish through routes, classifications and rates, including both steam and electric roads engaged in interstate commerce; but a question having arisen as to whether the commission under such provision might not have the authority to require a through freight route which would provide for carrying freight on street railways into and through the heart of cities, there is inserted the provision that the commission shall not, however, in establishing any through route, classification or rate, include a street electric passenger railway not engaged in the general business of transporting freight in addition to its passenger business."

DISCUSSION OF FIRE INSURANCE AT BOSTON

At the March meeting of the Boston section of the American Institute of Electrical Engineers a paper was presented by W. H. Blood, Jr., of Stone & Webster, Boston, on "Fire Insurance from the Engineer's Standpoint." The author pointed out the advantages of insurance on the mutual plan, and contended that existing rates on fireproof power stations were too high.

In the discussion which followed Ralph Sweetland of the New England Insurance Exchange stated that the profits of the insurance companies are made largely from their investments. These represent accumulation of profits of years ago, but many of the companies have been through serious conflagrations and have seen their capital impaired. Many deficiency charges are higher than the hazard would warrant, but they are made high to force owners of property to correct bad conditions. In the modern fireproof power station there is little use for sprinklers. In car houses, however, they were essential. Most public service corporations in New England, carry an amount of insurance very close to 90 per cent of the property value. The annual fire loss of $215,000,000 in the United States and Canada, enormous as it is, does not represent the total cost of fires. The loss to the public is nearer $450,000,000, if the cost of fire department maintenance and water supply is included.

M. V. Ayres, Boston & Worcester Street Railway Company, said that fireproof car houses or cars cannot be hoped for at present. The ordinary electric car is very inflammable, composed as it is of dry, hard wood filled with varnish. If a fireproof building is filled with combustible material and a fire gets started there is an excellent chance of losing all the cars, which constitute the principal part of the investment which is in the building. It has been found that with fireproof roofs on steel trusses which cannot burn the trusses warp and fall in, causing more damage than if the roof had been of wood. There is a tendency to-day towards the use of fireproof cars. Some of the subway cars are really fireproof, although the first ones built were not. It is possible to build cars and car houses which will not burn and this might be done in the future. Mr. Ayres thought it was possible to build steel cars lighter than wooden cars. He had recently noted some steel cars in Pittsburg, which seat 57 passengers and weigh less than wooden cars which seat 44 persons. This was in part due to lighter motor equipment. Two cars for use in New York were also cited which were of steel construction, each being 1100 lb. lighter than wooden cars of the same dimensions.

E. W. Holst, superintendent of equipment, Boston & Northern and Old Colony Street Railway Companies, believed that it was not economical to build car houses of brick fireproof construction, because the difference in the insurance rate did not offset the difference in the cost of construction in a good many cases. The companies which he represented are using a composite construction of the mill type, with brick fire walls, and a limited amount of space in each section.

AUTOMATIC SPRINKLERS IN BALTIMORE CAR HOUSES

The United Railways & Electric Company of Baltimore, Md., has contracted with the General Fire Extinguisher Company of Providence, R. I., for the complete equipment of four of its new fireproof car houses with automatic aisle and ceiling sprinklers. The dry pipe system with Grinnell heads will be used. A total of 4312 heads will be installed as follows:

Car House.	Aisle Sprinklers	Ceiling Sprinklers
York Road	645	683
Gay Street and North Avenue	368	428
Electric Park	775	507
Lombard & Eighth Streets	453	453
Total	2241	2071

Aisle sprinklers are to be placed between all storage tracks and ceiling sprinklers in the offices, lecture, reading and pool rooms, bowling alleys and all parts of the car houses where the special work will not permit the use of aisle sprinklers.

Every precaution has been taken in these new car houses to reduce the fire hazard to a minimum and as a further safeguard the following general order to all motormen and conductors has been issued and is posted in the car houses:

"You are instructed, when turning into the barn a convertible, semi-convertible or closed car, to see that all windows, doors and ventilators are tightly closed."

This regulation was proposed by L. W. Evans, sprinkler engineer of the local Board of Fire Underwriters. It is believed that with this rule in force a fire originating in a car can be confined in that car and the breaking of the glass in the car would give the alarm effectively to the car house attendants.

COST CORRECTION ON CHARLESTON PAINTING

In the Electric Railway Journal of April 2, 1910, an article entitled "Painting Practice in Charleston," was published on page 570. In this article, several figures were given on the cost of carrying out different classes of painting. Corrections of two of these costs were not made in time to be printed in that issue. The figure for the single truck car with 20-ft. body and 28-ft. 7-in. length over all should have been $55 instead of $46 and for the single truck car with 18-ft. body and 24-ft. length over all should have been $46 instead of $40.

News of Electric Railways

Suggestion that Franchise Extension be Considered in Toledo

A. E. Lang, president of the Toledo Railways & Light Company, Toledo, Ohio, has addressed the following letter to the Council of Toledo, suggesting that the extension of the franchise of the company should be considered:

"It is common knowledge to all citizens of Toledo that a portion of the franchises of this company will, by the terms of their grants, soon expire. This applies to approximately 9 miles of streets out of about 68 occupied by our tracks. We believe the time has now arrived when the subject of an extension or renewal should be taken up by the city and the company, with a view of arriving at a fair settlement of all questions involved—fair and equitable alike to the city and to the company.

"It is the wish of the present management of the company to give to the citizens of Toledo a street railway service second to none. The company may not be able to please all the people in a city of 200,000 inhabitants, but it can hope at least to please a majority of them. It desires, if possible, to avoid the delays, expenses and enmities which were attendant upon the expiration of the street railway franchises in the cities of Chicago, Cleveland and Detroit. The company will not ask for more from the city than it feels it is justly entitled to, and, on the other hand, we are firm in our belief that the city will be actuated by a like spirit of fairness on its part toward the company.

"It is well known to everyone that the panic of 1907 rendered it difficult for any corporation to procure the necessary money for capital investment, and this fact, taken in connection with the long and determined franchise fights in Chicago, Cleveland and Detroit and the early expiration of franchises here, has rendered it wholly impossible for this company to secure needed funds to develop and extend its business to meet the requirements of this rapidly growing city. There is a demand on the part of the city for additional cars and, from various sections of the city, for double tracks and extensions of existing tracks, but it is utterly impossible for the company to procure the capital to meet these demands until the franchise question is settled.

"The negotiations for the renewal of franchises in Chicago, Cleveland and Detroit have taken the form of an investigation of the value of street railway property, the cost of operation, and their present as well as future requirements. To determine these matters, several months of careful investigation on the part of experts, municipal authorities and citizens have been found necessary.

"Franchise negotiations in Chicago were pending for years, with the final result that the street railway properties were appraised, 6 per cent interest being allowed on such appraisal and on all additional capital expenditures and the net earnings divided, 55 per cent going to the city and 45 per cent to the stockholders. The fare was fixed at 5 cents with universal transfers, and, under this arrangement, the city has already received $4,250,000 as its share of the profit, and to-day enjoys one of the best street railway systems in the country.

"In Cleveland, where a contest exceeding eight years in duration, involving a renewal of franchises, has taken place, a settlement has finally been made with the railway on the basis of allowing 5 per cent interest upon outstanding bonds, and 6 per cent interest upon its stock, under an appraised value of its street railway properties. If the properties earn more than 6 per cent at the initial fare of 3 cents with 1 cent for transfers, then the fare shall be further reduced. But if they fail to meet the interest allowed, the rates of fare shall be increased in order to meet the return on the investment, as above stated.

"Negotiations in Detroit for a renewal of franchises have been carried on for many years along somewhat similar lines as obtained in the investigations at Chicago and Cleveland, but no conclusion has yet been reached. In all these cities, as above stated, a thorough and complete investigation of the books and street railway properties of the several companies has been found essential before franchises could be agreed upon. These investigations have been along similar lines, but varying somewhat to meet local conditions.

The statutes of Ohio provide that street railway franchises may be renewed upon such conditions as may be considered conducive to public interests. But we would respectfully suggest that before formal action in such matter be taken by the city or the company, it it desirable that the city make such investigation of the street railway problem in Toledo as it may deem wise, in order to reach a definite knowledge of the most desirable street railway system for the city with special reference to routes, equipment and frequency of cars, and also as to the cost of operating such a system. We will furnish the city with every facility for an examination of our properties and books, showing the cost of carrying passengers, the capital required for future developments, and all such other facts and information as may be desired.

"We respectfully urge that due consideration of this matter be given by the city, to the end that an early settlement may be reached, which will be of mutual advantage to the city and to this company."

Cleveland Traction Situation

At a conference on April 1, 1910, between Judge R. W. Tayler, G. H. Dahl, street railway commissioner, and Newton D. Baker, city solicitor, it was agreed that the grant made to the Cleveland Railway should be amended to allow the company to charge to capital account the difference between the value placed upon the tracks during the Goff-Johnson negotiations, which was taken as a basis by Judge Tayler in his arbitration work, and the outlay for rebuilding. The remainder of the cost of construction, represented substantially by the Goff-Johnson valuations, will be charged to maintenance under the agreement mentioned. It is believed that this agreement will become legal by expiration of the time limit.

The earnings of the company for March will probably show a surplus. March was the first month that the entire system has been operated at a 3-cent fare, plus 1 cent for transfers. The official figures will probably be completed by April 15. Neither J. J. Stanley, general manager of the company, nor Mr. Dahl cared to comment on the results.

Mr. Dahl has ordered that newsboys shall not be allowed to board cars after April 15. He says that with the pay-as-you-enter cars, the conductors cannot assist boys getting on and off cars, and that the boys would inconvenience passengers by crowding through the aisles.

J. T. Ross has been selected by Mr. Dahl as engineer in his department, at a salary of $6,000 a year. A brief biography of Mr. Ross will be found elsewhere in this issue.

On the evening of March 29 a number of retail merchants met at the Chamber of Commerce to discuss the possibility of having an interurban railway station built in Cleveland. A. E. Akins, vice-president of the Cleveland, Southwestern & Columbus Railway, intimated that the attitude of the city officials under previous administrations had discouraged the interurban railways from investing in Cleveland. E. W. Moore, president of the Lake Shore Electric Railway, said that the time had come for the railways, the city and the merchants to co-operate in the construction of the depot, and that he was ready to pledge two or three companies to further the project. He favored a central location for the station, possibly on the Public Square. The interurban railways now pay $26,000 a year in rentals in the city. Henry J. Davies, secretary of the Cleveland Railway, stated that it would be impossible for his company to help finance the station on account of the extraordinary expenditures for reconstruction which it would have to make. H. H. Johnson, a lawyer, expressed regret that provision was not made in the Tayler settlement for the Cleveland Railway to participate in this work.

Victor W. Sincere, general manager of The Bailey Company, which operates a department store in Cleveland, proposed that the merchants take the lead in financing a company to build a station. An office structure could be erected in connection with the terminal and be so managed as to return a profit on the investment. N. L. Dauby, of The May Company, which also operates a department store, indorsed Mr. Sincere's proposal. C. W. Burrows, chairman of the retail merchants' board of the Chamber of Commerce, will appoint a committee to canvass the matter and consider locations for the station. The condition of the Superior viaduct, over which the Lake Shore Electric Railway and the Cleveland, Southwestern & Columbus Railway operate into the business section of the city, will be considered carefully. It may be necessary to stop cars on the west side of the Cuyahoga River until this viaduct is replaced or repaired. This work, however, would probably be carried out before a station could be completed.

On April 4, 1910, Mr. Baker rendered an opinion to Mayor Baehr that Cleveland could not enforce a transfer provision in the East Cleveland grant to the Cleveland Railway which would give everybody a right to ride to Collinwood and Euclid Beach for 3 cents, even if the City Council should force the company to route all Euclid Beach cars by way of East Cleveland. The East Cleveland ordinance referred to by Smith, Taft & Arter, attorneys for the Humphrey Company, owners of Euclid Beach, was made for the benefit of East Cleveland people and not for Collinwood or East Cleveland. Whatever rights East Cleveland may have with respect to transfers to Collinwood and Euclid Beach, those rights could hardly be worked out through the medium of intervention by the city, according to Mr. Baker.

Appraisals to Be Arbitrated in Detroit

At a meeting of the committee of 50 in Detroit on March 28, 1910, it was resolved, for the purpose of adjusting the difference between the estimate of the value of the property of the Detroit United Railway made by the subcommittee on appraisals and the value placed by the company on its property, to submit the matter to a board of arbitration to consist of three members, one to be chosen by the committee, one by the Detroit United Railway and the third by the other two. The committee has accepted without approval the report of the sub-committee on appraisals. The report will be referred to the arbitration board. Judge James O. Murfin, of the Wayne County Circuit Court, has been named as a representative of the committee on the board, and it is expected that the other two members will be named very soon.

According to F. W. Brooks, general manager of the Detroit United Railway, estimates have been made by the company of the cost of reproducing the property, of the total cost of materials purchased and of the value of the property as a going concern. Mr. Brooks said that the estimate of the cost of replacing the property was $24,000,000, whereas the appraisal of the property made in the interest of the committee placed the value at about $11,000,000. The officers of the company had only been in possession of the report of the committee a few days, and were not prepared to discuss the matter in detail because they had not had sufficient time to consider the figures. Mr. Brooks is reported to have said at the meeting on March 28:

"So far as the Detroit United Railway is concerned, we know very little about the appraisal of our property in the interest of the committee of 50. Twelve or 15 months ago we were told that the committee desired to inquire into the valuations and earnings of the company. President Hutchins stated that he stood ready to give all the information desired.

"In pursuance of that promise nothing was left undone to place at the disposal of the committee of 50 all books and records of the company. We at once set 100 men at work making a report to aid in the work. We were told that as fast as each section of the appraisal was completed the company would be called in before the committee. We so understood until we read in the paper that the appraisal was completed.

"We will be glad to take up the matter of valuation now at any time. If the appraisal which has been made is the sort of appraisal outlined in the newspapers, we positively disagree with its finding. We understand that the appraisal was made of a going concern. We have 219 miles of track in the city, whereas the appraisal of the committee has reduced this trackage to 180 miles. It is evidently proposed to use the rest of this trackage without allowing us for it.

"I cannot discuss details of this appraisal because we do not know what has been done. We have not been consulted in the deliberations of the committee of 50, excepting in the matter of extensions and rearrangement of tracks. We have not seen anything of this appraisal in its progress. We stand ready to aid in a fair appraisal, but we believe we should know something of the methods that were pursued in arriving at the valuation of our property."

Petitions signed by more than 18,000 voters of Detroit have been presented to the Council, calling for a popular vote on the question of municipal ownership of the street railways in Detroit.

Hearing at Boston on Steam Railroad Electrification

The committee on metropolitan affairs of the Massachusetts Legislature gave a hearing on March 30, 1910, upon the bills for the electrification of the steam railroads in the vicinity of Boston. Representatives of public improvement associations who appeared on behalf of the bills urged electrification on the grounds of public health and comfort, convenience of travel and financial effect upon public and private property. A statement was quoted from the report of the United States Department of Commerce and Labor to the effect that the mortality from pneumonia was 50 per cent higher in cities than in rural districts on account of the unfavorable atmospheric conditions. Evidence was introduced to show that bridges within 10 miles of Boston are damaged to the extent of $100,000 a year by locomotive fumes. Many hotels were at a serious disadvantage on account of the failure of the railroads to electrify their lines. Costly railroad yards in the heart of the city could be turned to commercial account through the construction of buildings and streets above them. Electrification would help to solve the housing problem at Boston.

Mayor Fitzgerald of Boston stated that the work at New York pointed the way for Boston. He cited the growing sentiment in favor of the abolition of the steam locomotive, and concluded with the statement that no interstation tunnel would be built with his consent unless electric operation is provided to all the suburban lines for a considerable distance out of the city.

William H. Coolidge, of the Boston & Maine Railroad, agreed that electrification was a good thing in itself, but urged that it would cost $50,000,000 to electrify the suburban lines of the Boston & Maine Railroad and the New York, New Haven & Hartford Railroad at Boston. He contended that the charges upon this expenditure could not be met by the traffic, and cited the statement of C. S. Mellin, president of the New York, New Haven & Hartford Railroad, that it would cost eight to ten times as much to electrify the Boston lines as those at New York, on account of the radial character of the lines out of Boston. He urged that the railroads should be given more time to study the situation in accordance with the recommendation of the joint commissions which reported to the General Court upon the matter in January, 1910.

Melvin O. Adams, president of the Boston, Revere Beach & Lynn Railroad, the gage of which is 3 ft., asked that his system be excluded from the bills, as the cost of electrifying the road, $1,250,000, would be prohibitive.

E. A. Whitman, for the Boston & Albany division of the New York Central & Hudson River Railroad, stated that the cost of the suburban traffic on the Newton circuit exceeded the revenue by $200,000 per year. An expenditure of $4,500,000 for electrification would be unwarranted. The Massachusetts public must decide between wharf and dock improvements and electrification. Nothing should be done until the art was further advanced.

Brooklyn Companies Submit Subway Proposal

The Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad, in a communication to the Public Service Commission and the Board of Estimate and Apportionment on April 6, 1910, applied for the use of the proposed Canal Street subway, offering to run surface cars from all parts of Brooklyn and some sections of

Queens over the Manhattan Bridge and through the proposed subway to West Street, Manhattan, for a uniform fare of 5 cents. In a statement which it made public on April 6 the Brooklyn Rapid Transit Company said in part:

"The Canal Street subway should not be confused with the Center Street subway, which has already been built, and which is designed for the exclusive use of high-speed elevated or subway trains. The application of the company says:

"'This proposed agreement will accomplish all that has been suggested with reference to the extension of Brooklyn transportation routes over a reasonable distance in Manhattan, will furnish cheaper transportation considering the distance over which the passenger is privileged to ride than has been offered by any other railroad, and will obviate the necessity of a change of cars and an 8-cent fare such as will be the result of granting the application of the Manhattan 3-cent line now pending before your Board. We feel that it is due to the greater part of Brooklyn which all lines serve that these suggestions should be laid before you, and we respectfully request that the matter of our application be no longer delayed.'

"The two roads also offer to operate a 3-cent service upon the Manhattan Bridge similar to the arrangements now in effect upon the Brooklyn and Williamsburg bridges. They say that their operation of surface cars through the Canal Street tube will not interfere with the operation of any elevated or subway trains that the Board of Estimate or Public Service Commission might also wish to conduct through it."

It is stated that the Interborough Rapid Transit Company will submit to the Public Service Commission an amended plan for the construction of new subways in New York as a result of the conferences which have been held recently between T. P. Shonts, president of the Interborough Rapid Transit Company, Mayor Gaynor and Chairman Willcox, of the Public Service Commission.

The rapid transit committee of the Board of Estimate & Apportionment of New York held a public hearing on April 4, 1910, in the City Hall, to listen to suggestions concerning subway developments in the city. Many property owners and representatives of civic organizations from each of the boroughs attended. The demand of each of these borough groups was that their respective boroughs should be favored in the planning of new subways. It was estimated that if all the suggestions made at the hearing were carried out the city would be committed to an expenditure of $800,000,000 for new subways. The Mayor said that while he would agree to the use of the city's credit for the building of trunk lines the construction of out-of-the-way routes would have to be paid for by the property owners benefited by the improvement. Another hearing is to be held on April 11, 1910.

Chairman Willcox, of the Public Service Commission, has announced that the public hearings required by the law on the forms of contracts which have been prepared for the Broadway-Lexington Avenue route in Manhattan, the Broadway-Lafayette route in Brooklyn, the Fourth Avenue (Brooklyn) extensions and the Canal Street crosstown line will probably be begun in less than three weeks. Mr. Willcox said yesterday that the advertisements calling the hearings, which must appear for two weeks, would undoubtedly be published during the week commencing on April 11. Mr. Willcox said: "The entire cost of construction of these lines is estimated to be more than $100,000,000. While there are more than 20 rapid transit routes already laid out by the Rapid Transit Commission and the Public Service Commission, which have received the approval of the Board of Estimate and Apportionment and for which consents have been obtained the commission has deemed it advisable to press work upon the lines. After this work is started other routes will be taken up and considered."

Annual Meeting of the Society for the Promotion of Engineering Education.—The annual meeting of the Society for the Promotion of Engineering Education will be held at Madison, Wis., on June 23, 24 and 25. Particulars of the meeting and of the general work of the society can be secured from the secretary, Prof. H. H. Norris, Ithaca, N. Y.

Pennsylvania Tunnels Discussed.—At a meeting of the American Society of Civil Engineers held in New York on April 6, 1910, at 8:30 p.m., the following papers, which were illustrated with lantern slides, were discussed: "The New York Tunnel Extension of the Pennsylvania Railroad: The Terminal Station West," by B. F. Cresson, Jr., and "The New York Tunnel Extension of the Pennsylvania Railroad: The Bergen Hill Tunnels," by F. Lavis. These papers were printed in the proceedings of the society for February, 1910.

List of Officers and Member Lines of the Central Electric Railway Association.—A. L. Neereamer, secretary-treasurer of the Central Electric Railway Association, issued under date of March 31, 1910, in accordance with a resolution of the executive committee, adopted on Jan. 26, 1910, a list of the officers and member lines of the association for 1910. The list is arranged alphabetically, according to the name of the company. Mr. Neereamer requests that all changes in the list be communicated to him promptly so that it can be kept correct to date.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—The Maryland Public Utilities bill has passed the House of Delegates at Annapolis by a vote of 95 to 3. Out of the four measures that were considered in the committee room, the Straus bill was the only one that was favorably reported upon. The amendments, of which there are nearly 40, were added with the drafter's consent and are stated not to modify essentially the workings of the original measure. Strong opposition to the bill is expected in the Senate. The bill is now in the hands of the Senate committee on finance. It is said that there is a division of opinion in this committee and that on several occasions the vote has been 4 to 4.

Massachusetts.—In addition to the hearings upon electrification, the Boston Elevated Railway holding bill, and the Boston & Eastern tunnel hearings have been resumed on the bills to permit the New York, New Haven & Hartford Railroad to develop electric railways in the Berkshire district at a cost of about $2,000,000. There is very little opposition to the bill, but it has been held back by a report of the Railroad Commission about a year ago which advised against allowing steam railroads to control electric railways in Massachusetts. Advocates of the measure contend that private capital cannot be secured to develop the needed facilities, but that roads built by the New York, New Haven & Hartford Railroad could be made profitable by being constructed with a view to serving the steam railroad as feeders.

New Jersey.—A bill has been introduced in the Senate to amend the new public utility law in accordance with views expressed by Governor Fort. The Governor in signing the bill said that power should be given the commission to fix rates upon complaint of a municipal board or a given number of citizens. The amendments provide that orders of the commission for continuance of service shall be effective immediately; other orders to be effective at the end of 30 days. Appeals from orders may be made to the Supreme Court, but appeals shall not operate to suspend orders except where the Supreme Court so directs. A penalty of $100 a day is imposed for failure to comply with the commission's orders. The representatives of many municipalities opposed the bill to provide for the elimination of grade crossings on railroads, on the basis of a payment of 65 per cent of the cost by the railroads affected and 35 per cent by the municipalities, at the hearing on March 29 before the judiciary committee of the Senate. Two strike arbitration bills have been introduced. One of the bills provides that the Governor shall appoint three commissioners or that the employers affected may name a member of the board, the employees a member and the Governor the third member. Either commission is to have the power to subpœna and swear witnesses, and its decision is to be binding. The expenses are to be paid by the State. The dispute over the question of the revaluation of railroad property seems likely to end in the passage of a bill putting the matter in the hands of the State Board of Assessors, with $50,000 for the work, the reappointment to be completed within a year.

Ohio.—Representative Frank W. Woods has prepared a substitute for his original public utilities bill, and it was passed by the House on March 30 by a vote of 91 to 16. A digest of the principal provisions of the bill is published on page 669 of this issue.

Financial and Corporate

New York Stock and Money Market

April 5, 1910.

The stock market presents to-day the anomalous condition of developing strength on a situation which was taken to mean further depression. Since April 1, New York has shipped to London $7,650,000, and it is believed that before the movement is over this market will lose at least $25,000,000. In spite of this the money market remains easy. There continues to be brisk trading in Interborough-Metropolitan with prices practically unchanged.

Money to-day was quoted: Call, 2¾ to 3 per cent; 90 days, 4 per cent.

Other Markets

The dissolution of the Philadelphia strike has relieved the pressure to sell and important local issues have advanced.

There was no market in Chicago to-day, owing to the election. During the past week there has been little trading in traction shares. Yesterday a few shares of Chicago Railways Series 1 sold at 100, several points decline from the last sale.

In the Boston market there continues to be trading in Massachusetts Electric and Boston Elevated. The former has advanced slightly while the latter has declined.

In addition to the usual liberal sales of the bonds of the United Railways Company, there have been traded in during the past week, in the Baltimore market, a few small blocks of the stock at about 13.

At the auction sale of securities in New York last week, $10,000 5 per cent bonds of the Kansas City Western Railway were sold at 83⅜.

Quotations of various traction securities as compared with last week follow:

	Mar. 29.	April 5.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	128	126
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	a76	a76
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a46	a46
Brooklyn Rapid Transit Company	77	77¼
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84⅛	84¼
Capital Traction Company, Washington	a133	a133
Chicago City Railway	a185	*185
Chicago & Oak Park Elevated Railroad (common)	*3½	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a106	*106
Chicago Railways, ptcptg., ctf. 2	a33	*33
Chicago Railways, ptcptg., ctf. 3	a16	*16
Chicago Railways, ptcptg., ctf. 4s	89	*9
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76½	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a106½	a104½
Detroit United Railway	*65	63
General Electric Company	150	150⅛
Georgia Railway & Electric Company (common)	109½	110
Georgia Railway & Electric Company (preferred)	a90	a87
Interborough-Metropolitan Company (common)	22¾	27⅞
Interborough-Metropolitan Company (preferred)	58¼	58⅜
Interborough-Metropolitan Company (4½s)	81¼	81
Kansas City Railway & Light Company (common)	28	*28
Kansas City Railway & Light Company (preferred)	a78	*78
Manhattan Railway	136⅞	136½
Massachusetts Electric Companies (common)	a18	a18
Massachusetts Electric Companies (preferred)	84	a85½
Metropolitan West Side, Chicago (common)	a16½	*16½
Metropolitan West Side, Chicago (preferred)	a52	*51¼
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	76½	*76½
Northwestern Elevated Railroad (common)	a16	*15
Northwestern Elevated Railroad (preferred)	a68	*68
Philadelphia Company, Pittsburg (common)	a51¼	a50½
Philadelphia Company, Pittsburg (preferred)	a44½	a43
Philadelphia Rapid Transit Company	a21½	a22⅝
Philadelphia Traction Company	a87	a87¼
Public Service Corporation, 5 per cent col. notes	*100⅛	*100⅛
Public Service Corporation, ctfs	a105½	a104½
Seattle Electric Company (common)	a114	a114½
Seattle Electric Company (preferred)	a102	103
South Side Elevated Railroad (Chicago)	a53	*52½
Third Avenue Railroad, New York	6½	7¼
Toledo Railways & Light Company	11	10¼
Twin City Rapid Transit, Minneapolis (common)	115¼	*115¼
Union Traction Company, Philadelphia	a49¼	a49⅞
United Rys. & Electric Company, Baltimore	a13⅝	13
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*67	*67
Washington Ry. & Electric Company (common)	a39½	a39
Washington Ry. & Electric Company (preferred)	a91	a91¼
West End Street Railway, Boston (common)	a92	a89½
West End Street Railway, Boston (preferred)	a106	83
Westinghouse Elec. & Mfg. Company	64	66½
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

aAsked. *Last Sale.

Annual Report of the Washington Railway & Electric Company

Earnings of the Washington Railway & Electric Company and its subsidiary companies make the following comparison for the last three years:

Year ended Dec. 31:	1909.	1908.	1907.
Gross earnings from operation	$4,080,063	$3,720,573	$3,385,748
Operating expenses	2,110,578	1,856,170	1,748,752
Net earnings from operation	1,969,485	1,864,403	1,636,996
Miscellaneous income	10,602	37,525	42,353
Gross income, less op'ting exp	1,980,087	1,901,928	1,679,349
Fixed charges—			
Taxes	200,027	183,385	170,029
Interest	1,030,265	994,106	937,199
Total	$1,230,292	$1,177,491	$1,107,228
Surplus	$749,795	$724,437	$572,121
Operating expenses — percentage of gross earnings	51.73	49.89	51.66

The surplus revenues in 1909 were applied in part to the needs of the companies in which they originated, instead of being carried directly to the profit and loss account of the Washington Railway & Electric Company. The disposition of this amount is indicated as follows: Potomac Electric Power Company: Sinking fund requirements, $54,000; amortization of discounts, $5,628; loss on second-hand apparatus sold during year, $29,646; reserve for depreciation, $15,000; to profit and loss, $27,111.

Other subsidiary companies: Depreciation of equipment, $8,722; to profit and loss, $42.

Washington Railway & Electric Company: Depreciation on equipment, $51,278; dividends, 5 per cent on preferred stock and 1 per cent on common stock, $490,000; to profit and loss, $68,368.

The aggregate charge on account of depreciation on equipment of the railway properties is $60,000. No details of operating expenses are published in the report.

Changes in the last three years, as compared with the preceding years, were as follows:

	1907, Increase over 1906.	Per cent.	1908, Increase over 1907.	Per cent.	1909, Increase over 1908.	Per cent.
Gross earnings from operation	$252,508	8.06	$334,825	9.88	$359,490	9.66
Operating expenses	135,656	8.41	107,418	6.14	*a*254,408	13.71
Net earnings from operation	116,852	7.69	227,407	13.90	105,082	5.63
Miscellaneous income	*2,242	*5.03	*4,828	*11.40	*b*26,923	*71.75
Gross income less operating expenses	114,609	7.33	222,579	13.25	78,159	4.11
Fixed charges	66,110	6.35	70,263	6.35	52,801	4.48
Surplus earnings	$48,499	9.26	$152,316	26.62	*c*$25,358	3.50

*Decrease. *a.* Includes renewals of track charged in 1908 to surplus income. *b.* Excludes items now classified under gross earnings from operation. *c.* If track renewals had been included in operating expenses in 1908, the increase in surplus earnings that year over 1907 would have been $53,492 and the increase in 1909 over 1908 $124,181.

Clarence F. Norment, the president, states in the report: "If allowance is made for the difference in the classification of items, as indicated in the foot notes to the foregoing tabulated statement, it will be seen that the volume of increase in gross earnings was slightly greater than in the previous year. The large influx of visitors attracted by the inauguration and by popular interest in the special session of Congress, created unusually satisfactory traffic conditions during the first half of the year. Some of the exceptional business taken on during 1908 also favorably affected the earnings during the earlier portions of 1909.

"Operating expenses, after allowing for the difference in the classification, showed a ratio of increase of 7.95 per cent as compared with 8.85 per cent in all earnings. As, in the previous year, the expenditures for maintenance of track and roadway, buildings, electric lines and equipment, were very heavy and the physical condition of your properties is steadily improving in consequence.

"Pursuant to the terms of a contract with the Washington, Baltimore & Annapolis Electric Railway, the tracks of your Columbia division were reinforced with concrete beams at an expense of $174,585. The cost of this work, plus 5 per cent interest, will be reimbursed to the company by the Washington, Baltimore & Annapolis Electric Railway in 30 semi-annual payments beginning July 1, 1910. It is the purpose of that company to equip its line with

lighter rolling stock, which we propose operating on the Columbia division as far as the treasury."

The total increase in passenger revenue in 1909 as compared with 1908 for all the railways in the system was 7.41 per cent. In the previous year the corresponding gain was 6.54 per cent and in 1907 it was 4.60 per cent.

Boston Elevated Railway Presents Holding Bill

The Boston Elevated Railway filed a bill with the committee on street railways of the Massachusetts Legislature on March 29 which provides for the acquisition by the company of connecting and intersecting street railways, electric railroads or elevated railways through the purchase of securities. By the exercise of the holding principle the company plans to extend operation to all the important lines in eastern Massachusetts by forming a single system of administration covering more than 1700 miles of track, with annual gross earnings of $23,000,000, and a present service of 83,000,000 car miles per year. The bill provides that all security issues are to be supervised by the Railroad Commission; that no stock is to be sold without the approval of the commission; that the lines of the West End Street Railway or any other street railway hereafter organized and built within the territory occupied by the Boston Elevated Railway are not to fall within the bill's authorization; that power and traffic contracts are to be subject to the approval of the Railroad Commission, and that the company shall pay a franchise tax only upon its own shares. Frederic E. Snow, of counsel for the company, reiterated the general advantages of the bill. Massachusetts was committed to the policy of consolidation, but the Boston Elevated Railway could not enter a formal merger because its charter guaranteed a 5-cent fare on its lines, and the rental of the East Boston tunnel was based upon the earnings of all street railways owned, leased or operated by the company. In some cases the fares would be decreased, while in others they would remain stationary, for the company was carrying passengers as far as it profitably could for 5 cents.

Belton & Temple Traction Company, Belton, Tex.—The Federal Court at Waco, Tex., has ordered the sale of the property of the Belton & Temple Traction Company under foreclosure on May 3, 1910. The sale will be made by W. G. Haag, Temple, as special master, and he will report the sale to the court for confirmation on June 11, 1910.

Camden & Trenton Railway, Camden, N. J.—The sale of the property of the Camden & Trenton Railway under foreclosure to Henry W. Thompson, Jr., representing the bondholders' committee, as announced in the Electric Railway Journal of March 26, 1910, has been confirmed by the United States Court at Trenton.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The $705,000 of first mortgage consolidated bonds of the Cleveland, Southwestern & Columbus Railway, which were pooled by the owners on Feb. 1, 1907, with a committee consisting of J. R. Nutt, George N. Chandler and F. E. Myers, are being delivered in exchange for the pooling certificates at the office of the Citizens' Savings & Trust Company, Cleveland, the agreement under which the bonds were pledged having expired.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—E. W. Clark & Company, Philadelphia, Pa., announced on March 31, 1910, that the plan for having the Commonwealth Power, Railway & Light Company take over the Commonwealth Power Company, Grand Rapids-Muskegon Power Company, Saginaw-Bay City Railway & Light Company, Grand Rapids Railway, Michigan Light Company, Flint Electric Company, Flint Gas Company, Cadillac Water & Light Company, Charlotte Electric Company, Shiwassee Light & Power Company and the Au Sable River Property and Rights had been declared operative, and that the new securities would probably be delivered by April 15, 1910. According to the plan for the organization of the Commonwealth Power, Railway & Light Company announced in the Electric Railway Journal of Jan. 8, 1910, the company is capitalized at $18,000,000, of which $6,000,000 is preferred stock and $12,000,000 common stock.

Dartmouth & Westport Street Railway, New Bedford, Mass.—The Dartmouth & Westport Street Railway has petitioned the Railroad Commission for permission to issue at $150 a share stock amounting to $237,500, par value, to pay for a new freight terminal house, a car storage house, improvements at Lincoln Park, new rolling stock and feeder improvements.

Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Ia.—It is stated that negotiations are being conducted for the sale of the Crooked Creek Railroad to the Fort Dodge, Des Moines & Southern Railroad. The Crooked Creek Railroad extends from Lehigh to Webster City, a distance of 18 miles, and is operated by steam.

Fort Smith Light & Traction Company, Fort Smith, Ark.—An initial dividend of 1¼ per cent has been declared on the $650,000 of 5 per cent preferred stock of the Fort Smith Light & Traction Company, payable on April 15, 1910, to holders of record on April 1, 1910, out of the earnings of the company for the quarter ended March 31, 1910. Dividends on the stock are cumulative from Jan. 1, 1907.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—The property of the Gray's Harbor Railway & Light Company has been acquired by Sanderson & Porter, New York, N. Y.

Interstate Railways, Philadelphia, Pa.—The Interstate Railways has leased to the Reading Transit Company the Schuylkill Valley Traction Company; the United Traction Company, of Reading; the Oley Valley Railway; the Neversink Mountain Railway; the Metropolitan Electric Company; the Lebanon Valley Street Railway, and the Edison Electric Illuminating Company, Lebanon. The transaction leaves the Interstate Railways with only the Trenton Street Railway, the Wilmington & Chester Traction Company and the Delaware County & Philadelphia Railway.

Joplin & Pittsburg Railway, Pittsburg, Kan.—E. H. Rollins & Sons, New York, N. Y.; N. W. Harris & Company, New York, N. Y., and Boston, Mass., and the Harris Trust & Savings Bank, Chicago, Ill., offer for subscription at 97 and interest the unsold portion of $1,750,000 of first mortgage 5 per cent gold bonds of the Joplin & Pittsburg Railway, dated March 1, 1910, and due March 1, 1930, but redeemable at 103 and interest on any interest date.

Meridian Light & Railway Company, Meridian, Miss.—Henry L. Doherty & Company, New York, N. Y., have purchased practically all of the outstanding capital stock of the Meridian Light & Railway Company, consisting of $702,400 of common stock and $163,000 of 6 per cent preferred stock and will spend $200,000 in extending and improving the property.

Metropolitan Street Railway, New York, N. Y.—The *Wall Street Journal* says that since the New York City Railway passed into the hands of receivers in September, 1907, there has been a total default of $17,725,699 in interest and cumulative dividends on the bonds and stocks of companies in the Interborough-Metropolitan System. The amount in default on the stocks and bonds of the Metropolitan Street Railway and the Third Avenue Railroad is placed at $12,236,899 and the amount in default on the stock of the Interborough-Metropolitan Company at $5,488,800. These amounts do not include rentals on various subsidiary companies which have been discontinued owing to the lack of funds. A summary of the expenditures for reconstruction shows that this work has cost $8,385,000.

Philadelphia & Western Railway, Philadelphia, Pa.—It is stated that E. B. Smith & Company, Philadelphia, Pa., have purchased the Philadelphia & Western Railway.

Topeka (Kan.) Railway.—William B. McKinley and his associates in the Illinois Traction Company have secured control of the Topeka Railway through the purchase of the stock of E. W. Wilson, president of the company, and the Wilson estate.

Washington (Ind.) Street Railway.—The Burns Construction Company, Chicago, Ill., has purchased the Washington (Ind.) Street Railway, and will operate the road in connection with a line which it is building from Indianapolis to Evansville by way of Washington.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—The unsold portion of an issue of $1,300,000 of first mortgage 5 per cent gold bonds of the Waterloo, Cedar Falls & Northern Railway is offered for subscription at 97 and interest by McCoy & Company, Chicago, Ill.

Traffic and Transportation

Order for Increased Service on the Elevated Lines in New York

The Public Service Commission of the First District of New York adopted on April 5, 1910, the following final order directing the Interborough Rapid Transit Company to increase the service on all the elevated lines in Manhattan and the Bronx:

"Ordered: 1. That the Interborough Rapid Transit Company provide service daily on all elevated express and local tracks by operating trains in both directions past every station so as to furnish during each half-hour period, beginning at the even hour or half-hour, either:

"(a) A number of seats at least equal to the number of passengers; or,

"(b) The maximum number of trains and cars that can be operated with the elevated cars now and hereafter owned and equipped.

"II. That the interval of time between all trains operated shall be daily, except on Sundays and holidays, as follows:

"1. On the Ninth Avenue line, southbound, past Fiftieth Street:

"(a) Not more than a 4-minute interval between trains from 6 a. m. to 7 p. m.

"(b) Not more than a 6-minute interval between trains from 7 p. m. to 11 p. m.

"(c) Not more than a 10-minute interval between trains from 11 p. m. to 6 a. m.

"2. On the Sixth Avenue line (excluding Fifty-eighth Street trains), southbound, past Fiftieth Street:

"(a) Not more than a 4-minute interval between trains from 7 a. m to 6:30 p. m.

"(b) Not more than a 5-minute interval between trains from 6:30 p. m. to 11 p. m.

"(c) Not more than a 10-minute interval between trains from 11 p. m. to 7 a. m.

"3. On the Third Avenue line, southbound, past Thirty-fourth Street:

"(a) Not more than a 2-minute and 24-seconds interval between trains from 6:30 a. m. to 7 p. m.

"(b) Not more than a 3-minute interval between trains from 7 p. m. to 11 p. m.

"(c) Not more than a 6-minute and 40-seconds interval between trains from 11 p. m. to 6:30 a. m.

"4. On the Second Avenue line, southbound, past Thirty-fourth Street:

"(a) Not more than a 4-minute interval between trains from 6 a. m. to 7 p. m.

"(b) Not more than a 6-minute interval between trains from 7 p. m. to 11 p. m.

"(c) Not more than a 6-minute interval between trains from 11 p. m. to 12:15 a. m. and from 5 a. m. to 6 a. m.

"And it is further ordered, that this order shall take effect on April 11, 1910, and remain in force until modified or revoked; and it is further ordered, that within five days after service upon it of a copy of this order said Interborough Rapid Transit Company shall notify the Public Service Commission for the First District whether the terms of this order are accepted and will be obeyed."

Pay-As-You-Enter Service in Cincinnati

The service begun by the Cincinnati (Ohio) Traction Company on its Vine and Clifton and Vine and Norwood lines on March 1, 1910, with pay-as-you-enter cars, built under license from the Pay-As-You-Enter Car Corporation, has proved very successful and the cars have received the endorsement of the newspapers. One paper even conducted a contest among its readers by offering a prize of $5 for the best short name for the cars. The successful name, "Pay-Enter," was suggested by 49 different people.

The company naturally made the most of the favorable comments in the press, but the success of the cars is due largely to the campaign of education for the benefit of the public and its employees which the company conducted previous to installing the cars. The rules for the guidance of conductors and motormen were so arranged as to cover briefly the position of the conductor, the position of the motorman, the collection of fares, furnishing change, baggage, blockades, employees' tickets, etc. These rules were introduced with a statement of three important results which it was sought to accomplish with the cars as follows:

"1. The prevention of accidents through the starting of cars while passengers are in the act of boarding or alighting.

"2. Facilitating the collection of fares and enabling the conductor to give more complete attention to the operation of his car.

"3. Increasing the comfort of passengers by doing away with the necessity of having conductors push and crowd passengers in cars while collecting fares."

The principal notice to the public was a circular printed on newspaper 4 in. wide by 6½ in. high, at the top of which was a diagram of a pay-as-you-enter car showing the seating and platform arrangements. The company also introduced this circular with a statement of the three principal reasons for adopting the cars, worded substantially the same as in the circular to the employees. The circular then continued:

"It is believed that the above results will be fully realized if the company can have the cooperation of the patrons of these lines in the observance of a few simple rules, as follows:

"1. Passengers are requested to have exact amount of fare ready.

"2. Passengers will enter only by rear platform at point marked 'entrance' on car and follow the direction of the arrow on the above drawing.

"3. Passengers will deposit exact amount of cash fare or ticket in fare box and pass into car through the entrance door.

"4. Transfers will be handed unfolded to conductors and not deposited in fare box.

"5. Passengers needing change will receive the full amount from the conductor, out of which passengers will deposit fare in fare box.

"6. Transfers will be asked for at time of depositing fare in fare box.

"7. Passengers desiring change or transfers are requested kindly to allow those with exact fare and not needing transfers to pass in first, thus facilitating the movement into the car.

"8. Conductors are not required to change bills of larger denomination than $2.

"9. Standing on rear platform will not be allowed, but smokers will be allowed to stand on front platform.

"10. No baggage or bundles will be allowed on the platform. If too bulky to be taken inside, baggage will not be allowed to be taken on car.

"11. Passengers desiring to leave car will use front door as far as possible. If car is full, those near rear may leave by rear exit door."

Pay-as-You-Enter Cars in Rochester.—The New York State Railways, Rochester Lines, placed 25 pay-as-you-enter cars, built under license from the Pay-as-You-Enter Car Corporation, in operation on its East and West Main Street line on April 1, 1910.

Collision on Ohio Electric Railway.—As a result of a head-on collision between an eastbound passenger car and a westbound express car on the Ohio Electric Railway west of Convoy, Ohio, on March 27, 1910, two men were killed and three injured. Two coaches were destroyed by fire.

Freight Rights Approved in Massachusetts.—The Railroad Commission of Massachusetts has approved the petition of the Interstate Consolidated Street Railway to carry freight and baggage in Seekonk, and of the Milford, Attleboro, & Woonsocket Street Railway for the same privilege in Franklin.

New Limited Service Between Fort Worth and Dallas.—The Northern Texas Traction Company has issued a folder, in which a new limited service is announced between Fort Worth and Dallas. This additional service makes 63 passenger trains daily between these cities. The company has also issued a series of postal cards in colors which show views along its line.

Increase in Wages on West Penn Railways.—An increase of one cent an hour in the wages of its conductors and motormen was announced, beginning April 1, 1910, by the West Penn Railways. This applies to one, two, three and four-year motormen and conductors. Hereafter the scale of wages will be 24, 25, 26 and 27 cents per hour, instead of 23, 24, 25 and 26 cents per hour.

Change in Freight Rates on New York Line.—On May 1, 1910, the Lima & Honeoye Electric Light & Railroad Company, Lima, N. Y., will reduce the rate per 100 lb. from 11 cents to 8 cents between Lima and East Buffalo on sheep and calves. At the same time the company will increase the rate on hogs from 9 cents to 10 cents per 100 lb., and will also increase the rate on cattle from 7½ cents to 10 cents.

From Louisville to South Bend.—A car containing 35 delegates to the meeting of the Central Electric Railway Association at South Bend, Ind., on March 24, was operated between Louisville and South Bend under the direction of Martin J. Insull, general manager of the Louisville & Northern Railway & Lighting Company and operating manager of the Indianapolis, Columbus & Southern Railway. The distance is 300 miles, and the running time was less than 11 hr. The route was over the tracks of the Louisville & Northern Railway & Lighting Company to Columbus and over the Indianapolis, Columbus & Southern Railway to Indianapolis. From Indianapolis to Peru the car was operated over the line of the Indianapolis Traction Company; from Peru to Goshen over the Winona Interurban Railway, and from Goshen to South Bend over the Chicago, South Bend & Northern Indiana Railway. Mr. Insull hopes to establish a regular service between Louisville and South Bend.

Decision by Michigan Supreme Court in Detroit Fare Case.—The Supreme Court of Michigan has decided against the Detroit (Mich.) United Railway in the suit to determine whether the company has the right to charge a 10-cent fare on its Jefferson Avenue line to Fairview. The city ordinance of 1889 required that passengers should be conveyed to any point within the city limits of Detroit. The Detroit United Railway contended that it occupied the position of an assignee of the Grosse Pointe Railway, and that it is not, as to the railway in the former village of Fairview, an assignee of the Detroit City Railway. The Supreme Court holds that: "The case presented does not involve in this view an interference with any vested right of the company, as the assignee of the Fairview Railway, but resolves itself simply into a question of the construction of the ordinance, and we construe the ordinance to include any street railway constructed or purchased by the Detroit United Railway which shall be within the city of Detroit as the limits of said city may from time to time be fixed by the Legislature."

Anti-Spitting Crusade in Syracuse.—The Beebe Electric Railway System, Syracuse, N. Y., is conducting an anti-spitting campaign upon its lines. For some time the company has carried signs in its cars, stations, waiting-rooms and shelter buildings, declaring that spitting upon the floor was forbidden and punishable by a fine of $50 "by order of the State Board of Health." A recent investigation showed that the State Health Law afforded the company no protection. As a result it was found necessary to ask each city that had no anti-spitting ordinance and some 50 villages and townships to adopt a uniform ordinance prohibiting spitting, and providing a fine of $5. Little difficulty in securing the cooperation of the various boards of health has been encountered ,and within a month the ordinances will be effective over every line in the Beebe system. As soon as the ordinances have all been enacted the companies propose to have their special officers ride on the cars and arrest offenders, who will be prosecuted vigorously. As soon as the campaign was determined upon the management requested the support of each daily and weekly newspaper in the territory served by the company. As a result the campaign was given considerable publicity, and the way was paved for the adoption of the desired ordinances without opposition. In order that patrons might have no excuse for expectoration upon the floors of the cars, all cars have been equipped with cuspidors, which are changed at the end of every round trip.

Personal Mention

Mr. W. H. Burk has been elected treasurer and auditor of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., to succeed Mr. E. A. Boggs, resigned.

Mr. S. S. Straub has resigned as superintendent of the Schuylkill & Dauphin Traction Company, Harrisburg, Pa., to enter the manufacturing field at Anderson, Ind.

Mr. S. S. De Camp has resigned as master mechanic of the Rockford & Interurban Railway, Rockford, Ill., and Mr. Charles Winter has been appointed to succeed him.

Mr. F. W. McAssey has resigned as superintendent of the Rockford & Interurban Railway, Rockford, Ill., and Mr. Walter B. Page has been appointed to succeed him.

Mr. A. B. Clinger, assistant master mechanic of the Saginaw Bay City Railway & Light Company, Saginaw, Mich., has accepted the position of master mechanic of Toledo & Western Railroad, Toledo, Ohio.

Mr. James K. Gray has resigned as superintendent of the lines of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, in Mansfield, Ohio, to accept a position with the Illinois Traction Company, with headquarters at Decatur, Ill.

Mr. J. F. Turner, for several years assistant superintendent of the northern division of the Pacific Electric Railway, Los Angeles, Cal., has assumed the position of superintendent of the Fresno (Cal.) Traction Company, to succeed Mr. C. B. Jackson, resigned.

Mr. Leslie R. Coffin has been appointed acting manager of the Whatcom County Railway & Light Company to succeed Mr. L. H. Bean, who, as announced in the Electric Railway Journal of March 26, 1910, has been appointed manager of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company, Tacoma, Wash.

Mr. Charles Winter has been appointed master mechanic of the Rockford & Interurban Railway to succeed Mr. S. S. De Camp, resigned. Mr. Winter was for a number of years general foreman of the Metropolitan West Side Elevated Railroad, Chicago, Ill., and spent several years in expert work on automatic car controls for the Westinghouse Electric & Manufacturing Company.

Mr. Walter B. Page has been appointed superintendent of the Rockford & Interurban Railway, Rockford, Ill., to succeed Mr. F. W. McAssey, resigned. Mr. Page has had a long experience in the roadway and transportation departments of the Erie Railroad; New York, Ontario & Western Railroad; Lackawanna & Wyoming Valley Railway, passing through the grades of brakeman, conductor and train dispatcher. He was until recently trainmaster of the Interurban Railway, Des Moines, Ia.

Mr. Stephen Ridlen was appointed general ticket and freight agent of the Indianapolis, Crawfordsville & Western Traction Company, Crawfordsville, Ind., effective on April 1, 1910. Mr. Ridlen has been connected with steam railroads in various capacities for 23 years. He was with the Cincinnati, Hamilton & Dayton Railroad for seven years and for the last 16 years has been connected with the Chicago, Indianapolis & Louisville Railway. Mr. Ridlen acted as agent of the Chicago, Indianapolis & Louisville Railway at Crawfordsville, Ind., for two years prior to his appointment to the Indianapolis, Crawfordsville & Western Traction Company.

Mr. B. J. Fallon, whose appointment as assistant general manager of the Metropolitan West Side Elevated Railway was announced in the Electric Railway Journal of April 2, 1910, was graduated from De La Salle Institute, Chicago, Ill., in 1898, and began work with the Chicago, Burlington & Quincy Railroad as a rodman. In the succeeding years, until 1907, he advanced from rodman to division engineer, and for five years of that period was superintendent of track elevation for the Chicago, Burlington & Quincy Railroad. In 1907 he was appointed engineer of maintenance of way of the Metropolitan West Side Elevated and now as assistant general manager of the company will give his attention particularly to the track, rolling stock and power departments.

Mr. J. T. Ross has been appointed engineer to Mr. G. H. Dahl, street railway commissioner of Cleveland. Mr. Ross was born at Watertown, Wis., but concluded his education in the high school at Coshocton, Ohio. He began his railroad career as a rodman on the Coshocton Southern Railroad in 1888. Subsequently Mr. Ross was connected with the Wheeling & Lake Erie Railroad and the Cleveland Frog & Crossing Company. In the fall of 1895 he entered the employ of the Everett-Moore syndicate in Detroit. Later he had charge of the construction of the Shore Line of what is now the Cleveland, Painesville & Eastern Railway and the Lorain & Cleveland line. He was also engineer of maintenance of way of the Cleveland Electric Railway for 18 months, but in 1901 he resigned to take charge of the construction of the Detroit & Toledo Shore Line, after which he was appointed consulting engineer of the Lake Shore Electric Railway, the Northern Ohio Traction & Light Company and the Cleveland, Painesville & Eastern Railway. During the Goff-Johnson negotiations in Cleveland Mr. Ross was employed as an expert adviser by Mr. F. H. Goff. Mr. Ross will give his entire time to the duties of the new office.

Mr. L. H. McCray, whose appointment as general manager and purchasing agent of the Atlantic Shore Line Railway, Kennebunkport, Me., to succeed Mr. F. B. Kirk, was announced in the Electric Railway Journal of April 2, 1910, began his railroad work with the Winnebago Traction Company, Oshkosh, Wis., which he served in various capacities from 1904 until 1907, when he resigned as assistant foreman of the transportation department of the company to become superintendent of the Sterling, Dixon & Eastern Electric Railway, Sterling, Ill. Mr. McCray continued with the Sterling, Dixon & Eastern Electric Railway until March 15, 1908, when he was appointed trainmaster and assistant to the general manager of the Atlantic Shore Line Railway, Kennebunkport, Me. The Atlantic Shore Line Railway operates freight and passenger service over 95 miles of line.



L. H. McCray

OBITUARY

Edward Wiebenson, treasurer of the Stark Electric Railway and president of the United Banking & Saving Company, died at his home in Cleveland on April 1, 1910, after an operation for appendicitis. Mr. Wiebenson was born in Germany in 1859. He conducted a drug business in Iowa for some years, and later went into the same business in Chicago. Returning to Iowa he became a private banker at Gladbrook. Twenty years ago he went to Cleveland as secretary and treasurer of the United Banking & Savings Company, of which he later became president. Mr. Wiebenson held office in some of the companies that were organized in the interest of former Mayor Johnson.

W. W. Churchill, who resigned in the spring of 1907 as vice-president in charge of engineering of Westinghouse, Church, Kerr & Company, New York, is dead. Mr. Churchill was graduated from Cornell University in 1889 and soon after became connected with the engineering department of Westinghouse, Church, Kerr & Company, with whom he was associated for about 15 years. For that company he had charge of the engineering work of a number of important contracts. The first large undertaking of this kind was the electrical equipment of the South Station in Boston. Another contract of which he had engineering charge was the erection of the Kingsbridge power station of the Third Avenue Railroad, New York, N. Y., the construction of the Lackawanna & Wyoming Valley Railway and the initial electrical equipment of the Long Island Railroad. Mr. Churchill had been in poor health for the past three years and had been living at Monroe, Wis.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Oswego, Columbus & Cherryville Electric Railway, Oswego, Kan.**—Incorporated in Kansas to build a 47-mile electric railway from Columbus to Cherryvale. Headquarters, Oswego. Capital stock, $50,000. Incorporators: S. B. Miller, Oswego; D. Christman, W. J. Jones and G. Torbert, Altamont; I. M. Hinds, Mound Valley; David Dunbar, Hallowell; C. A. Mitchell, Cherryvale, and T. F. Stice, Oswego.

***Virginia City Southern Electric Railway, Virginia City, Mont.**—Application for a charter has been made in Montana by this company to build an electric railway from the Ruby Valley branch of the Northern Pacific Railway via Ruby, Junction, Adobetown and Nevada to Virginia City, a distance of 12 miles, and from Virginia City via Ennis up the Madison Valley to Lyon, about 50 miles southeast of Virginia City. The necessary funds for making surveys and other preliminary matters have been subscribed. Power plants, car houses and principal place of business will be located in Virginia City. Capital stock, authorized, $200,000. Incorporators: Luther H. Leber, New York, N. Y.; A. J. Bennett, Karl Elling, W. A. Clark and George E. Gohn, Virginia City.

***Southwestern New York Traction Company, Bolivar, N. Y.**—Incorporated in New York to build a 20-mile electric railway from Bolivar to Wellsville. Principal office, Bolivar. Capital stock, $200,000. Directors: Charles M. Van Curen and Albert J. Matson, Bolivar; Benjamin F. Patterson, New York, and James G. Pugh, Baltimore, Md.

***City & Suburban Railway, Brooklyn, N. Y.**—Incorporated in New York to build a 23-mile electric railway in Kings, Queens and Nassau Counties from Ridgewood Reservoir, Brooklyn, to Amityville. Capital stock, $230,000. Directors: W. H. Buroughs, I. T. Platto, L. C. Neuberger and David H. Cagney, New York.

***Astoria, Pacific Coast & Southern Railway, Astoria, Ore.**—Application has been made for a charter in Oregon by this company to construct an electric railway from Astoria to Tillamook. Capital stock, $500,000. Incorporators: B. Van Duson, E. E. Gray and J. E. Higgins.

***Coos Bay Rapid Transit Company, Portland, Ore.**—Application for a charter has been made by this company in Oregon to build an electric railway to connect Marshfield, Empire, North Bend and other towns on Coos Bay. Capital stock, $1,000,000. Incorporators: L. D. Kinney, Geo. M. Everett and George W. Kitchen.

***Fairdale, Trask & Tillamook Railway, Portland, Ore.**—Application for a charter has been made in Oregon to build an electric railway from Fairdale to Tillamook. Capital stock, $10,000. Incorporators: R. Haskins, A. B. Wastell and J. H. Gearin. Headquarters, Portland.

Bryan & College Interurban Railway, Bryan, Tex.—Incorporated in Texas to build a 6½-mile gasoline motor railway between Bryan and the State Agricultural and Mechanical College at College Station. The grade for the railway is finished and the track is being laid. Capital stock, $20,000. Incorporators: W. H. Hunter, Crowley, La.; O. E. Gammell, W. E. Sounders, J. W. Doremus and J. C. Mahoney, Bryan. [E. R. J., Jan. 22, '10.]

Middle Island Railroad, Middlebourne, W. Va.—Incorporated in West Virginia to build an electric railway from Clarkesburg to Salem, Middlebourne, Shirley, Center Point, McElroy Creek, and Sistersville. Capital stock, $5,000. Incorporators: T. Moore Jackson and C. P. Stout, Clarksburg; L. M. Underwood, John F. Shore and T. P. Hill, Middlebourne. [E. R. J., April 2, '10.]

FRANCHISES

Van Buren, Ark.—Application for a franchise has been made to the City Council by the Fort Smith Light & Traction Company, Fort Smith, to build new lines over certain streets in Van Buren.

*Easton, Cal.—Hall C. Ross has applied for a franchise to build an electric railway in Easton.

Sacramento, Cal.—The City Trustees have granted a franchise to the Sacramento Electric, Gas & Railway Company to construct and operate a double-track line on Y Street from Tenth to the Riverside Road in Sacramento.

Suisun, Cal.—The Town Trustees have granted a 50-year franchise to the Vallejo & Northern Railroad, Vallejo, to construct an electric railway within the town limits. This covers the same privileges given by a similar franchise to the company two years ago, which had recently expired. Work will be commenced within six months on this projected railway from Vallejo to Sacramento via Fairfield and Woodland. [E. R. J., Mar. 5, '10.]

Woodland, Cal.—The Board of Trustees has granted the Vallejo & Northern Railway, Vallejo, a franchise to construct a railway in Woodland.

Kansas City, Mo.—The City Council has granted a franchise to the Metropolitan Street Railway to build a double-track line on Twenty-fourth Street from Main Street to McGee Street, in Kansas City. W. W. Wheatley, Kansas City, general manager.

Altoona, Pa.—The City Council has granted a franchise to the Altoona & Johnstown Street Railway, Johnstown, to build an electric railway over certain streets in Altoona. It has been approved by the Mayor. This 40-mile projected railway will connect Altoona and Johnstown. Geo. L. Holman, Johnstown, general manager. [E. R. J., March 12, '10.]

Nashville, Tenn.—Application has been made to the Council for a franchise for the Nashville Railway & Light Company to double-track its line on West End Avenue, Nashville, and to build an extension to Salem and Bosley.

El Paso, Tex.—The County Commissioners have been asked by the El Paso & Fort Hancock Electric Railway, El Paso, for an extension of one year's time in which to start construction of its 60-mile proposed electric railway from El Paso down the valley of the Rio Grande to Fort Hancock. C. W. Kellogg, Jr., El Paso, manager.

Houston, Tex.—The City Council has granted the Galveston-Houston Interurban Electric Railway a franchise to operate an electric railway over certain streets in Houston. This is part of a plan to connect Galveston and Houston with an electric railway.

*Victoria, Tex.—The Council has granted a franchise to operate either electric or gasoline cars over the principal streets of Victoria to J. J. Welder, F. B. Lander, A. A. Sitterle, J. N. Fagan, T. D. Wood, J. W. Rutland and J. K. Hexter, Victoria.

*Brigham, Utah.—The County and City Councils have granted franchises to David Eccles to build an electric railway over the principal streets of Brigham and extend it to Hot Springs. Work must be started within six months and the railway completed within a year, according to the provisions of the franchise.

Walla Walla, Wash.—The County Commissioners have granted the Northwestern Corporation, Walla Walla, franchises to build electric railways over certain streets and for the transmission of electric power in Walla Walla.

TRACK AND ROADWAY

Pacific Electric Railway, Los Angeles, Cal.—This company has commenced grading on the 12-mile cut-off from La Habra Valley east to a point near Yorba. A contract for the construction of an extension from Pillsbury to Olinda has been let, and it provides for the completion of the work within 90 days.

Sacramento Electric, Gas & Railway Company, Sacramento, Cal.—This company advises that during the next six weeks it will rebuild some of its track, which will call for 87-lb. and 60-lb. rails. Most of the work will be done by the company. John A. Britton, San Francisco, president and general manager.

Egyptian Traction Company, Eldorado, Ill.—This company has been granted right of way through White County and it is planned to extend the railway to the Wabash River below Maunie, Ill., and into Indiana. It will connect Murphysboro, Marion, Carrier Mills, Harrisburg, Eldorado, Ridgway and New Haven, Ill., and Mount Vernon, Ind. George E. Leggett, Winchester, president and general manager. [E. R. J., March 5, '10.]

Rock River Traction Company, Geneseo, Ill.—This company expects to start construction within 30 days on its proposed railway from Princeton to Geneseo via Wyanet, Buda, Sheffield, Mineral, Annawan and Atkinson. [E. R. J., Jan. 29, '10.]

Quincy Horse Railway & Carrying Company, Quincy, Ill.—This company advises that it will soon place contracts for building several miles of new track. W. A. Martin, purchasing agent.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind.—This company has completed surveys from Bluffton to Geneva, 18½ miles, and is now surveying from Celina to Geneva, 21½ miles. The line will also connect Vera Cruz, Linngrove, Geneva, New Corydon, Ind., and Dublin, Ohio. [E. R. J., Dec. 4, '09.]

St. Joseph Valley Traction Company, Elkhart, Ind.—H. E. Bucklen, president of this company, announces that he has arranged with the Chicago, South Bend & Northern Indiana Railway, South Bend, for an extension of this railway from South Bend to Elkhart to connect with the St. Joseph Valley Traction Company, now operating between Elkhart and Angolia. The plan is to extend the railway to Pioneer, Ohio, where the St. Joseph Valley Traction Company's line would connect with an electric railway into Toledo.

Beech Grove Traction Company, Indianapolis, Ind.—This company has increased its capital from $10,000 to $100,000. Its proposed railway will connect Beech Grove and Indianapolis. W. H. Ogan, president. [E. R. J., Jan. 8, '10.]

Kokomo, Marion & Western Traction Company, Kokomo, Ind.—This company has recently made all arrangements to extend its railway from Kokomo to Frankfort. Work will commence at once and the railway will ultimately be extended to Terre Haute. The company absorbed the Kokomo, Frankfort & Terre Haute Traction Company a few weeks ago.

Omaha, Council Bluffs & Sioux City Railroad, Des Moines, Ia.—This company advises that construction will begin as soon as preliminary work is completed on its proposed 100-mile electric railway which is to connect Omaha, Council Bluffs, Beebeetown, Logan, Magnolia, Little Sioux, Onawa, Oswego, Luton, Morningside and Sioux City. Capital stock authorized, $10,000. Officers: M. H. Miller, Des Moines, president, secretary and general manager; B. J. Ness, Des Moines, vice-president, and J. W. Russell, Adel, treasurer. [E. R. J., Mar. 26, '10.]

Louisville & Eastern Railroad, Louisville, Ky.—This company has practically completed its extension to Shelbyville, 30 miles east of Louisville, and will have cars in operation June 1. The rails have been laid and the overhead work has been completed, and ballasting is now being carried on. An hourly schedule will be put on, and the distance will be covered in 1 hr. and 20 min. It is intended ultimately to extend the line to Frankfort.

Louisville (Ky.) Railway.—This company has practically completed the work of putting its feed cables underground. An ordinance directing the company to do this passed several years ago. It required the power cables to be put beneath the surface before Dec. 31, '10. The company has extended the underground system beyond the downtown district provided in the ordinance.

Western Massachusetts Street Railway, Westfield, Mass.—This company announces that it is planning to spend $50,000 for improvements to its line in Westfield this summer.

Kansas City, Lawrence & Topeka Electric Railway, Kansas City, Mo.—This company is reported to have awarded a contract to the Guilford Company, Kansas City, Mo., for building 6 miles of track from the present terminal at Shawnee, Kan., southwest to Zarah.

Gallatin Valley Electric Railway, Bozeman, Mont.—This company states it will extend its railway 27 miles from Bozeman Hot Springs to Three Forks this summer. The contract for grading has been awarded, and it is planned to have the new line in operation by Oct. 1. It will connect with the Northern Pacific Railroad at Bozeman. [E. R. J., Nov. 6, '09.]

Utica & Mohawk Valley Railway, Utica, N. Y.—It is stated that this company plans to build a 6-mile extension up the Sauquoit Valley.

Ashtabula (Ohio) Electric Street Railway.—This company advises that it will commence construction about April 20 on its proposed 6-mile railway over principal streets in Ashtabula to Ashtabula Harbor. It will connect with lines to Cleveland, Conneaut and Jefferson. The company is not yet ready for bids for its power plant or car house. The power station will be located on Lake Street. It will operate eight cars and will run to Harmon and Woodland Beach Parks. Capital stock authorized, $250,000. Officers: A. F. De Mayo, president; Charles J. Starkey, vice-president; Charles Wallin, treasurer; H. B. Stout, general manager, and Chapin & Bryson, engineers, all of Ashtabula. Headquarters, Haskell Building, Ashtabula. [E. R. J., April 2, '10.]

Eastern Oklahoma Traction Company, Muskogee, Okla.—This company announces that at present it is planning to build only about 84 miles of its proposed 251-mile electric railway, namely, from Muskogee to Sapulpa, and from Muskogee to Wagoner. Three bridges will be required; two will be built over the Arkansas River, one 3 miles southwest of Muskogee and the other 2 miles south of Tulsa. The third bridge will be built over the Verdegris River, 8 miles north of Muskogee. At a recent election the following officers were elected: H. B. Spaulding, president; J. W. Mattox, vice-president; J. F. Furry, secretary, and Guy Bowman, treasurer. [E. R. J., March 19, '10.]

Niagara Traction Railway, Niagara Falls, Ont.—This company states that it will commence construction within a year on its proposed 7-mile railway from Queensboro, Ont., to Niagara-on-the-Lake. The company is planning to install either gasoline or storage battery cars. E. Garrett, general manager. [E. R. J., March 5, '10.]

Huntingdon, Lewistown & Juniata Valley Traction Company, Huntingdon, Pa.—This company has opened offices in Huntingdon and preliminary steps are being taken to soon begin construction of its proposed electric railway which will run from Huntingdon to Mill Creek, at which point one branch will go to Mt. Union and another to Lewiston via Belleville, Reedsville and Burnham. Rights of way have been obtained on the main line as far as Union Mills. Capital stock, $1,500,000. Officers: R. W. Jacobs, Huntingdon, president; Samuel Watts, Belleville, vice-president; John M. Starr, Huntingdon, secretary and treasurer, and J. Murray Africa and L. P. McDonough, engineers. [E. R. J., March 26, '10.]

Philadelphia (Pa.) Rapid Transit.—This company is making arrangements to extend its Elmwood Avenue line to Essington.

***Grand Belt Interurban Railway, Gallatin, Tenn.**—The Gallatin & Suburban Railway has amended its charter, to build an interurban railway from Gallatin to Nashville, and has changed its name to the Grand Belt Interurban Railway. C. H. Fidler, Gallatin, Tenn., is the promoter.

Tennessee Traction Company, Memphis, Tenn.—This company has obtained most of the right of way and is surveying the route of its proposed 210-mile railway from Memphis to Jackson. George E. Busnell, Memphis, general manager.

Galveston-Houston Electric Railway, Galveston, Tex.—This company has awarded the following contracts: To the North American Dredging Company, San Francisco, for building 2½ miles of roadbed on Galveston Island; to the Louisiana Red Cypress Lumber Company, Harvey, La., for 100,000 cypress ties; to Pickering & Company, Barnham, La., for 20,000 heart pine ties. These are to be chemically treated and delivered immediately; the right of way grading contract was let to J. C. Kelso, Galveston, and is for a distance of 16 miles, from City Junction to Clear Creek. [E. R. J., March 19, '10.]

Eastern Texas Traction Company, Greenville, Tex.—This company, which was recently incorporated, advises that it will commence construction in about six months on its electric railway from Greenville to Wolfe City, Honey Grove, Paris and Dallas. Rights of way are now being secured. It has also authority to furnish power for lighting. Officers: S. B. Perkins, Greenville, president; J. H. Blocker, Wolfe City, vice-president; Joseph F. Nichols, Greenville, secretary; R. W. White, Greenville, treasurer, and J. B. Murphy, Greenville, general manager. [E. R. J., March 26, '10.]

Bluestone Traction Company, Bluefield, W. Va.—It is stated that this company plans to build an extension between Bluefield and Graham.

SHOPS AND BUILDINGS

Riverside & Arlington Railway, Riverside, Cal.—This company is reported to be planning to build a new car house in Riverside.

Shore Line Electric Railway, New Haven, Conn.—This company has almost completed its car house located near Saybrook Junction. The building is 24 ft. high and has a floor space of 13,760 ft. The side walls are of hollow concrete blocks and the roof is of reinforced concrete. Half the space will be used as a machine shop and the rest will be used for storage and for a substation.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company has awarded to M. F. Reisener, Indianapolis, the contract for building its new car shops at Greenfield. Work has been started.

Irwin-Herminie Traction Company, Irwin, Pa.—This company has about completed its car house in Irwin. It is built of brick, 35 ft. x 135 ft., and two stories high. The upper floors will be used for offices and storerooms and the basement as a machine shop.

Conestoga Traction Company, Lancaster, Pa.—This company has awarded the contract to Herman Wohlsen for the erection of an office building in Lancaster. The structure will be of brick, 50 ft. x 80 ft. in size and three stories high. The contract calls for its completion by June 1. The old car house on North Queen Street will be used as a repair shop.

POWER HOUSES AND SUBSTATIONS

Colorado Railway, Light & Power Company, Trinidad, Col.—This company has purchased a 4000-kw turbo-generator from the Westinghouse Electric & Manufacturing Company for installation in its new power house in Columbus. This is in addition to a 2000-kw unit to be delivered in April.

Rome (Ga.) Railway & Light Company.—This company will place orders during the next two weeks for about $30,000 of station equipment, including a 500-kw turbine, a 250-hp boiler, a 300-kw rotary converter and other small station machinery.

Quincy Horse Railway & Carrying Company, Quincy, Ill.—This company states it expects to soon purchase a 1000-kw generator, and erect a new steel stack and a condensing plant. It has purchased recently a 1500-hp cross compound condensing engine and an additional 316-hp boiler. W. A. Martin, purchasing agent.

Boston (Mass.) Elevated Railway.—This company has purchased a site for the erection of a new power house to take the place of the one on Albany Street, which was recently destroyed by fire.

Western Massachusetts Street Railway, Westfield, Mass.—This company has completed plans for an addition to its power house in Westfield. It expects to install another engine, generator and new boilers. L. S. Storrs, Springfield, president.

Worcester Consolidated Street Railway Company, Worcester, Mass.—This company has planned to spend $10,000 in temporary repairs on its Tremont Street power house in Worcester. New machinery will be installed. H. C. Page, Worcester, general manager.

Sunbury & Selinsgrove Street Railway, Sunbury, Pa.—This company, which in the past has purchased its power from the Middlecreek Electric Light Company, has decided to erect a power plant at Rolling Green. The structure will be 40 ft. x 84 ft. It will be equipped with three 100-hp boilers, two feed pumps, one closed feed-water heater, two Corliss engines and two d. c. generators. It is expected to have the new plant in operation by the time the park opens in the spring.

Manufactures & Supplies

ROLLING STOCK

Boston & Worcester Street Railway, Boston, Mass., contemplates buying five cars in the near future.

Mill Mountain Incline Railway, Roanoke, Va., has ordered two cars for its incline railway from The J. G. Brill Company.

La Crosse (Wis.) City Railway has ordered two double-truck cars, with 25-ft. bodies from the American Car Company.

Colorado Railway, Light & Power Company, Trinidad, Colo., expects to buy a number of fenders within a few weeks.

Union Electric Company, Dubuque, Iowa, has placed an order for trucks with the Taylor Electric Truck Company, Troy, N. Y.

Springfield (Mo.) Traction Company has placed an order with the American Car Company for four single-truck closed cars.

Vancouver (Wash.) Traction Company has contracted for one 28-ft. semi-convertible car body with the American Car Company.

Oakwood Street Railway, Dayton, Ohio, has placed an order for two cars with the McGuire-Cummings Manufacturing Company, Chicago.

Cincinnati (Ohio) Traction Company has placed an order with Wonham, Sanger & Bates, New York, for 18 dump cars for grading purposes.

Lexington (Ky.) Railways has purchased one 21-ft. 8-in. semi-convertible car mounted on a Brill No. 21-E truck from The J. G. Brill Company.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind., has contracted with the Jewett Car Company, Newark, Ohio, for one large interurban car.

City & Suburban Railway, Brunswick, Ga., is having built by The J. G. Brill Company two 10-bench pay-as-you-enter cars to be mounted on Brill No. 39 trucks.

Omaha & Council Bluffs Street Railway, Omaha, Neb., has placed an order with the American Car Company for 25 cars, all to be mounted on Brill No. 39-E trucks.

Rhode Island Company, Providence, R. I., is having 50 closed cars built by the Osgood-Bradley Car Company, Worcester, Mass., in addition to the open cars recently ordered.

Williamsport (Pa.) Passenger Railway, reported in the Electric Railway Journal of April 2, 1910, to be in the market for two cars, it is learned, is not in the market at the present time.

Columbus, Marion & Bucyrus Railway, Delaware, Ohio, reported in the Electric Railway Journal of Feb. 12, 1910, as being in the market for two cars, has placed an order for two interurban cars with the Jewett Car Company, Newark, Ohio.

Cumberland Railway, Carlisle, Pa., which was reported in the Electric Railway Journal of April 2, 1910, to have ordered three cars, has contracted with The J. G. Brill Company for but two cars of the combination baggage and passenger type.

Quincy Horse Railway & Carrying Company, Quincy, Ill., mentioned in the Electric Railway Journal of Jan. 8, 1910, as expecting to be in the market for eight single-truck pay-as-you-enter cars complete, will soon place the order for this rolling stock.

Lehigh Valley Transit Company, Allentown, Pa., reported in the Electric Railway Journal of March 26, 1910, as being in the market for 10 cars, has ordered 10 double-truck car bodies from The J. G. Brill Company, to be mounted on Brill No. 27-M.C.B. trucks.

Alton, Jacksonville & Peoria Street Railway, Jerseyville, Ill., mentioned in the Electric Railway Journal of Dec. 4 1909, as contemplating the purchase of four 52-ft. interurban cars, is reported to be planning the immediate purchase of this rolling stock.

Northwestern Elevated Railroad, Chicago, Ill., is asking for bids on the 20 cars referred to in the Electric Railway Journal of March 26, 1910. These cars will be of a type to conform with the standard now in use on the company's lines, and will have a length over all of 47 ft. 5 in.

Trenton (N. J.) Street Railway, recently reported in the Electric Railway Journal to have ordered 10 closed pay-as-you-enter cars, has decided on the following details:

Seating capacity 40	Curtain material...Pantasote
Weight with trucks...25,000 lb.	Destination signs.... Hunter
Wheel base.....4 ft. 6 in.	Fenders....Philadelphia type
Length of body.....28 ft.	Gongs..... Dedenda
Length over vestibule.... ..... 39 ft. 8 in.	Hand brakes ..... Peacock
	Heaters..... Consolidated
Length over all....41 ft. 6 in.	Headlights ..... Neal
Body ..... wood	Journal boxes ..... Brill
Underframe ..... wood	Registers...International R-7
Car trimmings..... bronze	Step treads ..... Mason
Curtain fix....Curtain S. Co.	Trucks..... Brill 39-E

Portland (Maine) Railroad, reported in the Electric Railway Journal of Feb. 5, 1910, to have contracted with The J. G. Brill Company for three 28-ft. closed cars, has prepared the following specifications for the new rolling stock:

Seating capacity 40	Gears and pinions..solid gears
Weight with trucks.24,500 lb.	Gongs ..... Dedenda
Wheel base.....4 ft. 6 in.	Headlights .....two; Neal
Length of body.....28 ft.	Journal boxes..... Brill
Length over vest...37 ft. 5 in.	Motors ..... four, GE-80
Body ..... wood	Registers ..... International
Underframe ..... wood	Roofs.....monitor deck
Brakeshoes ..Am. St. & Int. Std.	Sanders ..... Dumpit
	Sash fixtures..... Brill
Car trimmings..... bronze	Springs ..... Brill
Couplers ..... Hovey	Steps ..wood, with Universal treads.
Curtain fix....Curtain S. Co.	
Curtain material.. Pantasote	Trucks.....Brill 27 GE-1

The company also ordered two 12-bench open cars from The J. G. Brill Company. The equipment is the same as on the closed cars, except as follows:

Seating capacity 60	Headlights..Boston Brass Co.
Weight with trucks...22,000 lb.	Motors..... two GE-80
Length over all.....34 ft.	Trucks..... Brill 39-E
Curtain material..striped duck	

TRADE NOTES

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has moved its San Francisco office from 425 Market Street to Second Avenue and National Square.

Goldschmidt Thermit Company, New York, N. Y., has obtained the services of William C. Kuntz, sales agent of the Pennsylvania Steel Company, Steelton, Pa., commencing May 1.

O. M. Edwards Company, Syracuse, N. Y., announces that T. P. O'Brian has become connected with its sales department with headquarters at 3099 Broadway, New York City.

General Railway Signal Company, Rochester, N. Y., has secured the services of G. H. Groce, formerly assistant general manager of the Illinois Central Railroad and Indianapolis Southern Railroad.

Western Electric Company, New York, N. Y., has appointed F. X. Cleary advertising manager. Mr. Cleary for the past 20 years has been associated with the Western Electric Company in various offices.

Lackawanna Steel Company, New York, N. Y., has appointed Charles R. Robinson general sales agent to succeed H. Sanborn Smith, who resigned on April 1 in order to devote his time to personal interests.

American Creosoting Company, Chicago, Ill., has elected H. A. Davidson vice-president in charge of sales in the Southwest. Mr. Davidson until November, 1909, was president of the St. Louis & San Francisco Railroad.

Baldwin Locomotive Works, Philadelphia, Pa., advises that R. P. C. Sanderson, formerly superintendent of motive power of the Virginian Railway, has been appointed general superintendent of its new works at Eddystone, Pa.

Evans, Almiral & Company, New York, N. Y., announce that they have engaged F. H. Stevens, formerly central station heating engineer for the American District Steam

Company, as representative of their department of central station heating.

Northern Engineering Works, Detroit, Mich., are increasing the capacity of their plant, by installing new tools and machinery consisting largely of lathes, gear cutters and milling machines. The works report the receipt of many orders, particularly for their standard electric traveling cranes.

Burton Tracklaying Machine Company, Salt Lake City, Utah, has been incorporated in Utah with a capital of $300,000 to manufacture a tracklaying machine patented by Charles W. Burton. The officers are Charles W. Burton, president; H. Borman, vice-president and treasurer, and S. H. Lynch, secretary.

Idealo Company, 321 The Bourse, Philadelphia, Pa., will furnish a sample of its Idealo car cleaner free, express prepaid, to electric railways to prove its claim that the cleaner is free from alkali, acid, grit and water, and will not injure varnish. Idealo is in paste form and there is no loss from drippings. The claim is also made for the cleaner that it is exceptionally efficient because it is a perfect emulsion.

C. T. Alden, New York, N. Y., has become interested in J. B. Taylor & Company, Inc., Hudson Terminal Building, New York, N. Y., and has been elected to the position of general manager and chief engineer of the company. It is understood that under the management of Mr. Alden the business of the company will be enlarged and extended to include the organization, construction and financing of electric and steam railways, gas and waterpower installations and irrigation projects.

H. M. Byllesby & Company, Chicago, Ill., owing to its rapid growth and the constantly increasing number of cities and towns in which it owns, operates and manages utility properties, has opened a department of publicity. The new department will handle both the commercial and educational advertising of the organization, and will be in charge of William H. Hodge. Mr. Hodge formerly was managing editor of the monthly magazine, *Public Service*, and is a specialist in publicity work for utility companies.

Electric Service Supplies Company, Philadelphia, Pa., has secured Fred T. Murphy as salesman in its New York office. Mr. Murphy has had eight years' experience in the electric railway field, having been associated with the National Brake & Electric Company, the General Electric Company and the Merchants' Power Company, of Memphis, Tenn. At present he is taking a trip to the factories of the various companies whose products the Electric Service Supplies Company handles in order to familiarize himself thoroughly with the line.

McKeen Motor Car Company, Omaha, Neb., has received an order from the Charles City & Western Railroad, Charles City, Ia., for a 55-ft. car and from the Woodstock-Sycame Traction Company, Chicago, Ill., for a similar car. The company has also received the following orders for 70-ft. cars: Minnesota Central Railroad, one car; Rock Island Lines, two cars; Santa Fe Railroad, three cars. Orders have already been received by the company for 32 cars. Two more 70-ft. cars have been delivered to the St. Joseph & Grand Island Railway at St. Joseph, Mo., making a total of five 70-ft. cars in service on that line.

Dorner Railway Equipment Company, Chicago, Ill., has received orders for second-hand rolling stock and equipment as follows: Indiana Union Traction Company, one 20-ft. motor car, two 40-ft. 6-in. motor cars mounted on McGuire No. 39-A trucks, and equipped with G. E. 1200 motors, three open trailers and one closed trail car; Grand Forks Street Railway, one 20-ft. 6-in. motor car, to be mounted on Brill 21-E trucks and equipped with G. E.-1000 motors; Mexico, Santa Fé & Perry Traction Company, two 20-ft. 6-in. motor cars, to be mounted on Brill 21-E trucks and equipped with G. E.-1000 motors; Buckeye Manufacturing Company, one motor car, to be mounted on Brill 21-E trucks and to be equipped with gasoline motors.

Crocker-Wheeler Company, Ampere, N. J., announces the receipt of the following orders for direct current apparatus: One 200-kw engine-type generator, to Lake Copper Company, of Michigan; two 200-kw engine-type generators, to the Watt Mining Car Wheel Company, of Ohio; one 200-kw engine type, to the Pittsburg-Belmont Coal Company, of Ohio; one 250-kw engine-type generator, to the Pope Tin Plate Company, Steubenville, Ohio; one 250-kw generator, to the Ames Iron Works, of Pennsylvania; one 500-kw engine-type generator, to the Youngstown Iron & Steel Roofing Company, of Ohio; one 100-hp motor, to John A. Roebling Sons' Company, Trenton, N. J., and two 500-kw motor generator sets, to the Carnegie Steel Company, Pittsburgh, Pa.

Allis-Chalmers Company, Milwaukee, Wis., reports that the full capacity of its gas engine shop is required for gas engines alone. Some of the recent sales are two 18-in. x 24-in. engines with generators to the Ware County (Ga.) Light & Power Company; one 18-in. x 24-in. engine and generator to the American Car & Foundry Company, Huntington, W. Va.; three 24-in. x 36-in. engines and generators to the Alpha Portland Cement Company, Alsens, N. Y., and three 18-in. x 24-in engines and generators to the Guanica Centrale Company, Porto Rico. The company calls attention to a recent decision of the United States Supreme Court refusing to grant a writ of certiorari to review a decision rendered by the Circuit Court of Appeals of the Seventh Circuit in the case of the General Electric Company versus the Richmond Street & Interurban Railway for alleged infringement of reissue patent No. 12241, on electric railway controllers. The court held that the claims of the reissue patent were broader than those of the original patent. The case was defended for the railway company by the Allis-Chalmers Company.

ADVERTISING LITERATURE

W. N. Matthews & Brother, St. Louis, Mo., are mailing a card calling attention to their easy lamp changers.

C. W. Hunt Company, New York, N. Y., has issued an 80-page booklet in which the Hunt industrial railway system is described and illustrated.

Electric Storage Battery Company, Philadelphia, Pa., in Bulletin No. 121 describes the installation of the chloride accumulator in the mills of the Indiana Steel Company at Gary, Ind.

General Fire Extinguisher Company, Providence, R. I., in the March issue of the Automatic Sprinkler Bulletin, prints a complete description of its plant at Auburn, R. I. Several views accompany the article. Other articles are "History and Application of Automobile Sprinklers," by W. A. Neracher, and "Annual Convention of Superintendents and Engineers."

Western Electric Company, New York, N. Y., has recently issued Bulletin No. 5132-I, describing its type EC belt-driven Hawthorn generators. A complete description of the construction and operation of its generators is given, with illustrations of the different types. Considerable space is given to a description of the individual parts of these generators. Another bulletin, No. 5360, issued by the company is descriptive of its Hawthorn small power motors. These motors are built on a full line of ratings, ranging in capacities from 1/30 to 1/4 hp.

Joseph T. Ryerson & Son, Chicago, Ill., have issued an 80-page catalog which deals with the invention, function properties, manufacture, and application of glyco metal and contains data on the performance of glyco metal in practice and tests. A supplement to the catalog contains useful information and rules for uses of bearing metal. Another booklet, No. 10, on tool steel, issued by the company, contains a complete description of the various lines of high speed and carbon tool steels manufactured by the company, and directions for treating to insure the best results. Numerous tables for users of tool steel are also published.

General Electric Company, Schenectady, N. Y., in Bulletin No. 4721, describes and illustrates the Thomson direct-current watt-hour meters, type C-6, C-7 and C-Q, which are so constructed as to be easily and quickly installed and sealed. They are made for 2 or 3-wire service, 100 to 120, 200 to 240 and 500 to 600 volts. In Bulletin No. 4720 the company describes its steam and air-flow meters. The following are the titles of several other bulletins issued by the company: "No. 4716, Thomson Watthour Meters, with Prepayment Attachments"; "No. 4722, Electric Drive and Cement Plants"; "No. 4717, G.-I. Flame Arc Lamps" and "No. 4719, Fan Motors."

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Posting the Prices

Posting the prices in force in connection with specific jobs in a repair shop on the piece-work basis saves much time and trouble. In the motor repair shop of one large company every operation in connection with an armature, field or commutator repair is numbered and priced on tables hung on the wall outside the foreman's office. In the office is a card system giving in detail the precise duties which must be performed in connection with each operation, each card being numbered according to the posted list, and signed by responsible officers of the motive power department. Any question arising as to the detailed work required must be settled at once by an appeal to the card, which is always dated, and which leaves no opening for dispute. Such a posted list, with the card supplements, is a great help to new men entering the shop, no less than a positive guide to the older men who may be in doubt as to their compensation at any given time, or who may be tempted to cut down the number of operations performed under stress of heavy work.

Dividends from Fire Protection

There is more than one good lesson to be drawn from the fire protection and insurance practice of the Metropolitan Street Railway as described in this number but the principal one is that money spent for fire-quelling equipment can yield as positive a dividend as a like sum invested say for new cars. The railway manager must not suppose that the underwriters will grant him the minimum rate for his structures just because they are built of slow-burning or "fire-proof" materials. A car house or shop with highly varnished wooden cars in the vicinity of live wires and oily waste is not adequately protected by water and sand pails, hand extinguishers or even by hose lines and standpipes. It is true that automatic sprinklers, chemical engines, fire alarm systems and the like cost a great deal of money; but those who install and maintain them properly will find that the interest on the investment will be more than covered by the reduction in fire premiums. Thus, in the case of the Metropolitan Street Railway Company, the dividend on the automatic sprinkler investment is estimated at approximately 10 per cent while that on the auxiliary fire-fighting apparatus and improvements in construction ranges as high as 20 per cent. How many street railway companies are receiving such returns from the money spent for traffic handling equipment?

Still a greater saving, and one which cannot be reckoned in percentage upon investment, is obtained by training the employees to fight incipient fires. The object should not be to encourage the men to act as a substitute for the regular city fire department. Any fire drill which tends to delay the transmissal of a regular alarm will in the long run probably do

more harm than good. But it is impossible to overemphasize the value of teaching the men what they should do in case of fire. This can only be accomplished, of course, by assigning a specific duty to each man and by drilling the entire corps frequently and intelligently in the work which they have to perform in case of an alarm of fire. While these drills may take the men occasionally away from their regular work, this loss is probably more than made up by the spirit of regular discipline and enthusiasm in the interest of the company which are inculcated, even if we disregard entirely the advantages gained in the protection of the property. Drills of this kind have formed an important feature of the fire-fighting system of the Metropolitan Street Railway Company during the last two years under the regime of the receivers.

Another important lesson presented by the Metropolitan company's practice is the necessity of placing the maintenance of the buildings and the fire protection apparatus in the care of one official who, preferably, should be the engineer of way and structures. When several departments are housed at one location, it is particularly necessary to have some individual with authority to prevent violations of fire rules. Some infractions would doubtless be forgiven by the department heads in their desire to dispose of their work most conveniently. The policy of boxing up out-of-the-way corners is an excellent precaution because nothing accumulates faster than rubbish in places where it does not directly interfere with anyone. It should hardly be necessary to add that unless the management secures the loyal vigilance and obedience of its employees, the best fire apparatus can no more protect the property than a block signal system can in itself prevent collisions on a railroad.

Excess Fare Regulations

In our issue of Feb. 5, 1910, we published a digest of the decision rendered on Jan. 30, by the Public Service Commission of the Second District of New York, upholding the Buffalo, Lockport & Rochester Railway in its practice of charging an excess fare of 5 cents where a passenger boards a car at a station where tickets are sold but pays his fare in cash to the conductor. This practice is, of course, common on steam railroads and the decision reached by the commission was based largely upon the same reasons which warrant its enforcement on that class of roads. The commission did not pass upon the question as to whether the larger number of stops made by an electric road would not require a larger number of ticket stations, whether these stations on the Buffalo, Lockport & Rochester Railway were sufficient in number, or whether the 5-cent excess fare charged might not in some cases make the total fare more than 3 cents per mile, but limited its decision to the case presented to it except that it instructed the company to increase the time limitation in which its receipts could be redeemed from one month to three months.

An entirely opposite decision as regards the right to collect such excess fare has recently been reached by the Railroad Commission of Indiana in the case of the Muncie & Portland Traction Company. In that instance, the opinion of the commission was based largely upon the distinction which has always been drawn in Indiana between the functions and legal status of steam railroads and interurban electric lines. This difference has been emphasized by the Supreme Court, which has taken the position that interurban railways are not an additional servitude upon the streets, while the contrary has been held in regard to the steam railroads. Various statutes relating to steam railroads have also contained a proviso that they cannot be construed as applying to interurban lines, and corporations are forbidden by statute in Indiana to operate in both capacities. For this reason, the Indiana law which permits a steam railroad company to collect an excess fare from a passenger who has had opportunity for 30 minutes continuously before the departure of his train to secure a ticket and failed to do so, would not apply to an electric interurban line.

We think that all will agree with the action of both commissions in drawing a clear distinction between the services and scope of steam and electric interurban railways. The kinds of transportation which they provide are very different and many of the rules which apply to one should not be extended to the other. It seems to us, however, that where there is no difference in conditions and the question is one simply relating to the general efficiency of the service rendered, the privileges of one kind of road should be enjoyed by the other. In neither State is there any claim on the part of the electric railway companies that passengers should provide themselves with tickets when they board the train at stopping points where there is no ticket station. When, however, there is such a station open and convenient of access, it does not seem a hardship to require passengers to purchase their tickets there or else to go to the slight trouble of redeeming a receipt for the extra fare paid on the car. If it should be shown that railway companies were receiving a large income because of unredeemed receipts, the subject might possess a different aspect, but this point was carefully considered in the New York decision and it was found that nearly all of the passengers who were given duplex tickets on the Buffalo, Lockport & Rochester Railway collected their rebates, so that practically the only benefit to the railway company was that of having a check on the cash fares paid on its cars.

Recent No-Seat-No-Fare Ordinances

The news that "no-seat no-fare" ordinances have been introduced in the municipal councils of Norfolk, Va., and Trenton, N. J. will produce, we believe, a feeling among railway managers in other cities somewhat akin to that experienced by a man who has been abroad for a number of years and by chance runs across a former townsman. He may not have had a very high respect at home for his old acquaintance and probably would not there have crossed the street to have shaken him by the hand. But he has seen so many strange faces during his stay abroad and has had so few visible reminders of former days that the sight of his old friend, even if the latter was not very much of a friend, seems like a glimpse of home.

It is a number of years since "no-seat no-fare" ordinances were seriously discussed in city councils. That was before the days when Theodore Roosevelt was governor of New York State and caused the passage of the Ford franchise bill which perhaps can be considered as the beginning of the recent movement toward State regulation of street railway corporations. During the last five years the possibilities of a no-seat no-fare ordinance seem to have been forgotten by legislators. Every energy and every thought have been concentrated on devising variations of the theme of public service commission regulation. Less pretentious and comprehensive methods for disciplining companies passed from the category of available punitive measures and were allowed to lapse into desuetude. We

do not mean to say that any of the no-seat no-fare ordinances were ever enforced. We do not now recall any instance in which this threatened method of compelling railway companies by municipal enactment to give a seat to every passenger was carried to its logical conclusion. In fact it would not only be most difficult to enforce a strict interpretation of the no-seat no-fare idea but such a law would greatly aggravate the congestion which it is nominally designed to alleviate.

If fares should not be collected from standing passengers on a street car, many economical citizens would choose the crowded cars to take them to their homes. They would simply have to board a car in which all the seats were occupied and then enjoy all the privileges which would be possessed if they owned a pass on the line. So far, the administration of the law is simple, but complications would arise as passengers began to leave the car. If a person should have to stand for a certain distance and then had an opportunity to take a seat, should he pay half fare or full fare? Or could he decline to pay any fare, provided he was willing to stand for the rest of the distance? Again, what rebate, if any, would a man receive who gave a lady his seat? We believe that many companies would like to see a real no-seat no-fare ordinance enforced on some other line simply from curiosity to learn how these questions would be answered.

A modification of the no-seat no-fare ordinance which has been popular in cities which have not quite dared to go to the full extent of requiring companies to carry standing passengers without charge, is to limit the number of passengers on a car to those who can be seated, with perhaps an allowance of a few standing passengers. Those who advocate this measure believe in the old adage that the dividends of a company are earned from the straps and that when a few or no passengers are allowed to stand, the company, in self defense, will add more cars. It was this theory which induced the aldermen of New York a number of years ago to consider the passage of an ordinance of this kind and they expected that the railway companies would enter a vigorous protest at the hearing at which the ordinance was considered. To the great surprise of all, the manager of the principal road said that he would be willing to do his part to carry out the proposed measure but in the interest of the public peace, he would insist upon one proviso. This was that a policeman should be assigned to each car during the rush hours to keep people from boarding it after all the seats were occupied. It was not fair to ask the conductor to do this as considerable physical force would be required and the authority of a uniformed representative of the law would be necessary. The aldermen saw the force of the remark and the ordinance was never passed.

Still another modification of the no-seat, no-fare class of legislation is to limit the number of passengers on each car to those who can be seated and provide a penalty if persons desiring transportation are kept waiting for transportation longer than a certain time. This, at first glance, seems a little more logical or rather more workable than either of the preceding methods. A little thought, however, will show that it is not fair to either the railway company or the waiting passengers unless the latter form in line at each stopping place and fill the cars in regular order. This is practically the system adopted in certain European cities where such a plan is in vogue, although it is a great error to assume, as many do, that in most European cities, seats are given to all passengers. But unless some system of this kind is adopted, the impatient and strenuous individual who has been waiting only a short time will push aside the less vigorous and secure the coveted ride to the exclusion of the others.

The Congestion Problem

We believe that in the summary just published, we have passed through the entire gamut of the no-seat no-fare variations. There is no use of disguising the fact that there is a congestion problem on electric railways, but it cannot be solved by any of the crude propositions just outlined. Under the business conditions which prevail in both large cities and small cities, where the hours of business begin or terminate at about the same hours, many people demand transportation either to or from their homes at about the same time, and the physical limitations of transportation methods will always cause some congestion. We believe, however, that the situation would be less tense if the public understood two things.

The first of these is that it costs every electric railway company considerably more to operate a car during the rush hours than at other times of the day and that consequently the profit per passenger is materially less then than in the non-rush hours. The reason for this is evident to every railway man but perhaps is not so apparent to the public. Rolling stock and power equipment have to be provided to supply the maximum service and a considerable portion of the cars and of the power station which are used during the rush hours are idle during the rest of the day and are earning no money to pay for the interest on their investment and to care for depreciation. The question of providing the platform force to operate the cars would also be much simpler and platform expenses would be lower if all the men could be assigned straight runs.

The second truth with which the public should be acquainted is that the relief for congestion lies largely in the community itself. If a systematic plan could be devised by which the large stores and manufactories would arrange their working hours so that their employees would be released at different periods, the problem would be greatly simplified. An attempt was made by the railway company in Albany and Troy some time ago to bring about a change of this kind, but, according to the testimony of Mr. Fassett at the last meeting of the New York State Association, the employers would not listen to the suggestion of altering their working hours, even by a few minutes. Each individual can also often relieve conditions, so far as he is concerned, by waiting a few minutes instead of boarding the first car which passes him. But it seems to be a part of human nature, certainly in this country, to be in a hurry to reach one's destination and most people prefer to undergo a little discomfort rather than to be delayed in this purpose. If this is the case, we do not see that the railway companies can be held responsible for the situation. Any attempt made to limit the number of people on a car necessarily means that some people will have to wait for a following car. If they are disposed to do it voluntarily, well and good, but if compulsion has to be used it can be done only by following the precedent of certain foreign cities of attaching a penalty to those who attempt to board a car after its carrying capacity has been reached. We do not believe that the American public would consent to any rule of this kind which abroad often requires a person to wait for a period of 20 minutes to half an hour before he is allowed to take passage on a car.

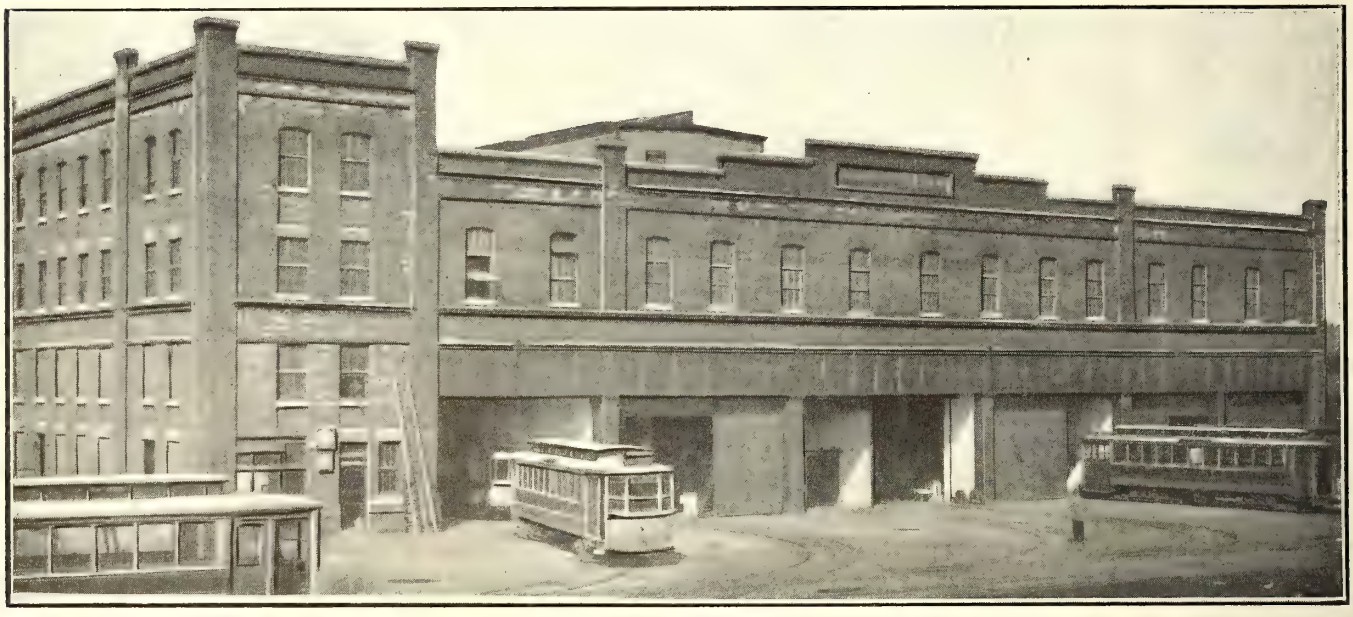
CONSTRUCTION OF NEW BUILDINGS, IMPROVEMENT OF EXISTING STRUCTURES, FIRE PROTECTION AND INSURANCE—METROPOLITAN STREET RAILWAY

Adrian H. Joline and Douglas Robinson were appointed as receivers of the Metropolitan Street Railway Company on October 1, 1907. During the few months preceding and subsequent to their appointment occurred the disastrous fires at 146th Street and Lenox Avenue, Eighty-sixth Street and Madison Avenue, Fourteenth Street and Avenue B and Ninety-sixth Street and Second Avenue. Seven hundred and thirty-one cars were destroyed. Nearly $3,000,000 worth of property was consumed and the repair shop and operating car house facilities of the Metropolitan were reduced by one-half. This loss of buildings and equipment produced most serious complications. The management was handicapped in the operation of the Metropolitan lines because the destruction of so many cars left but a limited number available for service, and of the number so available the greater proportion was in such a physical condition that breakdowns on the road were of frequent occurrence. An immediate and thorough rehabilitation of the rolling stock therefore was imperative. Aside from the fact that the cars could ill be spared for the period necessary for their rehabilitation, there were no adequate shop facilities in which this work could be performed; moreover, even sufficient car-house space for inspection and ordinary repair work was wanting. This combination of circumstances produced a situation with which it was most difficult to cope, and which required prompt and effective measures with the object of preventing further catastrophes and replacing as soon as possible the car-house and shop facilities which had been wiped out.

The Eighty-sixth Street and Madison Avenue building was originally constructed for horse car purposes many years ago and only the ground floor thereof had been remodeled to adapt it to electric car operation. The 146th Street and Lenox Avenue car-house was constructed about twelve years ago, and the Fourteenth Street and Avenue B and the Ninety-sixth Street and Second Avenue car houses, which had originally been properties used in horse car operation, were rebuilt about six years and 12 years ago respectively along lines which were supposed to constitute fireproof construction and with particular regard to electric car operation therein. The conflagrations which visited the Metropolitan properties, as referred to above, demonstrated forcibly the futility of reconstructing buildings in accordance with the ideas formerly conceived to be sound from a fireproof standpoint. The situation demanded the replacement of the facilities which had been destroyed, or the procurement of their equivalent at other points, with the utmost dispatch consistent with modern engineering practice, and in accordance with the latest accepted standards of fireproof construction.

CAR HOUSE RECONSTRUCTION

The reconstruction of the car house at 146th Street and Lenox Avenue was pushed forward with all possible speed, and on the site of the old building there was erected a modern two-story fireproof car house with steel frame, fireproofed with concrete, enclosed elevators, restricted areas in which a fire once started among the cars could be confined, a modern sprinkler system and all of the up-to-date fire prevention appliances which will be described later in this article. This car house has a storage capacity of about 500 cars and contains over 3 miles of tracks. In the meanwhile temporary facilities were provided for the storage of cars on the site of the Eighty-sixth Street car house, which had been destroyed by fire and which was converted into a car yard. The ramshackle buildings at Thirty-second Street and Fourth Avenue were also pulled down and a car yard there provided where almost no fire hazard exists at the present time.



Metropolitan Fire Protection—East Front of the 146th Street Car House

A careful study of the requirements of the system also demonstrated the desirability of constructing a modern two-story car house at Ninety-ninth Street and Lexington Avenue, fireproof and equipped with fire protection apparatus, in accordance with the same general plan of construction as was followed at 146th Street. The adjoining car house at One hundredth Street and Lexington Avenue was improved and, together with the Ninety-ninth Street house, provided the system with up-to-date car house facilities on the east side of Manhattan Island. There are more than 2 miles of track in the Ninety-ninth Street and One Hundredth Street car houses combined, and capacity for over 300 cars.

Lastly, the old structure at Fifty-fourth Street and Ninth Avenue was demolished and a new two-story fireproof car house of steel frame, fireproofed with concrete, is now nearing completion at that point capable of accommodating nearly 300 cars and containing almost 2 miles of track.

These three car houses, one in the northern section of Manhattan Island, another on the eastern side of the city and the other on the western side, constitute the nucleus of the new Metropolitan system of car houses and shops. They provide facilities far superior to those which the system has heretofore possessed and are located at convenient and strategic points, so far as operating purposes are concerned. The accompanying

half-tone engravings give an idea of the layout and appearance of the car houses in question.

CONSTRUCTIONAL DETAILS

At Fifty-fourth Street and Ninth Avenue, the interior walls of the building are of brick, while the exterior walls are of brick and terra-cotta. The ground floor of this building, in the portion recently constructed, consists of concrete, the rail being supported on small piers, except along the front and adjacent to the transfer pit, where concrete floor is laid flush with the top of the rail and a slot installed. In the old portion of the car house which still remains, the floor is of concrete flush with the top of the rail, with the necessary repair pits sunk between tracks. The second floor consists of structural steel supporting brick arches, the same being filled in above the arches to the level with the top of the structural members with cinder concrete. The rail is supported above this floor on concrete piers spaced at suitable distances. A flush floor is laid along the transfer pit similar in type to that on the first floor. The fire doors installed at the Ninth Avenue car house are of an approved type. There are no shutters installed at this building, but all windows, except in the office portion, are of the hollow metal frame wire glass type.

At Ninety-ninth Street and Lexington Avenue, the interior walls are of brick and the exterior walls are of brick and terra-cotta. On the first floor the construction is fireproof, of concrete, all floors being flush with the top of the rail except where the necessary inspection and repair pits are sunk in the track. On the second floor, on the Ninety-ninth Street side, the construction is of reinforced concrete slabs on structural steel members. The rail of this second floor is supported above the floor level proper on small concrete piers, except along the transfer pit, and in a small portion of the south side in the rear of the offices, where the floor surface is flush with the top of the rail.

In the 100th Street car house, the second floor consists of structural steel members supporting terra-cotta arches, which are filled in over the steel-work with cinder concrete. The floor level is depressed between the rail on all tracks, making a shallow pit throughout this 100th Street car house on the second floor. The roof of the 100th Street building consists of structural steel trusses, supporting a terra-cotta block tile roof.

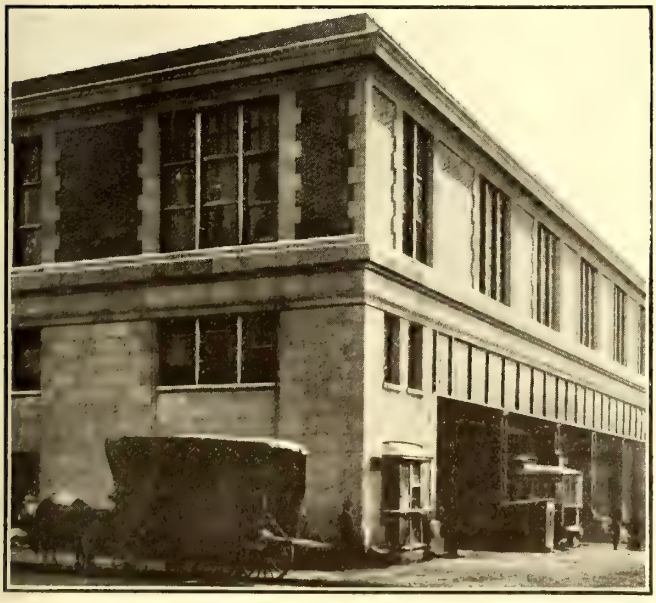
The Ninety-ninth Street roof is of reinforced concrete. The waterproofing on these roofs consists of standard tar and gravel roofing. Wire glass skylights are built in the roof at the Ninety-ninth Street building. Lighting and ventilation on the second floor of the 100th Street building are secured by monitor skylights of plain glass set in wood frames. Fire doors are also used. There are no fireproof shutters on these buildings but wired glass windows are installed throughout the Ninety-ninth Street building except in the office portion.

At 146th Street and Lenox Avenue, the interior walls are of brick, while the exterior walls are of brick and terra-cotta. The first floor is fireproof, of concrete, with the necessary pits of concrete. The second floor consists of structural steel with reinforced concrete floor supported thereby. The second floor is constructed with pits throughout, except along the transfer pit. In the shops building, the new floor, known as the third, was installed in 1909 with structural steel members supporting a reinforced concrete slab floor. The fourth floor of the shops building consists of terra-cotta arches on structural steel, filled in with cinder concrete with the surface finished with cement.

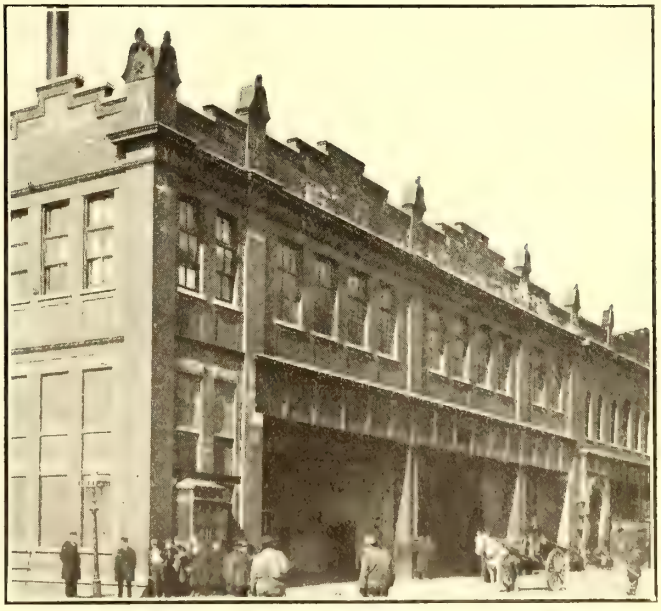
The roof of the 146th Street car house proper is of rein-



Metropolitan Fire Protection—South Side of the Ninety-ninth Street Car House



Metropolitan Fire Protection—West Front of Fifty-fourth Street and Ninth Avenue Car House



Metropolitan Fire Protection—East Front of the Ninety-ninth Street Car House

forced concrete with tar and gravel waterproofing. Wire glass metal frame skylights are built in this roof wherever necessary. On the old shop building, the roof consists of terra-cotta blocks supported by structural steel trusses. The waterproofing is of tar and gravel. Fire doors are used. There are no shutters but all exterior window openings are protected by metal frame wire glass windows, with the exception of the office section, where plain glass is installed. The shops building is fitted throughout with plain glass windows set in wooden frames except on the rear, where there is danger of exposure from adjacent apartment houses. On these buildings wire glass windows with metal frames have been installed.

Particular attention has been given to the installation of lighting circuits in the new car houses. All wires are insulated with the best grade of rubber insulating compound and are installed in metal conduits, except the main feeders, which are paper insulated, lead covered and run in clay ducts in the ground floor. The conduit lamps and panel boards in the track pits are placed in grooves and recesses cut in the concrete walls of the pits in order to protect them from mechanical injury and from water which drips down from the cars along these walls. Fixtures in oil rooms, locations where there is an extra fire hazard and in damp places are of the marine type, having an outer globe with guard and made water-tight by means of gaskets and suspended by conduit.

The new lighting systems are so designed as to reduce the cost of maintenance to a minimum and also that the lights can be turned on when required to suit the working conditions without having lights burning when not required. This plan has effected a considerable saving in cost of current, and has facilitated the better handling and inspection of cars.

It is interesting to note that during the process of construction of each of these car houses the operation of cars was carried on without cessation. Every inch of track was utilized as fast as the building operations would permit, for the lack of car house room necessitated the storing of cars on the street and gave rise to repeated protests on the part of individuals and the city authorities. Thus every effort was made to minimize cause for complaint, and furthermore, the fact that during this period the management was engaged in extensive overhauling and rehabilitating the rolling stock served as an incentive to all concerned to put forth their best energies to overcome the difficulties, which, at first, seemed well-nigh insurmountable.

GENERAL POLICY

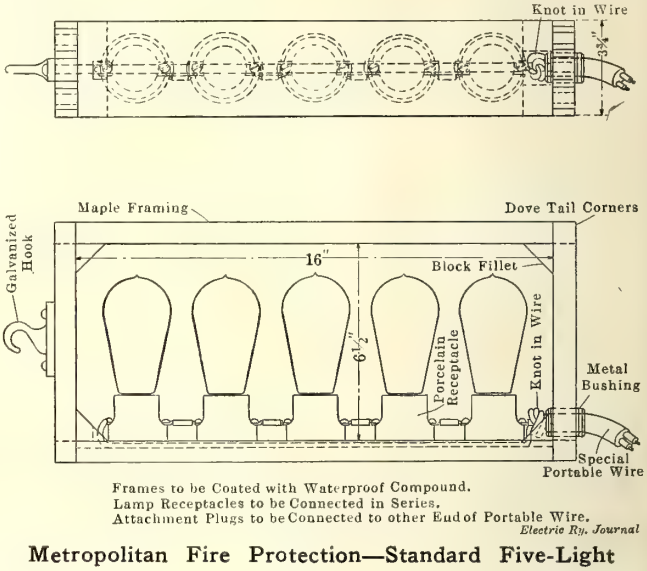
A sketch has now been given in this article of the results accomplished in new car house construction and the methods by which they were secured will be outlined in the following paragraphs:

While the plans were being formed and carried out in connection with the construction of the three new car houses mentioned, the entire subject of fire protection was given the most careful study, together with possible plans of improving the remaining car houses of the system. The program received the personal attention of Oren Root, general manager for the receivers who followed up each phase of the question. He secured all of the latest information on the subject of fire protection, called conferences of his engineers and operating staff sometimes three and four or five times a week to consider the best methods of securing the results sought and outlined the policy to be followed, not only to secure the essential features of adequate fire protection but also to obtain this result in a manner consistent with the operating requirements of the railway. Recommendations offered at these meetings by the engineering staff and by outside fire protection experts whom Mr. Root had called in to assist in a solution of the problem were promptly considered and discussed and often a decision was made the same evening and work put on the way the next morning. All work save that of the running of cars was subordinated to that of fire protection.

ORGANIZATION OF THE MEN FOR FIRE DEFENSE

Obviously, one of the first steps to be taken was to restore confidence among the employees, to create an *esprit de corps* and to secure the active co-operation of every individual to attain the end sought. It is but just to the men to say that the rank and file grasped the situation and arose to the emergency. All employees engaged in work about the buildings have been taught not only the necessity of cleanliness in keeping refuse swept up and deposited in metal rubbish receptacles, but have learned also how to perform their duties in a manner less likely to give a chance for fire to start. All rubbish is removed from the car houses daily and particular care is taken to prevent combustible material from remaining in a car house over night. The aisles and pits in all car houses and shops are swept out daily. The whitewashing of all of the interiors of the buildings, besides constituting a mild form of fire protection, has bettered the light inside the structures and made the surroundings more pleasing to those working there.

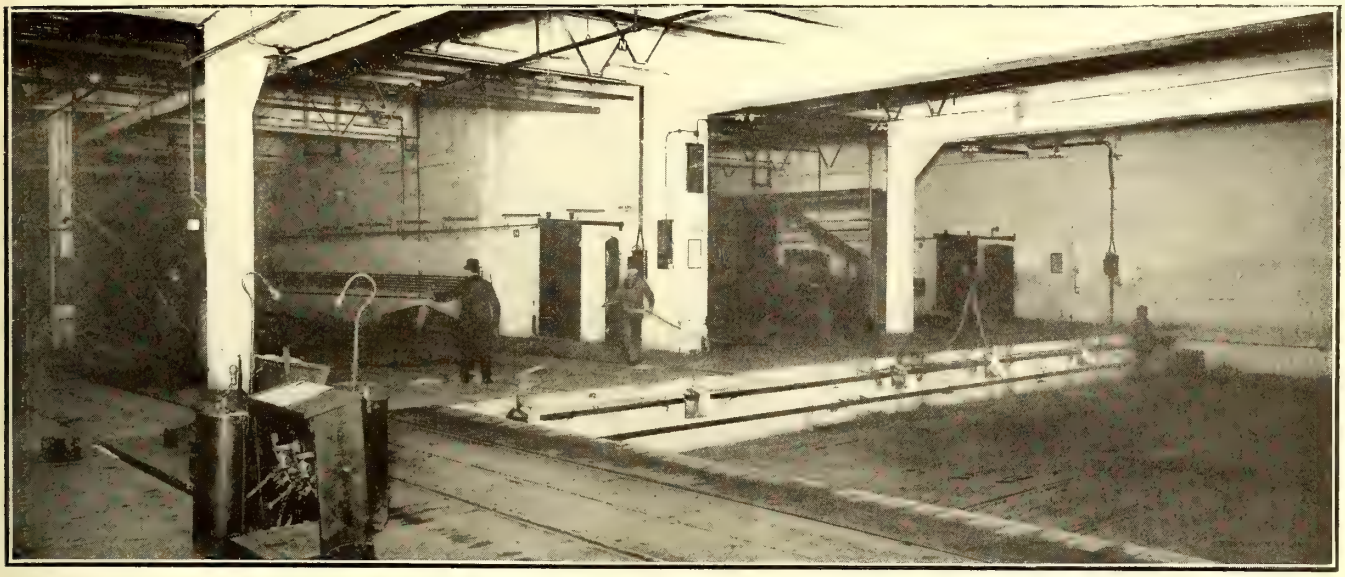
Early in the fire campaign, the men began to take a personal pride in keeping the premises neat and tidy. The old wooden lockers which had become dangerous rubbish receptacles, have been replaced by standard metal lockers, which are preferred by the men and decidedly more satisfactory to the underwriters. Out-of-the-way corners have been cleaned out and boxed up to prevent the collection of rubbish therein but better still the men have come to realize that their personal interests and comfort are in a measure identical with the

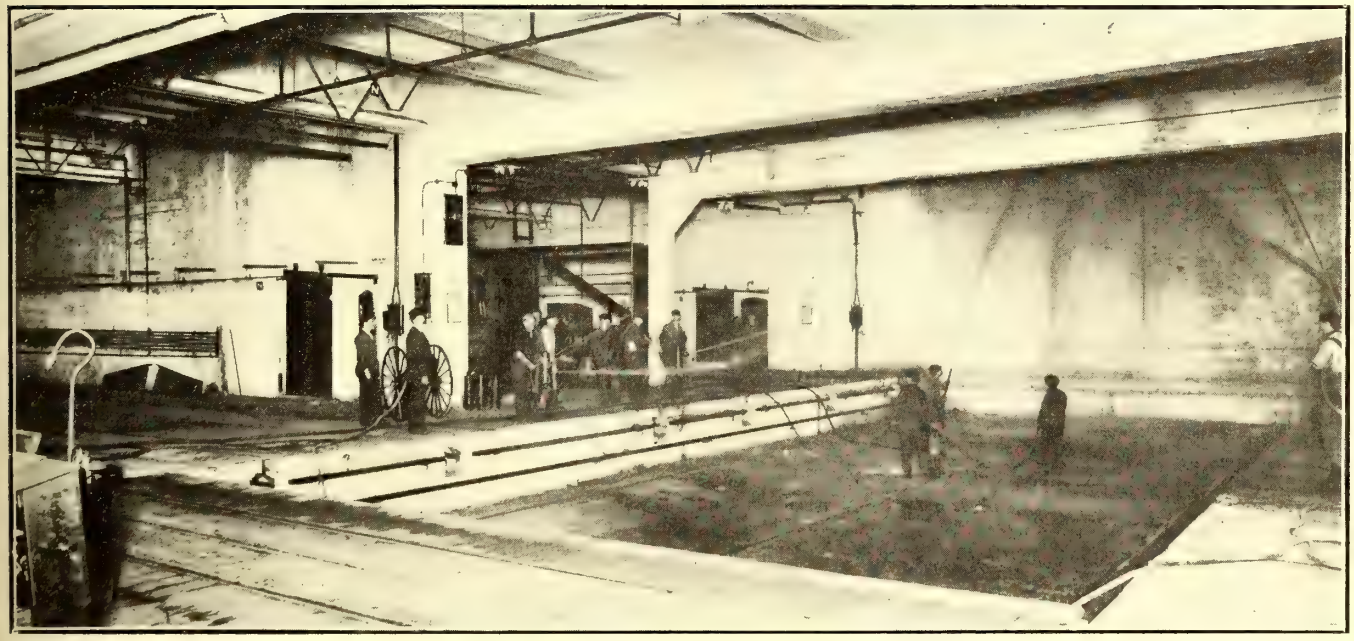


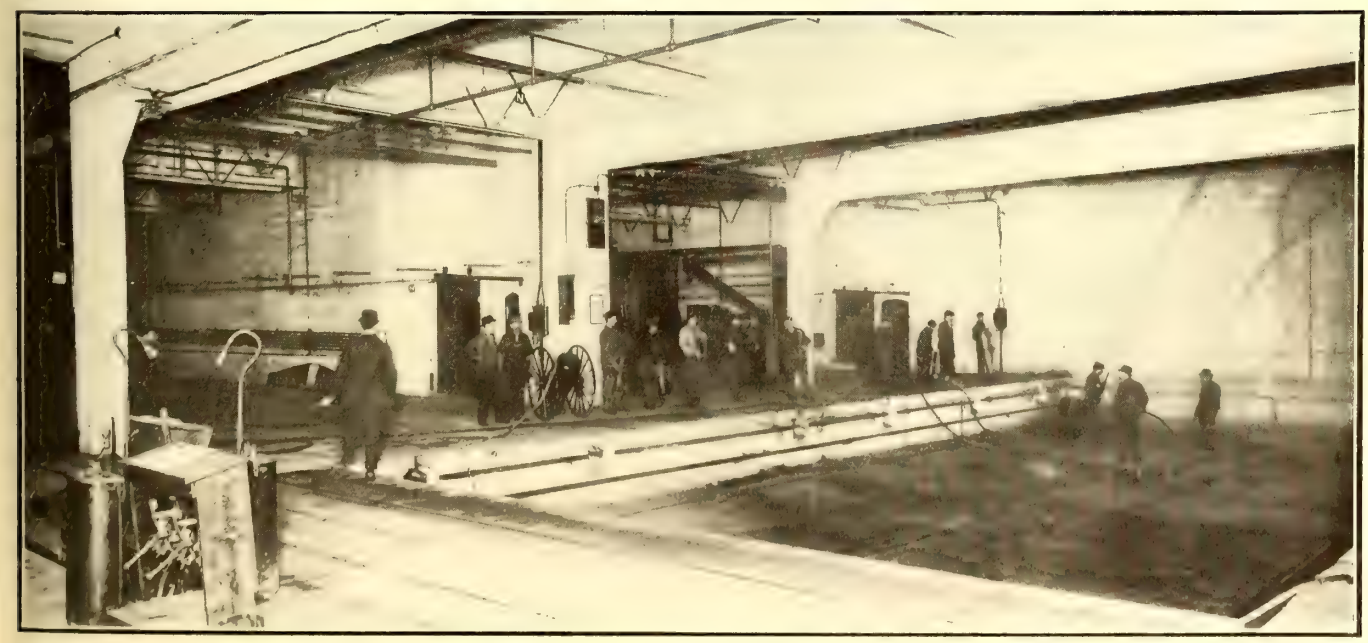
Metropolitan Fire Protection—Standard Five-Light Portable Set

fire protection policy of the management. Devices which are less dangerous from the fire standpoint than those which were previously used have been substituted for the latter; for instance, in place of the old portable lamps a portable five-light cluster has been designed, as shown on the accompanying drawing. This cluster consists of five lamps placed inside of a four-sided hardwood frame attached to a 40-ft. special heavy portable cord. It constitutes a device much more efficient and convenient than that which it superseded.

Within 20 days after the Ninety-sixth Street fire all employees were furnished with a brief printed pamphlet in which was outlined in simple language a statement of accepted precautions to be observed against dangers from fire. Subsequently these instructions were supplemented by an indexed publication entitled, "Description of Certain Precautions Against Fires," in which the subject was treated first in a general way and then under the four headings: "Fire Cause," "Fire Spread," "Fire Extinguishing," and finally "Alarms, Brigades, Etc." These regulations are in the hands of all employees whose duties require their working in and about the buildings of the Metropolitan company. A copy of this pamphlet was printed in the Electric Railway Journal of Aug. 15, 1908. At each property the men have been organized into fire brigades, there being a number of such brigades





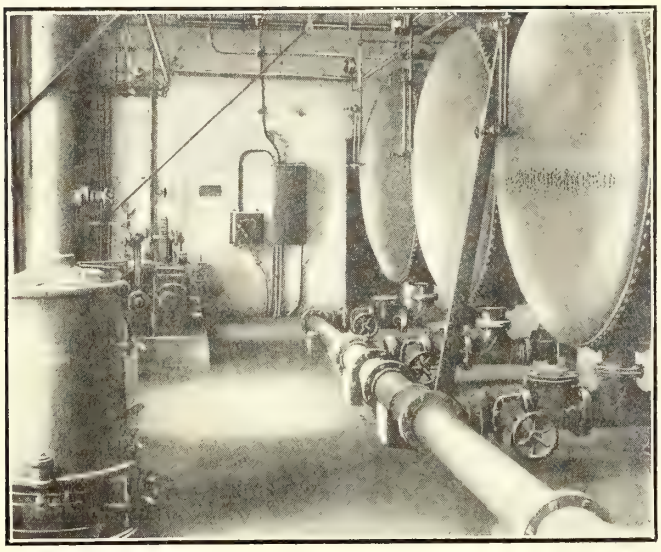


Metropolitan Fire Protection—Fire-Fighting Forces Available Within 30 Seconds, 1 Minute and 1 1/4 Minutes After Sounding an Alarm

at each property according to the extent of the premises. The men are thoroughly drilled, local alarms being sounded at unexpected times until each member of the brigade knows precisely what is expected of him in an emergency and how to perform his duties promptly and efficiently.

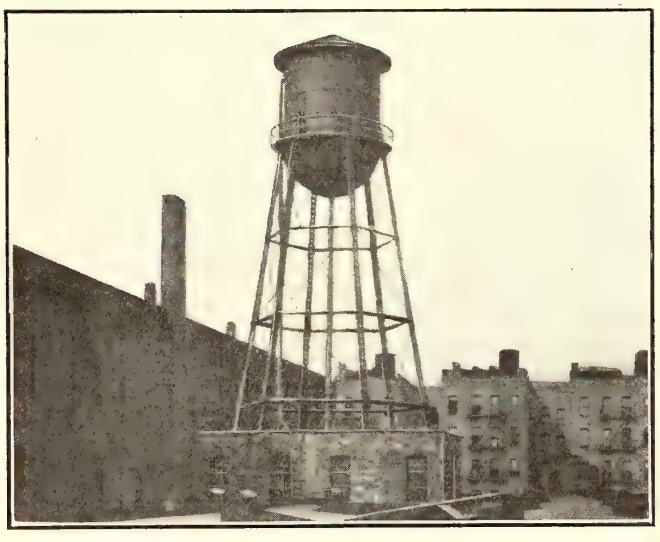
FIRE-FIGHTING EQUIPMENTS

Standpipe systems have been installed in the various properties with hose reels attached thereto. Pails filled with sand or water, according to the season of the year, are distributed over the premises in accordance with the standard procedure of the fire underwriters. Chemical fire extinguishers also are located at points easy of access. Local alarms have



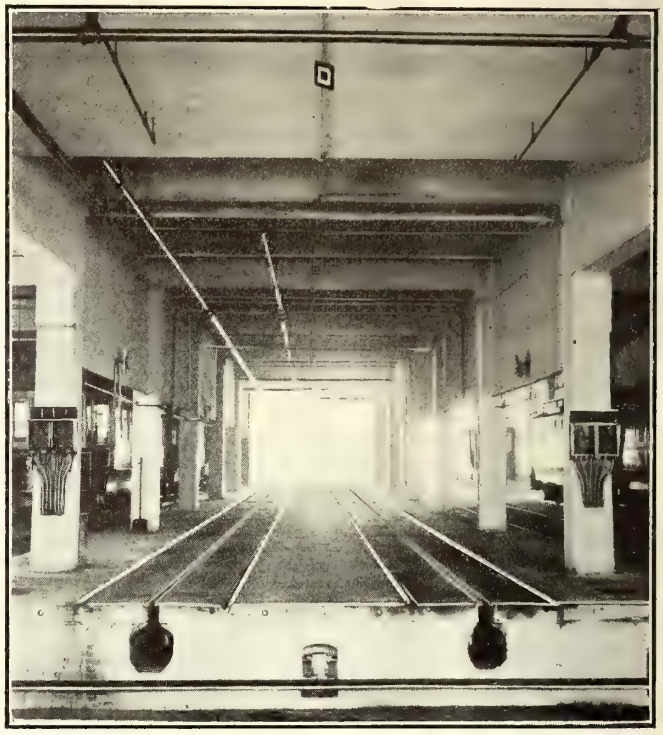
Metropolitan Fire Protection—Battery of Pressure Tanks at 146th Street Car House

been placed at different points in the buildings and the men taught to respond upon the hearing of the signal. Furthermore, auxiliary fire alarm boxes connected with the city fire-alarm service have been placed in the different properties and notices posted for the information of employees as to their location. These notices are supplemented by oral instructions.



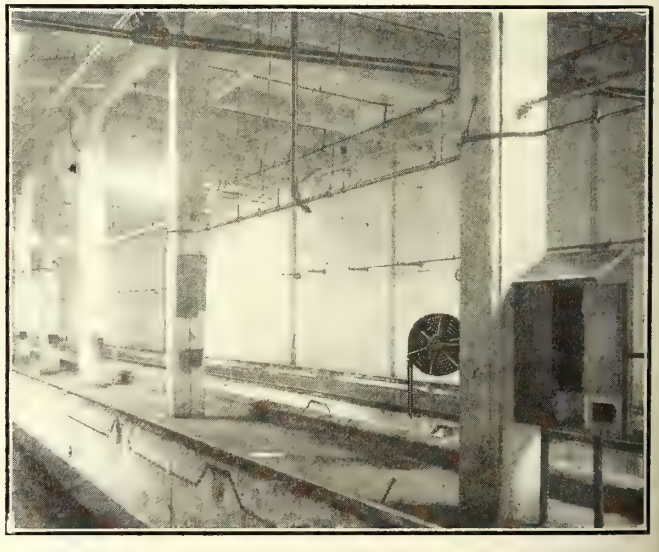
Metropolitan Fire Protection—Gravity Tank at the 146th Street Car House

For the further guidance of the men there has been installed at each property a system of red indicating electric lights, each of which burns throughout the 24 hours of the day and is a visual reminder of the fact that in its immediate vicinity are situated an auxiliary fire-alarm box, hose reels, extinguishers, etc. These lights are on a circuit separate from the main lighting circuit and power system of the car house, so that if the general lighting or power circuits are cut off in an emergency, the indicating lights will continue to burn. These lights are placed about 3 ft. below the ceiling and 4 ft. from the apparatus, the location of which they are intended to indicate.



Metropolitan Fire Protection—Fire Curtains at the Forty-second Street Car House

Small chemical engines have been located at some of the properties. These have been of material assistance upon several occasions when the efficiency of the fire brigades in extinguishing incipient blazes has been clearly demonstrated as in the case of cars which have caught fire on the street near the car house, due to grounded plows. In this connection the



Metropolitan Fire Protection—Fire Extinguisher in Case, Hose Reel, Fire Pails, Etc.

half-tones on page 691 illustrate respectively the conditions existing at the 146th Street car house within 30 seconds, one minute, and a minute and a quarter after the unexpected sounding of an alarm for fire drill purposes. The lines of hose in active operation and the number of fire extinguishers brought into play give evidence that a fire of even moderately large

proportions is likely to be extinguished promptly or at any rate confined to a very small area pending the arrival of the City Department. An illustration on page 692 shows a chemical extinguisher in its cabinet; two lines of hose reels, half a dozen fire pails; a fire-alarm box; aisle line and overhead sprinklers and standpipe connections. This view is typical of the way in which fire protection apparatus is installed at every car house. All of the premises are equipped with modern sprinkler apparatus.

On page 692 a view is given of a gravity tank, at 146th Street, which has been erected directly over the room containing the battery of pressure tanks illustrated on the same page. In this room are seen the automatically controlled compressors, the motor-driven water pump and the emergency heater for keeping the water from freezing. A view is also reproduced of the feature of curtain board protection. The system of fire protection shown in these illustrations is typical of that used in all of the car houses.

In many of the older buildings the area in which a fire might rage was great. This condition has been remedied by the erection of division fire walls and the cutting down of the area in which a fire may be confined when once started. Standard fire doors have been hung at openings in the walls which are necessary for operating purposes, unnecessary openings have been bricked up and metal frame and wire glass windows have also been installed.

MAINTENANCE AND INSPECTION SERVICE

The standpipe and automatic sprinkler systems in the various properties are visited daily by a sprinkler inspector who reports to the engineer of maintenance of way. It is the duty of this inspector to care for the prompt correction of

ADRIAN H. JOLINE, DOUGLAS ROBINSON, RECEIVERS.
METROPOLITAN STREET RAILWAY COMPANY
Void after .....
Admit .....
.....
To .....
Purpose .....
No. .....
Eng. Maint. of Way.
THIS PERMIT WILL BE HONORED ONLY WHEN WORN PROMINENTLY DISPLAYED ON THE HAT OF THE PERSON TO WHOM IT IS ISSUED.
COUNTERSIGNED .....

Metropolitan Fire Protection—Form of Building Pass

any defects which may develop, notwithstanding the fact that the systems are practically automatic in maintenance.

Stringent measures have been adopted to exclude from the buildings persons having no business therein. A pass system has been established under the operation of which everyone not em-

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers
METROPOLITAN STREET RAILWAY COMPANY.
Badge No. ..
WATCHMAN'S DAILY REPORT
For Night, Day Shift Ending 19
Property at ..... *Section*.....
Suspicious characters
Rubbish
Trouble
Doors and parts of building requiring repairs
Is all fire apparatus handy and ready for use?
Other matters requiring attention
Signed. *Watchman.*
Above noted and attended to by

Metropolitan Fire Protection—Watchman's Daily Report

ployed on the premises is required to present a pass properly signed indicating the name of the bearer, the character of his business, the name of the official issuing the pass and the period of its validity. All passes are numbered for the greater facility of identification. These passes are of two forms, one being good for one day only and the other valid for a longer period as may be specified thereon. The color of the daily passes is changed every week for four consecutive weeks, the color used during the fifth week being the same as the color used the first week, etc. The passes which are good for more than one day are of two forms—one of a given color being used for employees and the other being issued to outside parties having business on the premises.

The entire watchman service of the properties has been completely reorganized, this being placed under the supervision of

METROPOLITAN STREET RAILWAY COMPANY. **ROUNDSMAN'S DAILY REPORT** ADRIAN H. JOLINE DOUGLAS ROBINSON RECEIVERS
FOR DAY / NIGHT SHIFT ENDING 19
NOTICE.—Report matters for special attention on reverse side of this sheet

PROPERTIES	Hour Visited	NAMES OF WATCHMEN ON DUTY	Number	NAMES OF GUARDS ON DUTY	Number
215th St. Carhouse					
152d St. Yard					
146th and Lenox					
142d and Lenox					
		TOTAL =		TOTAL =	

Give on reverse side names of men who did not report for duty and cause.
Correct.
Roundsman

Metropolitan Fire Protection—Roundsman's Daily Report

the engineer of maintenance of way. Each watchman carries a standard watchman's clock which he rings up at the key stations throughout the property. The route of the watchman and the locality of the key stations are so arranged as to insure a complete inspection each hour of the property to which the watchman is assigned. A system of weekly inspections has

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers.
METROPOLITAN STREET RAILWAY COMPANY.
Examined by
FIRE REPORT.
Property
TO ENGINEER, MAINTENANCE OF WAY.
Reported that at ..... M. on ..... 190.. fire was discovered by ..... in .....
Private Alarm sent in at ..... A. M. P. M. By whom?
Public Alarm sent in at ..... A. M. P. M. By whom?
Private Brigade responded at ..... A. M. P. M.
Public Department responded at ..... A. M. P. M.
Cause of fire
Number of sprinklers opened?
Effect of sprinklers?
How long did water flow?
Did sprinkler alarm operate?
At what time was sprinkler system restored to its normal condition?
By whom?
Number of extinguishers used?
Number of pails used?
Number of standpipe lines used?
Number of chemical engines used?
How soon after discovery was fire extinguished?
By whom?
What property was damaged by fire, and to what extent?
Remarks: (Note—Give brief description of origin and cause of fire and any suggestions to prevent its recurrence.)
(Names of men whose efforts to extinguish fire were worthy of special mention.).
ted ..... Signed .....

Metropolitan Fire Protection—Report on a Fire

also been instituted. This covers all phases of fire protection at each property, particular attention being given to housekeeping conditions, fire-fighting apparatus, fire doors, sprinkler and standpipe systems, etc. Any defects or irregularities noted are promptly reported to the engineer of maintenance-of-way and immediately corrected.

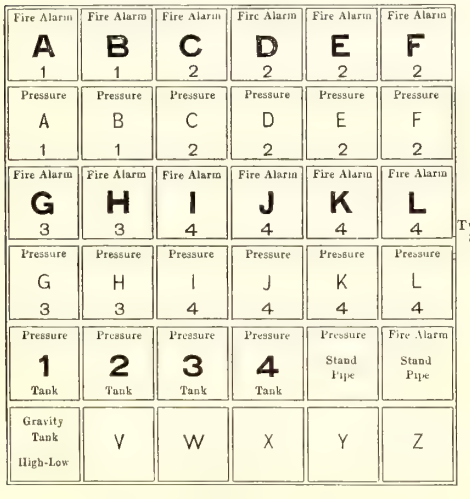
SPRINKLER ALARM SYSTEMS

In connection with the equipment of sprinkler systems there have been installed certain sprinkler alarm devices which automatically give notice of the existence of conditions which should be corrected. The following is a description of the details:

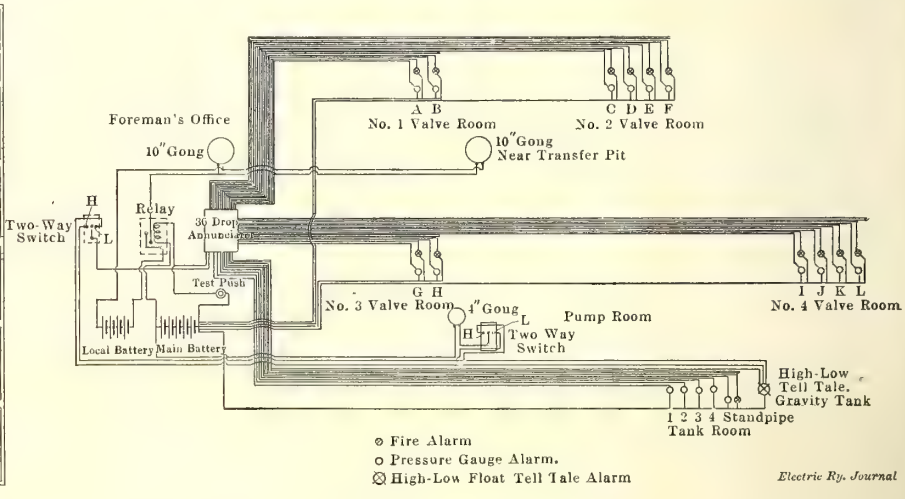
Gongs ring and an annunciator indicates the location affected when the pressure falls and when the water starts to flow in the sprinkler system; also when the water in the gravity tank reaches the low or high limit. The installation consists of a 10-inch gong, relay and local battery and an annunciator with main battery, all located in the foreman's or main office, and a second 10-in. gong located centrally near the transfer pit in the car houses and connected in parallel with the one in the foreman's office, so that both bells ring at the same time. Connections are made to the annunciator from dry valve fire alarms, dry valve pressure gages, pressure tank gages and the high-low tell-tale on the gravity tank. A 4-in. gong in the pump room is connected to the circuit of the high-low tell-tale, but the operation of this bell is independent of the operation of the annunciator and the 10-in. gongs. A typical wiring diagram of this system is shown in the accompanying drawing on this page.

The 10-in. gongs are connected in a local circuit to the armature side of the relay with the local battery, and the coils of the relay are connected to the annunciator and main battery. When any of the annunciator circuits are closed, the annunciator indicates and current passes through the coils of the relay causing its armature to close the local circuit and ring the 10-in. gongs. When the armature closes the local circuit, it remains closed and the bells continue to ring until someone releases the armature and thereby opens the local circuit. The two-way switch in the foreman's office is connected in the circuit of the high-low tell-tale so that one drop of the annunciator indicates "high" when the switch is set one way, and the same drop indicates "low" when the switch is set the other way. This switch is normally set to indicate "low." A similar two-way switch is connected to the 4-in. gong in the pump room, but this switch is normally kept open and is independent of the operation of the annunciator and 10-in. gongs. Common return wires are run to each valve room, tank room and gravity tank and two spare wires are also run to each of these locations.

All wires are insulated with the best grade of rubber insulation and braid and are run in metal conduits. All apparatus is of waterproof marine types. The relay was specially designed to meet the requirements and is of special heavy and reliable construction. It is provided with a latch so that the contact which is closed by the armature remains closed until the latch is raised by hand, as referred to above. The annunciator drops are marked as indicated on the drawing; the large letters and figures correspond to those assigned to the different dry valves and pressure tanks while the small figures at the bottom of some of the drops indicate the valve room in which the valves are located. The five drops marked on the drawing v, w, x, y, z, are spare. The letters and figures are in white enamel, the background on the fire alarm drops in vermillion, and on the other drops is black enamel. The 10-in. gong, annunciator, relay, two-point switch and test-push are neatly mounted on an oak panel in the foreman's office, and the main and local batteries are placed in separate boxes.



Marking on Annunciator Drops



Metropolitan Fire Protection—Wiring Diagram and Annunciator Drops for Sprinkler Alarm Service

POWER CUT-OFF METHODS

The general manager has issued stringent instructions to all employees that under no circumstances is the power to be kept on any track of a car house at times other than when it is necessary to use the power for the shifting of cars or for the burning of the lamps therein while repairs are being made or the cars are being cleaned. Not content with these precautionary measures, tests and experiments have been made with certain devices for the automatic cutting off of the power from tracks to eliminate the hazard due to the contact of the car plows in the houses with live channel rails which would render possible the occurrence of a fire through plow grounding or other electrical defects. These devices also effect economy in the use of current, as they prevent the liability of lamps burning and heaters operating on the cars in case the switches controlling them are left turned on. This is especially true of the heaters, there being nothing to indicate if they are turned on or off except by the inspection of the switches inside of the cars.

To accomplish these ends, several systems of the overhead trolley, contact shoe, and circuit-breaker types have been installed in various car houses to observe their efficiency under actual operating conditions. A description of the three principal systems follows:

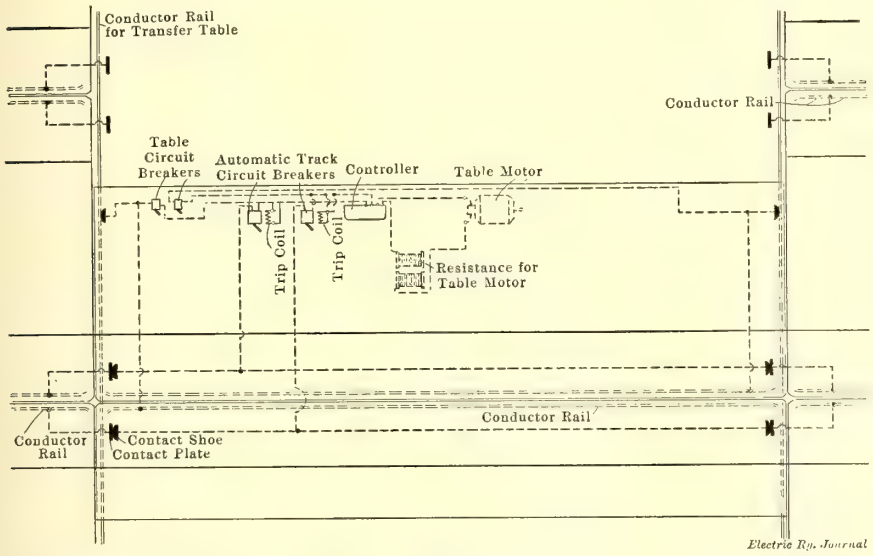
OVERHEAD TROLLEY SYSTEM

At the 146th Street and Lenox Avenue car house overhead wires have been installed and the cars have been equipped with a body plug attachment, which is connected to the overhead trolley wires by a portable pole with leads and plugs. While this system has been in operation but a short time, it is found that a saving of three men out of eight can be made in the shifting requirements of one-half of the lower floor. This scheme appears to be particularly well adapted to such a car house as the 146th Street property, where there is much pit construction, and consequently the operation of cars by the underground system requires the use of a number of leads in the pits, thereby creating conditions not altogether desirable.

SECTIONAL CONTACT SHOE SYSTEM

The sectional contact shoe system is particularly well adapted

for car houses which have short lengths of track accommodating three to four cars. This method of feeding the tracks is a very simple and safe one, as the first cost is comparatively small and there is very little apparatus to maintain. The parts are so designed that the track on which the cars are to move can be made alive after the transfer table is brought opposite the track, and a pair of circuit-breakers on the table closed by hand. All other tracks remain dead, as it is impossible for the conductor bars to be made alive on a track leading from a transfer pit until the transfer table is placed opposite the track, and the breakers are closed on the table. The arrangement of the circuits for this purpose is shown in one of the accompanying drawings, while a half-tone also on this page shows the installation on the ground floor of the 146th Street car house. There are contact plates on the walls of the transfer pit which are connected to the conductor rails of the tracks running from the transfer pit. The tracks are made alive by means of these contact plates which receive current from contact shoes on the table, these shoes in turn being controlled by automatic circuit-breakers also located on the table. These circuit-breakers are in the same circuit which supplies power to the transfer-table motor. This motor circuit is fed from conductor rails which are supported on the walls of the transfer pit.

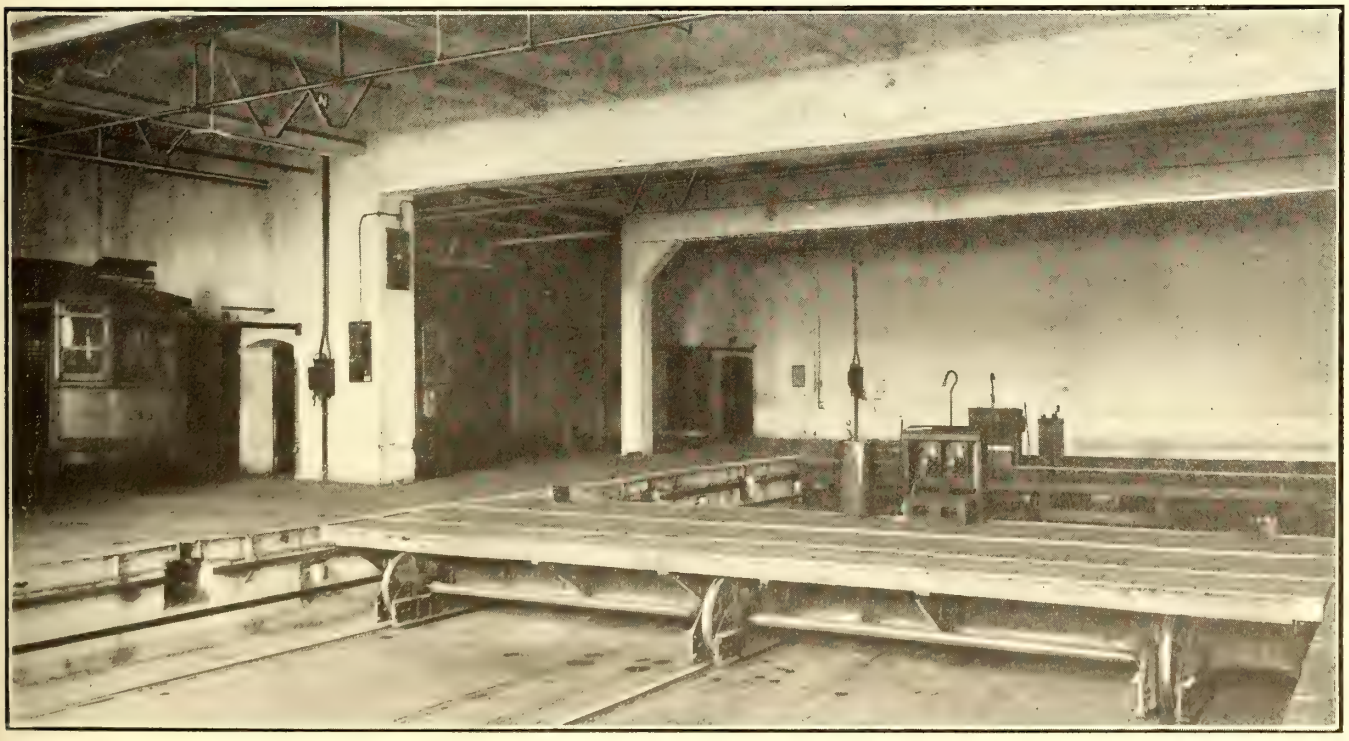


Metropolitan Fire Protection—Wiring Diagram for Transfer Table

The circuit-breakers are equipped with special solenoids which trip them open when the motor starts to move the transfer table. This is accomplished by having the motor current pass through the solenoids. A short-circuiting switch is provided so that when the circuit-breakers are open, the current cannot pass through the solenoids to cause them to operate. In the half-tone previously mentioned, the conductor rail which feeds the transfer table is clearly shown on the walls of the transfer pit supported by insulators. Above this rail may be seen the contact plates on one of the tracks and also the wooden stringer which runs from one contact plate on a track to the near contact plate of an adjacent track. The purpose of this stringer is to make a continuous path from track to track for the contact shoe on the table, thus simplifying the action of the shoe. The point at which the wood stringer meets the metal contact plate does not show very clearly in the illustration, as the stringer and plate appear as one continuous piece. The circuit-breakers shown on the transfer table are protected by a wooden housing which is completely lined with asbestos building lumber.

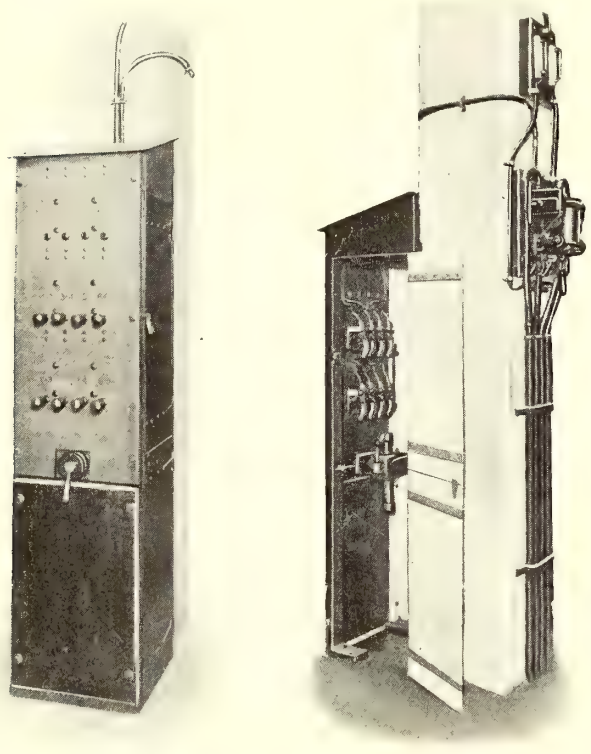
TIME-LIMIT CIRCUIT-BREAKERS

The time-limit circuit-breaker method, which is the third means used to keep the circuits dead when not in use, is especially applicable to car houses having long lengths of track, where the use of contact shoes would not permit sufficient rapidity in handling the cars, where it is often desirable to put power on a track for a short time without having to move the transfer tables opposite the track in question, or where a transfer table is not installed. This system consists of a group of switches



Metropolitan Fire Protection—Transfer Table and Pit with Contact Shoe System at the 146th Street Car House

which are mounted on a board and control the current supply to different tracks. Each track circuit is protected by a circuit-breaker and also by a time-limit device which will automatically trip open the circuit-breakers after they have been closed for a predetermined period like 5 or 10 minutes. One time limit device only is required for each control board. This method is one which has been lately developed and is very positive in its action. Front and back views are reproduced of



Metropolitan Fire Protection—Circuit-Breaker with Exterior and Interior of Time-Limit Device

the control board on the ground floor of the Ninety-ninth Street and Lexington Avenue car house. The latter cut also shows a pair of circuit-breakers mounted on the face of the column and their wiring arrangement.

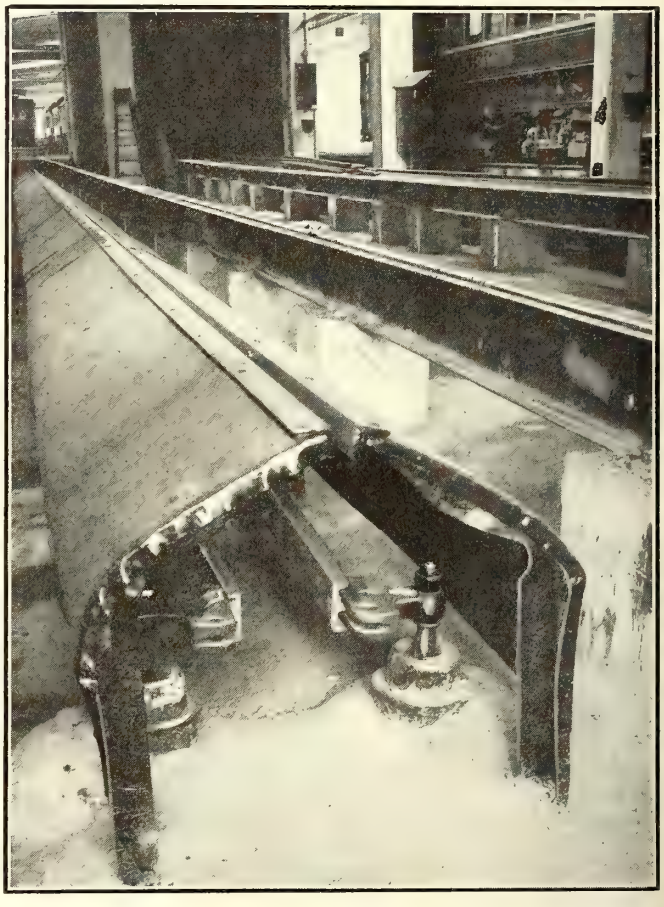
The eight handles on the face of the board operate the switches in the back which control eight pairs of circuit-breakers affecting respective tracks. The rod below the switch handles operates the same tripper which is actuated by the time-limit device which opens the control switches. This arrangement makes it possible to trip the circuit-breakers by hand at this board when desired. All wires from these control switches to the respective circuit-breakers are run in conduit. In the rush hours when the circuit-breakers have to be repeatedly closed on the individual tracks, time may be saved in getting out the cars by having a boy operate the control board.

CONSTRUCTION AND RECONSTRUCTION OF POWER SYSTEMS IN CAR HOUSES

New power installations, equipment and wiring have been put in several of the car houses and considerable overhauling has been done in the old installations. The car houses in which the installations have been made are given below, with short descriptions of the character of each.

Ninety-ninth Street and Lexington Avenue.—This building has been furnished with new power systems and wiring throughout. The time-limit circuit-breakers, installed on the ground floor, control all the tracks except those which go out to the street, these in- and outgoing tracks being controlled by overload track circuit-breakers. The contact shoe method has been installed on the second floor. The power service is supplied by incoming feeders which are connected to the entrance panel. All the power is controlled by a pair of circuit-breakers on this entrance panel independently of the lighting circuits. A recording wattmeter on this panel measures the power consumed in this car house and also in the adjoining 100th Street car house. Two circuit-breakers on the second floor control the power circuits on that level.

One Hundred and Forty-sixth Street and Lenox Avenue.—New power systems and wiring have been installed on the ground floor of this car house. Contact shoes control all the slotted portions of tracks adjacent to the transfer pit, except the tracks going out to the street, which are equipped with overload track circuit-breakers. On the west side of the transfer pit, or the side toward the rear of the car house, the tracks are slotted for 50 ft. from the transfer pit. The remaining portions of these tracks have pits 5 ft. deep, over which there has been placed a double overhead trolley. In order to operate the cars over the track sections equipped with this overhead trolley, all the cars in this building have side receptacles for attachment plugs so as to connect flexible leads from a trolley hand pole. They have also a double-pole, double-throw switch to disconnect the plow, from which all cars on this system are normally operated, and to connect the hand pole to the railway motor circuits. The trolley wires over the respective tracks are controlled by knife switches. The feeders which supply power to this building are carried directly from the substation to the main circuit-breaker panels, which are located on the two halves of the ground floor respectively, and separately control the power in each half of the car house.



Metropolitan Fire Protection—Supporting and Protecting Power Rails in Ninety-ninth Street Car House

Fourteenth Street and Avenue B.—A contact shoe system has been installed in this car house.

Fiftieth Street and Seventh Avenue.—A time-limit circuit-breaker system has been installed in this car house.

Fifty-fourth Street and Ninth Avenue.—Power feeders and an entrance panel are being installed, including only the feeders from the street to the entrance panel, from the entrance panel to the transfer pit and parallel to the transfer pits. The present temporary switches controlling some of the tracks are

being connected to these permanent feeders pending the time when it is decided what power system shall be put in for moving the cars in this car house. This building is in process of construction.

Thirty-second Street and Fourth Avenue Car Yard.—A double overhead trolley system and new wiring have been installed at this property.

PROTECTED CONDUCTOR RAIL CONSTRUCTION

A new type of conduit construction has been recently installed on the second floor of the Ninety-ninth Street and Lexington Avenue car house, which may be referred to as the protected conductor rail construction. This design was necessary to meet the requirements of the raised track construction on this floor. A general view of this construction is shown on page 696. It consists of yokes spaced approximately 5 ft. apart which support slot angles and sheet-steel aprons. The yokes are made up of old conductor rail bent to the desired form and secured to the floor by bolts and also imbedded in concrete. One of these yokes is seen at the end of the construction shown in this half-tone. The sheet-iron apron extends approximately to within 8 in. of the floor, being low enough to prevent anything touching the live portions of the conductor rails or their supports. At the same time a good clear space is given so that no dirt is liable to collect and the floor can be easily cleaned. The insulators supporting the conductor rail are inverted and securely held by means of bolts and imbedded in concrete. This construction is simple and inexpensive and combines the desirable features of operating convenience as well as possessing certain advantageous fire protective elements.

INSURANCE

The heavy loss involved in the 146th Street fire caused the insurance companies to look askance at the Metropolitan risk and some of them cancelled their policies. The Madison Avenue fire served to increase the feeling of uneasiness among the underwriters, which was correspondingly heightened by the partial destruction of the Fourteenth Street car house in the fall of 1907. The disastrous conflagration which destroyed the Ninety-sixth Street car house was the last straw. Every mail brought letters to the Metropolitan from insurance companies cancelling their policies, until, toward the latter part of March, 1908, practically the entire insurance schedule had been cancelled; that is, less than 5 per cent of the insurance desired had not been affected by cancellation. This was the situation when the fire protection campaign mentioned above was begun. The prejudice against the Metropolitan risk was general among the underwriters, many of whose local representatives had been severely criticised by their home offices because they continued any insurance upon the Metropolitan risks after the first two or three fires had taken place.

Briefly, then, two years ago the Metropolitan risk was regarded as one of the worst in the country and almost no insurance company would have anything to do with it. Now the best companies are willing and anxious to get the business, and the Metropolitan properties are considered among the finest street railway risks in the world. Further than this, the insurance authorities are expressing a willingness to make lower rates of insurance than the last rate quoted. This means that further reductions in premiums are in course of preparation.

During the two years prior to March 23, 1908, there had been fires in the Metropolitan properties aggregating a loss of nearly $3,000,000; in the two years since March 23, 1908, there has been no conflagration and no claim has been made upon the insurance companies. Had there been another fire equal in proportions to either the 146th Street or the Ninety-sixth Street fires, the Metropolitan lines would have been so badly crippled for lack of cars that before new equipment could have been procured the resulting fare losses would undoubtedly have been much greater than the actual value of the cars destroyed.

The following table indicates the insurance cost on an annual basis as of several dates beginning March 23, 1908, using the amount of insurance in force as of Jan. 11, 1910, at the various locations in the Metropolitan system. The table shows the average rate covering all such properties as of the dates indicated and the total premium cost as of such dates on the amount of insurance specified:

Date.	Insurance.	Premium.	Average rate.
March 23, 1908.....	$14,045,600	$192,755	1.372
March 23, 1909.....	14,045,600	93,416	.665
July 3, 1909.....	14,045,600	61,917	.441
Jan. 11, 1910.....	14,045,600	50,209	.357

Of the amount of premium saving, which is in round figures about $142,000, approximately $43,000 was due to improved housekeeping, organized effort to prevent fires and careful attention to details—a saving resulting from a very nominal expenditure. Of the balance, about $26,000 was due to the installation of automatic sprinkler systems, being a return of approximately 10 per cent on the investment, and $20,000 was due to auxiliary fire apparatus and improvements in construction, being, in round figures, a return of from 10 per cent to 20 per cent on the investment. The remainder of the premium saving resulted from other improvements made in the property, the inter-relation of which, so far as insurance rates are concerned, renders it impracticable to analyze the potency of each particular factor which has entered into the general result.

It is of interest to note that the improvements which were made in the Metropolitan risk were from the very beginning of such a character as ultimately to bear fruit in the way of rate reduction, thereby netting the Metropolitan a very handsome return on its expenditure, and at the same time placing its properties in such a condition as to minimize the possibility of interruption to the service because of the destruction of rolling stock or building facilities.

The insurance companies made inspections of their own, and, becoming satisfied that the situation warranted such a course, they acquiesced in propositions involving the reductions in rates which have taken place from time to time.

The entire operating staff of the Metropolitan Street Railway system has labored loyally and efficiently to carry out the fire protection program of the general manager, and the great reduction in the insurance rates symbolizes the success which has attended the efforts of all concerned.

OTHER ARTICLES.

In the next article on the rehabilitation of the Metropolitan property the method of fighting snow will be described.

RAPID CAR PAINTING IN RICHMOND

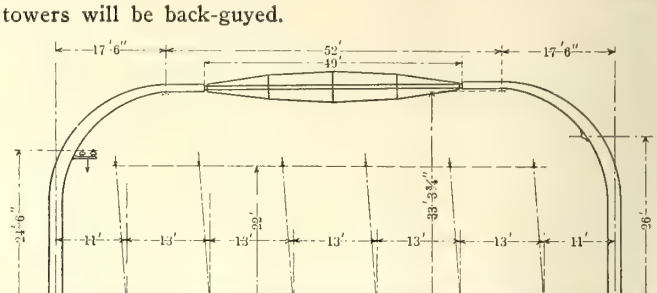
The Virginia Railway & Power Company, Richmond, Va., uses the following painting schedule for turning cars out within eight days:

First day—One coat of primer.
Second day—Puttying up.
Third day—One coat of surfacer.
Fourth day—Leveling coat.
Fifth day—Rubbing down and one coat of flat color.
Sixth day—One coat of varnish color and plain striping.
Seventh day—Varnish.

It will be observed from the foregoing that 48 hours are allowed to elapse between the first and second coats. It is believed that this interval is long enough to give the first coat a chance to dry so well that the rest of the work can be carried out successfully in the short time given. The standard body color of all Richmond cars corresponds to Masury's No. 9514 green, with light cream for the window and vestibule framing and plain aluminum striping. The green has proved a very durable body color and is easily matched. The vestibuled 32-ft. body convertible cars of the company have been cleaned and painted from the wood up for $100. This figure included scraping down the inside of the car, revarnishing and cleaning up the seats, etc. The cars are retouched every 50,000 miles when they come in for the general overhauling.

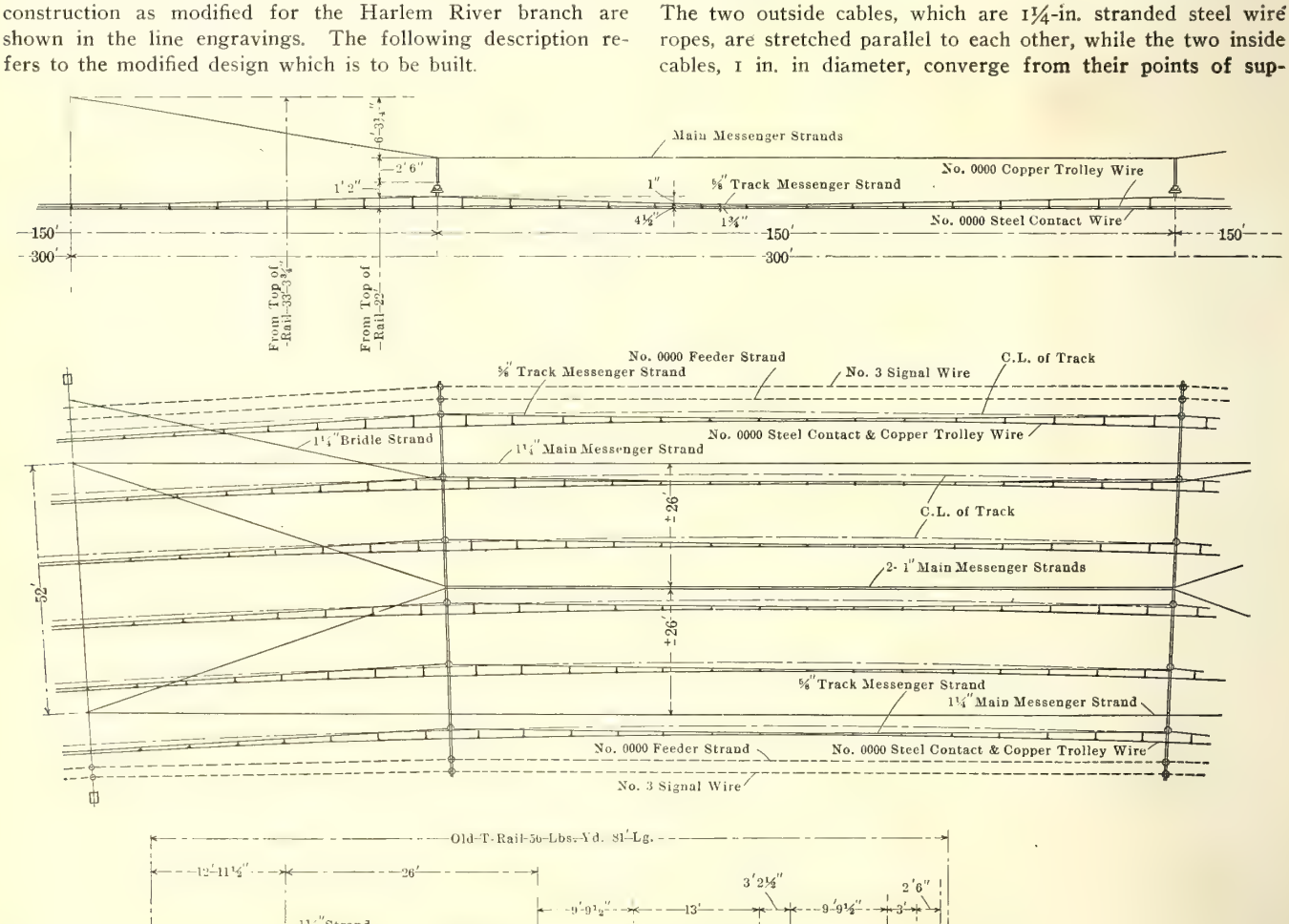
PROPOSED CATENARY CONSTRUCTION FOR HARLEM RIVER BRANCH OF NEW YORK, NEW HAVEN & HARTFORD RAILROAD

A 6000-ft. experimental section of catenary trolley construction of a novel type was built last fall by the New York, New Haven & Hartford Railroad eastward from the end of its electric zone at Stamford, Conn. The object in erecting this experimental section was to observe the results of electric locomotive operation under an overhead construction much lighter, more elastic and less costly to erect and maintain than the catenary construction with double messenger wires and triangular hangers which was used on the initial electric zone between Woodlawn and Stamford. The results have been so satisfactory that it has been decided to adopt this new construction with some modifications for the electric equipment of the six-track Harlem River branch between New Rochelle and Harlem River, 12.13 miles. The details of the experimental four-track section as built are shown in the accompanying engravings from photographs and the details of the six-track construction as modified for the Harlem River branch are shown in the line engravings. The following description refers to the modified design which is to be built.



New Haven Catenary—End Elevation of Supporting Towers for Six-Track Construction

The catenary structure is suspended from the overhanging ends of the supporting towers by four main messenger cables. The two outside cables, which are 1¼-in. stranded steel wire ropes, are stretched parallel to each other, while the two inside cables, 1 in. in diameter, converge from their points of sup-



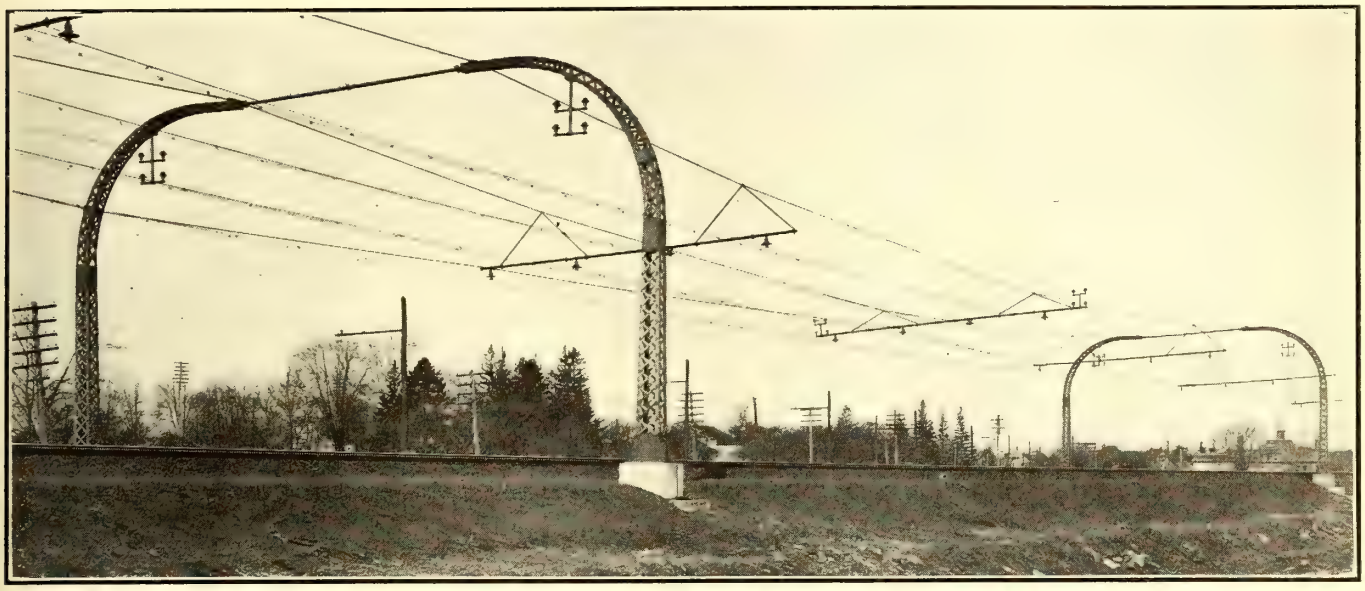
New Haven Catenary—Details of One Span of Six-Track Construction on 2 Deg. 30 Min. Curve for Harlem River Branch

The supports are latticed steel towers bolted down on concrete foundations and bent over at the top with a graceful curve, so that the extreme end is horizontal and for six-track construction overhangs 23 ft. 6 in. from the center of the foundation. The overhanging ends are braced apart by a pipe truss 40 ft. long made up of a piece of iron pipe 4½ in. in diameter and six ⅝-in. cables spread at the center with three spider castings mounted on the pipe. The total span of these six-track supports, which are spaced 300 ft. apart, is 87 ft. from center to center of foundations. On sharp curves the outside towers will be back-guyed.

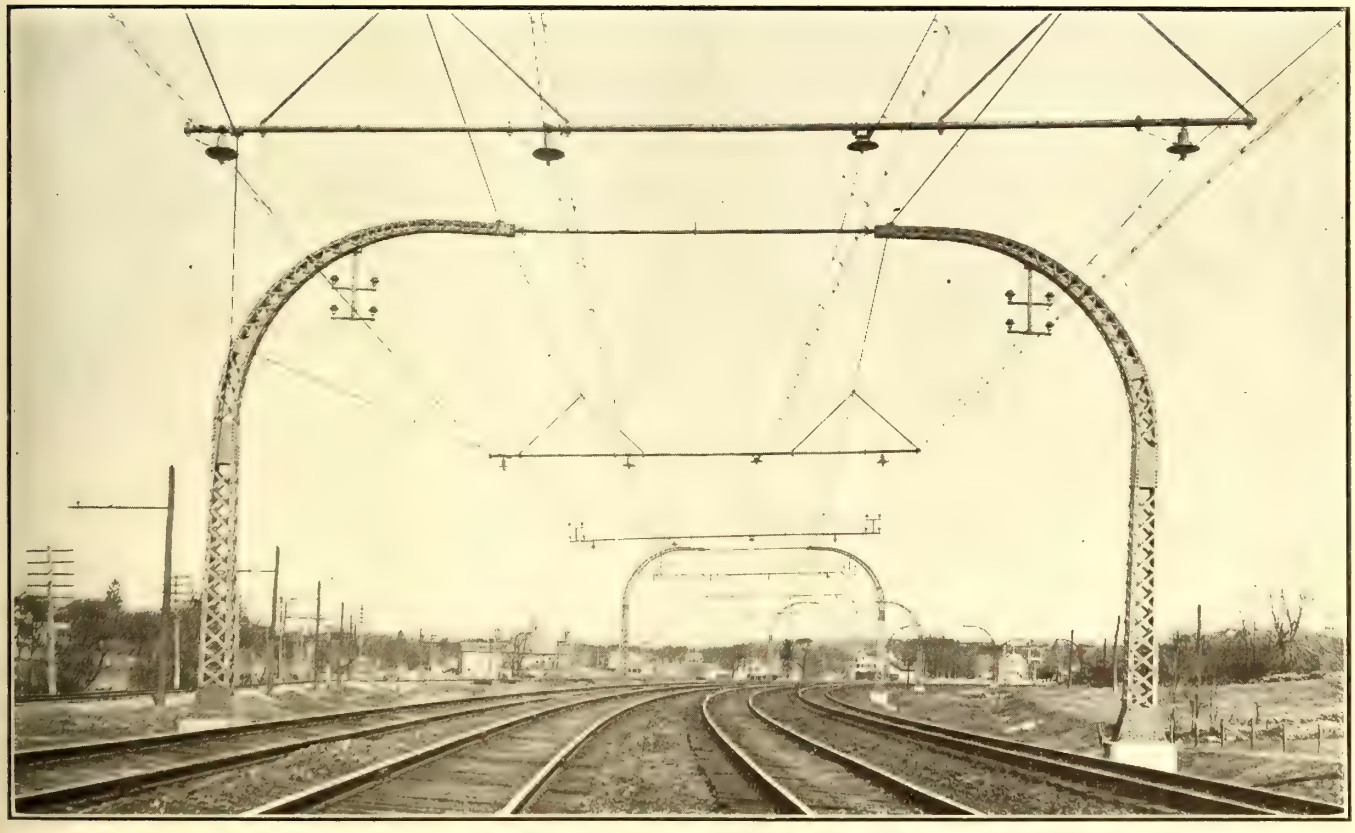
port on the towers and come together above the cross-bents. Between cross-bents they are stretched close together. The sag of the main messenger cables from the towers to the cross-bents is approximately 6 ft. 3 in. They are clamped in pairs on the underside of the towers 6 ft. in from the overhanging ends. Two cross-bents made of 56-lb. T-rail are used for each 300-ft. span. Iron pipe was first tried for this purpose and later

structural shapes were used. The old T-rail is cheaper and stiffer than either. These bents which support the six-track messenger cables are suspended at three points by heavy rod hangers from the main messenger cables.

From the cross-bents are suspended the 5/8-in. stranded messenger cables from which the trolley wires are hung. The track wire is fastened to the copper wire above it with a simple clamp. On tangents where the messenger cable and the two grooved wires lie in the same vertical plane the bottom clamp of the rod hangers grips the copper conductor only. On curves, however, the trolley wire is offset to one side of the messenger cable and in order to maintain the two grooved wires in the



New Haven Catenary—Experimental Four-Track Construction East of Stamford, Conn.



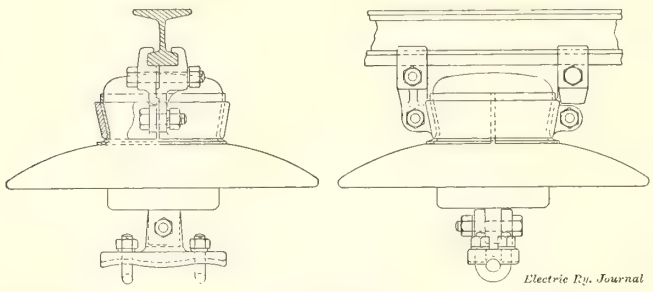
New Haven Catenary—Experimental Four-Track Construction East of Stamford, Conn.

messenger cables are insulated from the cross-bents by single-petticoat porcelain insulators 15 in. in diameter which are clamped under the head of the T-rail. One of the drawings shows a preliminary design for these insulators and clamps. The No. 0000 grooved copper conductor, which is strung 1¾ in. above the steel trolley wire of the same cross-section, is supported from the track messenger cable by plain rod hangers spaced 10 ft. apart. Halfway between these hangers the steel

same vertical plane a special form of hanger has been devised. As will be seen from the drawing on page 700, the hanger consists of a round rod with a bolted clamp on top and with its lower end threaded and bent to assume a horizontal position. This threaded end is screwed into a double clip, gripping both the upper and lower wires. This prevents any canting of the twin wires and thus procures the same vertical elasticity on curves as on tangents. The double clamps between hangers

are used on curves as well as on tangents. The track messenger cables are stretched to give a normal sag of 1 ft. in a 300-ft. span.

In addition to the trolley messengers the cross-bents carry two insulators at each end to which are attached an 11,000-volt feeder cable and a No. 3 wire carrying current at 2200 volts for the signal circuits. These two wires on each side are

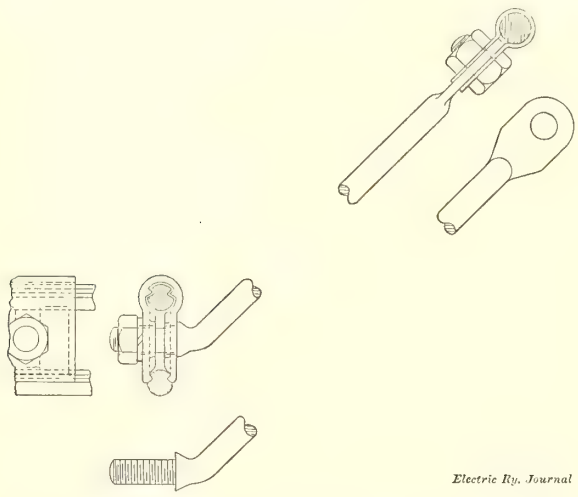


New Haven Catenary—Insulator for Track Messenger Wires

supported on a bracket at each of the towers, so that they have a span of only 100 ft.

On curves of over 2 deg. a 1¼-in. bridle cable is used to pull the entire overhead structure outward at the center of the span between towers. This cable is fastened to the outside towers and clamped on top of the cross-bents at the proper point to produce the desired deflection without undue strain.

It is estimated that this new type of construction can be erected at a considerable saving in first cost over the double-



New Haven Catenary—Hanger for Use on Curves

messenger cable catenary used on the main line between Stamford and Woodlawn. Less resistance is offered to side winds. The use of a steel-contact wire below the copper conductor has proved so satisfactory on the main line that this feature has been retained.

This paper is indebted to W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, who gave permission to select the published drawings from his engineering files.

An American consul in Latin America reports that a business man in his district has obtained from the local government a concession for the construction of an electric railway to connect two points in the country. The contract is for 50 years and will call for the construction of about 1½ miles of track; the gage will be 1.07 m (3 ft. 6 in). The government concedes the contractors free importation for all materials and equipment required by the company. Work must be commenced within a year from the approval of the contract, and must be completed within 18 months thereafter. Inquiries should be sent to No. 4726, Bureau of Manufactures, Washington, D. C.

ELECTRIFYING THE WENGERNALP RAILWAY FOR HIGH TENSION, D. C. OPERATION

The Alioth Company, of Basel, Switzerland is now engaged in electrifying for 1500-volt-2000 volt d.c. trolley operation the steam railroad which now connects the valleys of Lauterbrunnen Kleine Scheidegg and Grindelwald in Switzerland. This line was built about 15 years ago and is 24 km (14.9 miles) long. The road is well patronized by tourists, as it forms a part of the route to the famous Jungfrau Railway. Power for the line is to be taken from a converter station at Wengen, which will receive energy from a hydro-electric station at 7000 volts, three-phase, 40 cycles. Each of the two converter sets to be installed will consist of a 430-hp, 7000-volt, 485 r.p.m. asynchronous three-phase motor direct-connected to a 290-kw, 1500-2000-volt, interpole d.c. generator. A third set will be installed later. The generators will be operated in parallel with two independent storage batteries, each having 736 cells, rated at 513 amp-hours for four hours' discharge. Only one of these batteries will be used at first, but when both are in service they will be able to care for eight to 10 trains going upgrade. In fact, when a winter service is installed between Lauterbrunnen and Wengen, the complete battery equipment alone will furnish enough current to operate for a week two daily passenger trains and one daily freight train. This wise provision will insure greater reliability of service, as less dependence need be placed on the transmission lines in the severe Alpine winters. The converter station will also be furnished with two exciter sets and transformers for the same. The a.c. motors are to be controlled from nearby individual panels, which will carry the measuring instruments and control switches. The automatic oil switches and a.c. starting devices, however, will be placed in an underground metal compartment. The d.c. control apparatus will be mounted on a common switchboard. The trolley potential at periods of heavy travel will be maintained by a booster equipment, which will be kept in a double-truck car at Alpiglen. The apparatus will consist of a three-phase motor, direct-connected to a 110-kw d.c. series generator and the necessary control board. The use of a car for this equipment is to permit the easy transportation of the latter to the shops at Grindelwald either for repairs or storage.

The trolley poles in the yards are to be of double channels, but of wood on the right-of-way. A novel feature in connection with these wooden poles will be their insertion in metal holders so that they may readily be exchanged. In sections liable to visits from avalanches, the poles will be removed in autumn and replaced in spring. The poles are generally placed on the inner or mountain side of the track to give the passengers an unobstructed view of the scenery.

The trolley circuit on the new route between Lauterbrunnen and Wengen, and on the rest of the line to Grindelwald, will consist of two-hard drawn copper wires carried from malleable iron brackets. The old route, which will be used only for empty cars, has but one trolley. The feeders between Wengen and Alpiglen are carried on the high-tension wooden pole line which feeds the booster set. The feeder between Alpiglen and Grindelwald is mounted on the trolley poles. Feeder taps are installed every 1542 ft. The high-tension line is usually carried at a distance of 300 ft. to 600 ft. from the railway. The return current will be sent through the running rails and also through the rack rails, except on the rack section between Wengen and Lauterbrunnen. With this exception, all rail joints are supplied with flexible copper bonds cross-bonded every 615 ft.

The trains will be made up of electric locomotives and trailers. The locomotives will be carried on single trucks, and will weigh about 15 metric tons. There will be two running axles and two pinion axles for operation on rack sections up to 25 per cent grades. In accordance with the Swiss railway regulations, each locomotive will have a braking equipment consisting of two independent hand brakes, one automatic brake and one brake for running downhill. The electrical apparatus will comprise two 150-hp motors always operated in series, one controller, and one set of starting and braking resistances.

FORMS FOR ACCOUNTS OF INTERURBAN AGENTS

A number of forms designated to facilitate the work of agency accounting have been prepared by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

Mr. Hixson has found an agents' ledger of value. Loose-leaf pages measuring 14⅞ by 11¾ in. are used. The list of items explanatory of the debits and credits shown on this ledger is the same as that set forth on the balance sheet which the agent makes out, with the exception that the ledger provides for agency transfers. This line is used in the auditor's office in case of a transfer of agents to credit the retiring agent and debit the incoming agent with the amount of uncollected accounts which the new agent accepts. When a new agent is installed, a new sheet is placed in the ledger, starting with a debit of items accepted from the retiring agent.

correct, return this sheet at once with notation, stating explicitly why objection is made." Space is provided below the words "corrections accepted and records corrected" for the agent to sign his name and the date. Corrections on way-bills, of the form adopted by the Central Electric Accounting Conference, are made by either the forwarding agent, receiving agent or auditor's office. Notice of corrections on the monthly ticket report is also sent to the agent, with instructions to correct his records accordingly.

In checking the reports of agents before making entries on the agent's ledger, the auditor's department checks the forwarded and received abstracts of business against each other, so as to disclose any discrepancies that may exist. For instance, when freight is shipped from Indianapolis to Richmond, the report of the forwarding agent is checked against the report of the receiving representative of the company. In case a difference is shown, reference is had to the way-bill to show the

AGENT
ASSISTANT AGENT
CASHIER

INSTALLED	RELIEVED		BOND			STATION
	DATE	BY WHOM	AP. FILED	DATE BOND	AMOUNT	

YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
DEBIT												
Balance Due Company from Prev. Month												
Uncollected Accounts from Prev. Month												
Frt. and Adv. on Frt. and Dis. Frt. Rec'd												
F. P. Forwarded on Frt. and Dis. Frt.												
Bag. Rev. and Adv. on Baggage Received												
F. P. Forwarded on Baggage												
Storage												
Ticket Sales												
Cash from Conductors												
Auditor's Debit Advices												
Agency Transfers												
Balance Due Agent at Close of Month												
CREDIT												
Balance Due Agent from Previous Month												
Adv. on Frt. and Disp. Frt. Forwarded												
F. P. on Freight and Disp. Frt. Received												
Advances on Baggage Forwarded												
F. P. on Baggage Received												
Cash Remittances												
Auditor's Credit Advices												
Agency Transfers												
Balance Due Company at Close of Month												
Uncollected Accounts at Close of Month												

Forms for Interurban Accounts—Agent's Ledger

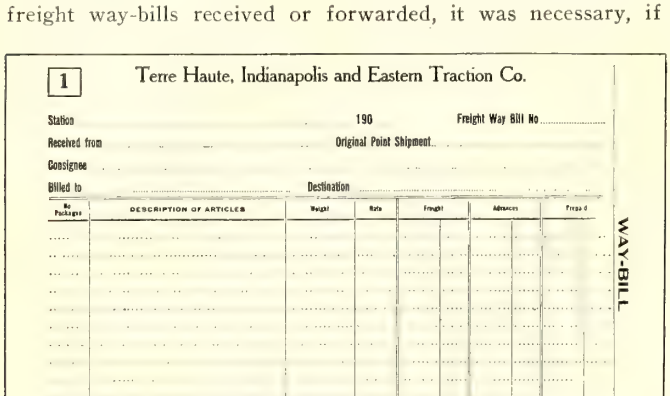
The recapitulation of balances of all agency accounts shows each month the same net balance due to the company, as shown by the controlling account of the general books.

Before the totals are entered under the various headings, abstracts of the way-bills and monthly ticket reports from which the entires are made are checked thoroughly and all necessary corrections made. The notice of all corrections in abstracts of way-bills is sent to the agent in duplicate with instructions as follows: "Correct your books and copies of reports; sign and return original by next train. Retain one copy for station file. If the above alterations are not found to be source of the error. After all entries are made on the agent's ledger, from the freight abstracts, ticket reports, cash book and from other sources, each station is balanced to show the balance due the company or the agent at the end of the month.

The agent is required to send a balance sheet to the auditor each month. This balance sheet, which is 13¾ in. x 8¼ in., is compared with the statement of the account on the agent's ledger. Any corrections which may be made on the agent's balance sheet are noted on red ink. The balance sheet is then returned to the agent together with an itemized statement of corrections which should be made on his monthly report. After

the agent checks the details as corrected, he signs the corrected balance sheet and returns it. With this practice the traveling auditor does not have to go further back than the last report which has been accepted by the agent. The balance sheet is returned to the agent for signature if no changes are made.

The practice of having agents make daily reports of waybills was tried for one year and then abandoned, because Mr. Hixson concluded that too much work was involved for the benefits received. With daily abstracts of dispatch freight and freight way-bills received or forwarded, it was necessary, if


1

Terre Haute, Indianapolis and Eastern Traction Co.

Station ... 190 ... Freight Way Bill No. .....
Received from ... Original Point Shipment ...
Consignee ...
Billed to ... Destination ...

No. Packages	DESCRIPTION OF ARTICLES	Weight	Rate	Freight	Advances	Prepaid

WAY-BILL

AGENT WILL IN EVERY CASE, WHEN DELIVERING SHIPMENT, TAKE CONSIGNEE'S RECEIPT ON THIS FORM AND FILE IN HIS OFFICE.
Received the property described hereon, in good order, except as noted ..... Consignee

Forms for Interurban Accounts—Local Waybill Sheet No. 1

monthly totals were desired, to add the figures for 30 days and this was found to be a disadvantage.

A great many freight agents also handle dispatch freight business, and to reduce the number of reports a combined freight and dispatch freight abstract is used. This abstract shows separate columns for weight and freight revenue for freight and dispatch freight, but the advanced charges, the amount prepaid, or the amount to be collected on freight or dispatch freight, is shown in the same column under the three heads. This plan gives the necessary information as to revenue and tonnage for the two classes, and also gives basis for charges or credits to agents.

The Terre Haute, Indianapolis & Eastern Traction Company form of local way-bill provides for four copies, one to be mailed to auditor at close of day's business, two to go forward with the shipment, and the fourth to be retained by forwarding agent. The size of the original is 8½ in. x 5½ in. and No. 1 is reproduced. The receiving agent takes consignee's receipt on one copy of bill which he files with his station records, and he signs and delivers to consignee one copy, showing payment of freight charges.

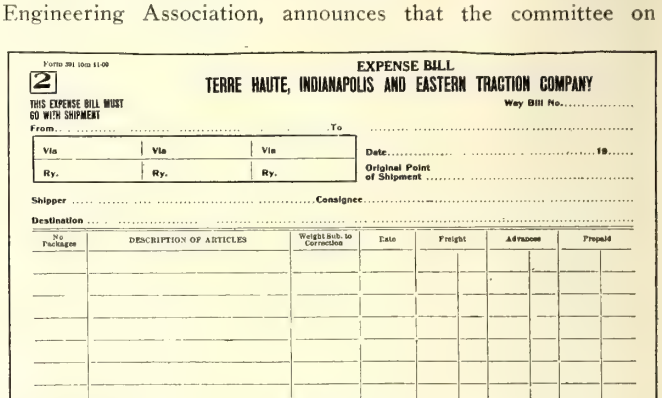
The "Indiana" form of interline way-bill is similar to the local bill, with the exception that the forwarding agent makes five copies, sending two to the auditor of the Terre Haute, Indianapolis & Eastern Traction Company, and the auditor of this company forwards one of these copies to the auditor of the road on which station to which shipment is made is located. In case a shipment goes over more than two lines, an additional copy of way-bill is made for the auditor of each line interested. Sheet No. 2 is reproduced.

The "Ohio" form of interline way-bill provides that three copies go forward for shipment, the auditor of receiving road being furnished with copy of way-bill by his agent upon receipt of shipment and bills.

These way-bills are in accordance with the forms adopted by the Central Electric Accounting Conference.

ENGINEERING COMMITTEE ON BUILDINGS AND STRUCTURES

Secretary Corning, of the American Street & Interurban Engineering Association, announces that the committee on


Form 391 10m 11-09

2

EXPENSE BILL

TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY

THIS EXPENSE BILL MUST GO WITH SHIPMENT

Way Bill No. .....

From ... To ...

Via	Via	Via
Ry.	Ry.	Ry.

Date ..... 19.....
Original Point of Shipment .....
Shipper ... Consignee ...
Destination ...

No. Packages	DESCRIPTION OF ARTICLES	Weight Sub. to Correction	Rate	Freight	Advances	Prepaid

TOTAL TO COLLECT.

Received payment for the Company ... Agent
Date ... 19...

Forms for Interurban Accounts—Interline Waybill Sheet No. 2

buildings and structures has been appointed. The following are members:

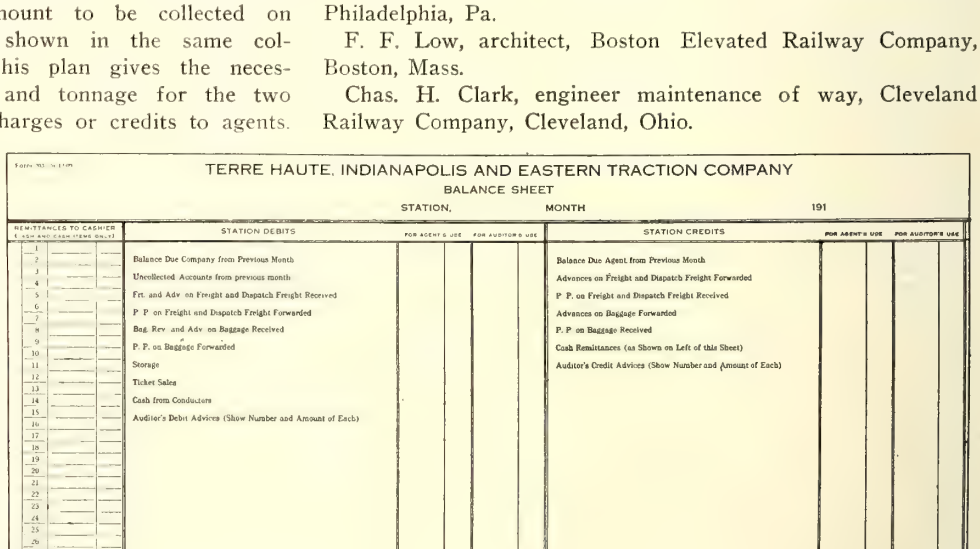
Martin Schreiber (chairman), engineer maintenance of way, Public Service Railway Company, Newark, N. J.

George H. Pegram, chief engineer, Interborough Rapid Transit Company, New York, N. Y.

Thos. K. Bell, chief engineer, United Traction Company, Philadelphia, Pa.

F. F. Low, architect, Boston Elevated Railway Company, Boston, Mass.

Chas. H. Clark, engineer maintenance of way, Cleveland Railway Company, Cleveland, Ohio.


TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY

BALANCE SHEET

STATION, MONTH 191

REMITTANCES TO CASHIER (CASH AND CASH ITEMS ONLY)	STATION DEBITS	FOR AGENT'S USE	FOR AUDITOR'S USE	STATION CREDITS	FOR AGENT'S USE	FOR AUDITOR'S USE
1	Balance Due Company from Previous Month			Balance Due Agent from Previous Month		
2	Uncollected Accounts from previous month			Advances on Freight and Dispatch Freight Forwarded		
3	Frt. and Adv. on Freight and Dispatch Freight Received			P. P. on Freight and Dispatch Freight Received		
4	P. P. on Freight and Dispatch Freight Forwarded			Advances on Baggage Forwarded		
5	Bag. Rev. and Adv. on Baggage Received			P. P. on Baggage Received		
6	P. P. on Baggage Forwarded			Cash Remittances (as Shown on Left of this Sheet)		
7	Storage			Auditor's Credit Advices (Show Number and Amount of Each)		
8	Ticket Sales					
9	Cash from Conductors					
10	Auditor's Debit Advices (Show Number and Amount of Each)					
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
				Balance Due Company Close of Month (See Analysis on Back)		
	Balance Due Agent Close of Month (See Analysis on Back)			Uncollected Accounts Close of Month (Per Attached List)		
Total						

NOTE This Balance Sheet Must Show all Station DEBITS and CREDITS for the Month.

DATE FORWARDED TO AUDITOR 191

AGENT.

Forms for Interurban Accounts—Agents' Balance Sheet

M. H. Brondson, chief engineer, Rhode Island Company, Providence, R. I.

This is a new committee whose appointment was decided upon by the executive committee of the association at its last meeting.

VALUE OF LIGHTNESS IN CARS

BY M. V. AYRES, ELECTRICAL ENGINEER, BOSTON & WORCESTER STREET RAILWAY.

The publication in the April 2 number of the Electric Railway Journal of the article relating to the new cars of the Boston & Northern and Old Colony Street Railways marks a very important step in the movement looking to the reduction of car weights. This movement is hardly more than 2 years old, and it has been fostered almost exclusively by a discussion of the savings to be expected, as indicated by theoretical considerations.

I have contributed several papers to this discussion, and have done a large amount of work in the effort to collect data showing the results of actual experience bearing on the subject. This investigation has shown an almost total lack of exact information as to the comparative costs of operating cars of different weights, but of the same size, in similar service. It has also demonstrated the difficulty of getting detailed weights of the component parts of car equipment, information much needed as a basis for determining the best direction in which to attack the problem of reducing weights. Hence the article above referred to is especially welcome, because it supplies valuable information in both of these fields. The fact that the cars are of exactly the same size and have the same electrical equipment, gives the data on power consumption a peculiar value; while the completeness of the analysis of component weights compels astonishment and admiration.

The question of operating costs is, of course, the most important factor in this subject, as it is the final test of the merit of achievement in design, and it deserves a somewhat more extended discussion than it has received in the article in question.

Evidently in figuring the savings which will result to his company from the reduction of weight in the new cars Mr. Holst wished to be very conservative, and he therefore took the low figures of 0.6 cent per kw-hour as the cost of power at the car. I take it that this is intended to represent the saving in coal alone, all other elements of power cost being eliminated. This would be justified by the argument that the use of these particular cars would not reduce labor, repair or fixed charges in the power station. I believe this method of figuring is fallacious, because sooner or later increases must be made in the power plant and transmission system to accommodate increased traffic, and every kilowatt of demand saved by the lighter cars postpones that additional investment and permanently reduces the final amount of the investment. Moreover, I doubt if the figures chosen take proper account of the loss in transmission between the power house and the car. The published calculation of savings errs in the other direction by assuming too great an annual mileage. The figure of 210 miles a day is obviously too much in the case of the slow-geared car, as the actual schedule speed made in the test runs was only 10.5 miles per hour, which would require 20 hours' service to complete the 210 miles. Very few cars run more than 18 hours out of the 24. I find no statement in the article as to the mileage used in calculating the saving made by the high-geared car, but the results show that 270 miles were taken. This would result from running 15 m.p.h. for 18 hours, and is a reasonable figure. My criticism of the mileage, however, is principally directed at the assumption that each car would run all day, every day in the year, a condition that could never obtain.

Another just criticism of the test results arises from the unfortunate fact that in both sets of tests the average number of stops per mile was different for the light car and for the heavy car. In the tests with the slow gear this difference is in favor of the heavy car, and in the high gear tests it is in favor of the light car. It is remarkable, however, that in both tests the watt-hours per ton mile are less for the lighter car. This is contrary to what would be expected, and would seem to indicate that there is less friction in the motors or trucks of the new cars. Possibly it is due to the shorter wheel base of the trucks.

To arrive at a more correct view of the real value of the results attained in reducing the weights of these cars, I have made some calculations based on the following assumptions. I have assumed these 44 cars, equipped with the higher gear ratio, to be the entire rolling stock of an interurban railway supplied with power from an alternating-current power plant with substations, a condition that actually exists on the Brockton-New Bedford line where the tests were made. I assume that at the dullest season of the year one-half the equipment, or 22 cars, would be required to run the load, averaging 270 miles per day each. At the time of best travel I assume that all the cars would be in service and that the average condition for the year would be equivalent to a daily use of 33 cars for 270 miles each per day. I have made no attempt to correct the power consumption figures for difference in stops per mile, in view of the fact already mentioned that the lighter cars seem actually to show a less frictional resistance. The power consumption therefore figures as follows:

If the cars were of the heavy 1907 type, the average daily load, at the cars, would be $33 \times 270 \times 3320 = 29{,}600$ kw-hours.

If the cars were of the light 1909 type, the average daily load, at the cars, would be $33 \times 270 \times 2781 = 24{,}800$ kw-hours.

If we assume the operating cost per kw-hour at the power house as 0.75 cent, the cost of direct-current at the substation will be about 1 cent, and at the car, allowing for trolley and feeder losses, about 1.15 cents. At this rate the annual cost of power for the heavy cars amounts to $124,200, and for the light cars $104,100.

The size of the necessary power station I figure as follows: For the heavy cars the average power requirement, at the cars, during time of heavy traffic when all cars are in use, is 2190 kw. Increasing this by the ratio of 1.15 to .75 gives 3360 kw as the average demand at the power station under these conditions. Of course, the peaks of the load will be very much greater than this, but I have assumed that a power station of exactly 3360 kw rated capacity would be large enough, which it would be if everything was in perfect working order. At $125 per kw this station would cost $420,000.

Figuring in the same way we find that the lighter cars would require a capacity of 2818 kw at a cost of $352,000. If we figure fixed charges, i. e., interest, taxes, insurances and depreciation at 10 per cent, we have $42,000 per annum chargeable to this item for the heavy cars, and $35,200 for the lighter cars. We may figure the substations as having 25 per cent higher aggregate rating than the power station, and as costing $25 per kw. This gives the substation cost in the two cases as $105,000 and $88,000 with annual fixed charges of $10,500 and $8,800.

The cost of the transmission system will be greater for the heavy than for the light cars, but it is difficult to arrive at correct figures without making complicated assumptions as to the layout and equipment of the system. I, therefore, arrive at an estimate in the following way: The cost of the electric line construction of the Old Colony Street Railway is given in the Massachusetts Railroad Commissioner's report for 1908 as $1,982,996, and the annual cost of power as $326,722. The transmission system cost 6.06 times the yearly cost of power. Figuring at a ratio of 6 to 1, the cost of this item for our assumed road using the heavy cars would be $745,000. It is not correct to assume that this would be reduced in proportion to the power demand, as a portion of the overhead work would be the same in either case. Our power consumption is reduced by the light cars 16 per cent. It would seem fair to assume that the cost of the transmission system would be reduced 8 per cent, to $685,000. Assuming fixed charges on this at 7½ per cent, we have annual charges of $55,900 if heavy cars are used and $51,400 if light.

There can be no doubt that repairs of electrical equipment will be less with the light cars, because the average load is 16 per cent less on the same motors. It seems fair to assume an 8 per cent reduction in repair costs. Again referring to the Railroad Commissioner's report, we find that repairs to elec-

trical equipment cost $100,761 with a car mileage of 10,090,000. This is almost exactly 1 cent per mile. On our assumed road the repairs to the heavy cars at 1 cent per mile would amount to $32,000. For the light cars, at 8 per cent less, this would be $29,900. There is not the slightest doubt in my mind that other car repairs, not electrical, will be much less for the light than for the heavy cars. Brake shoe, wheel and bearing wear, for instance, should be reduced at least proportionately to the weight. I believe the lighter design is also inherently the stronger, but for lack of data on which to base an estimate I have refrained from assuming any saving in car repairs except that for electrical repairs above indicated.

There can be no doubt that the use of lighter cars would materially reduce track repairs, but for lack of data I make no attempt to estimate this saving. The costs above estimated are shown below:

	Heavy car.	Light car.
Cost of power	$124,200	$104,100
Fixed charges, power station	42,000	35,200
Fixed charges, substation	10,500	8,800
Fixed charges, transmission	55,900	51,400
Repair cars	32,500	29,900
Totals	$265,100	$229,400

Difference, $35,700.

I thus figure a saving of $35,700 per year by the use of the lighter cars, instead of $14,020, as figured by the designer of the cars. My figure is two and a half times the latter, and is still too low, as two important items of known saving are neglected. I believe that my method of calculating is the correct one, even although the savings of fixed charges and labor costs do not at once become evident. The actual result of equipping an entire system operating under the conditions indicated with one kind of equipment or the other would be to show an annual saving approximately equal to that indicated, of $800 per car in favor of the lighter car. It is, therefore, only fair to credit the few cars actually in use with their full share of the saving ultimately to be achieved if the policy which led to their adoption is followed to its logical conclusion.

In my paper, "Car Weights as Affecting Operating Costs," which formed part of the report of the equipment committee of the American Street & Interurban Railway Engineering Association at Denver last October, I attempted an analysis of the probable savings due to a reduction of car weights. In the following table I give a comparison of the savings per mile per ton of weight reduction, as taken from my Denver paper, and as derived from the above calculations for the 44 cars under the condition assumed.

SAVINGS, CENTS PER TON MILE

	Denver estimate.	Old Colony car.
Power consumption	$0.1000	$0.1870
Cost of car repairs	0.0700	0.0242
Cost of track repairs	0.0260	....
Fixed charges, power plant, including substation	0.0500	0.0791
Fixed charges, distribution system	0.0200	0.0419
Totals	$0.2400	$0.3322

The wide divergence between these two estimates is readily explained. It is principally due to a difference in power consumption. The Old Colony tests show a saving of 539 watt-hours per car-mile due to a reduction of weight of 3303 tons, or a reduction of power of 163 watt-hours per ton-mile. My Denver estimate was 100 watt-hours per ton-mile, but I specifically stated that this figure would vary between wide limits, according to conditions of operation, and the figure I chose was intended to apply to more moderate conditions of operation than evidently obtained on the Brockton-New Bedford route. Part of the increase in the power figure is due to the fact that in my present estimate I assume a somewhat greater loss in transmission than in the earlier estimate. I think the larger figure is more nearly correct. The increase in fixed charges on power plant and distribution systems is due directly to the increase in power. The difference in car repairs is due principally to the fact that in the present estimate I have made no allowance for reduced repairs to mechanical equipment, and have assumed a reduction in electrical repairs proportional to only one-half the weight, whereas in the former estimate I assumed a reduction in all items of car repairs directly proportional to the reductions in weight.

The saving in cents per pound per year seems to be the figure which is most convenient for practical use, and the one which makes the strongest appeal to the imagination, although it is a figure which must necessarily vary with different conditions of operation. Some engineers have assumed a value for this as low as 2 cents. The value most commonly used appears to be 5 cents. The estimate made in my Denver paper as a fair average was 7½ cents. The value corresponding to the figures above given for the Old Colony cars is 12.6 cents. The saving estimated for these cars by the designer is only 4.82 cents for the interurban service, and his figures if corrected for the reduced mileage of my estimate would be reduced to 3.62 cents.

All of this testimony shows that the saving to be attributed to a reduction of car weights varies greatly with the conditions and still more with the point of view. However, for reasons already set forth, it appears clear that in the long run all of the factors of saving which I have discussed above will come into effect, and the net value of the weight reduction will approximate the largest figures rather than any of the smaller ones.

PROGRESS OF LONG ISLAND RAILROAD ELECTRIFICATION

In anticipation of the opening of the Pennsylvania Railroad terminal station in New York City, the Long Island Railroad, which will also use the station, has been extending its electric zone and making many expensive improvements. With the opening of the tunnels, it will have for its passenger service two tunnels from Seventh Avenue and Thirty-second Street to the Sunnyside yard in Long Island City; a six-track line from Sunnyside yard to Woodside, eight tracks from Woodside to Winfield; six tracks from Winfield to Glendale Junction to Jamaica.

The Long Island Railroad now has its line electrified from Flatbush Avenue, Brooklyn, to Hempstead, from Woodhaven Junction to Rockaway Park, from Rockaway Park to Valley Stream, and from Valley Stream to Jamaica. By July 1 the electrified line between Dunton and the Pennsylvania Terminal, and between Woodhaven Junction and Glendale Junction will be in operation. By September the line from Valley Stream to Long Beach will be electrified and in operation and by the end of 1911 electrification of the lines between Winfield and Whitestone Landing, from Whitestone Junction to Port Washington, and from Floral Park to Mineola and Oyster Bay will be completed.

The time which is expected to be made between the New York terminal station and the various stations on Long Island is as follows:

Between New York and	Minutes.
Jamaica	18
Garden City	34
Hempstead	38
Mineola	35
Roslyn	38
Oyster Bay	59
Hicksville	43
Huntington	53
Farmingdale	57
Lynbrook	33
Long Beach	40
Far Rockaway	33
Rockaway Beach	33
Flushing	16
Great Neck	26
Port Washington	32
Whitestone Landing	22

It is estimated that there will be a saving of from 20 to 25 minutes in each direction to people living in any of these towns over the time required at present to cross the ferry and take the trolley cars at the foot of Thirty-fourth Street.

The Odessa section of the Kaiserlichen Russischen Technischen Gesellschaft (Royal Russian Technical Society), announces that applications will be received up to May 1, 1910, for space at the Odessa Agricultural and Industrial Exposition at Odessa, Russia, which is to be held from May 15 to Oct. 1.

TESTIMONY ON ELECTRIC RAILWAY CONSTRUCTION AND OPERATION IN THE CASE OF MANHATTAN BRIDGE THREE-CENT COMPANY

Some very interesting testimony on the cost of electric railway construction and operation was elicited during the past two weeks at the hearings before the Public Service Commission of New York, First District, in connection with the application of the Manhattan Bridge Three-Cent Company for a certificate of necessity and convenience for a franchise in the boroughs of Manhattan and Brooklyn.

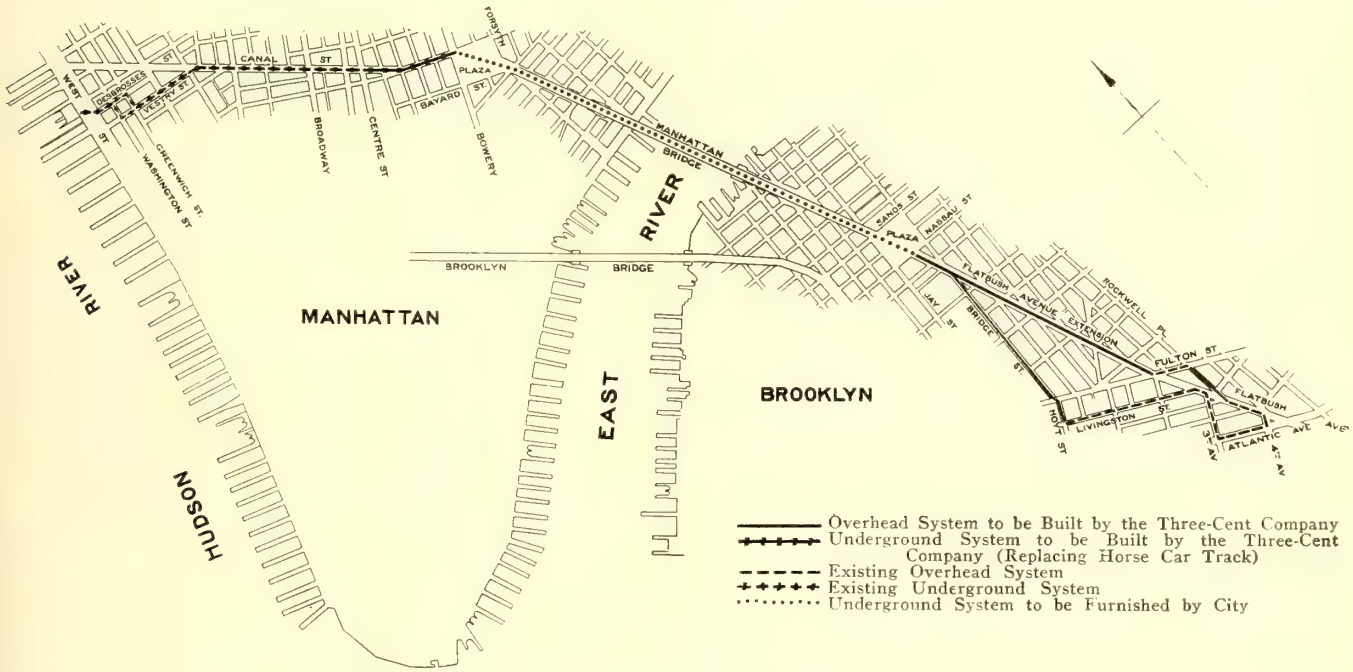
Manhattan Bridge is one of the new structures across the East River and provides space for four surface-car tracks. It is part of an almost direct line between the Flatbush Avenue station of the Long Island Railroad in Brooklyn and Canal Street, which is one of the principal crosstown thoroughfares below Fourteenth Street, in Manhattan. Of the other three bridges across the East River the car service on Brooklyn Bridge is supplied by the Brooklyn surface lines, operating through cars to all parts of Brooklyn, and a bridge local service; that on the Williamsburg Bridge by the companies operating surface cars in both Manhattan and Brooklyn, with a similar bridge local service, and that on the Queensborough Bridge by the New York & Queens County Railway Company, and the South Shore Traction Company. The bridge local service is operated from end to end of the bridges only, the fare being 3 cents one way, or 5 cents for the round trip.

Some time ago the Manhattan Bridge Three-Cent Company applied to the Public Service Commission, First District, for a certificate of necessity and convenience for a line from the Long Island Railroad Station in Brooklyn to and across Manhattan Bridge and across Manhattan Island to the North River along the route shown on the accompanying map, the rate of fare to be only 3 cents. For a considerable portion of this route the new company would be obliged to use tracks belonging to the constituents of the Brooklyn Rapid Transit Company, and to leased lines of the Metropolitan Street Railway Company and the Third Avenue Railroad Company. Under the present Public Service Commission law, the commission has authority to grant permission for the use of existing tracks for a distance not exceeding 1000 ft. on one street or connecting streets, and a certificate of necessity and convenience from the commission is also necessary, of course, for the construction of the line itself.

It was during the hearing before the commission as to the advisability of granting this certificate that the figures on electric railway construction and operation were brought out.

The Three-Cent Company through its principal witness, J. C. Brackenridge, showed that it expected to have to invest $851,345. It expected to carry 30,000 pasengers per day, this being based principally upon the count of the Public Service Commission on Nov. 16, 1909, of 17,472 passengers carried by the Bridge Operating Company over the Brooklyn Bridge, and 23,663 over the Williamsburg Bridge. It further estimated that the cost of operation, including taxes, rentals and depreciation, would be 2¼ cents per passenger.

In opposing the petition, the Brooklyn companies retained Frank R. Ford, of Ford, Bacon & Davis, who presented a complete estimate of the investment required for such a line, and the cost of operation based upon the number of passengers which the Three-Cent Company expected to carry. Mr. Ford's testimony, which included the five tables presented herewith, was to the effect that the road would not pay on the basis proposed. The testimony was particularly interesting because while proposed 3-cent fare lines are not novelties, none has been suggested under just these conditions; that is, to take what might be called the "cream" of the traffic in a large city, leaving the burden of transportation in the suburbs to the existing companies.



Proposed Manhattan Bridge 3-Cent Line—Map of Route

Mr. Ford testified that in preparing his figures he favored the Three-Cent Company where doubt as to details existed, but estimated that the income applicable to return on the investment of about $1,600,000 would be only about $12,000, or ¾ of 1 per cent, and that this slender margin would be more than wiped out if payment for use of tracks of present companies was required to compensate for loss of business, interference with traffic, and for value of special franchises. While this return was based on a traffic of 30,000 passengers per day, as estimated by Mr. Brackenridge, Mr. Ford considered it doubtful if the new company would carry anywhere near that number in view of the fact that the present companies operating on the Williamsburg Bridge and Brooklyn Bridge, without competition, carry an average of only slightly more than 23,000 and 17,000 respectively, as mentioned above.

The discussion presented by Mr. Ford followed the order of determining, first, the service which would be required, then cost of installation and operation, and then the final income account.

ESTIMATE OF SCHEDULE

It was developed that the promoters of the line proposed to run every other car through from end to end of the route, and to turn back the intermediate cars at Broadway, Manhattan, and at Fulton Street, Brooklyn. One minute headway was proposed for the rush hours and three minutes for the day non-rush hours.

Beginning with an assumed traffic of 30,000 passengers per day, and a rush hour headway of one minute, which for this traffic corresponds with the service on the present bridges, the first question determined in Mr. Ford's calculation was the maximum number of cars required at the rush hours, and the proper number of cars to be operated at other times of the day. The average headway during the non-rush hours was determined from the local service over the present bridges, which provides almost exactly one car for 20 passengers. The estimate of the Three-Cent Company was 24.6 passengers per trip.

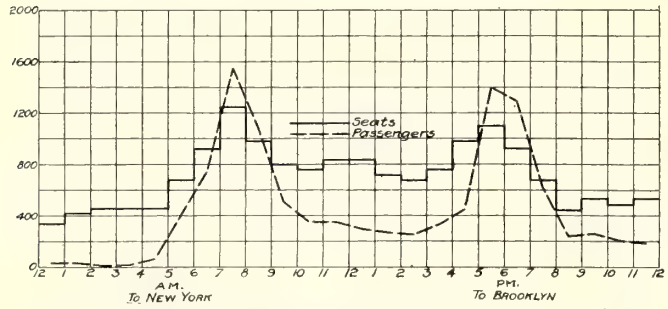


Fig. 1.—Proposed Manhattan Bridge 3-Cent Fare Line—Brooklyn Bridge Local Service, Count of Nov. 16, 1909

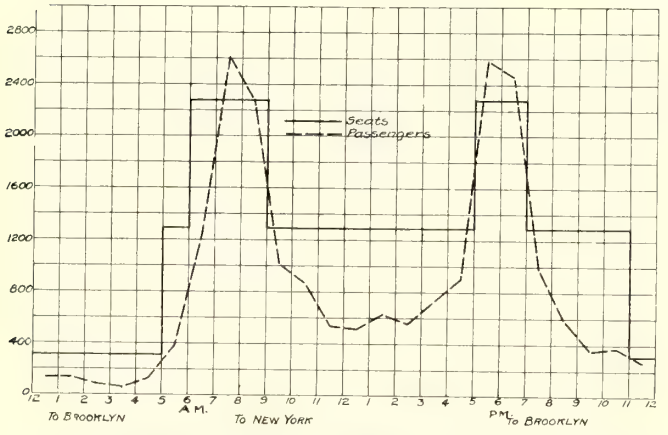


Fig. 2—Proposed Manhattan Bridge 3-Cent Fare Line—Estimate of Ford, Bacon & Davis, Based on 30,000 Passengers Per Day

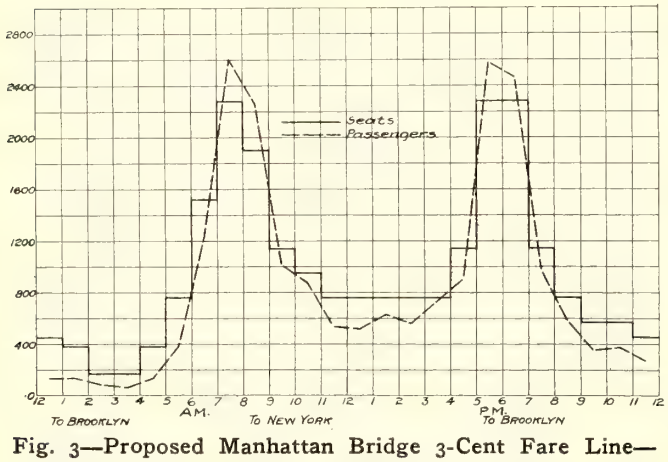


Fig. 3—Proposed Manhattan Bridge 3-Cent Fare Line—Estimate of J. C. Brackenridge for the Three-Cent Company

With the number of trips determined, the number of cars to be operated depends upon the average speed. This was figured at 10 m.p.h. by the Three-Cent Company. To determine this vital factor accurately, Mr. Ford had a series of observations made along the existing tracks which the new company proposed to use, and on other sections of track which correspond to the proposed route. These observations were compiled in Table I, and based upon them it is found that the average speed for the through service could not be expected to exceed 8.0 m.p.h. and for the turn-back cars 10.2 m.p.h. From the headways and average speed as determined, proper allowance being made for Sundays and holidays, the car-miles and car-hours per year were calculated.

TABLE I.—ACTUAL OPERATING SPEEDS ON PRESENT LINES IN NEW YORK AND BROOKLYN FROM OBSERVATIONS TAKEN DURING NON-RUSH HOURS, MARCH 11-15, 1909.

	Distance, miles.	Speed, m.p.h.
Manhattan:		
Third Ave. R. R., Desbrosses St. Ferry to Canal	0.36	6.0
Metropolitan St. Ry., Canal St. from Hudson to Center	0.58	5.7
Williamsburg Bridge	1.37	11.7
Brooklyn:		
B. R. T. System:		
From L. I. R. R. Sta. via Flatbush and Fulton to Smith	0.75	5.6
From Smith and Livingston via Livingston and Flatbush to L. I. R. R. Sta	0.73	7.3
C. I. & B. R. R.:		
From Livingston and Smith on Smith and Jay Sts. to Nassau	0.57	6.8

Note.—From above, an estimate was made assuming for *rush-hour* speeds 7 m.p.h. on all Brooklyn streets except Flatbush Ave. Extension, where 8.5 m.p.h. was assumed; in Manhattan 6 m.p.h. was assumed and on Manhattan Bridge 12 m.p.h. This gives an average speed of 7.8 m.p.h.

TABLE II.—ESTIMATE BY FORD, BACON & DAVIS OF INVESTMENT REQUIRED.

Track construction (Brooklyn):		
7,350 ft. track, including paving, at $7.29	$53,582	
2,850 ft. track, including paving, at $7.63	21,745	
	$75,327	
16 special work layouts	28,119	
Total track		$103,446
Line construction (Brooklyn):		
3,675 ft. double track overhead line, at $1.26	$4,630	
2,850 ft. single track overhead line, at $0.97	2,765	
16 overhead special work layouts	1,534	
Total line		8,929
Track and line construction (Manhattan):		
Bowery to Center, 2,750 ft. track, including paving, at $26.50	$72,875	
Special work layouts	44,500	
Vault for attaching plows	10,000	
Total track and line		127,375
Feeder and underground conduit		40,964
Power plant, 1,500 kw		220,000
Cars (48 passenger cars, 1 sweeper, 1 service car)		223,400
Car house and shop (26,000 sq. ft. in car house and 6,500 sq. ft. in shop)		194,400
Miscellaneous:		
Office furniture and fixtures		2,500
Materials and supplies		17,000
Track and line tools		2,000
Total		$940,014
Incidentals and contingencies, 5 per cent		47,000
Total		$987,014
Organization, engineering and legal, 20 per cent		197,403
Total		$1,184,417
Interest, average 6 months, 3 per cent		35,532
Total cost		$1,219,949
Livingston St. Payment to B. R. T., as per original franchise		9,346
Working capital		50,000
Total investment		$1,279,295
Additional cost if double slot construction is necessary west of Center Street, Manhattan		316,200
Total investment with double slot		$1,595,495

The adaptation of the proposed headway or service to the traffic is shown graphically in Figs. 1, 2 and 3, in which the solid lines represent the passengers carried during each hour in the day, and the dotted lines the seats provided. Fig. 1 shows the local service over the Brooklyn Bridge; Fig. 2, the service proposed by the Three-Cent Company over the Manhattan Bridge, with traffic distributed as to time of day, similarly to that of the Brooklyn Bridge, and Fig. 3 shows the proportion of seats to passengers estimated by Ford, Bacon & Davis.

It will be noted that the experts for the Three-Cent Com-

pany planned a service following the passenger load line much more closely than the present bridge curve. Mr. Ford thought that such curtailment of service during the non-rush hours would give longer headway than is generally satisfactory to the public and would not provide sufficient employment for the platform men. Continuing, Mr. Ford showed that the service estimated by him would require an average of 528 car-hours, 4452 car-miles and 747 round trips per day. Forty-three cars will be required on the road during the rush hours. After providing five aditional cars to allow for cars in the shop and for extra cars ready for service, a total of 48 passenger cars are required.

TABLE III.—SUMMARY OF ESTIMATED OPERATION DATA. PRESENTED BY MR. FORD.

Per year:	Through cars.	Short trips.	Dead mileage.	Total.
Car-hours	126,740	62,400	3,670	192,810
Average speed	8.1	9.7	....	8.4
Car-miles	1,016,000	604,800	4,400	1,625,200
Round trips	* 145,300	† 127,700	....	273,000
Per day:				
Car-hours	348	170	10	528
Car-miles	2,783	1,657	12	4,452
Round trips	398	349	..	747

Car-miles:	Through cars.	Short trips.	Total.
On Manhattan lines	232,000	30,600	262,600
On B. R. T. lines	119,000	....	119,000
Total on lines of other companies	351,000	30,600	381,600
On bridge	383,500	337,000	720,500
On 3-cent company track in Manhattan	66,500	58,600	125,100
On 3-cent company track in Brooklyn	215,000	178,600	393,600
Total on 3-cent company track	281,500	237,200	518,700
Dead mileage	.....	.....	4,400
Total all	1,016,000	604,800	1,625,200
Total passengers			10,950,000
Passengers per one-way trip			20.0

* 53 per cent. † 47 per cent.

With these figures as a basis, Table II was prepared. It will be understood that the plans of the proposed road contemplate the use of the underground system in Manhattan and across the bridge, and overhead trolley construction in Brooklyn. This makes it necessary to provide some special facilities for changing from trolley to plow contacts on the street, the expense of which is covered under the item of "Vault for Attaching Plows." All of the construction estimates are based upon first-class modern construction at recent prices. The estimate of $7.63 per foot of track for track in Brooklyn covers 102-lb., 7-in. rail, creosoted ties and broken stone ballast. The cost of the track on Flatbush Avenue Extension is figured at a somewhat less cost per foot because no excavation will probably be necessary. The estimate for straight track in Manhattan is based upon average costs of similar work. Each special work layout was estimated separately in detail, and the cost of overhead line construction was based upon recent work in Brooklyn.

In estimating the power plant, Mr. Ford took as a basis an average of 26 kw per car, giving a total of 1090 kw, including current required for switching and shop auxiliaries. To handle this load three 500-kw units would be necessary, one to be in reserve. As the Three-Cent Company had proposed to locate its power station near one end of the bridge, $40,000 was allowed for land, and with $120 per kilowatt for building and apparatus complete, the total cost of the power house would be $220,000. This estimate provides for direct-current generators driven by reciprocating engines.

The investment in cars covers 48 passenger cars with 28-ft. bodies and 5-ft. platforms, similar to those recently purchased by the Coney Island & Brooklyn Railroad Company. Such a car mounted on center swivel maximum traction trucks and equipped with two 50-hp motors would weigh about 31,000 lb., and the cost would be about $4,600 complete. If prepayment platforms were used, the weight would be increased and 60-hp motors would probably be required. The estimate for cars includes also a sweeper and service car.

In estimating the cost of the car house and shop, Mr. Ford allowed car-house space for 45 cars at 540 sq. ft. per car. Of the 48 cars to be purchased, six would be on the road all night and four in the shops, leaving 38 cars to be provided for. It is good practice, however, to design a barn for somewhat more than actual present needs. The area allowed per car compares with 700 sq. ft. in the new Maspeth barn of the Brooklyn Rapid Transit Company and 870 sq. ft. in the Covert Avenue barn of the Coney Island & Brooklyn Railroad Company. Offices, locker rooms, etc., would take up a space of about 10 ft. x 200 ft., making the total of 26,000 sq. ft. for the car house alone. Land in the vicinity of this line could not be bought for less than $3.50 per square foot, which, with the building figured at $2 per square foot and an allowance for track and special work, would make a total cost of $151,500. Shop space should be provided in addition for four cars, and the total shop area would have to be about 1600 sq. ft. per car to allow for machinery, benches, storeroom, etc. This, figured similarly to the car house, with the addition of $5,000 for shop equipment, gives a total cost for the shop of $42,900.

TABLE IV.—ESTIMATE OF OPERATING EXPENSES. PRESENTED BY MR. FORD.

	Units and unit cost.	Amount	Per car-mile (1,625,200), cents.	Per passenger (10,950,000), cents.
Maintenance and depreciation of way and structures:				
On track owned in Brooklyn	452,300 car-miles at 2.4c	$10,860	...	.10
On track on bridge	584,200 car-miles at 0.5c	2,920	...	.03
On track owned in Manhattan	207,100 car-miles at 2.5c	5,200	...	.04
On track operated jointly in Manhattan	262,600 car-miles at 2.5c	6,500	...	.06
On Livingston Street, Brooklyn	49,400 car-miles at 1.5c	740	...	.01
Total maintenance and depreciation of way and structures		$26,220	1.62	.24
Maintenance and depreciation of cars and equipment	1,625,200 car-miles at 3.0c	48,750	3.00	.45
Total maintenance		$74,970	4.62	.69
Power generated	1,575,800 car-miles at 2.4 kw-hrs. per car-mile by 1.0c per kw-hr	$37,819	2.33	.34
Power purchased on Livingston Street	49,400 car-miles at 2.6 kw-hrs. per car mile by 1.5c per kw-hr	1,927	.12	.02
Total operation of power plant		$39,746	2.45	.36
Platform wages	192,810 car-hours at 45c	76,300	4.70	.70
Other operation of cars	1,625,200 car-miles at 1.3c	21,500	1.32	.20
Total operation of cars		$97,800	6.02	.90
Total transportation		$137,546	8.47	1.26
Damages and legal	1,625,200 car-miles at 1.5c	$24,380	1.50	.22
Insurance	Property insured times premium	2,370	.15	.02
Other general expenses	1,625,200 car-miles at 1.3c	22,000	1.35	.20
Total general		$48,750	3.00	.44
Total operating expenses		$261,266	16.09	2.39

Incidental and contingent expenses were estimated at 5 per cent, and organization, engineering and legal expenses at 20 per cent. These percentages correspond with those developed before the commission by B. J. Arnold and Ford, Bacon & Davis in the Coney Island fare case.

The item entitled "Livingston Street payment to Brooklyn Rapid Transit Company" is calculated as prescribed in the franchise of the Nassau Electric Railroad Company under

which other companies are allowed to use the tracks and wires provided they pay to the Nassau Company a proportionate part of the cost of construction.

In addition, Mr. Ford estimated $316,200 for the construction of double-slot conduit in Manhattan Borough, which would be necessary if the Three-Cent Company could not make arrangements with the existing companies in Manhattan for the purchase of power, as it developed that the new company might condemn the right to using the tracks of the old company for a certain distance, but could not compel the old company to furnish power for the operation of the new company's cars. This being the case, the new company would have to provide its own conductors and this would necessitate double-slot construction west of Center Street in Manhattan.

OPERATING EXPENSES AND INCOME ACCOUNT

The next feature of the testimony was the determination of the operating expenses. This is shown in Table IV and is based on the data given in Table III and from actual past experience of the existing companies. The total operating expenses are 16.09 cents per car-mile, not including taxes or rentals, which compares with the cost on the surface lines of the Brooklyn Rapid Transit system of about 18 cents and on the Coney Island & Brooklyn Railroad of about 16 cents.

TABLE V.—ESTIMATE OF INCOME ACCOUNT. PRESENTED BY MR. FORD.

Operating revenue:	Amount.	Cents per passenger.
Passenger rev., 365 days by 30,000 passengers, at 3c.	$328,500	3.00
Advertising privileges, 43 cars, at $75	3,225	...
Total operating revenue	$331,725	3.02
Operating expenses*	261,266	2.39
Net revenue from operation	$70,459	.63
Taxes:		
City, 3 per cent of operating revenue on franchise tracks	$6,160	
State, 1 per cent of operating revenue	3,317	
Car license, 48 cars, at $20	960	
1.7 per cent on 89 per cent of cost of physical property owned†	14,900	
1 per cent of net earnings, federal	....	
Special franchise tax on intangible property in streets	....	
Total taxes	25,337	.22
Operating income (revenue over expenses and taxes)	$45,122	.41
Income deductions:		
Rentals of physical property:		
Bridge toll, 273,000 round trips, at 5c.	$13,650	
Brooklyn line‡	2,556	
Rental, Livingston Street construction§	1,635	
Manhattan lines	14,700	
Attachments to Brooklyn elevated structure	292	
Total rentals of physical property‖	32,836	.30
Income applicable to return on investment	$12,289	.11
Return on investment:		
10 per cent on investment required ($1,595,495)	159,550	1.47
Net deficit	$147,261	1.36

* Including depreciation and power purchased on Livingston Street.
† Includes special franchise tax on tangible property in streets.
‡ 2.4c. per car-mile plus 35c. per lineal foot of track.
§ As per franchise.
‖ Not including charges for interference with use of existing property, loss of business and value of special franchise.

Table V then gives an estimate of the income account. It will be noted that the taxes as estimated amount to 0.22 cent per passenger. This does not include any allowance for the special tax on franchises except in that part of the ad valorem tax on physical property which covers tangible property on the public streets. As Mr. Ford estimated that there would be no net earnings or profits after deducting interest on the investment, he did not make any allowance for the Federal Corporation tax of 1 per cent.

The bridge toll is calculated at the rate paid on the present bridges. The rental for use of the physical property of the Brooklyn lines, exclusive of Livingston Street, covers maintenance and renewals of track and line at 2.4 cents per car-mile and interest and taxes on the cost of construction at 35 cents per foot of single track per year. These prices are used at present by existing companies in Brooklyn for interchange of facilities. The item for Livingston Street under the head of "Rentals" covers amortization of the Three-Cent Company's portion of the cost of the Livingston Street construction, this franchise being for 10 years only. The estimate for rental of physical property of the existing lines in Manhattan is based upon the ratio which the service of the new company would bear to that of the present companies and covers the fixed charges on the cost of the construction used. No attempt was made to estimate the damage to the existing companies on account of loss of business or interference with use of the existing tracks or in the value of their special franchises. As before stated, Mr. Ford thought that this damage would amount to much more than the balance of income shown as applicable to return on investment.

The investment, as estimated, covers only the actual cash invested and does not provide for promotion expenses, property owners' consent, or many other expenditures which constitute a large part of the intangible property of a street railway. To attract capital to investment in a street railway project of more than usual uncertainty, a return of at least 10 per cent would have to be offered. Interest at 10 per cent on the investment of $1,595,495 would amount to $159,550, or 1.47 cents per passenger, which applied to the income applicable to return results in an annual deficit of $147,261. The total estimated cost of operation and fixed charges per pasenger is then 4.38 cents. If the rate of return on the investment were figured at 6 per cent, the total cost would be 3.76 cents per passenger. From these results Mr. Ford thought that the rate of fare of such a line should be from 3¾ cents to 4⅓ cents, and that 4 cents might be a reasonable figure.

FURTHER DATA ON THE EDISON-BEACH STORAGE BATTERY CAR

The Edison-Beach storage battery car, which was described in the Electric Railway Journal of Jan. 29, 1910, was placed in commercial operation on the Twenty-eighth and Twenty-ninth Streets Crosstown Railroad on March 3, after numerous trial runs since January last. The following is the schedule of a daily performance under the present service conditions. The car leaves the barn at 6 a. m., with the batteries fully charged. It travels over the line continuously until 8.30 p. m., during which time it handles the regular traffic of the line in making 14 round trips and covering a distance of 66.78 miles. At 8.30 p. m. the car comes into the car house, is inspected and charged for five hours. The average expenditure of current at the motors is 529 watt-hours per car-mile, and at the busbars, 853 watt-hours per car-mile.

On March 28 and March 29 a test was made to determine the mileage capacity of the car when carrying a normal passenger load. The car made 85 miles and then was found to be practically discharged. On the last trip in the 85-mile run, the car took on 27 passengers at the Twenty-third Street ferry making a total of 31 riders with the motorman, conductor and two engineers. The car maintained its regular speed over Twenty-eighth Street and the passengers were distributed all the way from the Twenty-third Street to the Thirty-fourth Street ferries. Only ten passengers were carried on the return trip from the Thirty-fourth Street ferry.

In considering these general data, it should be borne in mind that the conditions under which this car is working are not favorable to the economic operation or the long mileage per battery charged. The track conditions are bad and there are 46 curves in each round trip. On the long run of 85 miles there were approximately 700 stops.

The designers of this car had obtained by April 1, a record of performance of the Edison battery covering a period of 476 charges and discharges in commercial service. At the end of this number of complete charges and discharges, the battery was found to be 11 per cent higher in capacity than when at first put into service. Translated into car-miles, taking 80 miles per charge (5 miles less than was secured in the test run), the car traveled 38,800 miles and the battery appreciated in capacity 11 per cent over its original rating.

PROGRESS TOWARD ARBITRATION OF DETROIT APPRAISAL

Claudius B. Grant, formerly justice of the Supreme Court of Michigan, has been selected by the Detroit United Railway as its member of the board of arbitration which is to consider the appraisals of the property of the company. As stated in last week's issue, Judge James O. Murfin, of the Wayne Country Circuit Court, has been named as the representative of the Committee of Fifty on the board. It is reported that Robert W. Tayler, judge of the United States Circuit Court at Cleveland, who was the arbitrator for the city and the company in the recent franchise negotiations at Cleveland, will be asked to be the third member of the board.

Frank W. Eddy, chairman of the Committee of Fifty, expresses satisfaction with the selection of ex-Judge Grant. He is quoted as saying:

"I am sure that the people will have confidence in the findings of a commission which contains two such men as ex-Judge Grant and Judge Murfin. They are men used to hearing evidence and weighing its value. They can be relied on as fair and impartial. I am sure that the person whom they choose for the third arbitrator will have the confidence of the public. Certainly no fault can be found by the citizens of Detroit with either of the men thus far chosen. I am glad that the Detroit United Railway has shown the same spirit as the Committee of Fifty in choosing a man who will be acceptable to the people."

The report on the appraisal of the property of the city lines owned by the Detroit United Railway, made by Frederick T. Barcroft for the subcommittee on appraisal of the Committee of 50 citizens, has been published in book form. The book has 237 pages and contains also maps illustrating the properties involved in the appraisal, the population and the area affected.

The subcommittee on appraisal is composed of Joseph Boyer, chairman; Edwin A. Burch, Fred C. Hees, David W. Simons, W. W. McMahon, Louis R. Geist and W. W. Hannan. In its report to Chairman Eddy, of the Committee of Fifty, the subcommittee states that the appraisal was made of the Detroit United Railway as a going concern in its present condition under the supposition that the present traction relations are to continue. If no settlement satisfactory to the city of Detroit should be made, the committee suggests that the appraisal be reduced to some extent. The total figures determined in the appraisal and also some of the figures of an appraisal made for the company about the same time were published in the Electric Railway Journal of Nov. 20, 1909, page 1077.

The section of the report devoted to track is introduced by a discussion concerning the construction and depreciation of track, and includes also an inventory and the details of the basis of cost of the track and illustrations of the different types of construction. Specifications and costs of material for each type of construction follow. An inventory of the track in the car houses, yards and power stations is given with a deduction as an allowance for depreciation. The location of the special track work and the bases of cost on which this work was valued are given in detail. The section devoted to crossing protection devices gives the history of the various devices. Illustrations of the types of rail are given on the pages in which the location and weights of the various types are specified.

In valuing the cars, a division of the different types of rolling stock was made. After the different cars had been divided into groups, the average value was ascertained and the net value per car as determined was multiplied by the number of cars in that group in order to determine the present value. The non-revenue cars were treated similarly. Illustrations of the various types of cars are published. The report states the prices which were used in figuring the costs on electrical equipment of the rolling stock.

A discussion in reference to mechanical apparatus precedes the inventory and valuation of the shops. Sections are devoted to discussion on the subject of overhead charges and of paving. An appendix contains various laws and franchises affecting the Detroit United Railway properties.

REPORT OF CLEVELAND RAILWAY FOR MARCH

The report of the Cleveland (Ohio) Railway for March 1910, was presented to the City Council of Cleveland by G. M. Dahl, street railway commissioner of the city, at the meeting of that body on the evening of April 11, 1910. Gross earnings were $475,749.50, or 22.96 cents per car-mile, and the operating expenses were $321,181.86, or 15.50 cents per car-mile, divided as follows: Maintenance, $82,885.64, or 4 cents per car-mile, as provided in the ordinance, and operation, $238,296.22, or 11.50 cents per car-mile. The interest, which takes the place of the old dividend disbursements, amounted to $110,788.42. The average rate of fare for the month was 3.4 cents. The average fare for March, 1907, under the rate of seven tickets for a quarter and universal transfers, was 3.6 cents. The statement in detail follows:

INCOME ACCOUNT.

		Cents per car mile.
Gross earnings from operation	$475,749.50	22.96
Operating expenses	321,181.86	15.50
Net earnings from operation	$154,567.64	7.48
Miscellaneous income	1,743.56	.03
Gross income, less operating expenses	$156,311.20	7.54
Taxes	26,641.84	1.28
Income, less operating expenses and taxes	$129,669.36	6.26
Interest	110,788.42	5.35
Surplus	$ 18,880.94	.91

GROSS EARNINGS FROM OPERATION.

		Cents per car mile.
Car earnings:		
Passengers	$462,734.24	22.33
Less rebates to other companies	1,245.72	.06
Net from passengers	$461,488.52	22.27
Chartered cars	1,305.52	.06
Touring cars	.....	....
Freight and express	3,209.47	.16
Mail	1,156.58	.06
Passes	2,734.50	.13
Newspapers	1,333.33	.06
Total car earnings	$471,227.92	22.74
Miscellaneous earnings:		
Advertising	$4,481.58	.22
Rent of land and buildings	20.00	...
Rent of tracks	20.00	...
Rent of equipment	.....	...
Total miscellaneous earnings	$4,521.58	.22
Gross earnings from operations	$475,749.50	22.96

OPERATING EXPENSES.

Maintenance—2,072,141 miles at 4 cts.	$82,885.64
Operating expenses—2,072,141 miles at 11¼ cts.	238,296.22
Total	$321,181.86

MISCELLANEOUS INCOME.

		Cents per car mile.
Interest on deposits	$1,272.17	.06
Interest on bills receivable	25.00	...
Rent of real estate not used in operation	446.39	.02
Total miscellaneous income	$1,743.56	.08

DEDUCTIONS FROM INCOME.

		Cents per car mile.
Taxes:		
On real and personal property	$20,935.00	1.00
On earnings (to State)	4,774.93	.23
U. S. corporation tax	931.91	.05
Total taxes	$26,641.84	1.28
Interest:		
On funded debt	$33,962.50	1.64
On floating debt	3,447.92	.17
On Cleveland Ry. stock	73,378.00	3.54
Total interest	*$110,788.42	5.35

*Interest on Neutral Street Railway investment not included in above.

MILEAGE.

Suburban	61,0[illegible]
Trailers at 60 per cent.	60,413
Regular	1,903,230
Total passenger	2,055,563
Chartered cars	3,820
Freight and express	9,229
Mail cars	3,468
Newspaper	61
Total revenue mileage	2,072,141
Work cars operating expense	2,293
Track department—maintenance	5,072
Pay car	375
Total	2,079,881

MARYLAND PUBLIC SERVICE COMMISSION LAW

The public utilities bill which was pending in the Legislature of Maryland was passed by the House during the week ended April 2, 1910, and was passed by the Senate on April 4, 1910, without being amended. On April 5, 1910, Governor Crowthers signed the measure. The bill is entitled "An act to create and establish a public service commission, and prescribing its powers and duties, and to provide for the regulation and control of public-service corporations and public utilities, and making appropriations therefor. The principal provisions of the bill follow:

The commission is to be composed of three members appointed by the Governor. The chairman is to receive $6,000 a year and each of the other two $5,000 a year. The commission is to be appointed and the names announced 10 days before the first Monday in May, 1910. The term of office of the commissioners now to be appointed is to be two years, four years and six years respectively, the Governor to designate when he appoints the commissioners which one is to serve two years, which four years and which six years. After the expiration of the terms of each of the first appointees, the terms of all are to be for six years. If the term of six years is held to be invalid, the term of each of the commissioners is to be limited to two years. The Governor, upon the recommendation of the commissioners, will alone appoint a general counsel to the commissioners, whose salary is to be $4,800 a year, and his term of office six years, or two years, as in the case of the commissioners. There will also be an assistant counsel to be appointed by the general counsel, whose salary is to be $3,000 a year. The secretary of the commission is to get $3,000 a year, and the chief stenographer $1,500 a year. The jurisdiction and the powers of the commission extend over all public service corporations in the State, including all common carriers, steam railroads, street railways, steamboats, canal and canal companies, ferry boats, gas and electric companies, telephone and telegraph companies, light, heat and refrigerating companies, water and water-power companies and virtually every other utility corporation.

The commission has the power to determine rates to be charged by each public-service corporation subject to the act. These rates are required by the act itself to be just and reasonable. The commission is vested with full and plenary powers to conduct investigations in order to enable it to ascertain what rates in the case of each particular public-service corporation are just and reasonable. Among the powers given to the commission for the purpose of enabling it to determine what are just and reasonable rates are the following: To summon and examine witnesses, to require the production of all books and papers, to entertain complaints and conduct hearings with respect to the reasonableness of rates and charges, to require switch connections, to require public schedules to be made out for the railroad companies, to prohibit undue preferences and discriminations on the part of rails, gas companies or any other companies subject to the act; to require the interchange of passengers and freight, to prevent discrimination between carriers, to prevent unjust discrimination with respect to long and short hauls and to require safe and reasonably adequate and proper service on the part of the various corporations.

Uniform systems of accounts may be required if the commission sees fit. Control over the issuance of new franchises or privileges and over the transfer of franchises is vested in the commission. The corporations subject to the act may, with the consent of the commission, issue stocks, bonds or other securities, payable more than 12 months after date, when necessary to acquire property or for the construction, completion, extension or improvement of their facilities, or for the improvement or maintenance of their service, or the discharge or lawful refunding of their obligations. The commission is given power to enforce its orders in various ways provided by the act. Power is also given it, whenever it may deem it desirable to do so, to value the property of any public-service corporation, but such valuation shall be so made that as far as possible it shall not affect the value of bonds previously issued. The capitalization of merger agreements or franchises of public-service corporations and the issuance of stocks is prohibited, except that the amount actually paid for a franchise may be made the basis of capitalization and the issuance of stocks and securities.

The amount of $75,000 per annum, or so much thereof as may be necessary, is appropriated for the salaries and expenses of the commission and for carrying out the purposes of the act. Provision is made for biennial audits by the State Auditor of all the receipts and expenses of the commission. All acts or parts of acts heretofore passed fixing the rates of any public-service corporation are repealed, and the powers of the commission to ascertain rates which are reasonable and just supersede such acts prescribing rates. The repeal of these acts includes the repeal of the existing act fixing the price of gas in Baltimore City at $1.10, and gives the commission full power to reduce it to any figure which may be determined to be just and reasonable.

The office of the commission will be in Baltimore City, where the commission is directed to collect all necessary data pertaining to the corporations that come under its jurisdiction, such data to be regarded as public records. The hearings of the commission are to be public unless otherwise decided by necessity, but the records of any secret meeting shall not be withheld from the public more than 90 days. Provision is made in the act for an appeal from the findings of the commission to the Circuit Court and then to the Court of Appeals, although the burden of proof in such appeals shall be upon the party adverse to the commission. Another important provision is one which prohibits the giving of passes by public-service corporations to any persons other than bona fide employees.

RAILROAD COMMISSIONS ASKED TO CO-OPERATE WITH RULES COMMITTEE

C. D. Emmons, general manager, Ft. Wayne & Wabash Valley Traction Company and chairman of the interurban rules committee of the American Street and Interurban Railway Transportation and Traffic Association, has sent a copy of the following letter to the secretaries of all of the State railroad commissions in the United States:

Dear Sir:

The interurban rules committee of the American Street and Interurban Railway Association for 1910 is very anxious to keep in close touch with electric railway operation throughout the United States to study accidents in connection therewith, and to ascertain whether or not the rules are specifically clear as to how to avoid such accidents. If not, it is the desire of this rules committee to make such recommendations at the 1910 convention of the American Street and Interurban Railway Association as will tend to improve the rules to the point of greatest safety.

As chairman of this committee I would respectfuly ask if we can make such arrangements with you as will give us data concerning accidents in the operation of electric street and interurban railways in your State, giving us in detail the full cause of such accidents. It is not necessary that we should know the road upon which the accidents occur.

If you have printed bulletins to cover these points, I will be very pleased if you will place me on your mailing list.

I believe you will fully appreciate the good which may be accomplished by this committee keeping in close touch with this work, and by your assisting the committee in this manner.

Thanking you in advance for the trouble which you may take in this connection, I am,

Yours very truly,

C. D. Emmons,
Chairman Rules Committee.

The oldest tramway system in India is that of Madras. It was built in 1895 as an underground conduit road, but was soon converted for overhead trolley operation.

CONTACT TYPE SIGNAL SYSTEM

At the Feb. 17 meeting of the electrical section of the Franklin Institute, Philadelphia, Carl P. Nachod, general manager of the Nachod Signal Company, Philadelphia, presented a paper on "Automatic Signals for Electric Railways." The following is an abstract of the description of the contact type signal system invented and described by Mr. Nachod.

This contact system is for electric railways where cars run both ways on the single track sections. In track circuit systems the signal generally is located at the insulated track section, which is the entrance of the block, and the motorman entering the block assumes that the signal he leaves behind will drop to danger; nor does he look behind him to see that it has, before proceeding. It is desirable that the signal indication should be set sufficiently in advance of the contact device for setting, that the motorman may see the effect of his passing the device before he enters the block. In such a case a three-indication signal is preferable, having a neutral indication which can be changed to proceed or stop by the passage of cars, the neutral indication meaning that a motorman may pass the contact device, the block being presumably clear. In this manner the motorman protects himself with signals before passing the indication.

When the motorman about to enter the section of single track perceives that the signals are neutral, it indicates that there is no car on the block of single track, provided the signal system is operative. As his car passes under the contact switch, the trolley wheel causes an impulse of current to flow through the relay. This has the effect of setting permissive signals in front of him and danger signals at the other end of the block simultaneously, the circuit of the permissive signals being completed through that of the danger signals. The former is therefore an indication that the latter are displayed. Night and day signals are given at the same time in each box by a light and an opaque disk of the same color. A light alone, under certain conditions of direct sunshine and low voltage, is very unreliable as a day indication but the conditions that are against a light indication are all the more favorable for the disk indication, and vice versa.

The motorman, having seen that his car has set the signals, proceeds past the signal box into the block. The red signal, meanwhile displayed at the other end of the block would prevent a car which might have come up, from entering against him. When his car arrives at the end of the block, it runs under the contact switch, causing the signals to return to normal or neutral indication; after which the car held up by the red signal may now proceed into the block, setting the signals similarly but oppositely, and passing out will clear them. This signal, however, is used for what is known as permissive, as opposed to absolute block signalling. Several cars are admitted into the block from one end, and the signals held permissive at that end, and danger or stop at the other, so long as a car occupies the block. In the absolute block system, on the other hand, when a train occupies the block a danger or stop signal is displayed at both ends of the block.

To illustrate, suppose a car has entered the block and set the signals; and before it leaves, a following car arrives at the end of the block showing white. The motorman will understand by this that there is at least one car ahead of him going in the same direction, and that he may enter the block under control. As his car runs under the contact switch he observes the signal box, and notices the flash of the white light that his car causes. This is an indication that his car is counted in or registered in the signal relay; and so on for a number of cars following each other, each receiving its signal that there are other cars ahead of it and that it has counted in. When the first car arrives at the end of the block, in running under the contact switch, it causes a blinking of the light, but the signals are still set as before. They so remain until the last car clears them, leaving the block ready for cars in either direction.

The above is the normal operation, but if a car should enter the block from one end and back out by the other track at the same end, using the single track merely as a Y or cross-over, the signals will be cleared when the car leaves the block. This makes a very flexible operation, as in the complicated case where a number of cars enter the block from one end, and are continuously entering and leaving, some leaving by one end and some by the other, but the signals protect all the cars in the block and are cleared only when they all leave it.

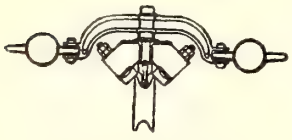
When the red signal is displayed, then the entering switch at that end of the block is "dead" and indications may not be changed by a car running against the red signal. Should a motorman intentionally violate the red indication and enter despite it, and a head-on collision result thereby, the signals will not have been changed, and the responsibility will be placed upon the offender. A knowledge of the certainty of his detection adds a safety feature to prevent the motorman from attempting to pass the signal set against him. However, a more frequent use of the lock-out device, as it is called, is the case where, of two cars approaching the block from opposite ends, one reaches the contact switch a moment before the other, and, obtaining a permissive signal, goes ahead. The motorman of the second car sees the red flash up, but is too near the contact switch to stop before passing it. He accordingly brings his car to a stop, and backs out again to wait, but the contact switch being dead, neither passage of his car will affect the signals. Should two cars run under the contact switches from opposite ends at exactly the same instant, then the permissive signal will not remain set by either car. They will therefore back to the contact switches, and the one reaching it first will hold up the other car.

The signal may also be operated as an absolute block system by leaving the hand-clearing switch open, which is equivalent to opening the line wire. For instance, a work train, entering the block to repair the trolley wire, closes the block at both ends by the motorman of the work train leaving the hand-clearing switch open. Then no permissible signals may be obtained from either end. In order to leave the signals for normal operation again, he must close the switch when leaving the block. In case of failure of line voltage, the signals reappear on its resumption with the same indications. The mechanism of the signal itself may be divided into three parts: The indicating, consisting of the lamps, color lenses and opaque color disks; the intermediate, represented by the relay, which converts the impulses of current caused by the passage of the car into signal indications; the actuating, consisting of the overhead trolley contact switches, which by the passage of the car determine the setting and the clearing of the signals.

The signal box is a cast-iron case, the upper part of which contains the indicating mechanism. The front cover is hinged to give access to the lamps, and has three openings: the upper, covered with clear glass through which one or the other color disks may be brought to an indicating position; the two lower openings, which have white and red semaphore lenses, respecively, behind which are lamps. The disk that is not indicating is used as a screen for the other lens. The disks are mounted as levers of the first class, counterweighted so as to fall to the indicating position by gravity, motion being communicated to the disks by push rods operated from the relay magnets below. This connection is such that the quick motion of the magnet is not transmitted to the color disk, which is thereby relieved of any shock.

The intermediate mechanism consists of the relay which is designed as an independent and easily replacable unit. It consists of a number of iron-clad electromagnets of the stopped-plunger type, arranged to open and close the switches by sliding contact rings on which fixed spring-fingers press. The counter is a magnet-driven ratchet and pawl. The entire relay, including both magnet coils and switch contacts, is immersed in oil. This prevents rust, lubricates the moving parts continuously and lessens the violence of the magnet action, which otherwise might loosen the parts. The oil also extinguishes the arc at the break, keeps the coils cool to increase the range of operating current, improves the insulation of parts by decreasing the

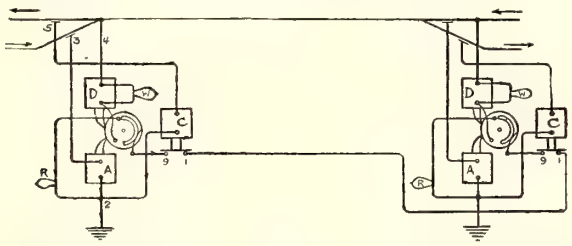
leakage distance, permits of compact design and lessens the liability of lightning damage. The connections from the relays to the lamps and incoming leads above are automatically made by spring contacts. Each of the magnet circuits is so designed that a powerful current starts the movement of its plunger, but when the latter is nearly seated the current is reduced to a safe value, either by inserting resistance in its circuit or shunting current around it.



End View of Switch

The trolley switch consists of a light angle-iron frame supporting at its ends through insulating blocks two flexible inclined contact strips, the trolley wire being withdrawn during the length of the contact strips, which are formed to receive the wheel without shock. One strip is connected to trolley, the other to ground through the relay. The wheel, being a metallic conductor, bridges them and sets the signal whether the car is taking power or not at the instant of passing the switch.

But one line wire is required for this system, and the installation consists of the hanging of two signal boxes on poles, and four trolley switches in the four branches leading to the single track, with the necessary taps to each. The operation of the signal is shown in the accompanying diagram, in which



Wiring Diagram of Overhead Contact Signal System

only the parts essential to a comprehension of the scheme are given. The parts are in position for no car on the block, in which case each end of the signal wire is grounded through a red lamp *R*. With no current in the coils, the armatures drop. The first entering car sends an impulse of current through magnet *A* in the relay at the entering end, operating a two-way revolving switch, which transfers that end of the signal wire to trolley through a white light *W* and a magnet *D*. This light and the red one at the other end now burn in series through the signal wire. Successive following cars turn the revolving switch so that the contacts overlap further, but make no change in the electrical circuit. Each leaving car energizes magnet *C* to break temporarily the signal circuit at 9-1, permitting magnet *D* in the first relay to drop its armature and revolve the switch in the reverse direction. When the same number of impulses has been made on magnet *C* as on *A*, that is, when all the cars that have entered the block have left it, the signals are cleared and the connections are as shown. The color disks are brought to an indicating position by magnets *D* and one in shunt with *R*, not shown. A no-voltage magnet, not shown, is interlocked with magnet *D* to prevent a motion of the armature of the latter should the power fail with cars on the block.

The American Street & Interurban Railway Association has just issued two new bulletins, one relating to the brake equipment used by different companies and the results secured, the other to the merit and demerit system of discipline. These two bulletins are for member companies only.

In 1909 the Liverpool Corporation Tramways carried 121,532,940 passengers, the traffic receipts amounted to £561,271, and the mileage run was 11,952,373. As compared with the figures for 1908, the passengers decreased 394,943, or .3 of 1 per cent, and the receipts were less by £1,873, or .3 of 1 per cent. Since the corporation owned the cars £234,970 has been contributed toward the reduction of taxes.

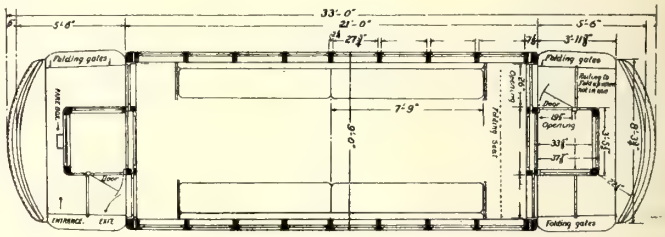
ONE-MAN PAY-AS-YOU-ENTER CARS FOR MUSKOGEE, OKLA.

The wide adaptability of the pay-as-you-enter car even for small cities is shown by the one-man design built by the Danville Car Company for the Muskogee Electric Traction Company, Muskogee, Okla. This car has standard pay-as-you-enter non-vestibuled platforms at both ends with folding gates at the steps on both sides. The rear platform gates are closed



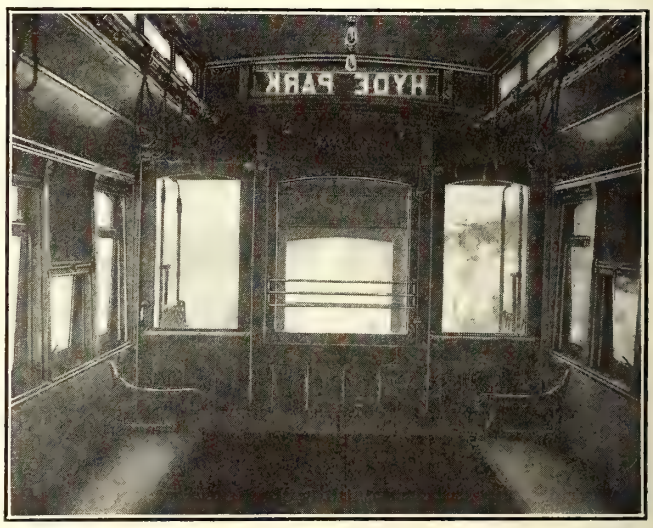
Exterior View of One-Man Pay-As-You-Enter Car

and locked and passengers enter and leave by the front platform under the eye of the motorman. In this respect the six cars ordered follow the scheme of operating the one-man pay-as-you-enter cars used in Brunswick, Ga., which were described in the Electric Railway Journal for Dec. 11, 1909. An un-



Floor Plan of Car

usual feature, however, appears in the use of motorman's cabs about three feet square which are located against the bulkheads between the entrance and exit doors and which take the place of vestibules. Each cab has a folding side-entrance door and a single drop sash at the front. Passengers boarding the



Interior View, Showing Folding Seat Across Rear End

cars must pass the motorman and as they do so drop their fares in a fare box which is hung from the window of the motorman's cab. The type of fare box which is used for the Muskogee cars is Brill No. 4A which is suitable for both tickets and coins.

To prevent passengers boarding at the rear of the car the steps on both sides are protected by folding gates which are fitted with locks. To avoid confusion by passengers attempting to leave the car at the rear, a folding seat is provided which may be placed in position against the bulkhead and extending across both doorways. This feature is shown on the plan of the car and is one of the half tones on page 712.

The cars have longitudinal seats and in general dimensions are standard 21-ft. closed single truck cars as follows: Length over the end panels, 21 ft. 0 in.; length over the platform crownpieces, 32 ft. 0 in.; length over each platform, 5 ft. 6 in.; length over the bumpers, 33 ft. 0 in.; width at the sill including panels, 8 ft. 6½ in.; truck wheel base, 8 ft. 0 in.; track gage, 4 ft. 8½ in.; wheel diameter, 33 in.

The trucks which are of the Brill No. 21-E type, have pipe truss-rod supports at the ends to carry the extra weight due to the platforms of slightly increased length. The interior finish of the cars is ash with bird's-eye maple veneer ceilings. The seats are upholstered in cane. Push buttons are provided on each side post and each car is equipped with eight electric heaters. The cars were built under license of the Pay-as-You-Enter Car Corporation.

THE ANTISEPTIC TREATMENT OF TIMBER

Investigators of the wood preservation problem in weighing the merits and demerits of the so-called superficial methods of timber treatment as compared with the vacuum-pressure or creosoting process, sometimes overlook the fact that distinctly different distillates of the coal tar oils are required for each process. Timber treated by the superficial methods with oils of the creosote type can only give disappointing results because the amount of penetration thus secured is not sufficient to hold in the wood the oils which have a low distilling-point. Such oils are of a volatile nature and are only of value when they are forced through the wood by the aid of a costly vacuum-pressure treating plant.

On the other hand it is now known that in any process using coal-tar compounds only those oils remain in the wood which distill above 572 degrees Fahr. (300 deg. C.). The remaining distillates evaporate in a short time after treatment. The knowledge of this fact lead to the idea of employing the heavy oils only and to applying them either with a brush, by dipping the wood or in accordance with the well-known open-tank process. The theory of this treatment is that as the fungi which produce decay enter the wood from the outside it is necessary to protect only the entire outer zone of the wood. These heavy oils remain in the wood both to repel water and to prevent the growth of fungi and their spores. Under the proper conditions of installation, such as where the wood is not subjected to severe mechanical wear and exposure, the superficial treatment will give, per dollar spent, much better returns than the more expensive creosoting methods. Aside from the greater cost of the preservative itself a creosoting vacuum pressure plant will cost from five to ten times as much as a superficial preservation outfit for the same capacity.

The wood-preserver known as "Antiseptine," made by the American Wood Preserving Company, Chicago, Ill., is a well-known coal-tar oil which is strongly advocated for the superficial method because it not only contains the oils which distill at about the temperature of 300 deg. C., but also contains all oils which distill between 350 deg. C. and 400 deg. C. This condition is necessary because the most permanent pungent and acrid antiseptics such as acridine and cryptidene are found only in that portion of that compound which has a boiling point of 350 deg. C. to 360 deg. C. These antiseptic oils will be partly solid at ordinary temperature but this is not objectionable because the wood-preserving liquid should be applied hot to secure sufficient penetration. Such a compound in fact is perfectly limpid at 38 deg. C. and is heated to about the boiling point of water when applied. In this way deep penetration is secured and the full benefit obtained from the subsequent solidification of the alkaloidal antiseptics in the wood.

A DROP-AND-LOCK CAR FENDER

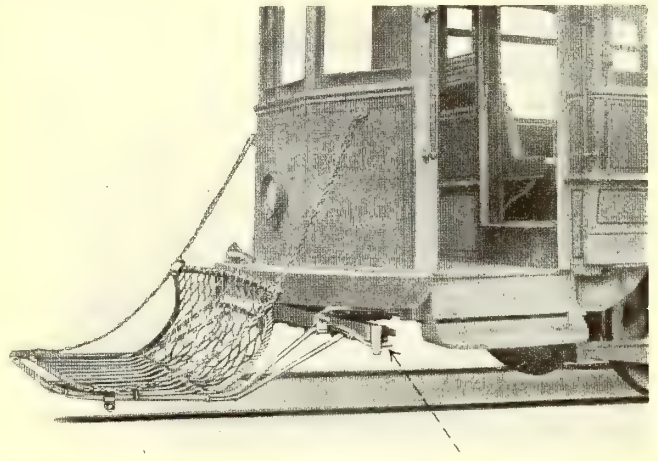
R. W. Sharp & Son, Camden, N. J., are makers of a drop-and-lock device which can be applied either to their own fenders or to other hanging fenders already in use by electric railway companies. The object of this invention is to provide hanging fenders with a safe and durable drop-and-lock attachment by altering slightly the side arms of the fender and applying two small track rollers which are used only when the fender has been dropped. The accompanying inverted view of this device shows the center plunger for starting operation,



Drop and Lock Device for Fender

stay-bolts on the extreme ends for holding elevated and locking down the fender, expansion springs, etc., all on a channel-iron base which is installed under the car platform. The combination of hanging fender and drop-and-lock attachment is operated as follows:

Should the motorman observe that a pedestrian is in danger of being run down by his car, he trips a conveniently-placed



Drop and Lock Device for Swing Fender

platform pedal. This action withdraws the two staybolts shown on each end of the channel base mentioned. When the fender is hanging normally, the extreme rear ends rest below the staybolts which keep them about 6 in. above the rail. As soon as the staybolts are withdrawn, however, the fender drops to the track by its own weight. It is prevented from buckling or other damage by means of two track rollers attached, as shown in the second view. The expansion springs geared around the staybolts force the latter outward when the fender is in the lowered position. As the extreme rear ends of the fender arms are above these staybolts, the lock thus secured makes it impossible for the fender to be raised. Hence, no person or object can be wedged under the dropped fender or come into contact with the trucks or other running gear.

SWISS RAILROAD REPORT

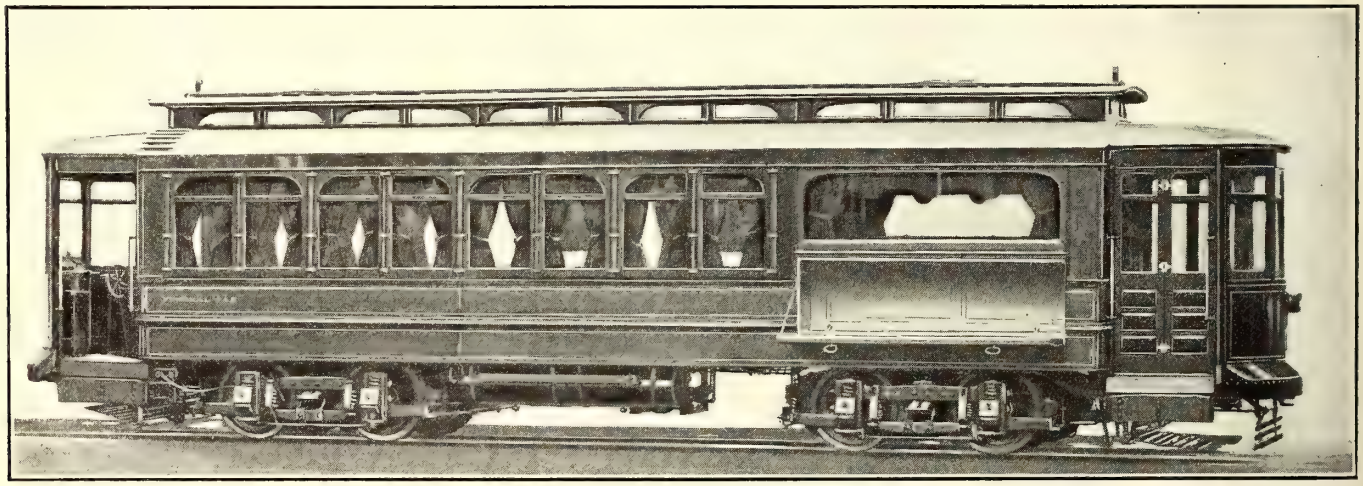
The report of the Swiss Railway and Postal Department for the year ending 1908 shows that Switzerland then had 628 km (390 miles) of electrified steam or interurban railways and 3874 km (2402 miles) of steam railroads. A rather interesting fact about the steam lines is that more track is laid on steel than on wooden ties. The street railway mileage for the year ending 1908 was 413 km (256 miles) of route, divided among 37 undertakings, which had 2972 employees. The estimated total installation cost of the street railways was 59,700,000 francs ($11,522,100); the gross earnings, 12,900,000 francs ($2,489,700), and the operating expenses, 10,300,000 francs ($1,987,900).

FUNERAL CARS FOR OPERATION IN CHICAGO

The Calumet & South Chicago Railway Company recently has had built by the G. C. Kuhlman Car Company, Cleveland, Ohio, two funeral cars which are to be operated in Chicago over the lines of the Chicago City Railway Company. These cars are of the double compartment type, one section being reserved for the casket and pallbearers and the other for the mourners. The compartments are separated by a double partition and end bulkheads which have hinged windows and single sliding doors with Burdett-Rountree ball-bearing hangers. One side of the casket compartment has a longitudinal seat, the other side being occupied by a locker for the casket. The locker is provided with both an inside and outside door. The latter is made to hinge downward and is held in place horizontally by chains and hooks as shown in the view of the exterior. Rollers on the inside of this door and the locker floor are provided for the traveling carriage used in installing and removing the casket. The inside panel of the locker is removable so that it can be used as a reserve outlet for the casket through the 30-in. body end door and the extra large front window. The passenger compartment has 12 transverse seats and four stationary corner longitudinal seats. The cross seats are of the Hale & Kilburn "Walkover" type, upholstered in Spanish leather. The corner seats are finished in the same manner and are removable to permit access to sand boxes and conductors' lockers. The longitudinal seat in the pallbearers' compartment also is upholstered and finished in Spanish leather. Vestibules with double folding doors are provided for double end operation. The platforms have folding steps and those on each platform are so inter-connected that one will close when the other is opened.



Mourners' Compartment of Chicago Funeral Car



Funeral Car for Calumet & South Chicago Railway

DETAILS OF UNDERBODY FRAMING

The car underframe is very substantial, both side sills consisting of 10-in., 15-lb. channels extending the full length of the car body. The side sill on the casket locker side is reinforced with a 10-in. 15-lb. steel channel, the full length of the locker door opening; the remaining part of this sill and the other side sill have a 3-in. x 2½-in. x 5/16-in. steel angle riveted on with the 3-in. leg flush with the bottom of the 10-in. channel. This 5/16-in. angle has a slot cut in between the posts for the escape of waste gathering in the sash pocket. The side sill opposite the casket compartment is reinforced at the center for a length of 12 ft. with 3-in. x 3-in. x ⅜-in. steel angle riveted to the top flange of the 10-in. channel. The end sills are of 10-in. 15-lb. steel channels projecting 1¾ in. below the side sills and flanged toward the platform, lined on both sides with yellow pine and fastened to the side sills with malleable iron angles. The cross-framing is made of 6 in. 8 lb. steel channels fastened to the side sills with steel connection angles and filled with yellow pine nailing strips for fastening the floor. The underframe is diagonally braced at the center with a steel angle having the top leg flush with the bottom of the underframe. The trap door beams consist of T-irons extending from the under sill to the second floor beam inside of the bolster. The body bolster is of cast steel of I-beam section, the ends of which are gibbed down under the side sills and bolted to the same. The body bolster is machined where the surface comes in contact with the side sills and at the center plate and side bearings. This center plate is of cast steel and the side bearings are of 4-in. x 1-in. wrought-steel bars secured with countersunk bolts.

The platform side knees are 7½-in. x 3-in. x ⅜-in. steel Z-bars. These knees are suspended from the end sills with 1-in bolts with connecting strip plates. The backs of the side knees run up inside of the side sills and are bolted and riveted to the same. The center platform knees are of white oak from the end sill to the bumper. The platform plates are of 2¼-in. white oak bolted to the knees which are cut out for the plates. The platforms are laterally braced by beams running diagonally which are mortised and tenoned into the side knee floors and center knees. The bumpers are 7-in. 9¾-lb. steel channels.

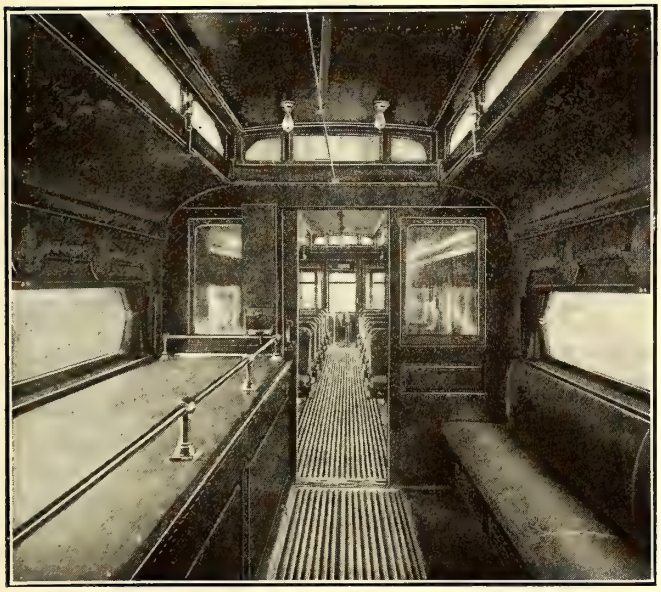
The through truss is composed of 2½-in. x ⅜-in. iron bars inserted longitudinally on the inside of the body framing at a height of 28 in. from the bottom of the side sills, and anchored at the bolsters to posts which are reinforced with a 2-in. x 2-in. x ¼-in. steel angle and a 1¼-in. rod welded to the end of the truss bar and threaded and fastened to the side sill at the end sill with a special casting and nut. At the casket com-

partment end of the car this rod is fastened to the side sill between the partition and the next side posts.

DETAILS OF UPPER BODY FRAMING

The corner posts of the body framing are 3¼ in. x 4¼ in. and the side posts are 2¼ in. x 3¾ in. with a sweep of 1¾ in. A pier post made up of two pieces of 5½-in. width each is set at the partition between the two compartments. All of these posts are of white ash bolted to the side sill panels. The side plates extend the full length between the body ends and are fastened to the side posts with strap bolts and tie rods. The intermediate vertical body framing consists of ash ribs spaced about 10 in. center to center.

The outside panels are concave and convex ½-in. poplar clear



Compartment for Casket and Pallbearers

wood. The panel ribs are of ash spaced approximately 10 in. center to center. The wooden panels are covered with No. 12 sheet steel in three sections on each side, held in place by screws through a steel overlapping molding, white-leaded before being put in place.

The roof is supported on side posts with 1½-in. x ⅜-in. iron carlins extending from plate to plate. The ends of the iron carlins are turned and fastened at the top of the side posts by ½-in. rods which pass vertically through the latter. The wood carlins are spaced about 11 in. centers. The lower deck carlins are of ash. The roof board is of tongued and grooved whitewood covered with cotton duck laid in white lead. The roof frame was thoroughly painted with lead and oil before the roof covering and linings were put in place. Wire glass is used in the upper deck sash.

The bottom flooring consists of 2⅞-in. x 3¼-in. Georgia pine except where floor mats are laid in which places there is only one layer laid lengthwise. Where double floors are laid, the top layer is of edge grain with felt between the layers. The floor mats are of white maple strips screwed to the flooring the full width of the aisle and the entire length of the car.

The passenger compartment is furnished with four sets of half-elliptic window pairs on each side. The upper sash of each is stationary and the lower sash arranged to drop into a pocket. The pallbearers' compartment has a single plate glass stationary window on each side extending the full length of this division. The car windows are furnished with Pantasote curtains and Curtain Supply Company's Forsythe fixtures. The side windows and the inside end and partition windows are fitted with black draperies.

The inside finish of both compartments is of cherry and all sash and doors are also of cherry of a uniform color, stained mahogany and finished dull. The interior finish of the bier compartment is in white and gold. The upper deck is covered with 3/16-in. and the lower deck with ¾-in. waterproof Agasote board, which is painted so that it will match the interior finish of the car.

DETAILS OF EQUIPMENT

Iron pipe conduit and flexible steel conduit are used for the power and lighting circuits. The car is lighted with frosted incandescent globes mounted in the center of the upper deck, there being 10 lights in the passenger compartment, four in the pallbearers' compartment and one on each platform. The platform lights are connected with four others through a three-way idea so that only one platform is lighted at a time. Interchangeable arc headlights are used on these cars. The motor equipment consists of four G.E.-80 motors and two controllers. The cars are electrically heated. Other equipment specified for these cars included hand brakes, air brakes, Nichols-Lintern air sanders, H. B. wheel guards, and push buttons to be furnished by the Consolidated Car Heating Company.

GENERAL DIMENSIONS

The general dimensions of these cars are as follows:

Length of car over bumpers, 43 ft. 1 in.
Length of car over crown pieces, 42 ft. 1 in.
Length of car over end sills, 31 ft. 11½ in.
Length of car over end panels, 32 ft. 1 in.
Length of platform, 5 ft. 6 in.
Width of car over side sill angles, 8 ft. ½ in.
Width of car over guard rails (over all), 8 ft. 6 in.
Width of car over posts at belt rail, 8 ft. 4 in.
Width of car over drip molds, 8 ft. 5 in.
Height of car from rail to top of trolley board, 11 ft. 10 in.
Distance between centers of side posts, 2 ft. 7 in.
Distance between body bolsters c to c, 20 ft. 5 in.

HIGH-TENSION TRANSMISSION LINE INSULATION



Suspension Insulator

The accompanying illustration shows a late development of the suspension type of insulator, for use with very high tensions, recently invented by Louis Steinberger of the Electrose Manufacturing Company, Brooklyn. As with other suspension insulators the insulators are in series. Each insulator is of two parts. The upper part is of the so-called thimble type and the lower is of the rod type, the whole forming a chain which can be extended indefinitely. The thimble shape of the insulators protects thoroughly from the weather the upper parts of the rod insulators by which spring suspension is provided. This construction gives a resiliency so that the chain of insulators is relieved in all its parts as well as in its entirety from the results of sudden or abrupt strains usually so destructive to mechanism of this kind.

The various parts of the insulators may be detached and replaced by other parts and the total number of parts may be increased or diminished at will, after the original structure is built. This feature is specially important in instances where after the installation of a conductor the voltage is increased.

BULLETIN ON TECHNICAL BOOKS

The McGraw-Hill Book Company, New York, N. Y., has commenced the publication of a bulletin entitled "Engineering Book Notes," designed to keep book readers in touch with the latest and best books in all fields of engineering and science. The bulletin, which is for free distribution, contains notes and comments on recent engineering literature, and lists of technical books grouped under appropriate headings. The names of the books issued by the publisher last month are given on the cover of the first number of the magazine, which is that of April.

News of Electric Railways

Cleveland Traction Situation

At the regular meeting of the City Council of Cleveland on the evening of April 4, 1910, members protested against a delay in street railway legislation until the expiration of the trial period of eight months, and insisted upon action on ordinances to reroute cars, disregarding the advice of Mayor Baehr and Street Railway Commissioner Dahl. The latter had prepared a resolution providing that interurban cars should not be required to handle city passengers and fixing a rate of 5 cents on interurban cars within the city limits. Mr. Dahl said that it would probably not be legal for interurban railways to charge a fare of 5 cents. Mr. Dahl did not press his resolution on account of threatened opposition. Councilman Haserodt moved that his bill, which provided for the abolishment of the plan of turning cars at the Public Square and re-establishing through lines, be taken from the street railway committee, but the resolution was referred to the street railway committee. The resolution that the street railway commissioner file with the clerk of the Council the car-miles operated, the earnings per car-mile and the passenger earnings was also referred to the street railway committee.

At the meeting of the Council on the evening of April 11, 1910, Mr. Dahl presented the statement of the earnings of the Cleveland Railway for March. This statement is published on page 700 of this issue. At this meeting of the Council the members pledged themselves to an eight months' trial with the 3-cent fare, plus 1 cent for a transfer, although at the meeting on April 4, 1910, as stated above, there were evidences of early legislation.

The report that the earnings of the system for March would show a surplus has resulted in opposition to the clause in the grant that provides for the payment of 1 cent for transfers. The amount paid for transfers in March was $35,554. Those who oppose the charge of 1 cent for a transfer say that it would be better to make the minimum fare 4 cents, with 1 cent extra for a transfer, the cent for the transfer to be refunded by the conductor who took up the transfer.

Mr. Dahl has suggested that illuminated markers should be used on the cars at night to designate the different lines. The officers of the Cleveland Railway have promised to consider this suggestion.

The question of fare from points within the original city limits to points north of Adams Avenue in Collinwood has been submitted to City Solicitor Baker by Mr. Dahl. The Tayler grant provides that two fares shall be paid, but does not specify what they shall be, and the company has been collecting two 5-cent fares. Mr. Dahl thinks that the ordinance contemplates that the charge for the ride within the city shall be 3 cents and the other 5 cents.

Mr. Dahl has refused to approve the purchase of the Puritan Springs line of the Cleveland, Southwestern & Columbus Railway for $215,000, in order that the tracks on Lorain Street may be utilized, as required by the city ordinance. He has also refused to consider the purchase of the tracks on Lorain Street alone at $86,000, until Engineer Ross has estimated their value.

Developments in Storage Battery Application

Taliaferro Milton, district engineer in Chicago of the Electric Storage Battery Company, addressed the Chicago Electric Club on April 6, 1910, on the application of storage batteries for the regulation of alternating-current loads. So far as railway work was concerned, Mr. Milton said that the reasons for installing batteries were chiefly to control the fluctuation of the load so as to reduce wear on the generating apparatus and save fuel by improving the load factor. Until very recently no system of battery regulation according to the alternating current demand was successful. After 10 years of experimental work, however, several plants have been installed with the battery charge and discharge so controlled as to smooth the alternating current demand. One of the first plants of this type was installed in the generating plant of the East St. Louis & Suburban Railway, which furnished current for lighting, power and direct-current railway service. This battery was connected across the brushes of rotary converters and the field of the series booster was supplied indirectly with current through transformers connected in the alternating current mains. Thus, when any load came upon the alternating current mains and the voltage tended to fall, the potential of the battery, in combination with the booster, was raised automatically and the battery drove the rotary as an inverted machine fed current into the alternating current mains, thus lessening the demand on the generators.

Another battery plant which had given excellent service in smoothing the alternating current demand curve was that of the Spokane & Inland Railroad, at Spokane, Wash. This company's Inland division is operated by single-phase current. Formerly power was purchased from the Washington Water Power Company at Spokane, and the battery and regulating devices were installed to cut down the power bill, a penalty being charged for maximum demands. Three-phase current was received from the Washington Water Power Company and used to drive each of three similar three-unit sets. Each set consists of an induction motor, a single-phase generator and a direct current railway generator mounted on one shaft. The induction motor receives current from the supply line; the single-phase motor generates current which is distributed at high voltage to step-down transformer stations feeding the trolley lines; the direct current machine acts either as a generator or a motor to charge the battery or run the single-phase generator, according to the load demand on the railway distribution line. A "watt-solenoid" controls the booster field and varies the charge and discharge of the battery so that the demand on the generating company's lines is kept practically constant. Mr. Milton quoted the officers of the road as having said that this battery had paid for itself in two or three years. A little more than a year ago the Spokane & Inland Empire Railroad completed a 60-cycle generating station of its own. This plant now supplies the single-phase railway system and the battery regulating installation was still used to relieve the water-power plant of the comparatively severe railway peaks. Mr. Milton stated that these successfully operated batteries were sure to be followed by similar installations, because the system of alternating current regulation had shown itself to be successful from a technical standpoint, and is economical.

Transit Affairs in New York

The Brooklyn Union Elevated Railway, a subsidiary of the Brooklyn Rapid Transit Company, has applied to the Public Service Commission for a franchise to run its elevated lines across the Williamsburg Bridge and through the Manhattan end of the so-called bridge loop subway to the Brooklyn Bridge. The application says that the direct effect of this operation would be:

First—To bring traffic crossing both the Williamsburg and Brooklyn Bridges to the one point in Manhattan—at or near City Hall.

Second—To increase the number of cars per hour for the present traffic and give better time on account of the freer movement of trains.

Third—The operation of Myrtle Avenue trains from Metropolitan Avenue and Ridgewood without change of cars by making a physical connection between the Broadway and Myrtle Avenue lines.

Fourth—Relieve the congestion on the Brooklyn Bridge and all connections leading thereto on tracks that are now greatly congested by diverting trains over the Williamsburg Bridge.

The Manhattan part of the Brooklyn loop subway was laid out by the old Rapid Transit Commission and contracts for its construction were let by that commission. It was designed to connect the three bridges over the East River, namely, the Williamsburg Bridge, the Manhattan Bridge

and the Brooklyn Bridge. The Brooklyn part of the loop subway, better known as the Broadway-Lafayette Avenue route, has not yet been built, but it is among the new subways which the Public Service Commission will soon submit to bidders. The Manhattan part of the loop has cost about $10,000,000 and is nearing completion.

Resolutions setting aside $60,000,000 for the construction of subways were adopted by the Board of Estimate and Apportionment of New York on April 8, 1910.

The Public Service Commission is preparing a bill for presentation to the Legislature which will authorize the commission in its negotiations to order a change of grade of any existing railroad as well as the grade of any existing street. Under the present railroad law the commission has the power to decree that a street or highway shall be raised or lowered when a grade crossing is eliminated, but it has no right to say that the grade of the railroad shall be altered so as to make it pass under or over the thoroughfare.

Hearing on Boston & Eastern Tunnel

The committee of the Legislature of Massachusetts on metropolitan affairs gave a hearing recently on the bill to provide for the construction of a tunnel under Boston Harbor by the Boston & Eastern Electric Railroad. Counsel for the company argued that the public necessity of the enterprise had already been determined by the Railroad Commission, and that the final step before construction was the building of a tunnel from East Boston to Postoffice Square. J. H. Bickford, chief engineer of the company, stated that the road would not interfere with any improvement planned for Boston by the joint commission on transportation matters.

W. H. Coolidge,, for the Boston & Maine Railroad, said that the companies opposed to the construction of the Boston & Eastern Electric Railroad had never admitted the need of its construction. There was not enough suburban traffic in the territory to support the project, which would cost $11,000,000. The policy of the State was against destructive competition. Assistant Corporation Counsel Spring, of Boston, said that the construction of a new tunnel under the harbor might interfere with the profitable leasing of the East Boston tunnel later. The Boston Elevated Railway desired to have the Boston & Eastern Electric Railroad terminate on its system, where it could handle all the traffic in and out of Boston.

New Road Opened in California.—The Modesto (Cal.) Interurban Railway has been placed in operation between Modesto and Oakdale.

Central Electric Traffic Association.—The Central Electric Traffic Association will meet at Lima, Ohio, on April 16, 1910. The association will take up the subjects of a joint tariff on milk and cream, which was put over for further consideration at the meeting of the association in Indianapolis, and a merchants' dispatch freight tariff.

Bridge Company Has Condemnation Rights.—According to a recent decision by the Circuit Court in St. Louis, the St. Louis Electric Bridge Company, which is building the McKinley bridge across the Mississippi River at St. Louis, has the right to condemn a right of way for the west approach over tracks of railroads.

Central Electric Railway Association.—The hotel committee of the Central Electric Railway Association has arranged to hold the meeting of the association on May 26, 1910, at the Boody House, Toledo, Ohio, which will reduce rates for the meeting and arrange for exhibits by manufacturers who are members of the association.

Milwaukee 1200-Volt Lines.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has reequipped its interurban divisions formerly operated with alternating current to operate with 1200-volt direct current. The change on the interurban line from Waukesha Beach to Oconomowoc and Watertown to 1200-volt service was made on March 16, 1910. The lines from St. Martin's to East Troy and to Burlington began operating at 1200 volts on April 5. The new equipment is reported to be working satisfactorily.

Iowa Street & Interurban Railway Association.—L. D. Mathes, Dubuque, Ia., secretary and treasurer of the Iowa Street & Interurban Railway Association, announces that the attendance at the annual convention of the association, which is to be held in Sioux City on April 21, 22 and 23, 1910, promises to exceed that of previous years. The programme, as previously announced, includes a paper on "City Railway Track," by J. G. Huntoon, Davenport, Ia. Mr. Mathes states that his paper has been written and will be presented by W. A. Heindle, superintendent of construction of the Tri-City Railway, Davenport, Ia.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—Hearings have been closed upon the bills to permit the New York, New Haven & Hartford Railroad to acquire electric railways in the Berkshire district. Bentley W. Warren, in concluding, emphasized that the railroad acquired its street railway holdings in the State in good faith, and that it disposed of them in the same spirit when the courts decreed that the laws prohibited such control. The entire Berkshire district was in accord with the proposed development, and the company was prepared to expend $2,000,000 if the Legislature would permit it to use the electric railways as feeders. The committee on street railways has continued the hearings upon the so-called Boston Elevated holding bill. F. E. Snow, counsel of the Boston Elevated Railway, stated that the company would not object to the insertion of a clause providing that the combined bond issue should not exceed the combined capital of the separate companies. Bentley W. Warren, on behalf of the Massachusetts Electric Companies, asked that that organization be permitted to purchase the securities of the Boston Elevated Railway. Hearings have been closed upon the proposed tunnel of the Boston & Eastern Electric Railroad under Boston harbor. If the bill passes the question of exigency will probably be reopened before the Railroad Commission. The bill to permit railroads to operate their lines by electricity or other power has been passed to be enacted. The bill permitting the purchase of foreign street railways by companies within the State has been given a first reading in the Senate, after having passed the House. The committee on metropolitan affairs has introduced a bill to exempt the transit bonds of Boston from the provisions of law relative to loans by that city. The Senate has accepted the adverse report of the committee on street railways upon the Hennebery bill to provide for the transportation of freight and express by street railways.

Maryland.—The session of the Legislature which was convened on Jan. 5, 1910, was adjourned on April 4, 1910. The most important work was the passage of the public utilities bill recommended by Governor Crowthers and drawn under the direction of Attorney-General Straus. As noted in the Electric Railway Journal of April 9, 1910, the bill was passed by the House during the week ended April 2 by a vote of 95 to 3. On April 4 the bill was passed by the Senate by a vote of 25 to 2. The Governor signed the measure the following day. The commission created under the act is to consist of three members whose terms of service are to be 6 years. The first appointees will be chosen for 2, 4 and 6 years, however. The chairman of the commission will receive a salary of $6,000 per year and each of the other commissioners $5,000. The total expenses of the commission in a year are not to exceed $75,000. Of this sum approximately $30,000 is needed for salaries. The members of the commission are to be appointed not later than April 22. A digest of the principal provisions of the measure is published on page 710 of this issue.

New Jersey.—The Legislature adjourned on April 7. The most important work of the session was the enactment of the public utility law, the text of which was published in the Electric Railway Journal of April 2, 1910, page 626. One of the measures passed permits the Pennsylvania Railroad to lease the Pennsylvania Tunnel & Terminal Railroad, which has erected the New York terminal for the Pennsylvania Railroad. The Lee bill was defeated in the Senate. This measure was designed to permit electric railways to construct a half a mile of connecting railroad in cities without the consent of the Councils or property owners.

Financial and Corporate

New York Stock and Money Market

April 12, 1910.

With the exception of the activity and buying which occurred yesterday after the announcement that the Supreme Court had ordered rehearings in the two important Sherman law test cases, the market for the past week has been lifeless and prices have sagged. The rise of yesterday was lost to-day, however, and the market is little improved.

The financial market has not been seriously affected by the shipments of gold. Rates are still easy enough to encourage speculation if there was any disposition by the public or the professionals to go into the market. Rates to-day were: Call, 2¾ to 3½ per cent; 90 days, 4¼ to 4½ per cent.

Other Markets

There is no longer any serious pressure to sell Philadelphia Rapid Transit and Union Traction. Despite this, prices have not advanced.

In the Boston market, it is the same old story. There has been fair trading in the issues of Massachusetts Electric and Boston Elevated, but prices have declined fractionally during the week.

In the Chicago market there has been very little trading in traction shares. Series 1 and 2 of the Chicago Railways have appeared in small lots. Prices are somewhat lower.

In addition to the regular trading in the bonds of the United Railways, the Baltimore market has handled during the past week some small blocks of the stock of the same company. The prevailing price is about 13½.

Quotations of various traction securities as compared with last week follow:

	April 5.	April 12.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	126	a126
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	a76	a75
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a46	a46
Brooklyn Rapid Transit Company	77¼	78⅜
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84¼	*84¼
Capital Traction Company, Washington	a133	*133
Chicago City Railway	*185	*195
Chicago & Oak Park Elevated Railroad (common)	*3½	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	*106	a100
Chicago Railways, ptcptg., ctf. 2	*33	a32
Chicago Railways, ptcptg., ctf. 3	*16	a18
Chicago Railways, ptcptg., ctf. 4s	*9	a8
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104½
Detroit United Railway	63	*64
General Electric Company	150⅝	152
Georgia Railway & Electric Company (common)	110	a110
Georgia Railway & Electric Company (preferred)	a87	a87
Interborough-Metropolitan Company (common)	27⅞	22¼
Interborough-Metropolitan Company (preferred)	58⅜	57¼
Interborough-Metropolitan Company (4½s)	81	*81
Kansas City Railway & Light Company (common)	*28	a31
Kansas City Railway & Light Company (preferred)	*78	a77⅝
Manhattan Railway	136½	134
Massachusetts Electric Companies (common)	a18	17¼
Massachusetts Electric Companies (preferred)	a85½	a88
Metropolitan West Side, Chicago (common)	*16½	a17
Metropolitan West Side, Chicago (preferred)	*51¼	a54
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*76½	77½
Northwestern Elevated Railroad (common)	*15	a17½
Northwestern Elevated Railroad (preferred)	*68	a50
Philadelphia Company, Pittsburg (common)	a50½	a50¾
Philadelphia Company, Pittsburg (preferred)	a43	a44½
Philadelphia Rapid Transit Company	a22⅝	a21
Philadelphia Traction Company	a87¼	a87
Public Service Corporation, 5 per cent col. notes	*100⅜	a96½
Public Service Corporation, ctfs.	a104½	a104½
Seattle Electric Company (common)	a114½	a113½
Seattle Electric Company (preferred)	103	103¼
South Side Elevated Railroad (Chicago)	*52½	a53
Third Avenue Railroad, New York	7¼	8
Toledo Railways & Light Company	10¼	10¼
Twin City Rapid Transit, Minneapolis (common)	*115¼	*115¼
Union Traction Company, Philadelphia	a49⅞	a49¾
United Rys. & Electric Company, Baltimore	13	a13¾
United Rys. Inv. Co. (common)	*37	37
United Rys. Inv. Co. (preferred)	*67	*67
Washington Ry. & Electric Company (common)	a39	a38½
Washington Ry. & Electric Company (preferred)	a91¼	*91¼
West End Street Railway, Boston (common)	a89½	88¼
West End Street Railway, Boston (preferred)	83	*83
Westinghouse Elec. & Mfg. Company	66½	66¾
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Report of Chicago Railways for Year

The comparative income statement of the Chicago (Ill.) Railways for the years ended Jan. 31, 1910, and Jan. 31, 1909, follows:

Income.	Year ending Jan. 31, 1910.	Year ending Jan. 31, 1909.
Passengers	$12,155,017	$10,773,914
Chartered cars	4,728	4,619
Mail	35,556	31,813
Advertising	63,000	44,333
Rent of land and buildings	13,262	14,633
Rent of equipment	27,182	33,974
Sale of power	19,922	17,925
Interest on deposits	37,040	41,711
Miscellaneous income	87,175	74,149
Gross	$12,442,882	$11,037,071
Expense.		
Maintenance, way and structures	546,507	544,763
Maintenance equipment	762,862	844,712
Renewals	*37,639	171,201
Operation power plants	1,326,919	1,000,149
Operation cars	4,042,786	3,618,694
General expenses	1,393,538	1,119,639
Expense acct. invest. real est.	62,868	54,837
Taxes (estimated)	612,177	371,955
Total	$8,710,017	$7,725,950
Balance (actual)	$3,732,864	$3,311,121
Balance (based on 70 per cent for operation)	3,732,864	3,311,121
Deduct interest of 5 per cent on valuation	2,275,718	1,739,684
Net income	$1,457,146	$1,571,437
City of Chicago 55 per cent	801,430	864,290
Chicago Railways 45 per cent	655,716	707,147

*Credit

Chicago (Ill.) Railways.—The report of the Chicago Railways for January, 1910, compared as follows with the report of the company for January, 1909: Gross receipts for January, 1910, $1,020,614, as compared with $945,856 for January, 1909; operating expenses for January, 1910, $776,805, as compared with $549,694 for January, 1909; earnings from operation for January, 1910, $243,808, as compared with $396,162 for January, 1909; net income for January, 1910, $91,742, as compared with $123,366 for 1909; City of Chicago (55 per cent), for January, 1910, $50,458, as compared with $67,851 for January, 1909; company (45 per cent), for January, 1910, $41,284, as compared with $55,515 for January, 1909.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—Charles L. Henry, receiver of the Indianapolis & Cincinnati Traction Company, who was instructed to file with the court not later than April 15, 1910, a written report on the progress made toward reorganizing the company, has informed the court that there is a movement among certificate holders to organize a new company. Receiver's certificates for $1,000,000 have been issued, and the people who control certificates representing about one-half of this amount have stated that they were in accord with the movement to reorganize the company. It is proposed now to organize a new company, cancel the outstanding bonds by issuing preferred stock for them and issue new bonds to take the place of the outstanding receiver's certificates. Mr. Henry stated that the plan could be worked out by July 1, 1910.

Janesville (Wis.) Street Railway.—A judgment of foreclosure and sale of the property of the Janesville Street Railway was entered on April 5, 1910. As announced in the Electric Railway Journal of March 19, 1910, page 508, W. H. Lemons and William Murphy were recently appointed receivers of the company.

Kansas City Railway & Light Company, Kansas City, Mo.—The Kansas City Railway & Light Company announced on April 9, 1910, through R. J. Dunham, chairman of the board of directors of the company, that in order to provide for the payment of the consolidated mortgage 5 per cent gold bonds of the Metropolitan Street Railway, maturing on May 1, 1910, arrangements have been made to issue new 5 per cent coupon bonds maturing on May 1, 1913. Holders of the bonds which mature on May 1 who wish to exchange them for the new bonds which mature May 1, 1913, must deposit their bonds at the office of Lee, Higginson & Company, Boston, New York or Chicago, or at the office of J. P. Morgan & Company, New York, on or before April 16, 1910. A cash payment of $20 for each $1,000 bond so deposited will be made, and coupons due May 1, 1910, if presented, will be cashed at the same time and place. Bonds

not so exchanged will be paid in full on or after May 1, 1910, upon delivery to the Old Colony Trust Company, Boston, Mass.

Louisville (Ky.) Railway.—A syndicate of the Louisville banks and trust companies has purchased $1,500,000 of the Louisville Railway's new 5 per cent 40-year bonds at a price said to have been between 98 and 99, and will offer them for public subscription. These bonds are part of an issue of $20,000,000 of 5 per cent 40-year bonds recently authorized, as noted in the Electric Railway Journal of Feb. 12, 1910, page 295. It is stated that they are all of the issue that are to be sold this year, $8,000,000 being reserved to retire $6,000,000 of first mortgage 5 per cent bonds and $2,000,000 of second mortgage 4½ per cent bonds of the company. The proceeds of the $1,000,000 of bonds which have just been sold will be used to pay for the Louisville & Southern Railway and to complete the construction of the road to Shelbyville, a distance of 24 miles.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has issued an order directing the receivers of the Metropolitan Street Railway to spend $510,000 on the Eighth Avenue Railway for the purpose of rehabilitating that property. The formal decree of the United States Circuit Court, based on the mandate of the Circuit Court of Appeals, directing the sale under foreclosure proceedings of the Metropolitan Street Railway because of the default in payment of principal and interest on mortgage bonds held by the Guaranty Trust Company, amounting to $13,589.270, was filed on April 7, 1910. The decree of the court directs that this sum, together with interest at 6 per cent from March, 1909, be paid into court by the receiver before April 27, 1910. If this order is not complied with, William L. Turner, who is appointed special master, is directed to sell at public auction, at a time to be fixed by him, all the property, estate, rights, franchises, contracts and effects of the Metropolitan Street Railway and all the leased roads in its possession. The proceeds of the sale, after payment of the costs and master's charges, are to be used for the payment of receivership certificates amounting to $3,500,000, the principal and interest on bonds, and taxes due the city and the Federal Government. Each bidder is required to deposit $100,000 in cash before the sale.

Milford & Uxbridge Street Railway, Milford, Mass.—The Railroad Commission of Massachusetts has authorized the Milford & Uxbridge Street Railway to issue $88,000 of new stock to pay floating debt.

Philadelphia (Pa.) Rapid Transit Company.—In order to meet recent extraordinary expenses and to provide capital for improvements and the construction of extensions, the Philadelphia Rapid Transit Company has applied to the City Council of Philadelphia for permission: 1. To sanction a new loan, not to exceed $2,500,000, to be secured by pledge of such property as the company has available and to run not longer than the city contract of July 1, 1907. 2. To authorize the use of car trust securities whenever in the future new equipment may be required for the purchase of the same to the extent of not more than 85 per cent of the value of the same. (The company is in need of new rolling stock, costing approximately $500,000, for its elevated system.) 3. To make possible the sale of the final $600,000 of the $5,000,000 5 per cent collateral bonds of 1908 by authorizing an amendment to the lease of the Lehigh Avenue Railway so that the stock of that company "would carry a rental of 6 per cent upon par guaranteed by the Union Traction Company and the Philadelphia Rapid Transit Company," and so be available as collateral for the 1908 loan, as it is not at present. 4. To authorize the sale of the remaining $635,000 of the $1,500,000 bonds of the Darby, Media & Chester Street Railway guaranteed by the Philadelphia Rapid Transit Company, but only to cover actual outlays for the betterment or extension of the property of that company. At present about $50,000 has been expended thereon, and $50,000 more is needed.

Toledo & Indiana Traction Company, Toledo, Ohio.—The Toledo & Indiana Traction Company has made a mortgage to secure a temporary loan of $400,000 with which to pay off the minority bondholders of the Toledo & Indiana Railway, which it has succeeded. Plans are now being made for the reorganization of the company.

Traffic and Transportation

New Wage Agreement in Connecticut

After several conferences with a committee of its employees the Connecticut Company, New Haven, Conn., has established a new wage scale, which modifies and unifies the working conditions on its various divisions. The new scale follows the old scale in beginning at the minimum rate and working up to the maximum at the end of five years, but instead of three scales there are now only two, as Middletown and Torrington have been promoted from third class to second class and Bridgeport and Waterbury from second class to first class. The new working conditions are substantially the same as those heretofore in effect on the New Haven division. The new scale of wages went into effect on April 9, 1910, and for purposes of comparison the old scale and the new scale follow:

OLD SCALE

	First year.	Second year.	Third year.	Fourth year.	Fifth year.	Sixth year and thereafter.
New Haven and Hartford	21	21½	22	23	24	25
New London, Stamford, New York & Stamford, Meriden, Bridgeport, Waterbury, Derby, New Britain, Norwalk and Putnam Divisions..	20	21	22	22½	23	24
Middletown and Torrington Divisions	19	19½	20	21	22	23

NEW SCALE

	First year.	Second year.	Third year.	Fourth year.	Fifth year.	Sixth year and thereafter.
New Haven, Hartford, Bridgeport, Waterbury Meriden, New London, Stamford, Derby, New Britain, Norwalk, Middletown, Torrington, New York & Stamford	21½	22	22½	23½	24½	26
	20½	21½	22½	23	23½	25

The principal clauses of the agreement follow:

"Five cents per hour above employee's regular rate will be paid for overtime, snow plow and sweeper work.

"An extra man assigned to other than a regular run will be paid overtime after having worked 10 hours.

"Any regular man ordered to report on the second half of his run later than his regular time will be allowed time from the time called for on his regular run, but overtime will not begin until the time called for by his regular run has been worked.

"When a regular man who has finished his run is ordered to report for extra work he will receive at least one hour's time.

"Any man taken from his regular run for extra service and who reports for same but does not make the time his regular run calls for, shall be paid for the time of his regular run. Any man taken from a regular run for extra service, and who reports for same, shall receive overtime after working the number of hours called for on his regular run.

"Any motorman or conductor suspended for any cause, who upon investigation, is proved not guilty of the charges preferred, shall be reinstated to his former position and paid for all lost time.

"All motormen and conductors will be allotted passenger car runs according to seniority of continuous service, and the bidding-in system shall prevail, the superintendent reserving the right to change allotments, giving next best runs practicable, if necessary for the good of the service.

"A motorman or conductor desiring to see his record as kept in the office of the superintendent will be allowed to do so upon application. The record above referred to covers discipline for misses, accidents and general infraction of the rules.

"Upon reasonable notice the company will, at all times, treat with its employees or properly accredited representatives from among their number."

Letter from F. W. Coen, Lake Shore Electric Railway, on Interstate Commerce Bill

The committee on Interstate and Foreign Commerce has made public a number of letters received by the committee on the subject of joint rates and through routes in connection with the bill now before Congress to amend the powers

of the Interstate Commerce Commission. One is from F. W. Coen, vice-president and general manager of the Lake Shore Electric Company. Under date of March 30, 1910, Mr. Coen urged strongly the amendment of the bill so that the commission will have authority to order through routes and tickets between steam and interurban roads. He says that there is a great many points on the Lake Shore Electric Railway where trains interchange traffic between that company and the steam railroads which the electric line crosses. For instance, at Munroeville, where the line crosses the Baltimore & Ohio Railroad, the steam trains stop in front of the interurban station instead of the steam railroad station, but any passengers who desires to use both roads must buy two tickets and have his baggage checked twice on account of the present agreement between steam railroads. Mr. Coen continues: "The Lake Shore Electric comprises about 215 miles and for the year ending June 30, 1908, carried approximately 6,000,000 passengers. The Wheeling & Lake Erie, which comprises about 500 miles (almost entirely within the State of Ohio), handled during the same period, approximately, 1,090,000 passengers. All of these 1,090,000 passengers had the opportunity of buying through tickets, having their baggage checked through to point of destination, while on our system of less than one-half the mileage and handling six times as many, passengers were not accorded this privilege. It is a remedy to cover this discrimination which I seek. I trust you will appreciate the situation and will lend your influence to have the bill amended so that the commission may, in its judgment, order through rates and routes between steam and interurban railroads."

Six-For-a-Quarter Tickets Withdrawn in Des Moines

The Des Moines (Ia.) City Railway issued the following notice on April 1, 1910, regarding the withdrawal of six-for-a-quarter tickets:

"From time to time everything except fares in connection with street railway transportation has advanced. In the face of this advance the company has tried to give satisfactory service and reduce fares, but finds itself unable to do so.

"In the last 10 years the cost of everything which the company buys, including rails, ties, poles, coal, copper, lumber, machinery, cars, and other equipment, and the wages of employees have increased from 33⅓ per cent to 125 per cent, and during the same period the length of a ride for a single fare has increased 180 per cent; but the price that the company receives for transportation which it sells has remained the same.

"All these items add thousands of dollars to its expense account, and finally compelled the company to admit its inability to sell six tickets longer for a quarter; and it therefore discontinues the same from this date."

Full Fare for Dogs on Illinois Traction System.—In order to discourage the practice of carrying dogs on its cars the Illinois Traction System, Peoria, Ill., has established a rule that passengers must pay regular fare for dogs, and that the animals must not be permitted in any way to annoy passengers.

Complain About Fare Between Dunkirk and Fredonia.—On April 15, 1910, the Public Service Commission of the Second District of New York was to hear at Buffalo the complain of the residents of Dunkirk and Fredonia against the Buffalo & Lake Erie Traction Company regarding the rate of fare between Dunkirk and Fredonia.

Increase in Wages in Columbus, Ohio.—The Columbus Railway & Light Company, Columbus, Ohio, on April 7, 1910, granted its employees an increase in wages to 24 cents an hour, with an addition of one-half cent an hour from Jan. 1, 1911. The company has agreed to reinstate the men who were discharged recently for their activity in union affairs while on duty, but has not recognized the union.

Northampton Street Railway Asks for Fare Readjustment.—The Northampton (Mass.) Street Railway, through its president, Henry M. Tyler, has petitioned the Massachusetts Railroad Commission to discontinue the sale of reduced rate tickets between Northampton and Williamsburg and Northampton and Haydenville; to establish certain new fare limits and certain ticket book sales on the 6-cent basis, enumerated in detail in the petition.

Veterans in Brooklyn.—The Brooklyn Rapid Transit Company has sent to each of its directors a group photograph of 21 veterans of the company which has been mounted and framed and a pamphlet entitled "The Old Guard of the B. R. T.," which contains a reprint of an article from the Brooklyn *Daily Eagle* of Feb. 27, 1910, in which an extended account was given of the services performed by these men during their connection with the company.

Proposal to Limit Number of Passengers to a Car in Norfolk.—It has been proposed in revising the City Code of Norfolk, Va., to include the following regulation for street cars: "Cars shall stop at every street crossing, when necessary to accommodate the public, unless all the seats are occupied, in which case the motorman may display a sign 'Limit' and pass on without violation of law, it being understood that unless a seat is provided a passenger shall not be obliged to pay fare."

Increase in Wages in Rhode Island.—The Rhode Island Company, Providence, R. I., has increased the wages of its employees, effective from April 9, 1910. The lines of the company are divided into two divisions. A comparison of the old and new hourly scales of wages for both divisions follows: Exclusive of the Woonsocket division—First year, from 20 cents to 21½ cents; second year, from 21 cents to 22 cents; third year, from 22 cents to 22½ cents; fourth year, from 23 cents to 23½ cents; fifth year, from 24 cents to 24½ cents; after fifth year, from 25 cents to 26 cents. Woonsocket division—First year, 20 cents to 21½ cents; second year, 20 cents to 22 cents; third year, 20 cents to 22½ cents; fourth year, 22½ cents to 23½ cents; fifth year, 22½ cents to 24½ cents; sixth year, 22½ cents to 26 cents.

Pay-as-You-Enter Cars on Sea Shore Line.—The Public Service Commission of the First District of New York has approved plans submitted by the Ocean Electric Railway for the conversion of 10 open cars into cars of the pay-as-you-enter type. This company is a subsidiary of the Long Island Railroad, and operates about four miles of road from Hammel to Belle Harbor and Far Rockaway. It carried more than 2,000,000 passengers during 1908. The cars which it is proposed to convert are the familiar summer type, with benches extending across the car and entrance to each bench from a running-board at the side. It is proposed to close the sides of the cars with metal gratings and to cut an aisle through the center of the car from end to end and rearrange the platforms to conform to the pay-as-you-enter type. The cost of the improvement will be from $400 to $500 per car.

Summer Schedules of Inland Empire System.—Waldo G. Paine, traffic manager of the Spokane & Inland Empire Railroad, has announced that the summer rates of that road will be effective from May 13 to Sept. 26, inclusive. The summer schedules provide special round-trip rates on Sundays and for week-end trips. These include the fares to the several lake resorts and the combination route over the Coeur d'Alene division and the steamer lines of the Red Collar and the Perry-Lyon Navigation companies, which operate on the St. Joe River and serve the Coeur d'Alene mining district. Twenty-five-ride family commutation tickets, good for purchaser and members of his family, will be sold between Spokane and Coeur d'Alene or Hayden Lake, Idaho, at rates of $16.20 and $21.20, respectively. Special rates also are announced for round-trip parties, the fare per passenger being graded according to the total number of passengers in the party.

No-Seat-No-Fare Ordinance.—The City Council of Trenton, N .J., has passed the following ordinance: "It shall be the duty of all corporations operating a line or lines of street railways within the city limits, between the hours of 6 and 9 in the morning, and 5 and 7 in the evening of each day, to furnish and run a sufficient number of cars to provide a seat for each passenger from whom a fare is demanded. Section 2.—That persons desiring transportation thereon shall not be kept waiting longer than ten (10) minutes. Section 3.—Any corporation violating the foregoing provision shall forfeit and pay a penalty of $50 for each offense." The Council has also passed an ordinance

which provides that the city engineer shall inspect at least once every three months, the roadbed, tracks and overhead equipment of electric railways operating in Trenton, and report any defects to the chief of police, who shall notify the company to remedy the defects within 30 days. A fine of $10 is imposed for each day during which these defects shall be unremedied, the penalty beginning with the day following the expiration of the 30 days' notice.

Accident Fakir Convicted in Baltimore.—The United Railways & Electric Company, Baltimore, Md., has secured the conviction of George Custerd, or Czyyewski, in the Criminal Court of Baltimore, upon a charge of attempting to defraud the company by a fraudulent accident claim. Custerd filed a claim with the company on Feb. 28, 1910, for injuries alleged to have been received while boarding one of the company's cars at 5:45 p.m. on Feb. 23, 1910. He made affidavit that after the alleged railway accident a plaster cast had been placed on his ankle at the City Hospital and that he was later removed to his home. He claimed $25 in settlement. An investigation proved that Custerd had not been taken to the City Hospital. The claimant finally admitted that the injuries which he had sustained to his foot were received from a cart which ran over his foot. He was arrested on the charge of attempting to obtain $25 from the company under false pretense, and at a hearing at the Central Police Station was held for the action of the Grand Jury. He pleaded guilty before Judge Duffy in the Criminal Court on March 29, 1910, and was sentenced to 30 days in jail.

Sleeping Car Exhibited.—The Illinois Traction System has put the two new 10-section sleeping cars which were described in the Electric Railway Journal of March 19, page 476, into service on its line between Peoria and St. Louis. Previous to the installation of the new service one of the cars was exhibited in Illinois by Fred G. Buffe, of the department of publicity of the company, for the purpose of advertising them. The sleeper which was exhibited was drawn by a new motor car from Champaign to all the cities and small towns on the Illinois Traction System, and was exhibited for one day at each of the larger terminals and for shorter periods in the smaller towns, making the tour extend over a period of two weeks. In four days 18,000 people were shown through the car. At Springfield, Ill., where the car was exhibited on a Saturday night and Sunday, visitors were shown through it at the rate of 18 per minute. A picked crew of employees were on duty during the entire trip. One trainman was stationed at each section of the car, and visitors were sent through in groups at short intervals. The trainman in each section made a short address to each group regarding some feature of the equipment. On leaving the car the visitors were presented with an illustrated description of the equipment and told about the service, which was begun with the cars on April 1.

Commission Upholds 10-Cent Fare for Special Service in Ithaca.—The Public Service Commission of the Second District of New York has dismissed the complaint of residents of Ithaca against the Ithaca Street Railway as to alleged unreasonable fare charged between the East Ithaca station on the Elmira, Cortland & Northern branch of the Lehigh Valley Railroad and other points in Ithaca. The commission holds that section 101 of the Railroad Law permits that company to charge a 10-cent fare in each direction, subject to reduction under and by reason of the enactment of the Public Service Commission Law; that the service rendered by the company between points in Ithaca and the East Ithaca station is a special service in that it involves transportation upon a line having an elevation of more than 450 ft. within a distance of 1½ miles, and the 10-cent fare in force affords small return to the company above the cost of operation. The 10-cent fare on the line in question has been a mooted question in Ithaca for years. Nearly 400 lawsuits resulted from the levying of this fare, one of which reached the Court of Appeals. It was held in the trial court that section 37 of the Railroad Law did not apply to street railways, but that under section 39 of the Railroad Law the Ithaca Street Railway, having acted in good faith and under the advice of eminent counsel, was not liable for penalties. Before the case had its final hearing legislation expressly authorizing the 10-cent fare was obtained in the shape of an amendment to section 101 of the Railroad Law.

Personal Mention

Mr. C. T. Munz has been appointed purchasing agent of the Toledo & Western Railroad, Toledo, Ohio, to succeed Mr. T. U. Franklin, resigned.

Mr. W. T. Corbusier has been appointed superintendent of the Schuylkill & Dauphin Traction Company, Harrisburg, Pa., to succeed Mr. S. S. Straub, resigned.

Mr. M. H. Bochow has been appointed superintendent of the Philadelphia & Easton Electric Railway, Doylestown, Pa., to succeed Mr. L. C. Lugar, resigned.

Mr. John J. Stanley, vice-president and general manager of the Cleveland (Ohio) Railway, has been elected president of the company to succeed Mr. Horace E. Andrews. Mr. Stanley will continue as general manager of the company.

Mr. Horace E. Andrews has resigned as president of the Cleveland (Ohio) Railway, but will continue as a director of the company. Mr. Andrews will in the future devote all his attention to his financial interests in New York, where he will be located permanently. He has been succeeded as president of the Cleveland Railway by Mr. John J. Stanley, vice-president and general manager of the company.

Mr. Oliver I. Davis has been appointed local auditor of the Dayton, Covington & Pique Traction Company, in charge of the company's office at West Milton, Ohio. When the company's line was opened 8 years ago Mr. Davis was appointed chief clerk to the general superintendent and afterward filled the position of auditor of freight accounts and local auditor, under Mr. M. M. Smith, who resigned in March, 1910.

Mr. Ira P. Scofield resigned recently as superintendent of motive power and equipment of the Toledo & Western Railroad, Toledo, Ohio, to become master mechanic of the Dayton, Springfield & Xenia Southern Railway, Dayton, Ohio. Mr. Scofield entered the service of the Toledo & Western Railroad during its construction, and for the last eight years had been superintendent of motive power and equipment of the company.

Mr. E. R. Kelsey has been appointed manager of the publicity and advertising department of the Toledo Railways & Light Company, Toledo, Ohio. Mr. Kelsey has been in newspaper and theatrical work in Toledo for a number of years and has recently devoted part of his time to the interest of the Toledo Railways & Light Company. The demands of the company upon Mr. Kelsey's time have assumed such proportions that it was recently decided to retain his undivided service as manager of the publicity and advertising department.

Mr. D. C. Powell has recently been appointed general freight and passenger agent of the Evansville (Ind.) Railways. Mr. Powell began his railroad career in 1893 with the Southern Railway at Evansville, Ind., as a messenger. Subsequently he served the company as night operator and bill clerk, through bill clerk and ticket agent and city freight agent and solicitor at Evansville. In 1903 he was appointed relief agent of the company, but returned to Evansville in 1905 as through rate clerk. In 1907 Mr. Powell was made city freight clerk and assistant commercial agent of the Southern Railway at Evansville and in 1909 he was appointed freight and passenger agent of the company in that city.

Mr. George M. Curtis, Jr., who has been connected with the legal department of the Brooklyn (N. Y.) Rapid Transit Company for 13 years, has been appointed Assistant Corporation Counsel of Brooklyn. Mr. Curtis was born in Brooklyn and prepared for college at the Mount Pleasant Military Academy, Ossining, N. Y. Afterward he attended Lehigh and Yale Universities, and was graduated from Yale in 1893. Subsequently he attended the Yale Law School. He began with the Brooklyn Rapid Transit Company as a trial lawyer in the municipal courts, and gradually took the company's more important cases in the county and Supreme courts. Mr. Curtis was endorsed for the position to which he has been appointed by Supreme Court Justices Stapleton, Hirschberg, O'Gorman and Dugro, and by Mayor Gaynor, of New York.

Mr. L. M. Levinson has resigned as secretary and general manager of the Shreveport (La.) Traction Company

to become connected with the Salt Lake & Ogden Railway, Salt Lake City, Utah. Mr. Levinson was sent to Shreveport in October, 1897, by the Kansas City Southern Railroad as chief clerk of the shops of the company. In 1899 Mr. Walter B. Jacobs, president of the Shreveport Belt Railway, appointed Mr. Levinson superintendent of these lines, and in 1900 he became manager of the company which is now the Shreveport Traction Company. Several months ago he was elected secretary and general manager of the Shreveport Traction Company. During Mr. Levinson's connection with the company the road has been completely rebuilt and extended to double the original mileage with a new power station, new cars, overhead lines, tracks, etc.

Mr. E. L. Green, formerly foreman of the 146th Street shops of the Metropolitan Street Railway, New York, N. Y., has been appointed master mechanic of the York (Pa.) Railways. Mr. Green was graduated from Princeton in 1893 with the degree of A. B. From 1893 to 1895 he was an instructor in the New York Military Academy. In 1896 he reentered Princeton as a graduate student and after a year at the university became an apprentice at the Plank Road shops of the Public Service Railway, Newark, N. J., where he remained until May, 1899, when he accepted a position with the Metropolitan Street Railway. Mr. Green continued with the Metropolitan Street Railway until February, 1907, as night foreman of the Twenty-third Street and the Thirty-fourth Street car houses and day foreman of the Eighth Avenue and Fiftieth Street and the 146th Street shops. From February, 1907, to October, 1907, Mr. Green was employed by the Westinghouse Electric & Manufacturing Company. He then re-entered the employ of the Metropolitan Street Railway as foreman of the overhauling and new equipment shops and continued in this position until appointed to the York Railways.

Mr. W. P. Bailey, division passenger and freight agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has been appointed general freight and passenger agent of the Western New York & Pennsylvania Traction Company, Olean, N. Y. Mr. Bailey began his railway career in 1891, and was connected with several steam roads in various capacities for 12 years. In 1903 he entered the employ of the Indianapolis & Northwestern Traction Company, which was taken over later by the Terre Haute, Indianapolis & Eastern Traction Company, as train dispatcher, and shortly afterward was made chief clerk to the general manager. Later he was appointed auditor of the company. When the Terre Taute, Indianapolis & Eastern Traction Company was organized, Mr. Bailey was made assistant auditor of the Northwestern division, under Mr. L. T. Hixson, and continued in that capacity for two years. He then accepted a position as division superintendent of the Chicago, South Bend & Northern Indiana Railway, but after serving a year with the company he re-entered the employ of the Terre Haute, Indianapolis & Eastern Traction company as division passenger and freight agent. His resignation from the Terre Haute, Indianapolis & Eastern Traction Company became effective on April 15.

Mr. H. W. MacKay has been appointed superintendent of the Western division of the New Hampshire Electric Railways, Haverhill, Mass., to succeed Mr. Clarence P. Hayden, whose resignation was announced in the Electric Railway Journal of April 2, 1910. Mr. MacKay entered the employ of the Boston (Mass.) Elevated Railway in June, 1898, as a motorman, but resigned from the company in September, 1898, to enter the employ of the Boston & Northern Street Railway at Haverhill, Mass., as a conductor. He was later appointed starter, and then foreman with the Boston & Northern Street Railway, and on April 1, 1903, he was appointed superintendent of the Haverhill division to succeed Mr. David Bruce, who was transferred to Lawrence, Mass. In July, 1904, Mr. MacKay left the Boston & Northern Street Railway to enter the employ of the Boston & Worcester Street Railway, and on April 1, 1905, he was appointed division superintendent of that company, with headquarters at Marlboro, Mass. On April 30, 1907, he accepted the position of superintendent of the Eastern division of the New Hampshire Electric Railways with headquarters at Amesbury, Mass., and continued in that capacity until he was appointed to succeed Mr. Hayden.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Norwich, Colchester & Hartford Construction Company, Norwich, Conn.—Incorporated in Connecticut for the purpose of building an electric railway between Norwich and Hartford. Capital stock, $50,000. Incorporators: A. L. Potter, Frank Kramer, C. E. Stark and W. H. Woodworth. [E. R. J., March 12, '10.]

***Athens Railway & Electric Company, Athens, Ga.**—Chartered in Georgia to build an electric railway in Athens. Capital stock, $1,050,000. Incorporators: John R. White, Whitehall, Ga.; J. Y. Carithers, W. S. Holman, A. H. Hodgson, C. D. Flanigan, James White and W. T. Bryan, Athens.

Toronto & Eastern Railway, Toronto, Ont.—Incorporated in Ontario to build an electric railway from Cobourg to Toronto, with branches to Peterboro, Uxbridge and Lindsay. F. L. Fowke is interested. [E. R. J., Nov. 13, '09.]

***South Carolina Western Railway, Hartsville, S. C.**—Incorporated in South Carolina to build a 40-mile railway to be operated by steam or electricity, to connect McBee, Stokes Bridge, Hartsville, Swift Creek, High Hill, Darlington and Florence. Capital stock, minimum, $20,000; maximum, $500,000. Headquarters, Hartsville. Directors: W. R. Bonsal, Hamlet, N. C., president; S. O. Bauersfeld, Hamlet, secretary; Chas. Gibbons, S. Lawrence and J. E. Hancock, Hamlet, N. C.

***Iowa & Dakota Interurban Railway, Yankton, S. D.**—Incorporated in South Dakota to build a 125-mile railway between Sioux City, Ia., and Mitchell, S. D. Capital stock, $500,000. Headquarters, Yankton. Directors: B. E. Wells, E. E. Bamford, H. E. Valentine, Centerville; C. L. Phillips and W. G. Amundson, Lake Andes, S. D.

***Temple Northwest Railway, Temple, Tex.**—Incorporated in Texas to build a 100-mile railway between Temple and Comanche, passing through Bell, Coryell and Hamilton Counties. Capital stock, $100,000. Incorporators: George E. Wilcox, A. F. Bentley, John A. Cole, P. L. Downs, H. W. Peck, J. W. Beard and D. J. Gribbsby.

Western Washington Railway, Aberdeen, Wash.—Incorporated in Washington to build an electric railway from Grays Harbor to Puget Sound, via Elma and Shelton. Capital stock, $100,000. Headquarters, Aberdeen. Incorporators: C. C. Quackenbush and W. B. Sammons, Aberdeen. [E. R. J., March 26, '10.]

FRANCHISES

Riverside, Cal.—J. B. Jackson, in the interests of the Pacific Electric Railway, Los Angeles, has asked the County Board of Supervisors for a franchise to build a railway in Riverside. The route of this proposed 25-mile extension will be through San Jacinto, Hemet, Florida, Lakeview and Moreno.

Sacramento, Cal.—The Board of Supervisors has granted a franchise to the Northern Electric Railway, Chico, to erect a bridge over the Sacramento River at the foot of M Street, in Sacramento. This is part of a plan to extend this line to Woodland, Los Molinos and Red Bluff.

Carrier Mills, Ill.—The Egyptian Traction Company, Eldorado, has applied to the Board of Trustees for a franchise to operate an electric railway in Carrier Mills. A similar application will be made at Eldorado. This projected 100-mile railway will connect Murphysboro, Marion, Carrier Mills, Harrisburg, Eldorado, Ridgway and New Haven, Ill., and Mount Vernon, Ind. [E. R. J., April 9, '10.]

West Hammond, Ill.—The Eastern Illinois Railway, a subsidiary of the Chicago City & Connecting Railways, has been granted a 50-year franchise for an electric railway over certain streets in West Hammond. This line will extend from West Hammond to Riverdale, via Harvey, Burnham and Hegewisch. [E. R. J., March 19, '10.]

Covington, Ky.—The City Council has granted a franchise to the Cincinnati, Louisville, Lexington & Maysville Traction Company, Dry Ridge, Ky., to build an electric railway

through Covington to the Ohio River. This is part of a plan to build an interurban railway between Cincinnati, Ohio and Lexington, Ky., a distance of 200 miles. [E. R. J., Dec. 4, '09.]

Worcester, Mass.—The Council has granted a franchise to the Worcester & Providence Street Railway, Worcester, to build an electric railway over certain streets in Worcester. This proposed 45-mile railway will extend from Worcester to Providence, via Millbury, Sutton, Manchaug and Douglas, Mass., and Burrillville, Mohegan, North Smithfield, Smithfield and North Providence, R. I. [E. R. J., Jan. 29, '10.]

***Bessemer, Mich.**—Messrs. Appleyard and associates have applied to the City Council of Bessemer, Mich., for a franchise to build an electric railway from Ironwood to Bessemer. Work will begin as soon as the franchise is granted.

Lincoln, Neb.—The Town Board has voted a franchise to the Lincoln (Neb.) Traction Company to extend its railway in two directions over certain streets in Lincoln.

***North Bend, Ore.**—L. D. Kinney has applied to the Council for a franchise to build a railway in North Bend. He will make a similar application in Marshfield for a franchise. This is part of a plan to build a railway between North Bend and Marshfield. Surveys have been started and it is stated that Seattle capital is financing the enterprise.

Zanesville, Ohio.—The Ohio Electric Railway, Cincinnati, has been granted a franchise to build additional track over certain streets in Zanesville. It has also been recently granted a franchise for the reconstruction of its tracks in Dayton.

Cosmopolis, Wash.—The Council has granted a franchise to the Gray's Harbor Electric Company, Aberdeen, to build a railway in Cosmopolis.

Seattle, Wash.—The King County Board of Commissioners has granted a franchise to the Seattle-Tacoma Short Line, Seattle, to build an electric railway over certain portions of the highway between Seattle and Tacoma. The company proposes to begin work on the new line within 60 days. It will be 29 miles long.

Spokane, Wash.—Application has been made to the City Council by the Okanogan Electric Railway, Spokane, for a franchise to build an electric railway in Spokane. This proposed railway is to connect Loomis, Okanogan, Ophir, Malott, Brewster and Riverside, and will connect at the north end with Victoria, Vancouver & Eastern extension of the Great Northern Railway. A. M. Dewey, Empire State Building, Spokane, president. [E. R. J., May 1, '09.]

Wenatchee, Wash.—The Council has granted the Wenatchee Valley Railway & Power Company a franchise to build a railway in Wenatchee. This projected line will extend from Wenatchee via Cashmere to Leavenworth.

Morgantown, W. Va.—The County Court has been asked to grant a franchise to the Union Utilities Company, Morgantown, to extend its lines up Decker Creek to Dellslow and Cheat. H. R. Warfield, Morgantown, general manager. [E. R. J., March 19, '10.]

TRACK AND ROADWAY

***New Decatur, Ala.**—W. J. Cottingham, New Decatur, and others are advocating the building of a 50-mile railway from Union Depot in New Decatur to Curtis Wells, Neal, Danville, Jesseton, Needmore, Moulton, Landersville, Mount Hope, Newburg and Russellville.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company is considering plans for building an extension of its line from Graton to Guerneville and also a branch to Camp Meeker. E. M. Van Frank, Petaluma, manager.

Chicago City Railway, Chicago, Ill.—This company is said to be in the market for 5000 tons of rails.

Beech Grove Traction Company, Indianapolis, Ind.—This company has awarded the contract to the Alan Construction Company to build its railway between Beech Grove and Indianapolis. Work will be started within a few days. The company has filed a mortgage with the Security Trust Company to secure $100,000 worth of first mortgage bonds, due in 30 years. At a recent meeting the following officers were elected: W. H. Ogan, president; John Wocher, vice-president; C. F. Schmidt, secretary, and M. S. Hawkins, treasurer. [E. R. J., April 9, '10.]

Evansville (Ind.) Railway.—The citizens of Chrisney have offered this company a subsidy of $20,000, the right of way and the grading of the roadbed if it will extend the Richland branch of its railway to Chrisney.

Kansas Union Traction Company, Altamont, Kan.—At an election held in Parsons on April 5, this company was voted $10,000 in bonds to aid in building an interurban railway from Parsons to Coffeyville, via Altamont and Edna. This makes a total of $41,500 in bonds that have been voted for the benefit of this line. Surveying is now being done by Archer, Rollins & Company, Kansas City, Mo. Barney McDaniel, Altamont, secretary. [E. R. J., April 2, '10.]

Cumberland & Westernport Electric Railway, Cumberland, Md.—This company is considering plans to extend its railway on the Maryland side of the North Branch River to McCoole, and there into Keyser over the bridge already spanning the river. C. L. Bretz, Cumberland, president.

***Hibbing, Minn.**—W. N. Brown and associates are promoting a plan to construct a street railway in Hibbing.

***Fenton, Mich.**—David L. Dillon, Fenton, is said to be interested in an electric railway between Fenton, Ann Arbor and Flint. The line would connect with the Ann Arbor Railroad at Ann Arbor and with the Saginaw & Flint Railway, Saginaw, at Flint.

***Missoula, Mont.**—Negotiations are pending between W. H. Smead and the Chamber of Commerce for the building of a 75-mile electric railway between Missoula and Polson.

Virginia City Southern Electric Railway, Virginia City, Mont.—This company has awarded to Luther H. Leber, New York, N. Y., the contract for the construction of its projected railway to Alder. [E. R. J., April 9, '10.]

Citizens' Traction & Power Company, Albuquerque, N. Mex.—This company advises that construction will commence about May 10 on its proposed 2-mile electric line in Albuquerque. One car will be operated at first. Capital stock authorized, $75,000; issued, $25,000; bonds authorized, $15,000. Officers: A. W. Hayden, 412 West Copper Avenue, Albuquerque, president; D. H. Beatright, vice-president; Isaac Barth, Stern Building, Albuquerque, secretary, and J. C. Baldridge, treasurer. [E. R. J., March 26, '10.]

Southwestern New York Traction Company, Bolivar, N. Y.—This company advises that construction will commence about June 1 on its 15-mile line between Bolivar, Scio, Allentown and Wellsville. The power station will be located at Allentown, and five cars will be operated. It will furnish light and power along the route. Officers: Chas. M. Van Curen, Bolivar, president; Benj. F. Patterson, Baltimore, Md., vice-president; Albert Matson, Bolivar, N. Y., secretary, and B. F. Patterson, Bolivar, N. Y., general manager. [E. R. J., April 9, '10.]

Port Jervis Traction Company, Port Jervis, N. Y.—This company has applied to the Public Service Commission, Second District, for permission to extend its railway in Deer Park, Orange County, and to abandon a portion of its route in Port Jervis.

Cleveland (Ohio) Railway.—This company has awarded a contract to the Carnegie Steel Company for 8000 steel ties.

Toledo & Indiana Traction Company, Toledo, Ohio.—This company has decided to start work shortly on the completion of its line from Bryan, Ohio, to Fort Wayne, Ind. Surveys have been made. C. S. Schenck, president. [E. R. J., Feb. 19, '10.]

***Eugene, Ore.**—F. B. Kidder and John Baird are promoting the construction of an electric railway in the vicinity of Eugene, including a line between Eugene and Springfield, and one to Siuslau and Coos Bay and also up the McKenzie Valley.

Oklahoma City & Suburban Railway, Oklahoma City, Okla.—This company has increased its capital stock from $250,000 to $400,000. It expects to build 32 miles of new track from Edmond to Moore. Construction has already commenced. John W. Shartell, president. [E. R. J., Aug. 21, '09.]

Clackamas Southern Railway, Portland, Ore.—This company announces that it has secured financial backing and work will soon commence on its proposed electric railway to connect Silverton and Oregon City. Incorporators: F.

M. Swift, David Loring and A. E. Clark. [E. R. J., Dec. 26, '08.]

Johnstown (Pa.) Traction Company.—This company announces a comprehensive system of improvements of its local system which will involve the expenditure of $145,000. The work will include the construction of new curves at the stone bridge, new curves and turn-outs at the Eighth ward transfer, and a new loop at the terminus of the railway in Coopersdale. E. M. Du Pont, president.

Pittsburgh & Allegheny Valley Railway, Leechburg, Pa.—This company will advertise for bids for the construction of its railway from New Kensington to Leechburg about May 1. H. A. Waddell, Leechburg, superintendent.

Sunbury & Freeburg Street Railway, Sunbury, Pa.—This company, which was chartered a short time ago, has completed surveys between Selinsgrove and Freeburg, 15 miles, and it is reported that work will be commenced on the line this summer. W. H. Lyons, Sunbury, president. [E. R. J., Jan. 8, '10.]

Tioga Traction Company, Wellsboro, Pa.—This company, which proposes to build a 15-mile railway to connect Wellsboro, Middlebury, Chatham, Covington and Mansfield, has secured rights-of-way and has nearly financed the proposition. Applications for franchises will shortly be made. Geo. F. Keagle, Avis, general manager. [E. R. J., Dec. 11, '09.]

Greenville & Spartanburg Electric Railway, Greenville, S. C.—This company has awarded a contract to W. J. Oliver & Company, Knoxville, Tenn., to construct its railway between Greenville and Spartanburg. H. H. Prince, Greenville, S. C. [E. R. J., Dec. 18, '10.]

Aberdeen (S. D.) Street Railway.—This company is receiving bids for the construction of 4 miles of new track in Aberdeen. Plans and specifications have been drawn up and work will commence this month.

Galveston-Houston Railway, Houston, Tex.—This company has awarded a contract to Hartley & Ford, Bay City, for the construction of 19 miles of roadbed from Clear Creek to Bray's bayou. The contract calls for completion by Oct. 1. The Galveston Creosoting Company was awarded the contract for approximately 500,000 ft. of creosoted bridge timbers, enough material for the construction of 36 bridges and culverts. [E. R. J., April 9,'10.]

Houston (Tex.) Electric Company.—This company has accepted a bonus of $27,000 offered it by the Western Land Corporation, to extend its line through the eastern part of South Houston to La Porte. Surveyors are now at work laying out the route. David Daly, Houston, manager.

***Washita (Tex.) Electric Company.**—A. E. Perry, president of this company, and several other capitalists are promoting an interurban railway from Pauls alley, Okla., to Dallas, Tex., via Ardmore, Marietta, Sivells Bend, Gainesville, Whiteboro and Denton. Power could be obtained from Washita Falls power plant.

***Seattle, Wash.**—It is stated that J. L. Anderson, of the Anderson Steamboat Company, plans to build a railroad on the east side of Lake Washington from Bellevue to Redmond, via Kirkland. Gasoline cars are to be used at first and later the line will be electrified.

Clarksburg & Western Traction Company, Clarksburg, W. Va.—This company advises that it has not decided when construction will commence on its proposed 25-mile electric railway between Clarksburg and Weston. It will furnish power for lighting. Capital stock, $25,000. Officers: F. B. Haymaker, Clarksburg, president; W. G. Bennett, Weston, vice-president; W. M. Cornray, Clarksburg, secretary and treasurer, and S. G. Munroe, Clarksburg, general manager. [E. R. J., April 2, '10.]

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company has awarded a contract to the Pennsylvania Steel Company for 4500 tons of girder rails.

SHOPS AND BUILDINGS

Fresno (Cal.) Traction Company.—This company has completed the construction of its combined car house, shop and office building at Fresno. [E. R. J., Oct. 9, '09.]

Capital Traction Company, Washington, D. C.—This company is having plans prepared by Beale & Meigs, Washington Loan & Trust Building, Washington, for remodeling its passenger station. The structure is to have three stories, and will be built of steel and concrete. The improvement is to cost $150,000.

Illinois Traction System, Champaign, Ill.—This company has purchased a site on Twelfth Street, between Morgan Avenue and Lucas Avenue in St. Louis, on which it will erect a four-story express building. The structure is estimated to cost $100,000.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company recently purchased 40 lots at $15,000 in Indianapolis on which it is reported it will build a new power house.

Northern Indiana Railway, South Bend, Ind.—In a heavy gale on April 6, the steel skeleton of the new car house and repair shops of this company which has been under construction at South Bend, collapsed. The building was being erected by the George Hoffman Company, South Bend, which awarded the subcontract to the Lafayette & Construction Company, Lafayette.

Charles City & Western Railway, Charles City, Ia.—This company has recently decided upon Charles City as the location of its new car house, 60 ft x 80 ft., and its repair shop, 40 ft. x 55 ft. The buildings will be built of steel and cement. Work will begin at once. C. W. Hart, Charles City, president.

North Jersey Rapid Transit Company, Paterson, N. J.—This company has awarded a contract to E. W. Goates, Ridgewood, for the erection of a fireproof one-story building, 67 ft. x 147 ft., in Hokokus. It is to be of brick and corrugated iron with concrete roof and floors and will contain the superintendent's office, power plant and car house.

Yakima Valley Transportation Company, North Yakima, Wash.—This company expects to erect soon a new car house at North Yakima. The estimated cost, $5,000. M. C. Richards, North Yakima, general manager.

Seattle, Renton & Southern Railway, Seattle, Wash.—This company is constructing on its property at Columbus Station, Seattle, a new car house and repair shop, to be 140 ft. x 120 ft. It will also contain headquarters of the company.

POWER HOUSES AND SUBSTATIONS

Albany (N. Y.) Southern Railroad, Hudson, N. Y.—This company is making inquiries regarding one 400-kw rotary converter and one 350-kva, single-phase air-blast transformer.

Northern Ohio Traction & Light Company, Akron, O.—This company is said to be considering the erection of a new power plant to have a capacity of 75,000 hp. The estimated cost, it is said, will be $1,500,000. The company now operates power plants at Bedford, Cuyahoga Falls, Akron, Canton and Midvale.

Columbus Railway & Light Company, Columbus, Ohio.—This company has placed the following contracts for power equipment for its Spring Street plant: The Jeffrey Manufacturing Company, Cincinnati, secured the contract for the structural steel work for the new plant and also for the coal and ash conveyors. The Allis-Chalmers Company, Milwaukee, was awarded the contract for the turbo-generators; these generators will have a normal capacity of 4000 kw, with a maximum capacity of 6000 kw. The Worthington Pump Company, New York, secured the contract for the condensers. The Babcock & Wilcox Company was awarded the contract for the boilers. The Green Fuel Economizer Company, Chicago, secured the contract for the induced draught fan apparatus. The Green Engineering Company, Chicago, was awarded the contract for the automatic stokers. The improvements will cost approximately $200,000. The excavation for the new addition to the plant is completed and it is expected that the improvements will be completed by Aug. 1.

Northern Texas Traction Company, Fort Worth, Tex.—This company expects to erect a new power house at Handley at an estimated cost of $30,000.

Ogden Rapid Transit Company, Ogden, Utah.—This company will install a 300-kw, 550-volt Allis-Chalmers generator in its power plant at Ogden. An extension will be built to the present switchboard and this will also be furnished by the Allis-Chalmers Company.

Manufactures & Supplies

ROLLING STOCK

Chicago City Railway, Chicago, Ill., is planning additional cars for its wrecking and street-cleaning equipment.

Ohio Electric Railway, Cincinnati, Ohio, is having 10 interurban passenger cars built by the Cincinnati Car Company.

Interborough Rapid Transit Company, New York, is finishing the specifications for the 100 cars to be ordered soon for elevated service.

United Railroads, San Francisco, Cal., reported in the Electric Railway Journal of Dec. 11, 1909, as contemplating the purchase of 50 city cars, it is rumored is now in the market for this rolling stock.

Chicago & Oak Park Elevated Railroad, Chicago, Ill., is rebuilding 30 cars in its own shops. The cars will have seven reversible seats on each side, and short longitudinal seats in the four corners.

Albany & Southern Railroad, Albany, N. Y., reported in the Electric Railway Journal of Jan. 29, 1910, as contemplating the purchase of two double-truck cars, has decided not to order this rolling stock until fall.

Lexington, Ky.—Y. Alexander, president of the Third National Bank of Lexington, contemplates the purchase of one gasoline or gasoline-electric motor car for use on a short steam railroad in Northern Kentucky.

Chicago & Joliet Electric Railway, Joliet, Ill., mentioned in the Electric Railway Journal of Dec. 1, 1909, as being in the market for cars, it is reported, has placed an order with The J. G. Brill Company for two cars.

Pennsylvania Railroad, Philadelphia, Pa., is building 42 electric locomotives in its own shops at Juniata, Pa., for service in the New York tunnels. Westinghouse Electric & Manufacturing Company, Pittsburgh, is furnishing the electrical equipment.

New Orleans Railway & Light Company, New Orleans, La., reported in the Electric Railway Journal of April 2, 1910, to be in the market for from 35 to 50 cars, it is rumored, has ordered 50 cars from the St. Louis Car Company, St. Louis, Mo.

Michigan United Railways, Jackson, Mich., mentioned in the Electric Railway Journal of March 5, 1910, as contemplating the purchase of two sets of trucks, has purchased three sets of type O-50 trucks from the Standard Motor Truck Company, Pittsburgh, Pa.

Interborough Rapid Transit Company, New York, has placed an order with the Westinghouse Traction Brake Company for enough electric-pneumatic brakes to equip all the company's subway express cars. The 10-car trains which will soon be run in the subway necessitated a change of brake systems and the one decided upon gives each car an independent air supply which acts instantaneously and simultaneously on each car.

Virginia Railway & Power Company, Richmond, Va., reported in the Electric Railway Journal of Feb. 5, 1910, to have ordered 20 pay-as-you-enter cars from The J. G. Brill Company, has decided on the following details for this rolling stock:

Seating capacity..... 47	Fenders ..... Providence
Bolster centers, length..24 ft. 6 in.	Gongs ..... Dedenda
	Hand brakes..... Peacock
Length of body.....32 ft.	Heaters ..... Consolidated
Length over vest..44 ft. 11 in.	Headlights ..... Dayton
Height rail to sills.....30 in.	Motors.....two; G.E. 210
Body ..... wood	Roofs ..... monitor deck
Underframe ..... wood	Sanders ..... air
Air brakes ..... G.E	Sash fixtures..... Brill
Car trimmings..... bronze	Seats ..... Winner
Curtain fix....Curtain S. Co.	Step treads..... Mason
Curtain material.. Pantasote	Trucks, type.....Brill 39E
Destination signs..... glass	

Winona Interurban Railway, Warsaw, Ind., reported in the Electric Railway Journal of April 2, 1910, as having ordered six 13-bench open, two closed and one baggage car, has contracted with the Jewett Car Company, Newark, Ohio, for the baggage and open cars and for five combination baggage, smoker and passenger cars with the following details:

Seating capacity..... 66	Car trimmings..... bronze
Weight .....32,000 lb.	Couplers.....Wright M.C.B. radial
Bolster centers, length..35 ft. 11 in.	Curtain fix....Curtain S. Co.
Length of body..47 ft. 10 in.	Curtain material.. Pantasote
Length over vest..57 ft. 8 in.	Fenders....Loco. type pilot
Width over sills.....9 ft.	Heaters ....Smith hot water
Width over posts at belt.9 ft. 3 in.	Headlights ..... Lima
	Sanders ..... De France
Body ..... wood	Sash fixtures..... Jewett
Interior trim .....mahogany	Seats....H. & K. No. 99 EE
Underframe ..... composite	Seating material .... leather
Bumpers.....oak faced with steel	Trolley retrievers.. Peerless

Visalia (Cal.) Electric Railroad, mentioned in the Electric Railway Journal of Oct. 30, 1909, as having ordered two three-compartment cars from The Moran Company, Seattle, Wash., has specified that one be of the combination passenger, smoking and baggage type to seat 58 and the other of the combination passenger and smoking type to seat 70 passengers. Other details of these cars follow:

Weight with trucks.90,000 lb.	Curtain fix....Curtain S. Co.
Wheel base..... 84 in.	Curtain material ..Pantasote
Length of body..51 ft. 8½ in.	Fenders ..... wood pilot
Length over vest..56 ft. 3 in.	Gongs..fitted with Keystone pneumatic ringer
Length over all....57 ft. 9 in.	
Width inside.....8 ft. 3 in.	Hand brakes. ....Lindstrom
Width over all.....9 ft. 4 in.	Heaters ..... Consolidated
Height inside....8 ft. 3½ in.	Lavatory fittings .....Duner
Sill to trolley base..9 ft. 9 in.	Motors...single-phase West.
Height rail to sills..3 ft. 8 in.	Sanders .... Nichols-Lintern
Body ..... metal	Sash fix.....Curtain S. Co.
Underframe ..... metal	Seats.....Hale & Kilburn
Air brakes.....West	Draft springs..... Simplex
Axles ..... Baldwin	Step treads..... Mason
Bolsters, body, cast steel, Moran	Trolley poles and attachments ..... Westinghouse
Bolsters, truck..... Baldwin	Trucks ..... Baldwin
Car trimmings..... bronze	Ventilators ..... Globe
Control system.... Westinghouse	Vestibule....steel lined with birch
Couplers.....Janney M.C.B.	

TRADE NOTES

King Bridge Company, New York, N. Y., moved its office on April 6 to room 1040, 30 Church Street.

T. H. Symington Company, Baltimore, Md., has moved its offices from the Equitable Building to the Maryland Trust Building.

Robins Conveying Belt Company, New York, N. Y., reports that the business in the last 3 months exceeded that of the entire year of 1909.

W. J. Jeandron, New York, N. Y., has returned from a trip abroad. He visited the works of the Le Carbone Company at Paris, France, and took a pleasure trip through Italy and Southern Europe.

American Tie & Lumber Company, New York, N. Y., announces the shipment of 200,000 yellow pine and cypress cross ties during the month of March, which, it is stated, is the largest number of cross ties ever shipped by the company in one month.

Duff Manufacturing Company, Pittsburgh, Pa., manufacturer of Barrett jacks and Duff-Bethlehem hydraulic jacks, has been awarded the contract by the Central South African Railway for jacks in competition with English, German and other American manufacturers.

Wonham, Sanger & Bates, New York, N. Y., recently closed a contract for 100 30-ft. Tripartite steel poles with the South Shore Traction Company. The company has received a large number of inquiries for these poles for both street and power transmission work.

Burton W. Mudge & Company, Chicago, Ill., will on May 1 remove its office to temporary quarters in suite 1003, People's Gas Building, until such time as the southern portion of the same building is completed, when it will occupy offices overlooking Michigan Boulevard and Adams Street.

W. A. Morschhauser, New York, N. Y., sole agent for the Millionaire calculating machine, in the past several years has introduced this device into a large number of electric railways throughout the country. The machines have been so successful that a number of roads now have two or three at work in the accounting department.

Edgar Allen Manganese Steel Co., Chicago, Ill.—To meet the constantly increasing demand in America for its "Stag" brand manganese steel products, and particularly for railway frogs and crossings, Edgar Allen & Co., Ltd., of the Imperial Steel Works, Sheffield, England, is erecting and equipping an up-to-date and very extensive plant at Chicago for the manufacture of its specialties. This branch of the organization has just been incorporated at Springfield, Ill., with a capital stock of $300,000, under the name of Edgar Allen Manganese Steel Co.

Dearborn Drug & Chemical Works, Chicago, Ill., advise that Paul T. Payne, who has had charge of the Philadelphia office for the past two years, has returned to Chicago to do special work in the general office. Mr. Payne has been connected with the company for the past 12 years, having spent some time in the laboratory before entering the sales department. Mr. Payne's assistant at Philadelphia, P. G. Jones, will assume the management of the Philadelphia office, covering Eastern Pennsylvania, and W. J. Stokes will look after the company's interests in Maryland and Virginia, with office at 809 American Building, Baltimore, Md. Mr. Stokes was formerly with the H. W. Johns-Manville Company. Both Mr. Jones and Mr. Stokes will work under the general supervision of the New York office of the Dearborn Drug & Chemical Works at 299 Broadway, the headquarters of Grant W. Spear, vice-president and general Eastern manager.

Harrisburg Foundry & Machine Works, Harrisburg, Pa., announces the following changes in its organization: C. H. Israel, formerly assistant engineer at Harrisburg, has been appointed manager of the Baltimore district with headquarters at 1415 Continental Trust Building, Baltimore, Md., to succeed F. W. Jackson, who will become manager of the company's Chicago district with an office in the Marquette Building, Chicago, Ill. Mr. Jackson succeeds A. M. Morse, resigned, and will have Walter Bird associated with him as district engineer. Geo. M. Illges, formerly manager of the Atlanta, Ga., district, will have charge of the company's St. Louis district with headquarters at 1415 Chemical Building, St. Louis, Mo., to succeed Geo. D. Pogue, resigned. P. A. Haradon will be associated with Mr. Illges as district engineer. R. B. Hall, Jr., has been appointed manager of the company's Atlanta district with an office in the Empire building, Atlanta, Ga., to succeed Messrs. Illges and Hall. Walter Castanedo will be in charge of the company's New Orleans district with headquarters at 1103 Hennen Building, New Orleans, La., to succeed Mr. Glenny. Mr. Castanedo will have R. M. Doherty associated with him as district engineer.

Henry D. Shute has been appointed acting vice-president of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. Mr. Shute was graduated from the Massachusetts Institute of Technology in 1892, with the degree of electrical engineer. Following his graduation, he studied for a year in Germany and in Austria. In 1893 Mr. Shute entered the works of the Westinghouse Electric & Manufacturing Company at Pittsburgh as an apprentice. He spent his first two years with the company in the testing department, and then took up erection work, under C. F. Scott, and later became an assistant foreman of one of the departments of the works. After 5 years' service with the company, Mr. Shute was promoted to the sales department at the East Pittsburgh office, and in 1901 was placed in charge of the alternating current division, correspondence department. Two years later he was appointed assistant to L. A. Osborne, vice-president, which position he held at the time of his recent appointment. Mr. Shute has been associated with the Westinghouse company for 17 years. He is a member of the American Institute of Electrical Engineers and the Engineers Club of New York.

Ackley Brake Company, New York, N. Y., of which Griffin S. Ackley is proprietor, has established a subsidiary company under the name of the British Ackley Brake Company, with offices in the Westinghouse Buildings, Norfolk Street, Strand, London, England. The British company will introduce and sell the Ackley adjustable brake in the United Kingdom, the Colonies and other territory in which the Ackley brake is covered by patents, and will manufacture this brake for all requirements in this territory. The remarkable success of the Ackley brake in Europe necessitated establishing the British company to relieve the demands made upon the New York company for these brakes, as they are now in use in almost every country in the world. The business of the British Ackley Brake Company will be conducted under the joint management of W. L. Lorkin, A.M.I.E.E., and E. E. Daglish, A.M.I.E.E., of the Equipment & Engineering Company, London, who have hitherto acted as sole agents for the Ackley brake since its introduction into British territory. In addition to the British company the Ackley Brake Company is represented in Europe by agencies established in Paris, Berlin, Brussels and Zurich. Mr. Ackley, the patentee and sole proprietor of all foreign rights for the Ackley brake, is making his second tour through Europe in the interests of these companies and agencies.

ADVERTISING LITERATURE

Frank Ridlon Company, Boston, Mass., has issued its list of second-hand electrical machinery for April, 1910.

George R. Stanton, Decatur, Ill., is distributing a circular describing and illustrating his coach and window washer.

Euclid Crane & Hoist Company, Euclid, Ohio, has issued a 14-page catalog in which its various cranes are described and illustrated.

Consolidated Car-Heating Company, Albany, N. Y., has issued its Catalog No. 10, which is an attractive arranged illustrated booklet describing its buzzer system.

Wonham, Sanger & Bates, New York, N. Y., have issued a circular about Tripartite steel poles and other rolled steel specialties, for which they are selling agents. The circular contains a list of some of the prominent users of Tripartite poles.

General Vehicle Company, Long Island City, N. Y., has published *Elec-Tricks* for April. It contains a description and illustrations of two electric trucks furnished to the Philippine Government at Manila and other interesting articles relating to electric trucks.

Ohmer Fare Register Company, Dayton, Ohio, is mailing a circular calling attention to its various types of indicating, recording and printing registers. An illustration is presented showing a group of delegates in Denver during the last convention of the American Street and Interurban Railway Association.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 4723, in which its regulating pole rotary converters are described and illustrated. They are built in capacities of from 300 to 3000 kw, with a voltage range between 240 and 300 to cover the usual lighting circuit requirements. The company has also issued an attractive publication entitled "Transformer Manufacturing Facilities," in which the various processes of transformer manufacture at the Pittsfield (Mass.) works are illustrated.

Fairbanks, Morse & Company, New York, N. Y., have issued catalog No. 101-B descriptive of gasoline motor cars for every requirement and department of railroad work, from the small car light enough for one man to handle to a large car seating 35 people for passenger service. It also contains descriptions of two new types of gasoline cars, Nos. 12 and 26, designed for section work. The publication is well arranged, and is profusely illustrated with half-tones of cars in operation in different sections of the country.

Vacuum Car Ventilating Company, Chicago, Ill., has issued an attractive illustrated booklet in which its method of car ventilation is described. The application of the Cooke system to 350 new pay-as-you-enter cars of the Chicago Railways is illustrated, the appearance of the installation, the circulation of air and methods of installing parts all being shown. The booklet states that the Chicago Railways order "is the largest contract ever placed by any street railway for a car ventilating system, and it is also the first instance where such a contract was ever placed under an absolute guarantee by a ventilating company to accomplish set results under all operating conditions."

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The No-Seat No-Fare Hysteria

When Herbert Spencer wrote on "The Sins of Legislators" he had in mind the childish trustfulness of those lawmakers who fondly imagine that they can set at naught the truths of common sense merely by a legislative fiat. The very latest example of this tendency is the absurd no-seat-no-fare ordinance which was supposed to go into effect in Trenton, N. J., on Monday, April 18. This ordinance provided that unless a passenger was given a seat during the morning and evening rush hours, he would not be obliged to pay fare. The city council in its ponderous wisdom, however, overlooked the point that there was nothing in the ordinance to prevent the railway company from treating as trespassers those who refused to pay for riding. Even the legal representative of the city hesitated to deny the force of this fact. In consequence, the turbulent elements which are found in every industrial community showed no desire to take advantage of the provisions of the ordinance, while the people at large treated the whole matter as a huge joke. From interviews with the car crews and personal observation of the traffic conditions over the busiest lines in Trenton, it is evident that the public has a much better appreciation than its representatives of the impracticability of providing a seat for every passenger during the rush hours. The Trenton ordinance also stated that the company should be fined if intending passengers were obliged to wait more than 10 minutes for a car containing empty seats. This clause was inserted in spite of the fact that in Trenton the cars are frequently delayed at steam railroad crossings for 10 minutes or more. The bias which animated the city "fathers" in insisting upon the immediate enforcement of their ordinance may be appreciated from the fact that it was generally known that the company has on order a considerable number of new cars. The council was so unfair in its action that it forfeited whatever support it might have received from the public in an attempt to enforce this preposterous regulation.

Saving Fuel at the Hoisting Plant

In the surroundings of the average coal-hoisting plant there are ordinarily few incentives toward economical operation. A recent examination of a large installation of this kind, however, showed that small but continuous savings could be realized by the adoption of a few simple expedients. In the plant steam was being constantly kept on long runs of pipe leading from the power house proper to the coal towers, and losses from condensation and frequent leaky operating valves were evident. Inside the pocket no attempt was apparent to cut off incandescent lamps not needed in service, and the wiring appeared to provide little if any subdivision of the illumination. Carelessness regarding the shutting down of conveyor chains after a given run of fuel had been handled, increased the consumption of the electric motors installed for the operation of this machinery. The cost of segregating the lighting circuits, paying

closer attention to the lubrication of the sprocket wheels and placing valves at the boiler house end of the steam mains serving the hoisting engines would be a small matter in proportion to the annual savings in fuel thus made possible. The hoisting plant is comparatively so small a portion of the equipment of a power station that the necessity for securing economies in its different parts is sometimes overlooked. Nevertheless considerable power is required to operate the hoisting plant and it can be wasted there as certainly as in any other part of the system.

Blown Fuses

The inspection of spare fuses by a simple electrical test during routine examinations of cars is often neglected. It is an easy matter to supply the inspector with a box containing two dry cells, with a small buzzer on the outside, for use in fuse testing. Too much care cannot be taken to maintain the necessary separation between good and burned-out fuses carried on rolling stock. A recent instance is illustrative; a car on the busiest track of a large city blew a fuse in the rush hour. The motorman replaced the fuse with another of the enclosed type which chanced to be burned out. Motor trouble was assumed, and after a delay of five minutes the car was pushed to an inspection track where the facts were quickly discovered. At such a time of day even five minutes' blockade cost the company quite a number of dollars. The lesson is plain that nothing is too small to affect the quality and economy of service on a modern street railway. The smallest loose end in operation may cause costly delays out of all proportion to the expense of forestalling trouble.

The Mayoralty Election in Milwaukee

The election of a mayor on the Socialistic ticket in Milwaukee has given rise to considerable speculation as to the effect on the public service interests of that city. A careful study of the situation would indicate, however, that practically nothing is to be feared from the socialistic administration. The Railroad Commission of Wisconsin is clothed with a great deal of power with respect to the public utilities of the State, and it would be impossible for any radical action to be taken without the consent of this commission, whose decisions have been marked by ability and conservatism. The most drastic action which the municipality could take has been directed against the company during the past two years through the activity of the representatives of the Socialistic party in the City Common Council. This is the three-cent fare litigation which has been in progress for a long time and has been fully reported in the Electric Railway Journal, but the company presented a strong defense and argument against any reduction in its fares before the Railroad Commission, which now is deliberating on the question. Undoubtedly the Socialists would be glad—if it were at all possible—to attempt to inaugurate their hobby of municipal ownership in Milwaukee, but this is out of the question under the present law because the company is protected by its franchise rights. As regards the political aspect of the election, it is generally believed that the success of the Socialists was due more to internal dissensions in the Republican party of that section of Wisconsin and a certain amount of dissatisfaction which has been current as regards the Democratic administration for several years past, than to any inherent strength in the Socialistic party.

The Close of the Philadelphia Strike

An illuminating article on phases of the Philadelphia strike by Daniel T. Pierce, executive assistant of the Philadelphia Rapid Transit Company, appears elsewhere in this issue. It is particularly interesting because it gives the viewpoint of one who has been conversant with every step taken by the company during the recent controversy. We shall not attempt to analyze all of the points mentioned by Mr. Pierce, but shall refer to one of them because it is brought up so often by strikers and outsiders during a dispute of this kind. This is the recurrent proposal to settle difficulties between a company and its employees by arbitration. The conclusion of the Philadelphia strike was not effected in this way as the men finally concluded to accept terms offered by the company four weeks ago, but according to Mr. Pierce the constant hope on their part that somebody or some influence would induce the company to arbitrate, did more than anything else to prolong the strike and cause loss to the employees, the company and the public.

A demand for arbitration is always raised at the beginning and during the continuance of a strike by a great many well-meaning persons, as well as by others whose purposes are not so disinterested. To the former, as well as to a large portion of the community, the settlement of the dispute by an impartial and disinterested man or set of men seems the most logical plan to pursue. A disagreement between individuals in civilized communities is no longer followed by a struggle to see which is the stronger. The courts adjudicate their differences. Hence a great many people reason that industrial quarrels should also be referred to competent tribunals for settlement. The idea is attractive and plausible but it is fallacious. The parallel to a judicial case ceases to exist when one of the parties to the suit is responsible, while the other is utterly irresponsible and cannot be penalized by the court if he does not accept its verdict. The practical result is, in most cases, that instead of investigating the merits of the controversy, the arbitrators direct their energies to the only practical way which they have of settling the dispute, that is, by scaling down the demands of the responsible party in the controversy to a point at which they will be accepted by the irresponsible party. In other words, one side has everything to gain and nothing to lose from arbitration, while the other side has nothing to gain and everything to lose.

What then is the proper method of settling industrial disputes? They are an enormous economic waste, and it is a drain upon the community to resort to the primitive plan of the survival of the strongest even in cases when the employers and employees are not engaged in a public utility service. But when, as the result of such a contest, the community as a whole suffers from the interruption of its supply of light, transportation or any other necessity of modern life, the public is even more vitally interested. What can it do to protect itself? It is indeed difficult to reply to this question, but we do not believe that the proper answer is that of peremptorily requiring concessions from the one party of the controversy against whom pressure can be brought. Perhaps if we consider the status of public service corporations, a possible solution of this problem may become evident. By both direct enactment and judicial interpretation, these companies are held to owe duties and obligations to the community far different from those possessed by private corporations and individuals.

Municipalities, States and the national government have insisted upon the right to incorporate a statement of some of these obligations in the charters of such companies, to supervise their accounts, to regulate their fares, to control in many cases with detail the services which they supply and to provide severe penalties for discontinuance of operation without permission. The power of the public, acting through properly constituted authorities, to place public service companies under these obligations has been upheld in so many cases by the highest courts in the land that there can be no dispute as to the general fact. This being the case, it is only a logical step to impose upon the employees a different degree of responsibility as to a proper execution of their work than if they were engaged with a private corporation or an individual. No one is obliged to accept service with a public service corporation, but if a man does so, he should assume, so far as they relate to his own duties, legal obligations corresponding to those which bind his employer. According to this theory of employment, which was advocated by August Belmont at a meeting of the National Civic Federation several years ago during a discussion on trade agreements, an employee who entered the service of a public utility corporation to perform certain duties should not be permitted to abandon his position, except in case of sickness, any more than if he had enlisted in the army. At the termination of his period of enlistment, he would be free to accept some other engagement, if his wages or other terms of service were not satisfactory to him. If this plan should be followed, the law of supply and demand would require the establishment by the company of standards of wages and other conditions of the service corresponding with the duties performed, and equal to or greater than those paid for a similar class of work in other industries.

Heavy Electric Railway Service

We publish this week an abstract of three important railway papers and the following discussion at the Institution of Civil Engineers. The installations considered are the Mersey Railway, the Heysham branch of the Midland Railway and the Tynemouth branches of the Northeastern Railway, of which the first and last are direct-current systems of the customary third-rail construction, while the Heysham road is a typical single-phase system at 6600 volts. The power station of this latter line is particularly interesting because it is operated by producer gas and being essentially a direct-current station, the single-phase current is obtained through motor generators.

The discussion not unnaturally involved the usual controversy regarding alternating current versus direct current, a controversy which for commercial reasons is apt to wax hot when there is even a distant probability of broaching this tender subject. In this case, however, the presentation of the papers and discussion extended over four meetings of the Institution, so that there was more opportunity for thrust and parry, for lunge and guard and tierce, than when rapiers are drawn and sheathed in a single evening. We do not know whether "electrical month" will become as firmly established in the future programs of the Institution as "electrical night" has been in those of the New York Railroad Club. But we trust that it will, because upon the whole the important portions of the discussion were upon broad lines and dealt with the general phases of electrification. In this larger aspect of affairs the fact of greatest significance was the effect of changing from steam to electric motive power upon the receipts and profits of the Mersey Railway. The facts disclosed in the discussion leave no doubt whatever of the great commercial value of such a change. The increased traffic in this instance showed rapidly in the earnings on the system, even after the additional capital changes necessitated by electrification had been duly accounted for. A person may theorize about the relative cost of steam and electric traction to any extent that time and the patience of his auditors permit without in the least altering the great salient fact regarding electric traction, that it has been, is and will continue to be a traffic developer to an extent absolutely impossible with any other form of motive power yet devised.

The Heysham single-phase line was warmly praised and roundly abused by various participants in the discussion. Praised for its excellent working results and denounced as a line too light and too short to give valuable data on the subject under discussion and as generally representing a type of apparatus which does not meet the approval of the direct-current engineers. On the whole, the attitude of the participants was more fervid than scientific. However, in the discussion, some interesting figures were brought out. Mr. Dawson, in particular, presented some data on the practical consumption of energy per ton-mile at various speeds with both alternating and direct-current motors, showing that the latter had little the better of it up to 25 m.p.h. for rolling stock of the character under discussion, while above this speed the alternating-current motors came to the front, to an extent quite to over-balance the added weight of the a. c. equipment.

Incidentally in the discussion some interesting figures were given as to the cost of the overhead construction on a thoroughly modern high-speed single-phase line. The data were with respect to three of the important German roads and showed that the total cost of the overhead line construction, inclusive of special work, as determined from the actual building of the roads, came out between $5,000 and $6,000 per mile of single track, in one instance even less than this. The Hamburg-Altona Railway, which is a beautiful piece of construction, showed a cost for its overhead work of $5,500 per mile of single track. These continental roads have mostly latticed poles of light and graceful design, and the familiar Siemens double-catenary suspension. Of course, one could not hope to put up overhead construction as cheaply here as in Germany, yet the experience there shows beyond any doubt that when a line is carefully and scientifically laid out as an engineering structure it can be built using conductors of the cross-section suitable for high-tension work at a figure surprisingly low considering the admirable operating properties of the structure. Anyone who has seen the light bow trolleys of these German lines slipping over the beautifully aligned trolley wire will have little doubt of the working properties of the overhead system whatever he may conclude regarding the motors.

We wish that discussions of this kind might be conducted with somewhat less of evident irritation than generally appears when the a. c.-d. c. question is raised. As was remarked in the course of the present debate, it does not follow that the same system be applied for all purposes, or that a railroad must forever and ever commit itself to a given system before it dares think of electrification. What the public wants is electrically driven trains and it cares very little for the quarrels of engineers over the relative advantages of different forms of electric propulsion.

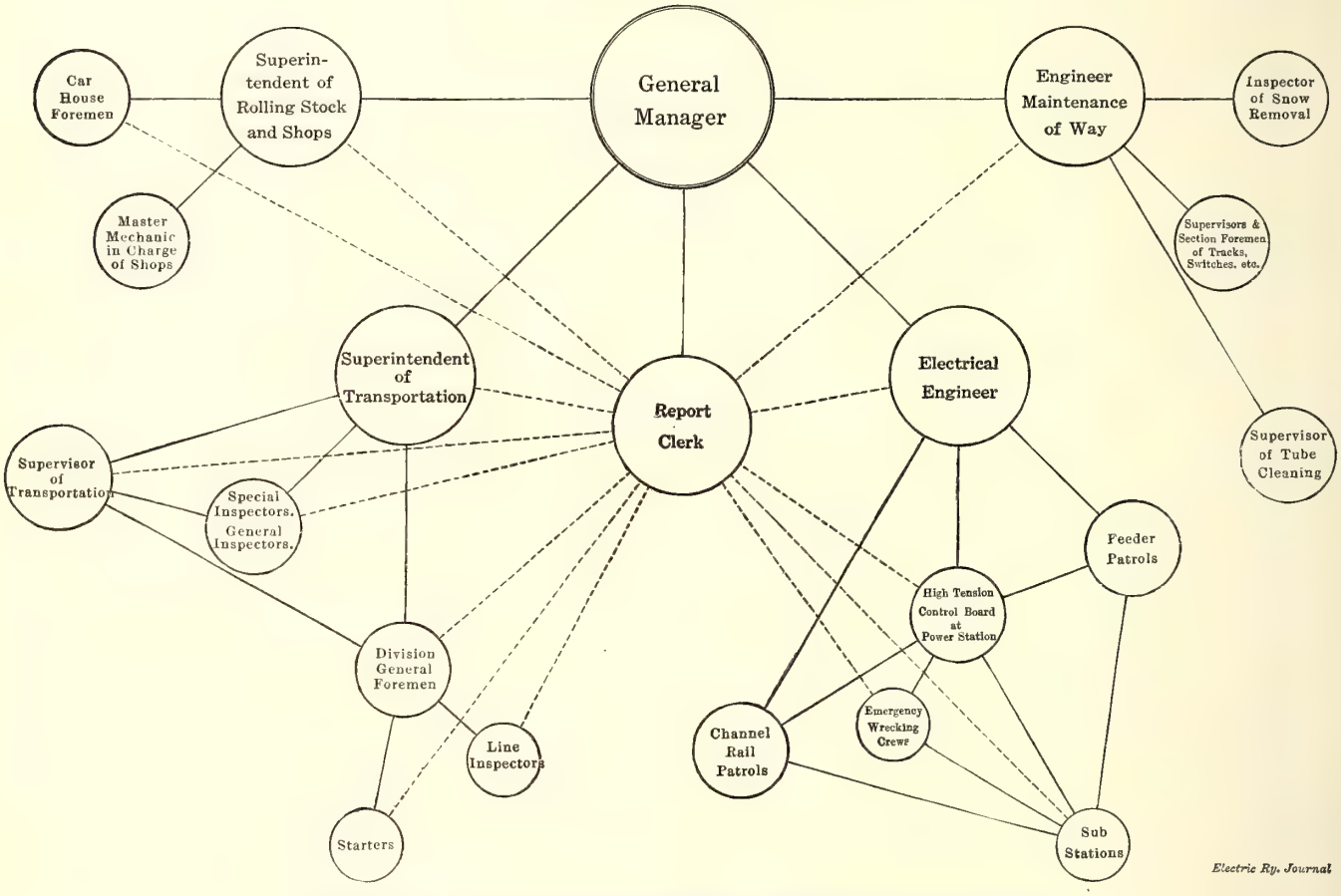
SNOW FIGHTING METHODS AND ORGANIZATION OF THE METROPOLITAN STREET RAILWAY CO.

Under the terms of their franchises all surface street railway companies on Manhattan Island are required to remove and cart away all the snow and ice which may fall or form upon the area located in, between and for 2 ft. on either side of their tracks. In practice, however, it has been found to be more desirable to all concerned for the railway companies to make an agreement with the city commissioner of street cleaning to clean all the snow and ice which may fall or form upon the entire width of certain streets, from building line to building line, the area thus cleaned to be approximately equivalent to that which would have to be cleaned if the railway companies should adhere strictly to the plan of cleaning only the central strip of the streets in which tracks are laid. Early in the fall of each year an understanding is reached regarding the area which the railway companies are to clean, and the commissioner of street cleaning then issues to the railway companies the necessary permits for the operation of snow sweepers and other snow-cleaning apparatus. The city authorities give special attention to the cleaning of those streets occupied by railway tracks, which the railway companies are relieved of cleaning.

With the conduit electric system a comparatively light fall of snow may cause serious delays, and a heavy storm which would have only slight effect on the operation on an overhead trolley system would completely tie up the underground conduit road, unless energetic action is taken. Fine, dry sifting snow when blown by the wind into the trolley slot quickly causes trouble. The task which confronts the operating department of the Metropolitan Street Railway Company is that of keeping the snow out of 130 miles of conduit. The conduit is elliptical in form, approximately 16 in. wide and 24 in. high. Every 105 ft. there are manholes and dumping pits into which the snow is pushed by the scrapers and afterward removed. The slot in the surface of the street, through which the snow drifts, is ¾ in. wide. When a sudden change in the weather converts the damp snow into ice, covering or partially obstructing the slot, it is necessary to pick out the ice by hand. Keeping the conduit always clean and free from obstruction throughout an average New York winter requires much special apparatus, many men and a perfect organization for any emergency.

PRELIMINARY ORGANIZATION

As soon as the agreement between the city and the Metropolitan Street Railway Company is signed and it is known from what streets the railway company is to remove the snow, a conference of the operating department officers is held to determine which streets can be advantageously cleaned by the forces and equipment of the railway company and which streets are to be assigned to contractors to clean. Bids are then procured from contractors and contracts for the season awarded on the basis of a fixed price per cubic yard of snow removed. Shortly before the time when snow may be expected, the heads of the maintenance of way, electrical, transportation and rolling stock and shops departments issue general orders



Metropolitan Snow Fighting—Diagram of Organization of Forces

in which the duties of each man engaged in snow fighting and removal are specifically stated.

TRACK DEPARTMENT FORCE

The engineer of maintenance of way assigns each supervisor and foreman to a given section of the system and each man in authority is told what work he will have to perform, so that he may arrange for the necessary emergency forces. Each is also told where to report when it begins to snow, and where on his section during the night, when most business places are closed, he can obtain access to a telephone by means of which he can transmit an hourly report to the engineer of maintenance of way. All of the men of this department, with the exception of watchmen and sprinkler and building inspectors, constitute part of the snow fighting force. With the exception of emergency work, their entire energies are devoted to keeping the tracks clear until the snow has ceased falling and enough has been removed to insure no interference with the operation of cars. The power scraping cars, which scrape the snow from the conduit and dump it into

the manholes, are in charge of the track department. They are made ready for service in the fall, and all auxiliary snow-fighting apparatus such as shovels, picks and brooms is distributed ready for instant use.

ELECTRICAL DEPARTMENT

As a preliminary step the electrical department prepares instructions in blueprint form, indicating at what point each officer and foreman of the department will report as soon as it commences to snow, and where extra emergency wagons will be stationed. For the information of all concerned, particularly the report clerk, who despatches the emergency wagons, a blueprint schedule is prepared indicating what emergency wagon is to be sent out in the event that short-circuits occur at any point on the system. This sheet also shows what wagon is to be sent in case the wagon which is assigned to the given territory is out on some other trouble. The sheet also shows a third wagon to be sent in the event that both the regular and substitute wagons are away from their quarters. In this way the method of dealing with feeder troubles, or short-circuits of any character, is determined in advance, thereby systematizing the relief measures which are to be taken in any emergency.

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers,

Metropolitan Street Railway Company.

MAINTENANCE OF WAY DEPT.

SCRAPING CAR REPORT.

Rec'd by . . . Time . .
Name. . . . Location
Car No. . . . Depot .
Time of leaving . . . Direction . . .
Motorman. . . . Badge No.
Crew . . .
Any trouble with car? . . . .
Time to repair . . . .
Condition of conduit . . . .
Any ice in conduit? Where? . . . .
Cutters needed? Where? . . . .
Hand scrapers needed? Where? . . . .
Condition of handholes . . . .
Condition of manholes . . . .
Manholes in need of immediate attention . . . .
Scraping cars needed? . . . .
Location of cars on section . . . .

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers,

METROPOLITAN STREET RAILWAY COMPANY.

MAINTENANCE OF WAY DEPT.

SNOW REPORT.

Rec'd by . . . Time . . .
Name . . . Location . . .
No of men Regular . . . Extra . . .
Kind of work . . .
Are more men needed? Where? . . .
Too many men? Where? . . .
Condition of section . . .
Tight slot? Where? . . .
Any other trouble? Where? . . .
Time required to remedy trouble . . .
Cars running regularly? . . .
If blocked, cause . . .
Scraping cars needed? Where? . . .
Location of scraper cars on section . . .
Sweepers needed? Where? . . .
Condition of Conduit . . .
Condition of handholes . . .
Condition of manholes . . .
Streets being cleaned . . .

Metropolitan Snow Fighting—Forms for Foremen's Reports to Engineer Maintenance of Way

All the foremen in the electrical department, including those in the main power station, substations, channel rail, line and feeder departments, are assigned special duties. The power station and substation foremen remain at their respective stations. The line foremen and their gangs are divided into day and night shifts, each being responsible for a certain section of the city. These sections are divided into patrol beats, and men are assigned to each patrol. The feeder men are also assigned to patrols. Both the feeders and the channel rails are carefully watched by these men, who report for duty as soon as the storm begins.

TRANSPORTATION DEPARTMENT

The transportation department makes up a schedule showing the distribution among the car houses of all snow sweepers, wing cars and miscellaneous snow-fighting apparatus, together with a statement of the tracks over which each piece of equipment is to be operated. The schedule also shows the location of all extra sand shakers, push poles and drag ropes at various points on the system. Other information given on the schedule includes the posts assigned to each of the special inspectors, who regulate the service by switching back cars; a list of grades which are to be sanded and the points where sand can be procured in addition to that carried in the sand boxes of passenger cars and in the sand cars; the assignment of general inspectors to various sections of the system, a tabulated list of questions to be answered by inspectors in making telephone reports of the conditions existing on the sections in their charge; an outline of the duties of each class of employees engaged in operating snow-fighting equipment, and specific instructions for despatching cars and regulating destination signs when the snow schedule is in effect.

ROLLING STOCK AND SHOPS DEPARTMENT

In the fall this department prepares instructions for the men regarding the prompt repairing of any disabled snow-fighting equipment which may be run into a car house. These instructions include blueprints showing the correct and incorrect method of adjusting brooms on sweeper cars, and other information. All car house foremen are informed in advance of their duties when the snow schedule is in force. They obtain the addresses of all their men, and arrange to communicate with them promptly in an emergency. The men who are assigned to duty on sweepers are subject to call as soon as it begins to snow, whether day or night. All of the snow-fighting equipment is placed in the car houses where it can be run out immediately, and each piece of apparatus is equipped with a full set of auxiliary tools, etc. Extra equipment parts are procured and distributed for emergencies, and arrangements are made for extra repair gangs in the car houses and shops, prepared to deal with any breakdowns.

FIGHTING SNOW

When snow begins to fall in the day time the men in all departments report without special orders at their proper stations, and take up their duties as outlined in the instructions of the department in which they are employed. If a storm begins during the night, however, the report clerk, whose office is at Fiftieth Street and Seventh Avenue, approximately in the geographical center of the Metropolitan system, advises by telephone the heads of departments and their immediate assistants, that a storm is in progress. The report clerk has a complete list of officers to be called. The department heads when advised of a storm communicate in turn with their subordinates, many of whom are supplied with a list of employees to be summoned. Within a few minutes the entire snow-fighting force of the company is ready to commence work.

The power scraping cars are first sent out. Usually two cars are assigned to each section and operated in opposite directions. Several scraping cars are held in readiness for service at different car houses, and are called out if conditions require them. Sweepers and wing cars are sent out on their regular routes as the storm progresses, the sweepers brushing the snow away from the track and the wing cars pushing the snow back about 9 ft. from the outside rail.

As fast as snow-fighting equipment goes into service a report is made by telephone to the report clerk, who enters on a special snow log sheet the character of the apparatus, its serial number, the direction in which it started, its starting point and the time; later, the time when it is taken off the road, the cause of its removal and the time when it was repaired and again made ready for service are entered. This log sheet thus shows exactly what snow-fighting apparatus is in service at any time. It also shows the time when a sweeper, scraper car or wing car

passes or stops at a depot, or arrives at or leaves a terminal. This information is promptly telephoned to the office of the division to which the apparatus is assigned, so that the division superintendent knows exactly where his snow-fighting apparatus is in service.

With the beginning of a snowstorm a special snow schedule of car service goes into effect, and the inspectors and starters go to the posts assigned them and proceed to regulate car movements accordingly. In the division offices, and in the main office of the transportation department, the clerical force is divided into night and day reliefs for snow duty, and two men are on duty in the report clerk's office. The inspectors and starters are required to keep in close touch with the office of the division to which they are assigned, and must call those offices by telephone at least once in two hours while the snow schedule is in effect. Every two hours a clerk at each of the division offices calls the office of the superintendent of transportation and makes a general report of the conditions existing on his division. This report gives the name of the division, the time the report is made, comparison between the number of cars actually in service and the number scheduled, where cars are becoming disabled, where snow is drifting, where the worst blockades are being experienced, what work is being done and what progress made in connection with snow removal, particularly the cleaning of switches and the conduit.

A clerk is detailed in the office of the superintendent of transportation during the time the snow schedule is in force to receive all trouble reports, such as switches out of order, tight slot, car disabled, etc. The maintenance of way, electrical or equipment departments are promptly notified by telephone of any trouble which requires the help of any of these departments to remedy. This telephone message is subsequently confirmed in writing by a memorandum to the head of the proper department. The report clerks attend to the despatching of the emergency wagons as rapidly as calls for such assistance come in over the telephone. The substance of all reports received by wire as to blockades, accidents, etc., is typewritten on a special form.

The carhouse foremen report to the superintendent of rolling stock and shops by telephone as each piece of snow-fighting equipment goes into service, and subsequently make hourly reports as to the number of sweepers, scraper cars, wing cars, etc., which are in service, the number in reserve and in serviceable condition, the number which have been run in for repairs and the probable time required to complete such repairs. As soon as any piece of equipment is run into a carhouse, the house foreman promptly reports the fact by telephone to the office of the superintendent of rolling stock and shops, and again telephones as soon as the repairs have been made. Emergency repair crews are in readiness in the shops to handle any snow-fighting equipment which cannot be repaired in the car houses. Particular attention must be given to the conduit plows of the passenger cars during a snowstorm. The amount of trouble experienced depends on the quantity of snow that sifts into the conduit. When snow is followed by rain, and water accumulates in the conduit, much difficulty is experienced. It is not an infrequent occurrence for the carhouse forces to change the plows on as many as 1400 cars in a single day, the wet plows being removed during the night and replaced with dry plows.

The chief trouble experienced by the electrical department during a snowstorm is the frequency of grounds and short circuits, due to the accumulation of water in the conduits and cable ducts and manholes. All employees of the electrical department who are on patrol duty make reports by telephone to the office of the electrical engineer, of any trouble which they observe, or conditions likely to create trouble. They are required also to report every hour by telephone regarding the conditions on each patrol section. Special gangs of channel-rail trouble men and feeder trouble men are held in reserve at a number of points on the system, where they can be called on immediately if needed.

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers,

METROPOLITAN STREET RAILWAY COMPANY

TRANSPORTATION DEPARTMENT.

Report of Snow Storm of _____ 19__

Compiled by _____

DIVISION

WEATHER

TEMPERATURE

12 MID. _____ 12 Noon _____ 12 MID. _____ 12 Noon _____

3 A. M. _____ 3 P. M. _____ 3 A. M. _____ 3 P. M. _____

6 A. M. _____ 6 P. M. _____ 6 A. M. _____ 6 P. M. _____

9 A. M. _____ 9 P. M. _____ 9 A. M. _____ 9 P. M. _____

Began snowing at _____ M. — First sweeper out of _____ depot _____ bound as _____ M.

Stopped snowing at _____ M. — First scraper out of _____ depot _____ bound at _____ M.

Depth of snowfall _____ In. — First wing car out of _____ depot _____ bound at _____ M.

Remarks _____ — Snow schedule in effect at _____ M.

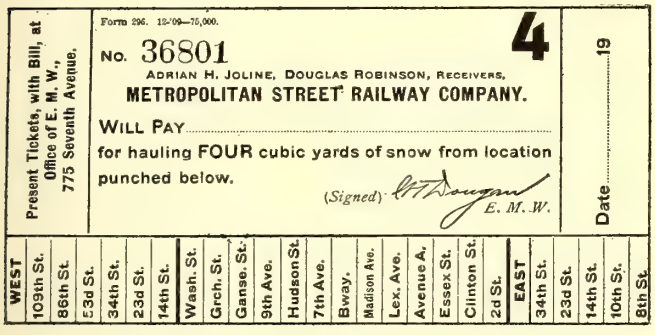
Snow schedule declared off at _____ M.

REPORTED BY	TIME	FROM (Location)	Number of Cars: In Service	Number of Cars: Schedule	Cars are losing power at	Cars are becoming disabled: at	Cars are becoming disabled: No. of Cars	Tight slot: at	Tight slot: Repairman there?	Switches are not properly manned at	LABORERS NEEDED: No.	LABORERS NEEDED: Location	LABORERS NEEDED: Purpose	No. of Extra Inspectors on duty	SNOW BEING REMOVED: at	SNOW BEING REMOVED: by	Snow is drifting at	Most blocking is experienced at	Where is line tied up? Cause? Who at work there? Duration?

Metropolitan Snow Fighting—Log Sheet for Entering Reports During Progress of Storm

In the office of the electrical engineer, the clerical force receives and tabulates reports and sends out such instructions as the electrical engineer may issue. A log sheet is kept, on which all reports are entered. This shows the employee's name, his patrol number, the time the call was made, and the substance of the report. After trouble is reported, the measures taken to correct it are stated, together with the nature and cause of the trouble, the time it commenced, the time it was remedied, and by what means.

The men in the electrical department are called out for snow duty at night by the operator on the high tension switchboard, who notifies certain employees assigned to duty in different sections of the city, and these men in turn call out the balance of the department's forces. The names, addresses, and nearest telephone calls of all employees are recorded in the office to insure prompt communication.


Present Tickets, with Bill, at Office of E. M. W., 775 Seventh Avenue.

Form 296. 12-'09—75,000.

No. 36801 4

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers,
METROPOLITAN STREET RAILWAY COMPANY.

WILL PAY.....
for hauling FOUR cubic yards of snow from location punched below.

(Signed) E. M. W.

Date..... 19

WEST: 109th St. | 86th St. | 53d St. | 34th St. | 23d St. | 14th St. | Wash. St. | Grch. St. | Ganse. St. | 9th Ave. | Hudson St. | 7th Ave. | Bway. | Madison Ave. | Lex. Ave. | Avenue A. | Essex St. | Clinton St. | 2d St. | EAST: 34th St. | 23d St. | 14th St. | 10th St. | 8th St.

Metropolitan Snow Fighting—Snow Removal Ticket

Every foreman of the maintenance of way department is required to report by telephone to the office of the engineer of maintenance of way once each hour while the snow schedule is in effect, giving a full report of the situation on his section. These reports are entered on a printed form, showing what questions must be answered. The foremen knowing what is expected of them, are able to give briefly all of the essential information in a comparatively short conversation over the telephone. One printed form is used for reporting the progress of snow removal, cleaning of switches, etc., and another is used to report the work done by the scrapers in cleaning the conduit. The substance of these reports is then transferred to a log sheet, so that the engineer of maintenance of way is constantly informed as to conditions on all parts of the system, the number of men at work, what they are doing, and where additional men are needed.

As illustrated by the chart on page 730, showing the snow schedule organization of the Metropolitan, each head of a department is not only in close touch with his subordinates, but is also promptly made acquainted by the report clerk with developments in any way affecting the operation of the system. The report clerk therefore not only acts as a disseminator of information, but is a most important agent in co-ordinating the work of all the departments, effecting the desired results in the shortest possible time. He makes it possible for the men engaged in fighting snow to perform their work with the greatest efficiency and at the same time without waste of money through misdirected efforts or unnecessary expenditure of physical strength, the conserving of which, as every railroad man knows, is of the utmost importance in snow storms.

To this snow organization may be attributed the fact that notwithstanding the heavy snow storms of 10 in. and 14 in. of last winter, the records indicate that there was no interruption to the operation of the surface lines of the Metropolitan, even with its handicap of the contact electric system; while, on the other hand, the severity of the storms caused the suspension in some instances of overhead trolley operation on other systems in the neighborhood of New York.

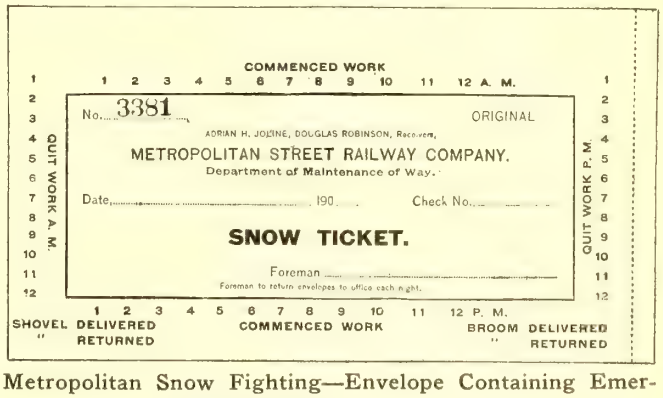
SNOW REMOVAL.

As soon as it has stopped snowing the contractors with whom the receivers of the Metropolitan Street Railway Company have entered into agreements for the removal of snow are notified to begin the cleaning of the streets assigned to them. They begin at the most important points and clean as directed by a representative of the engineer of maintenance of way. When a contractor begins to clean a street a ticketman and an inspector assigned to that street by the maintenance of way department report to the contractor and issues tickets for each cart load of snow removed. The vehicles used by the contractor are measured up by the engineers of the maintenance of way department, and the ticketman issues tickets of the correct denomination, according to the cubic measurement of the wagon boxes given him by the engineers. At the same time that the contractors begin cleaning up and hauling, arrangements are made to start on the streets which are to be cleaned by the forces of the railway company. The transportation department furnishes the trucks and drivers required, and the foremen of the maintenance of way department, with their own gangs and such extra men as are required, attend to the piling of snow and the loading of the trucks.

Each morning at 9 o'clock a report is sent in to the office of the engineer of maintenance of way, showing the number of men and vehicles at work on those streets which are being cleaned, either by the railway company's forces or by contractors. These reports enable the engineer of maintenance of way to keep a check on the progress of the work and the speed with which it is being carried on. Each afternoon at 4 o'clock a report is made to him, stating what portion of each street has been cleaned up to that time. Each evening, based upon the 4 p. m. report, a report is made by the maintenance of way department to the general manager, giving a complete list of the streets which must be cleaned under the agreement with the commissioner of street cleaning, and showing just what progress has been made up to that time in the cleaning of those streets. A copy of this report is also transmitted to the superintendent of transportation, for his information.

As soon as it stops snowing or, in the case of an extraordinarily severe storm, as soon as they start to fill up, the cleaning of conduit manholes, handholes and special pits is begun. The regular track men, with such extra men as are required, are used on this work, which is kept up until all manholes and pits have been thoroughly cleaned out.

A comparatively small force is regularly employed by the maintenance of way department during the winter season, and it is necessary to depend to a considerable extent on extra


COMMENCED WORK
1 2 3 4 5 6 7 8 9 10 11 12 A. M.

No. 3381 ORIGINAL

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers,
METROPOLITAN STREET RAILWAY COMPANY.
Department of Maintenance of Way.

Date..... 190.. Check No.....

SNOW TICKET.

Foreman.....
Foreman to return envelopes to office each night.

QUIT WORK A. M.

QUIT WORK P. M.

1 2 3 4 5 6 7 8 9 10 11 12 P. M.

SHOVEL DELIVERED
" RETURNED
COMMENCED WORK
BROOM DELIVERED
" RETURNED

Metropolitan Snow Fighting—Envelope Containing Emergency Laborer's Time Ticket

men in cleaning up after a snowstorm. When the storm begins to look dangerous, two of the regular men, who are Italians, are sent through the Italian settlements to pick up such men as they can from the various employment agencies. These men are sent to the Fifty-third Street yard of the railway company, from which point they are distributed as required. Arrangements are made so that these men can be promptly paid on the day after they have worked, and this accommodation makes many of them prefer to work for the railway company rather than for the city or city contractors, who make them wait some time for their money. As a man is put to work he is given a sealed envelope containing a ticket or time slip. The foreman punches out of this enve-

lope, and on the ticket enclosed within it the time when the man starts working and also indicates by a punch whether the man has been given a shovel or broom. When the man quits work, the foreman punches the time of quitting, signs the envelope, tears it open, gives the man the ticket contained in it and sends the envelope to the office of the engineer of maintenance of way. The ticket is the man's receipt for the work he has done for the railway company, while the envelope is used as a check against the ticket when presented. If the man has been given a shovel or broom, he does not get his money until he has returned the implement and the return is punched on his envelope and ticket. After a man has worked five hours he is given a brass check, the number of which is noted on the envelope. The check serves as a further identification and is honored as a pass on the various lines of the Metropolitan system. Each work ticket is good for only twenty-four hours, and a new set of envelopes and tickets is issued each day.

When a man presents his ticket at the office of the engineer of maintenance of way it is compared with the envelope already sent in by the foreman, and if found to check, the man is given an order on the paymaster, at 621 Broadway, for his money. His brass check, if he has one, is first taken up.

The extra men, hired by the company for snow removal, are laid off as soon as they are no longer required. The work of cleaning snow and ice from the streets is continued, however, until all of the streets have been entirely cleaned, when a final report to this effect is sent to the general manager. After the streets have been cleaned there is sent to the general manager, with a copy for the superintendent of transportation, a complete report, giving the time that it began snowing, when the snow ceased, the official snowfall as reported by the United States Weather Bureau, when the contractors were ordered out, and when they started hauling, together with the time the cleaning of streets was completed. The contractors on completing their work send in their bills, with the tickets which have been given the drivers as vouchers. These bills are checked, and if found correct are certified and sent through to the auditor for payment.

NEXT ARTICLE.

The next article on the Metropolitan Street Railway system will describe the Maintenance of Way Department of the company.

MEETING OF MASSACHUSETTS STREET RAILWAY ASSOCIATION

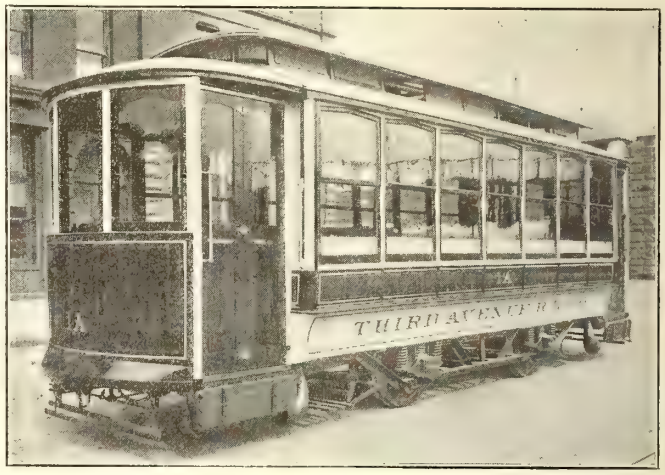
The regular monthly meeting of the Massachusetts Street Railway Association was held at Young's Hotel, Boston, on the evening of April 13, with President R. S. Goff in the chair.

After the usual dinner, the association was addressed by Capt. William E. McKay, consulting engineer of the New England Gas & Coke Company, on "The Mining and Transportation of Coal and the Manufacture of Coke." Capt. McKay described at length the mines of the company in West Virginia, explaining the methods of ventilation, drainage, blasting, lighting, power supply and transportation employed below the surface. The company takes out 11,500 tons of coal per acre. Methods of excavation, accident prevention and tests for dangerous gases were reviewed. The transportation of coal from the mines to the seaboard was discussed, and a description given of the company's steel collier fleet, which plies between Chesapeake Bay and Boston. On account of delays at Cape Cod and other causes, the cost of water transportation has varied within the past few years from 45 cents to $2 per ton between Baltimore and Boston. The transportation expense between the mine and the seaboard and the cost of mining are practically fixed quantities.

In conclusion the plant of the company at Everett, Mass., was described by the speaker.

STORAGE-BATTERY AND GASOLINE-ELECTRIC CARS ON THE THIRD AVENUE RAILROAD

For some time past F. W. Whitridge, receiver of the Third Avenue Railroad, New York, has been considering the replacement by some form of self-contained vehicle of the 25 horse cars now operated on several of its subsidiary crosstown lines. Before taking this step it was decided to try in competition one gasoline-electric car and one storage-battery car. With this idea in view, a gasoline-electric equipment was placed in service in November, 1909, and this is now followed by the storage-battery car, which has been running since March 28, of this year. Both cars, although intended eventually for some of the present horse-car routes, are in operation on the important 125th Street electric crosstown line so that they can be tried



Storage Battery Car with Vestibule Doors Closed and the Steps Up

out under conditions more severe than the actual requirements will demand. A description of the gasoline-electric car was published in the Nov. 6, 1909, issue of the Electric Railway Journal and a tabulation of some of the excellent operating results was given on page 48 of the Jan. 1, 1910, issue. At this writing the gasoline-electric car has been in service for over five months, during which period it has operated without other interruption than that due to a broken shaft. The principal question now is whether the storage-battery car will prove equally reliable. The latter car and its equipment have a much lower first cost than the gasoline-electric type. Furthermore, if storage-battery cars are adopted, their total power requirements would not be enough appreciably to affect the output of the power station. In fact, the cars could be charged at night and the only expense involved would be for the extra coal consumed and the cost of charging stations.

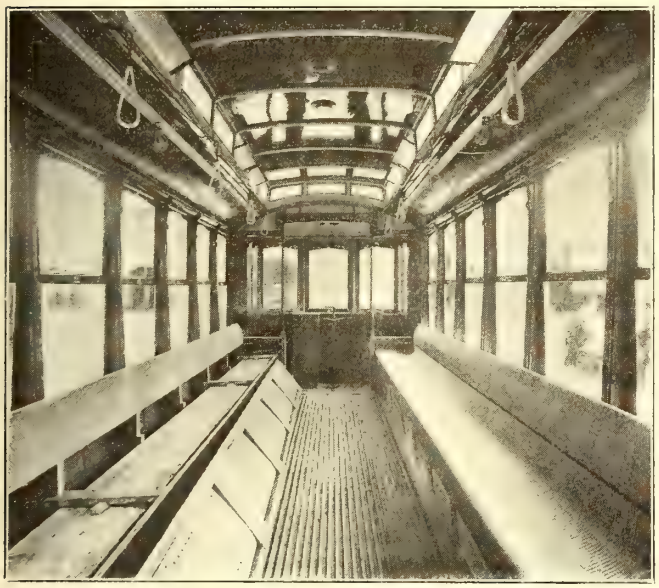
THE STORAGE-BATTERY CAR

The body of the new storage-battery car was formerly a horse car in service on the Dry Dock & East Broadway line, and with its truck weighed 7200 lb. The construction of the car body has been changed in very few respects, aside from the addition of vestibules with folding doors and disappearing steps to permit prepayment operation. The body is 17 ft. 10 in. over the corner posts and has 4-ft. platforms. It seats 26 passengers and, including all equipment, weighs 6 tons or only 461 lb. per passenger. Owing to the haste with which the car was equipped, the truck was supplied with heavy cast-iron journals and cast-iron wheels, the latter weighing 235 lb. each, but these are to be replaced by cast-steel parts which will weigh only one-half as much. The original horse-car brakes have been retained and are giving satisfaction. It will be noted from one of the accompanying illustrations that this car has been fitted with the H. B. wheel guard.

Because of the light weight of the car and the use of roller bearings in the journal boxes and ball bearings in the armature journals, not more than two 5-hp motors are required for op-

erating at the schedule speed of 7 m.p.h to 8 m.p.h, making eight stops per mile. In fact, the car is so light that it can be easily pushed along a level track by one man. Eventually, this car will be operated on streets where the speeds will be only 6 m.p.h. The car body is mounted on a truck which is made up entirely of commercial riveted angles. Each pedestal carries three helical springs and is made of 5-16-in angle iron. Although the present truck is riveted only, the company would rivet and weld any future trucks in case it should decide to use additional storage-battery cars.

The batteries are of the Gould Storage-Battery Company's type TH, high capacity, pasted design, composed of 29 plates



Interior of Storage Battery Car, Showing Battery Crates Under the Seats

per cell and 44 cells per set. At 84 volts, the battery has a rating of 420 amp-hours. As shown in the view of the car interior, the batteries are placed under the longitudinal seats on each side. There are four crates of five cells each, and eight crates of three cells each. The battery covers are screwed down tightly. The battery gases are carried off by the natural ventilation which is afforded when the movement of the car sends air through a pipe on each side of the car. As this air passes over the batteries it drives off the odors and exhausts them under the step at the back of the car. There is no odor in the car from the batteries.

Other electrical equipment comprises two 5-hp, 1200-r.p.m. motors, of the G. E. 1029, automobile type, operated at 40 amp, 84 volts with 50 per cent overwound fields. The platform controllers are of the S-34-D automobile type encased in wood. The car wheels are driven from the motors by two sets of geared chains, furnished by the Link Belt Company, as follows: Two 3-in., 15 teeth steel sprocket flanged wheels, two 22½-in., 113 teeth cast iron, split sprocket flanged wheels, two silent chains, ⅝-in. pitch, 3 in. wide and approximately 10 ft. 8 in. long. The entire storage battery equipment, including the building of the truck, was carried out by the company at its Sixty-fifth Street shops. The approximate cost of rebuilding the body and manufacturing the truck was $375.

DATA ON OPERATION OF THE STORAGE-BATTERY AND GASOLINE-ELECTRIC CARS.

Three accompanying tables are presented on the operation of both types of cars over exactly the same route, viz., on the 125th Street line and according to the same schedule. Two of the tables cover the experimental and service runs of the storage battery car made on two different days of April, and the third table is the log of the gasoline-electric car for March. It will be observed from the data on the test run of the battery car that it was operated for 70.176 miles on one charge at a schedule speed of 6.78 m.p.h., which included eight stops per mile. The power consumption per car-mile under these conditions was .496 kw-hours, or about 83 1/3 watts per ton-mile. In the service runs, with 9.62 stops per mile, the power consumption per ton-mile was 90 watts.

From these results it is apparent that the car is giving very satisfactory results, so far as speed and power consumption are concerned. The crux of the problem, however, is the upkeep of the storage battery. It is hoped that the present experi-

BATTERY CAR TEST, APRIL 2, 1910.

Total time elapsed (hours)	10.35
Total distance traveled (miles)	70.176
Speed, m.p.h. (actual running)	7.25
Speed, m.p.h. (including stop-overs)	6.78
Total kw-hours consumed (wattmeter)	34.84
Kw-hours per car-mile	.496
Time lost by stop-overs (minutes)	40½
Actual running time (hours)	9.675
Stops per mile	8

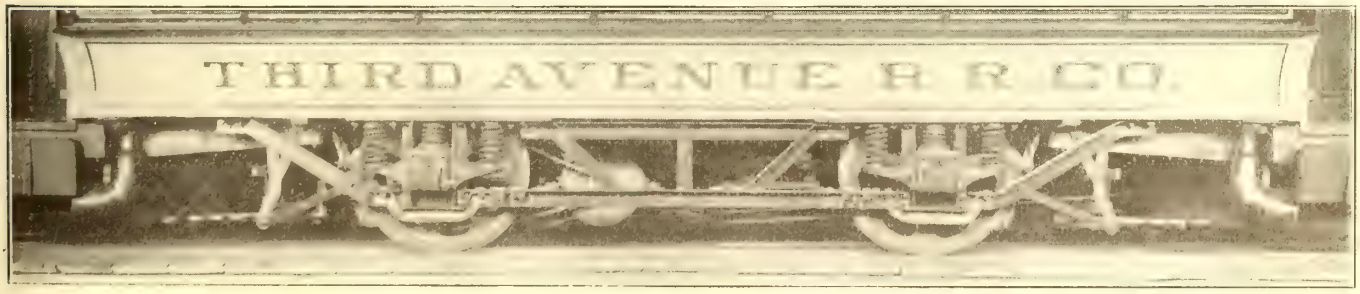
BATTERY CAR SERVICE RUNS, APRIL 5, 1910.

Total time elapsed (hours)	9.133
Total distance traveled (miles)	57.78
Speed, m.p.h. (including stop-overs)	6.33
Actual running time (hours)	8.64
Speed, m.p.h. (actual running)	6.68
*Kw-hours consumed (wattmeter)	31.24
Kw-hours per car-mile	.540
Time lost in stop-overs (hours)	.492
Total number of stops	556
Stops per mile	9.62

*Car run in on account of darkness owing to absence of headlight.

PERFORMANCE OF GASOLINE-ELECTRIC CAR, MARCH, 1910.

Revenue fares	12,084
Transfers and passes	3,833
Revenue miles	2,015
Dark miles	56
Gasoline, gallons	1,121
Cylinder oil, gallons	26.5
Platform expenses	$154.54
Motor grease	$7.32
Other expenses, including two brake shoes	$30.25
Gasoline per revenue mile, .5563 gal. at 11.35 cents	6.314 cents
Cylinder oil per revenue mile, .01315 gal. at 38.50 cents	.506 cent
Platform expenses per revenue mile	7.67 cents
Motor grease per revenue mile	.363 cent
Other expenses per revenue mile	1.501 cents
Total expenses per revenue mile	16.354 cents
Gasoline per mile of gross miles, .5413 gal. at 11.35 cents	6.144 cents
Cylinder oil per mile of gross miles, .0128 gal. at 38.50 cents.	.493 cent
Platform expenses per mile of gross miles	7.462 cents
Motor grease per mile of gross miles	.353 cent
Other expenses per mile of gross miles	1.460 cents
Total expenses per mile of gross miles	15.912 cents
Total revenue per revenue mile	29.985 cents
Total revenue per mile of gross miles	29.174 cents
Total revenue for month of March	$604.20
Total cost of operation, March	329.55



Truck and Chain Drive for the Motors of the Storage Battery Car

ments will give the storage battery makers a line on what accumulators can do in this class of service, so that they can eventually make an offer to the Third Avenue Railroad Company to maintain the equipment of a specified number of cars for so much per car-mile. This price would cover the replenishment of battery acid and water, renewals of cells, etc. All that the railroad company would do in this connection would be to send the battery maker daily or monthly statements of the car mileage.

The table covering the March operations of the gasoline-electric car shows that in 27 days the cash revenue amounted to $604.20, and the cost of operation to $329.55. A total of 15,917 passengers was carried. The figures for 29 days of January, 1910, and 27 days of March, 1910, compare as follows, the January figures being given first: Total expenses per revenue car-mile, 16.282 cents and 16.354 cents; revenue per revenue-mile, 31.85 cents and 29.985 cents. It would appear that the cost of operation per car-mile for the month of April will be considerably reduced on account of the greater mileage which can be obtained in the same running time due to the elimination of snow, ice and slippery rails.

PHASES OF THE PHILADELPHIA STRIKE

BY DANIEL T. PIERCE, EXECUTIVE ASSISTANT, PHILADELPHIA RAPID TRANSIT CO.

These notes are written partly in answer to many inquiries for information as to phases of the strike on the system of the Philadelphia Rapid Transit Company, and partly to emphasize some of the most clearly taught lessons of this struggle.

I

When the strike was called, at 1.30 p. m. on Feb. 19, there immediately began, even before most of the people of the city knew that a strike had been ordered, a reign of violence which continued to a greater or less extent throughout the strike. One car was burned and another car badly damaged by fire on the afternoon of the 19th. On the day following Sunday, and on Feb. 22, mobs in various sections of the city, but mainly in the territory from Germantown Avenue eastward, attacked cars and car crews with missiles, firearms and explosives. Over 2,000 panes of glass were broken on each of these days. Scores of arrests were made by the police, and it is true of the arrests of the days mentioned, as well as those that followed, that 50 per cent of the persons charged with rioting were 18 years of age or younger. As is usual in such cases, Union officials denied all responsibility for violence, but there was almost daily evidence that the stoning of cars was carefully organized by strikers and those working in the interest of the strikers. Mobs of young men and boys were urged on to violence by older men. A large number of strikers were arrested for inciting riots and using explosives.

During these early days of the strike the police were unable to suppress disorder. The utmost efforts of the men available for police duty were unsuccessful in quelling disturbances that broke out at points as far distant as West Philadelphia, Germantown, Frankford and Kensington. From the first the city administration had determined to protect the company's property, and, while making preparations to do this, requested the Governor to send the State police to the city. This was done, and on Feb. 24, 175 mounted State police arrived and were at once distributed over the section between Germantown Avenue and Front Street. Order was immediately restored in this district and time allowed for the enlistment of additional police. Nearly 2,000 extra policemen were employed by the city and assigned to the duty of protecting the company's cars and depots and maintaining order. The city firemen were also armed and placed on the same duty. When this had been done the State police were withdrawn, and from about March 1 the city police had no difficulty whatever in suppressing disorder. They could not, of course, prevent the occasional stoning of cars and assaults upon car crews, but crowds were not allowed to collect in such numbers as to become unmanageable, nor did rioting continue after the police had arrived on the scene of the trouble.

One of the facts clearly shown by this strike is that rioting cannot be effectively suppressed except by radical measures. The great difference between the methods and effectiveness of the State and city police was that the State force had a reputation for firmness that made the use of their clubs and revolvers unnecessary, except in a few instances. On the other hand, rioters did not take the city police seriously until they had used their clubs very freely, and occasionally their firearms. During the first few days of the strike the stoning of cars frequently continued uninterruptedly, notwithstanding the fact that there were policemen standing on front and back platforms with a club in one hand and a revolver in the other. It was not until both weapons began to be used in earnest that the stoning stopped and crowds quickly dispersed upon the appearance of the police.

A direct wire was placed in operation between the general manager's office and that of the superintendent of police, so that all trouble reports could be 'phoned instantly to the authorities. At 12 o'clock each night the company informed the police department how many cars would be operated from each depot on the following day, so that a sufficient guard could be provided for each car, in addition to the force that remained at the depots to guard property and answer riot calls in the vicinity. Several emergency police stations were also established and provided with automobiles for the quick transportation of police to the scene of outbreak.

The system of picketing adopted by the union constitutes the best answer to the question: How could the men be kept out so long? All strikers were ordered to report twice a day to the depot headquarters, and anyone who failed to do so was closely followed up by "entertainment committees." It is a fair statement that fear of consequences and loyalty to the union were in equal part responsible for the holding out of the men. No regular strike benefits were paid, as claimed by the union leaders. Possibly an average of $6 or $8 per man in all was paid during eight weeks.

II

On Feb. 27 a general strike movement was inaugurated in sympathy with the carmen. On that date a meeting of the Central Labor Union, comprising 127 locals, was held, and resolutions were passed providing that if city councils, the city representatives on the board of directors of the Rapid Transit Company, or the company's own action did not bring about arbitration of the matters in dispute by Saturday, March 5, a general strike would take place. The concluding paragraph of the resolutions adopted stated that the general strike was a protest against the action of the city administration in protecting the company's property and enabling it to operate its cars, and "We pledge ourselves not to return to work until all rights have been recognized and complied with."

No settlement of the carmen's strike was made by arbitration or otherwise within the time limit set by the Central Labor Union, and a general strike was accordingly called, to become effective March 5. The announcement was then made that "75,000 organized workers had quit their various employments in this city, to remain on strike until the Philadelphia Rapid Transit Company grants arbitration or effects a settlement with its striking employes."

The actual number of men who went out under the sympathetic strike order is impossible to determine. The Committee of Ten in charge of the general strike greatly exaggerated the number of men out, its estimates running at times as high as 140,000. The police reports indicated that perhaps 35,000 men were out for a very few days, but the number steadily decreased after the second day of the general strike, until on March 27, when the strike was formally called off, only a few thousand strikers were still out of work, and these were very largely the employes of textile mills in the northeastern part of the city.

The general strike at no time affected the operations of the Transit Company. Acts of violence did not increase, nor was

there greater difficulty in getting new men. As a matter of fact, the company's difficulties in this and other respects lessened as soon as the general strike was called, and continued to decrease throughout its continuance. The sympathetic strike was an absolute failure as a means of "bringing the company to terms," and as a demonstration of the coercive power of organized labor. The talk of a "State-wide strike" was abandoned after it became apparent that the Philadelphia general strike had failed.

III

Under such conditions as faced the company when the strike of Feb. 19 was declared, it has been usual to engage new men through strike-breaking agencies. This has always been an unsatisfactory arrangement, for the reason that the agencies through which strike-breakers are employed do not, and cannot, carefully discriminate in the choice of men.

Anticipating in January that there might be a strike upon its system, the company had established offices outside of the city and examined and enlisted nearly 1,000 motormen, who, when the strike was called, were promptly shipped to the city. In this work only the company's own employes were engaged in the choice of men, and the examination of them as to their fitness for work on the cars. After the strike began this method of employing new men was continued at many points throughout the country. Offices were maintained for various periods of time, varying from a few days to several weeks, in Boston, New York, Baltimore, Washington, Norfolk, Richmond, Reading, Pa.; Wilmington, Del.; Cleveland, Ohio, and St. Louis, Mo. In addition to this, the company's employment officers travelled through small towns, picking up men wherever they could be found.

The results of this method were very satisfactory. It was no more expensive than the employment of men through agencies, and undoubtedly resulted in obtaining a better class of men than are received when an order is given to an agency to supply men without any condition being made as to their qualifications.

The enlistment of so many new employees, and the fact that the men at work were constantly molested on the street, necessitated the establishment of sleeping quarters and commissaries at all of the company's nineteen depots. The commissary became a regular department of the company's operation. The feeding of the men and the regular and extra policemen was in charge of a chief commissary, who had several hundred cooks and waiters on his staff. Requisitions were made daily upon the purchasing department for the food supplies. Kitchens were established at all of the depots, where food was prepared at all hours. As many as 2,000 loaves of bread per day were baked in the company's ovens. At the height of the strike the company was feeding approximately 7,000 men, including the policemen and regular employes, nearly all of whom remained at the depots over night.

This condition of affairs also existed on the elevated system, although that division had no trouble whatever, only about a half dozen of the elevated trainmen going on strike. Owing, however, to the intimidation of all men working during the strike, and the fact that the elevated service was continued later than usual, all of the employes of this system were housed and boarded at the 69th Street Terminal of the elevated. On this branch of the system not a trip was lost, nor was the service in any way affected by the strike. By this it is not meant that no difficulty was encountered in maintaining the service of the elevated, but, owing to the excellent management of the superintendent, not only did the great majority of the men remain loyal, but such difficulties of operation as were encountered were promptly overcome. The property was carefully guarded at all times, and the service was not only maintained at a normal level, but was largely increased throughout the strike.

Although the announcement that the company's power house employes would strike, or had gone on strike, was made almost daily by the labor men, the power houses were at no time affected. A few employes left the service, but these desertions hardly outnumbered those that would have taken place under normal conditions.

Many of the families of men employed in the power houses, as well as those at the homes of loyal carmen, were systematically terrorized by threats of violence throughout the strike. The boycotting of men at work and of shopkeepers who sold goods to them was severely felt in the northeastern section of the city. This boycotting extended even to car riders.

IV

Following the course of the strike day by day, it is evident that the most serious difficulty the company had—and this, above all, is the difficulty that public service corporations should most carefully consider before entering into a labor controversy—was the constant effort of outside parties to bring about arbitration or some form of settlement by negotiation with the strike leaders. That nearly all activities of this nature were well meant does not change the fact that they all had the disastrous effect of enabling the union leaders to hold the men out on promises that "something was going to happen." The mere fact that men of responsibility and influence consented to confer, even independently of the company, with the strike leaders was sufficient from week to week to hold off a return to work by the strikers. Had no encouragement whatever been given to the hope that outside influences would be brought to bear upon the company to induce it to make terms, it is doubtful if the strike would have lasted more than three weeks.

Apparently the public service corporation must be prepared in the event of labor troubles, not only to combat the strike and to operate under great difficulties, but to ward off constant attempts to force a "settlement"; that is, an ending of the trouble at whatever violation of right, justice and sound policy.

Another disadvantage under which the public service corporation labors is that the press will almost invariably support the striker's position. The influence of advertisers whose business is injured is effective in this direction, and so is the loss of circulation that is likely to follow a policy antagonistic to "labor." The newspapers are furthermore hurtful in that they give prominence and an appearance of truth to the most irresponsible statements emanating from labor leaders. The unexciting statements of a transportation company as to actual conditions cannot compete in interest with the outgivings of strike leaders who are held to no accountability whatever, and can say anything, or one thing to-day and something quite different to-morrow, without being called to account. No prevision, nor the fact that (as was the case prior to the beginning of the Philadelphia strike) public opinion favors the company before a strike, can avoid this condition after a strike begins.

V

Some months prior to the calling of the strike in February the company had formulated a definite policy aimed to improve the working conditions of its men, to attract better men to the service and to hold them when once they were employed. For some years about one-third of the company's motormen and conductors were one-year men and this proportion of "floaters" seemed to be constant. On the other hand, the company had more than 1800 men who had been in its service six years or more. The desire was, of course, to increase the proportion of long-service men.

On the first of January a free pension and insurance system was inaugurated under which the beneficiaries of all employees received $500 insurance. Twenty-three such insurance payments have been made so far this year, and seven employees who had reached the age of 65 after a service of 25 years, have been placed on the pension list.

When the strike was called the company was ready to put into operation a welfare department to which all employes could apply in case of need. Lunch rooms and comfortable recreation rooms at all depots were also planned and the establishment of them had begun in February.

With the exception of the pension and insurance systems, it is likely that the welfare work of the company will be greatly

retarded by the strike, but it is not the intention of the company to abandon these plans. The management believes that by the improvement of working conditions and close attention to the needs of the men, its system will come to be looked upon as offering extremely desirable employment. It is hoped also that in some measure at least the *esprit de corps* so noticeable upon some steam railroad systems and so scarce in the street railway world may be encouraged. Although the company's welfare plans have been deprecated by the union leaders, they seem to be appreciated by the men.

The restoration of harmony among its working force is one of the problems now receiving the most careful consideration by the company. It is impossible to tell at this time what will be the temper of the strikers who have been steadily returning to work for the past two weeks. Prior to the strike there was constant friction and conflict between the union and non-union elements, but it is believed that if this feeling has not disappeared, it will at least be kept under cover for some time to come.

REPORT ON PITTSBURGH RAILWAY CONDITIONS

A report on Pittsburgh conditions by Emil Swensson who was engaged by the Pennsylvania State Railroad Commission to make an investigation in the complaint of the city against the Pittsburgh Railways Company, was made public the latter part of last week. It describes first the topographical difficulties of the Pittsburgh system, which are considered at length.

The next section of the report discusses the operation and construction conditions of the system and gives a sketch of the history of the Pittsburgh Railways Company. According to statistics contained in the report, in January last the company owned 670 motor cars and 140 trail cars, with 530,000 seats, and carried an average of 510,000 passengers. The report states that the key of the traction situation in Pittsburgh is the capacity of the downtown terminals between the hours of 5 p. m. and 6 p. m., when the majority of the people desire to go home and makes the following recommendations, among others:

The purchase of 260 cars of the 56-seat type as an additional equipment, and 80 cars of the same type to replace a number of the existing single-truck cars; 50 of these 340 cars may be trailers. The company should plan to increase the seating capacity of cars operated 5 per cent each year and should also replace each year about 10 per cent of its cars, so that there should be a regular annual addition of about 15 per cent to the rolling stock. The single-truck cars should gradually be retired.

A traffic bureau should be established to compile the information necessary to study the means of routing and operating the cars, and in connection with it a bureau of publicity should publish and distribute freely in the cars and other convenient places information as to the operation and service provided. This information should take the form of description of routes, time tables, transfer points, maps to the terminal district, etc., and pamphlets through which the public can be advised as to the reasons for changes in the service, etc.

A private-telephone system connecting all barns, stations, etc., should be provided, and where the stations are far apart intermediate stopping places should be equipped with telephones.

The routes should be divided into long and short hauls and the most attractive cars should be used on the short-haul routes so as to induce short-haul passengers to keep off all long-haul cars. As it will be impossible to handle all of the cars required in the terminal district between 5 p. m. and 6 p. m. as fast as patrons desire to use them, a limit should be placed on the loading capacity of the cars.

A number of the streets should be widened to permit of more tracks and rules of the road for other vehicles should be adopted giving the street cars the right of way in the street. There should be stricter police supervision of vehicle movement. Grade crossings on steam railroads should be abolished. Signs should be used to indicate all stops. Trucks for motors for 200 open cars should be procured immediately so that open cars can be put in service without removing an equivalent number of closed cars.

TROLLEY FARMING SPECIAL OPERATED IN MASSACHUSETTS

The first electric railway farming special train to be operated in New England, was run on April 14, 15 and 16 in Massachusetts over the mid-state lines of the New England Investment & Security Company, having headquarters in Springfield. President L. S. Storrs of this organization has for some time devoted considerable attention to the problems of stimulating traffic and developing territory industrially through the agency of the electric railway, notably through the establishment of through passenger and express service between



Trolley Farming—Arrival of the Special at Worcester

the principal centers on the lines controlled by the company, and vigorous publicity of the aims and methods of working to attain the utmost prosperity of the railway system and its interconnected communities. In the belief that the street railway is in closer touch with the public than the steam road through its more flexible service and range of stops in operation, arrangements were made some weeks ago with the Massachusetts Agricultural College and the State Forestry Department, for the running of a special train of four cars over about 300 miles of track on the lines in the vicinity of Springfield and Worcester, for the purpose of bringing into co-operation important factors for the growth of profitable agriculture in western and central Massachusetts. The Springfield Board of Trade and the Country Work Department of the Y. M. C. A.



Trolley Farming—Arrival of the Special at Sturbridge

were also interested in the campaign, which practically placed the agricultural college on wheels for three days for the benefit of the general public.

The advent of the trolley farming special was extensively advertised for some days before the trips were started, the public interest being appealed to through the daily press, the weeklies, by means of dasher signs and large posters placed on car houses and in various community centers. A carefully arranged schedule was planned, allowing stops of from one to two hours each in the towns visited. About a score of the faculty of the Massachusetts Agricultural College, State offi-

cials and prominent men interested in farming and related industries accompanied the special. The schedule of communities visited was as follows:

SCHEDULE OF FARMING SPECIAL, NEW ENGLAND INVESTMENT & SECURITY COMPANY

April 14

Amherst	Leave	8:20 a. m.
South Hadley	Arrive	8:55 a. m.
South Hadley	Leave	9:55 a. m.
Russell	Arrive	12:35 p. m.
Russell	Leave	1:35 p. m.
Huntington	Arrive	1:54 p. m.
Huntington	Leave	3:57 p. m.
Springfield	Arrive	5:49 p. m.
Springfield, evening meeting, Board of Trade		8:00 p. m.



Trolley Farming—Cattle Judging at Oxford, Mass.

April 15

North Wilbraham	Arrive	9:28 a. m.
North Wilbraham	Leave	10:58 a. m.
Brimfield	Arrive	11:40 a. m.
Brimfield	Leave	1:40 p. m.
Sturbridge	Arrive	2:07 p. m.
Sturbridge	Leave	4:07 p. m.
Charlton Center	Arrive	4:50 p. m.
Charlton Center, evening meeting		8:00 p. m.

TROLLEY FARMING SPECIAL OPERATED IN MASSACHUSETTS

April 16

Oxford	Arrive	8:15 a. m.
Oxford	Leave	10:15 a. m.
Holden	Arrive	1:00 p. m.
Holden	Leave	2:38 p. m.
Sterling	Arrive	4:14 p. m.
Sterling	Leave	5:30 p. m.

A stop was also made in Worcester about noon, en route to Holden.

Each of the four cars comprising the special was a four-motor equipment with a 30-ft. closed body. About half the interior of each car was devoted to exhibits and reading matter bearing upon the special branch of agriculture which the car illustrated. One car was devoted to the exhibiting of farm fertilizers and corn; a second contained exhibits pertaining to dairying and animal husbandry; a third contained exhibits pertaining to fruit culture and insect life, and the fourth was devoted to forestry. Summaries of the exhibits follow:

FERTILIZERS AND FARM CROPS, CORN CAR

Illustrations of the results of fertilizer experiments with corn; the value of corn as a component ration for egg production; the value of lime for clovers and alfalfa; the use of fertilizers.

DAIRY CAR

Exhibit of utensils, coolers, centrifuge, etc., models, charts, feeds, milk tests.

FRUIT AND INSECT CAR

Spraying apparatus of all kinds; pruning tools, methods of correct and incorrect pruning; packing, mounts of insect pests and examples of the destruction wrought by insects and the methods of extermination.

FORESTRY CAR

Specimens of trees from State nurseries; exhibit of reforestation; browntail moth and other pests; specimens of parasites imported from foreign countries; forest fire fighting equipment, and literature describing the work of the department.



Trolley Farming—An Audience at Sturbridge

In a publication which the Massachusetts Agricultural College issued entitled "Massachusetts—The Land of Agricultural Opportunity," the roster of the special train lecturers was given, also the schedule of the cars and other facts about the new work. In addition a number of helpful articles were contributed under the titles, "The Passing of the Abandoned Farm, "A New Attitude Toward Farming," "Science and Reason in Farming," "The Crime of Forest Fires," "Danger from Tree Parasites," etc.

In all the cars the sign racks were pressed into service for special placards, and numerous circulars, bulletins and other publications were given away at the various stops. Prominent in the display was a collection of agricultural books bearing upon the latest aspects of rural life. At each stop lectures were given upon farming topics by members of the party, either in the cars or out of doors, according to the attendance. The New England Investment & Security Company distributed folders and maps of its lines, with timetables and fare schedules, freight and express charges and classifications. Each person in attendance was also given a neat souvenir of the trip, several thousand of these being disposed of in the three days.



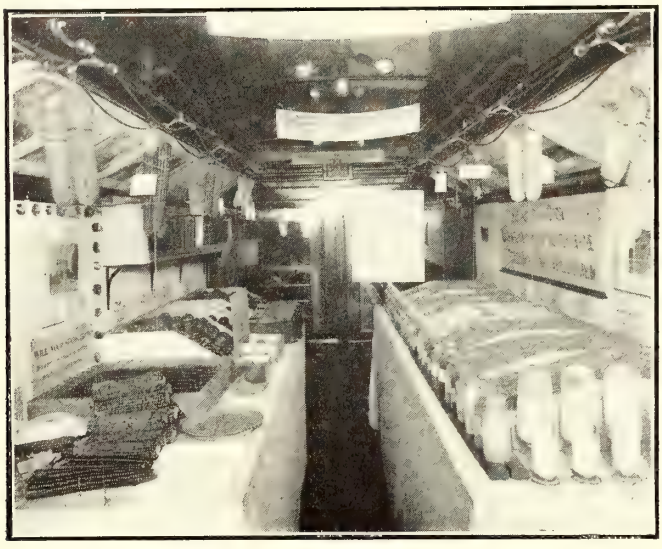
Trolley Farming—Spraying Demonstration



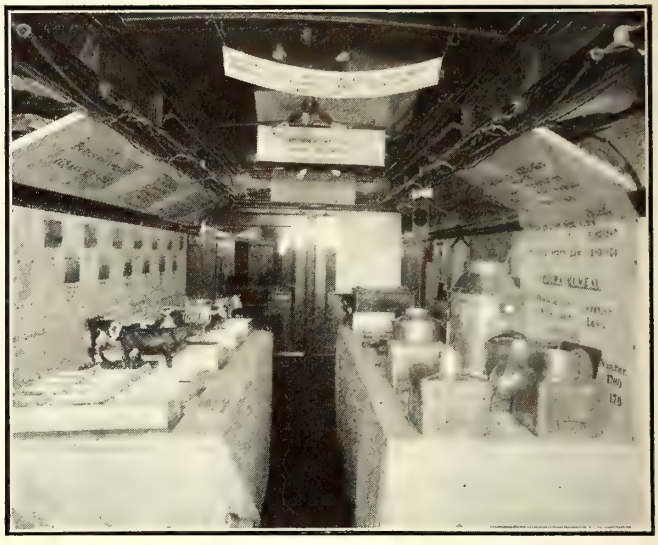
Trolley Farming—Pruning at Brimfield

These souvenirs gave a complete list of the special train lecturers, the car schedule, details of the exhibits in each car; out-

lined the interest of the street railway in the prosperity of the farmer and concluded with a discussion of what the State does for the farmer by reviewing the relation of the Agricultural College, the Massachusetts Agricultural Experiment Station and the State Board of Agriculture to the industry. The booklet pointed out that the extension and improvement of trolley service is bringing the farms closer to the markets as well as placing the farmers themselves nearer the cities, and it contended that an electric railway is not giving to communities the full measure of benefit which may be expected unless trolley express is a part of its service. The booklet stated that express service at freight rates is about what these facilities offer in the company's territory, and that it has been found that the benefits to the communities which get trolley express service are such that the larger business and increased prosperity of the public create increased passenger traffic for the electric railway company.



Trolley Farming—Fertilizer and Farm Crops Car



Trolley Farming—Dairy Car



Trolley Farming—Fruit and Insect Car



Trolley Farming—Forestry Car

In the majority of cases the lectures at the different stops were well attended and enthusiastically received. The schools in the smaller towns were given special recesses to enable the pupils to visit the trolley special and two evening meetings were held. At the first, which was held in Springfield, President W. C. Brown of the New York Central lines had been scheduled to speak, but on account of his detention in New York C. C. Morrison, traveling passenger agent and immigration commissioner of the Great Northern Railway, gave a talk on the agricultural situation. He was followed by President Kenyon L. Butterfield of the Massachusetts Agricultural College, who spoke at length upon a campaign for rural progress, and paid a tribute to the New England Investment & Security Company for its enterprise in initiating the first trolley farming special to be run in New England. He estimated the annual value of the agricultural product in the towns served by the railway company as $17,000,000, and pointed out the great benefits of a saving of even a few per cent in the cost of transporting these products by trolley. President Brown of the New York Central lines sent a telegram of regret on account of his enforced absence, and reiterated his well-known views upon the importance of agricultural development.

The special train lecturers included Professors Hurd, Foord, Sears, Lockwood and Gribben, of the Massachusetts Agricultural College; Messrs. Brooks, Haskins, Smith and White of the Experiment Station; Messrs. Ellsworth, Rane, Harwood and Worthley of the State Departments; C. A. Stone; Springfield, C. H. Hathaway, Springfield Board of Trade, and H. N. Davison, secretary, Worcester Board of Trade. C. V. Wood, traffic manager of the New England Investment & Security Company, was in general charge of the trip and itinerary, assisted by the division officers whose territory was traversed.

The Belfort-Rechesy-Bonfol Electric Railway, which will be constructed partly in France and partly in Switzerland, will be about 18 miles long. Work is to begin in May, and it is scheduled to be completed in 1912.

PAPERS AND DISCUSSION ON HEAVY ELECTRIC TRACTION IN ENGLAND

The Institute of Civil Engineers, London, Eng., has just made available the full text of the three papers on electric traction of which a preliminary abstract was printed on page 43 of the Electric Railway Journal for Jan. 1, 1910. The subjects and authors of the papers were as follows: "The Equipment and Working Results of the Mersey Railway Under Steam and Electric Traction," by Joshua Shaw; "The Single-Phase Electrification of the Heysham, Morecambe & Lancaster Branch of the Midland Railway," by James Dalziel and Josiah Sayers; "The Effect of Electrical Operation on the Permanent Way Maintenance of Railways," by Charles Augustus Harrison. The three lines mentioned, together with the London & South Coast single-phase line of the Brighton Railway, constitute all the high-speed, heavy electric traction undertakings in England. The following abstract will present the more striking data brought out in the three papers which were read on Nov. 9, 1909, and in the ensuing discussion, which was continued from the session of Nov. 9 to the meetings of Nov. 16, Nov. 23 and Nov. 30, before being concluded.

THE MERSEY DIRECT-CURRENT RAILWAY

The Mersey Railway extends under the Mersey River, connecting Liverpool and Birkenhead. It was opened in 1886 as a steam railroad, 2 miles, 726 ft. long, but it is now 4 miles, 4092 ft. long. All of the seven stations, including the terminals, are underground. The electrification of the tunnel in 1903 was brought about to overcome the difficulties incident to steep grades, ventilation, pumping, etc., and to regain traffic which was gradually being taken by the ferries. Under steam operation the trains consisted normally of seven coaches, the number of trains per hour varying with the requirements. The electric service provides for a three-minute headway on the main line and six minutes on the two branches. The following table compares the two train services with regard to the number of trains, mileage, seating capacity, weights, etc:

WEIGHTS OF TRAINS, MILEAGE AND SEATING CAPACITY, ETC.

	Light traffic.		Heavy traffic.	
	Steam.	Electric.	Steam.	Electric.
Weight of train (unloaded), tons	137¾	56½	137¾	122½
Number of seats per train	310	110	310	250
Weight per seat, lb.	997	1,148	997	1,097
Number of trains per hour	8	20	12	20
Train-miles per hour	50.7	127.2	78.3	127.2
Ton-miles per hour	6,984	7,186	10,785	15,582
Seat-miles per hour	15,717	13,992	24,273	31,800

Stock: Steam—Locomotives, 18; cars, 96. Electric—Motor cars, 24; trailers, 33.
Total seats: Steam, 4,280; electric, 3,156.
Weight of stock in tons: Steam, 2,172; electric, 1,534.
Note: One ton equals 2,240 lb.

The electric cars are of the corridor, two-compartment type, 60 ft. long over the buffers and 8 ft. 8½ in. wide. They are mounted on Baldwin trucks and carry four Westinghouse No. 83, 100-hp motors, geared 56:20. This equipment made it possible to increase the original schedule speeds from 12.6 m.p.h. to 18 m.p.h. in one case and from 20.1 m.p.h. to 28.2 m.p.h. in another. The train make-up varies from two to five cars, the latter containing three trailers. The power station has three 1200-kw d.c. generators and a storage battery having a capacity of 1000 amp-hours and a momentary capacity of 2000 amp. One generator is generally in reserve.

In making a comparison of working results for typical years of steam and electrical operation, the author gives the various kinds of mileage and other data as follows:

MILEAGE

	Steam.	Electric.
Train-miles per year	310,944	828,674
Ton-miles per year	43,843,000	67,330,000
Seat-miles per year	96,392,000	127,548,000
Average weight of train (loaded), tons	141	81.4
Average number of seats per train	310	154
Average weight per seat, lb.	1,019	1,176

Note: One ton equals 2,240 lb.

Briefly, the result of the electrification of the Mersey Railway is as follows:

GENERAL RESULTS

	Steam.	Electricity.
Number of trains per hour, light traffic	8	20
Number of trains per hour, heavy traffic	12	20
Average speed, including stops, m.p.h.	15.6	19.9
Time required for journey, including stops:		
Main line, mins.	15	11
Branch line, mins.	10	8
Train-miles per annum	310,944	828,674
Ton-miles per annum	43,843,000	67,330,000
Seat-miles per annum	96,392,000	127,548,000
Average weight of train (loaded), tons	141	81.4
Total expenses per train-mile, after allowing interest on additional capital for electric works, cents	97.0	47.6
Total expenses per ton-mile, etc., cents	0.688	0.5856
Total expenses per seat-mile, etc., cents	0.312	0.3096
Passengers carried for six months ending June, 1908		5,719,572

Note: one ton equals 2,240 lb.

The cars are inspected for minor repairs every two days or after running about 300 to 400 miles. The general practice is to examine controllers, lights, car-doors, bells, motors, brake-shoes, brake-levers, motor-suspensions, springs, wheels, and lubrication of bearings every other day. The electropneumatic control is inspected weekly; the multiple-control wiring and connections are examined and tested monthly, the triple valves every three months, and the brake-cylinders every six to nine months. The motor cars are overhauled every 38,000 miles. The trailer-cars run 50,000 to 60,000 miles before overhauls.

The brake-shoes are chilled on the face to a depth of 5/8 inch and have an aggregate life of 10,000 miles for motor-cars, and of 13,500 miles for trailers. When electrical working was first commenced ordinary cast-iron brake-shoes were tried and gave an average life of 2200 to 2500 miles. The life of the motor-pinions averages about four years, representing 200,000 miles. No gear-wheels on the axles have yet worn out, although some of these have done 350,000 miles, and it is anticipated that a further life of two years will be obtained.

THE HEYSHAM-MORECAMBE SINGLE-PHASE RAILWAY

The Heysham-Morecambe single-phase double-catenary railway of the Midland Railroad is a 6600-volt, 25-cycle line, equivalent in length to 8.5 miles of double track. The electrification was completed on June 8, 1908, and a long illustrated description of the work was presented in the Electric Railway Journal of July 4, 1908.

The experiments made by the authors on the impedance of the 85-lb. steel rails employed showed that while their resistance to direct current would be 0.085 ohm per mile, their impedance at 25 cycles with about 25 amp is 0.37 ohm per mile.

The rolling stock now consists of three trains, there being one Westinghouse and two Siemens motor cars. Taking the Siemens motors on their forced-draft rating of 210 hp, the weight of the actual electrical equipment is 0.035 ton (one ton = 2240 lb.) per hp, whereas the Westinghouse apparatus weighs 0.041 ton per hp. It has been found that if certain feasible changes are made the weights can be reduced to 0.029 ton and 0.035 ton per hp. This contrasts with the figures of 0.016 ton and 0.02 ton published for d.c. equipments and coming out to 0.020 ton to 0.025 ton per hp in practice. The 60 ft. single-phase, 420-hp motor car, seating 72 passengers, weighs 36 tons on the revised figures, as against 32.25 tons for a similar d.c. car.

Obviously, while the revised a.c. equipment is by itself about 40 per cent heavier than similar d.c. equipments, the percentage by which the weight of a single-phase car exceeds that of a d.c. car is much less, namely, about 12 per cent, and still less is the percentage difference in the weights of the respective complete trains, viz., for the standard Heysham train 5½ per cent.

The motor-cars were specified for a 20-minute service between Morecambe and Heysham, and a 15-minute service between Morecambe and Lancaster, each with a three-car train (trailer—motor-car—trailer), the Siemens train weighing 77½ tons without, and 89½ tons with, 180 seated passengers, the corresponding Westinghouse weights being 74½ and 86½ tons. It was considered by the railway company that two 150-hp motors per motor-car would satisfactorily carry out the work, and the respective contractors supplied motors of their nearest standard sizes to this, the Siemens motors being nominally of

180 hp, and the Westinghouse motors of 150 hp. The former motors are rated by their makers at 210 hp when under forced draft. Various tests made by the authors showed power consumptions of only 88.7, 99.3 and 100.76 watt-hours per ton-mile as against a calculated consumption of 110 watt-hours for d.c. equipments. The accelerations obtained were as follows: Sustained accelerations giving 25 m.p.h. in 25, 22 and 21 seconds, or 1.0, 1.14, and 1.19 m.p.h. per second were given by the 7.7-, the 8.15-, and the 10-hp-per-ton trains respectively, which would with better gear-ratios be improved to 19 m.p.h. in 14, 13, and 10.5 seconds, or 1.36, 1.46, and 1.81 m.p.h. per second. The maximum attained accelerations were 1.1, 1.3, and 1.4 m.p.h. per second, improvable to 1.55, 1.8, and 2.0. The new gear-ratios taken are for the highest gear-ratio and smallest wheel available, namely, 3.7 to 1, and a 40-inch wheel. The results of these tests clearly established (1) the watt-hour economy of single-phase equipments in high-schedule speed service, a result quite contrary to frequently expressed opinions based apparently on inadequate data; (2) that the accelerating possibilities of single-phase motors are in no way less than those of d.c. motors; (3) that single-phase trains in high-schedule-speed service need not be seriously heavier than d.c. trains; and therefore that (4) single-phase working is perfectly applicable to and suitable for such services. The tests have all been carried out on a forced-draft service-capacity basis, but the installation of forced draft has involved no appreciable complication. It should also be mentioned that there was no trouble from the commutators or other parts of the equipment.

After being erected two years and in use fully 18 months, the contact wire showed no wear.

The transmission-efficiency was difficult to ascertain but appeared to be about 97 per cent from bus-bars to bow. The leakage from the overhead line amounted to 0.5 kw to 1 kw in dry weather; this rose in wet weather to as much as 20 kw for a short time after switching on, while leaks of about 10 kw lasting ½ to 1 hour have been recorded. The average leakage appeared to be about 1.5 kw to 2 kw or 0.092 kw-hour per hour per mile of single track. The consumption at the car-collectors, eliminating ohmic losses and leakage in the line and adding the switching mileage, amounts to 50 watt-hours per ton-mile.

One of the appendices contains the accompanying table, showing the life of wearing parts.

The Siemens car equipments were altered as follows: The main shaft of the bow was fitted with ball-bearings to make the bow follow the wire better; replacement of main high tension cable in car by bare wires owing to breakdowns of insulation; change to continuous excitation of main transformer during running instead of switching off and on, which caused breakdowns in the insulation of the transformer; hot-wire overload cut-out replaced by magnet-operated tension spring type which takes less time to reset itself; simple pad lubrication substituted for scheme of pumping oil to supply tanks and siphoning through pipes to the bearings; brush-holder connections changed from solid cast rings to bent copper rods to reduce the number of parts and increase clearances. The Westinghouse motors and equipment required no alterations except that to the high-tension cable through the car.

The mileage lost during the 15 months ending Sept. 30, 1909, through electrical defects of any kind whatever due to power house, line, or cars, amounted to 212 miles, and the cars made 99.63 per cent of the total mileage they were called upon to do. Most of the breakdowns of Siemens motors have been due to lack of sufficient surface insulation between the stator end windings. The armature defects have been due to the commutator, there being a gap between the quill and the clamp-ing-ring, up which carbon dust worked to the inside of the segments. Some metal (borings) was also found inside the commutator and may have been a contributory cause.

On Jan. 19, 1909, one of the Westinghouse armatures went to "ground," the fault having the appearance of being caused by some foreign material having got in between the windings and the supporting end drum, and having been driven in with sufficient force to break through the insulating material on the end drum. As this insulation consisted of thick micanite the conclusion that mechanical damage initiated the breakdown seems unavoidable. The motor took current on several trips after the development of the failure and the car took a train of 165 tons on one motor.

LIFE OF WEARING PARTS OF TWO TYPES OF SINGLE-PHASE EQUIPMENT.

Name of part.	Number in use per car.	Total renewals during period.	Total mileage run.	Average mileage between renewals per set.	Best mileage between renewals per set.	Remarks.
		Siemens Equipments				
		Two cars.	Two cars. Miles.	Miles.	Miles.	
Bow-collector wearing-strips (aluminum)	2	14	71,459	10,200	11,000	Experiments with materials of varying hardness were made during this period, otherwise the mileage would have been higher.
Main motor-brushes	64	179	71,459	25,000	....	Over 100 of these brushes were renewed owing to breakage brought about by unsuitable attachment of shunts. Since fitting new brush-gear without shunts in June, 1909, no breakages have occurred. Allowing for wear of the broken brushes, the average life comes out at 47,000 miles. Since fitting brushes without shunts one set has run 6400 miles and the wear has been only 1-16 inch, which gives a life of 100,000 miles.
Main motor-bearings (armature)	..	..	....	....	....	The lubrication of these bearings has not so far been satisfactory, and several renewals have been made owing to hot bearings. Of the others one set of bearings on car No. 2237 ran 10,000 miles before renewal was necessary.
Contactor contacts	56	5	71,459	....	....	
		Westinghouse Equipment				
		One car.	One car.			
Bow-collector wearing-strips (galvanized iron)	1	6	39,066	6,511	9,417	The low average life is due to three of the strips being very soft. Those now in use are harder.
Main motor-brushes	48	195	39,066	9,020	....	A large number of these were broken at first, due to brush-pressure being too great and brushes being of poor quality. Allowing for wear of the broken brushes, the average life comes out at about 20,000 miles.
Main motor-bearings (armature)	..	..	....	....	....	One set of bearings ran 19,000 miles before renewal was necessary.
Contactor contacts	16	4	39,066	....	....	

EFFECT OF ELECTRICAL OPERATION ON THE PERMANENT WAY

The paper by Dr. Harrison discussed the effect of electrical operation on the permanent way maintenance of railways as illustrated on the Tynemouth branches of the North Eastern Railway. This d.c. third-rail installation, which has been in service for five years, comprises 29.5 miles of route or 75 miles of single track. Stations are 1¼ miles apart. The rolling-stock consists of 62 motor and 44 trail cars, each seating 60 passen-

gers. The trains vary from one to nine coaches. Freight is also handled by this company.

The following table compares the train service under steam and electrical working. It will be noticed that, although the train-mileage has been nearly doubled, both the car-mileage and the ton-mileage are slightly less under the new conditions.

	Steam.	Electric.
Average schedule-speed (m.p.h.)	16.7	20
Increased speed of electric trains (per cent)	—	19
Acceleration (m.p.h. per second)	0.5	0.75
Maximum train-service per hour	10	15
Normal train-service per hour	1	4
Train-miles per annum	600,000	1,199.729
Car-miles per annum	3,900,000	3,772,601
Ton-miles per annum	115,200,000	104,600,000
Average number of cars per train	6.5	3.14
Maximum number of cars per train	7	9
Average weight of train (tons of 2240 lb.)	192	87.2
Passenger coaches in use (normal service)	84	85
Locomotives in use (normal service)	14	—

It was not to be expected that the upkeep of the electrical equipment could be dealt with without some increase in the maintenance costs, but the additional cost has not proved to be a heavy one. All repairs and renewals connected with the electrical equipment are carried out under the permanent-way inspectors by the ordinary track gangs, special provision being made by the use of insulated tools and working regulations to avoid danger to the men by shock.

The steam driving wheels were 66 in. in diameter, while the electric driving wheels are only 36 in. The additional hammer of the smaller wheel when going over the intersecting gap of a crossing, coupled with the non-spring borne weight of the motors, has a marked influence on the life of a crossing. Instances have occurred of a crossing which would have lasted nine years requiring renewal at the end of five years. To meet the new conditions of wear, especially on curves and at crossings, Sandberg and manganese-steel rails have been installed. So far as the straight track is concerned, no definite opinion can be formed as to the increase of wear under the new conditions, but it is certain that the effect is not very marked.

With a regular service of trains every 15 minutes in each direction the difficulties of maintenance were naturally increased, and it became desirable to adopt a type of ballast requiring less attention than the ash-ballast with which the branches were laid. After experimental lengths had been ballasted with various classes of stone, it was eventually decided to adopt a hard limestone with an outside limit in size of 2 in. The fact that the stone has a high insulating resistance as compared with the ash-ballast was also a factor in coming to this decision.

With regard to the cost of maintaining the electrical equipment of the track, while it is not possible to give a figure that will be applicable to all lines and conditions of working, a general figure, which is the result of experience, may be interesting. Assuming, as in the North Eastern Railway case, that no special staff is organized to deal with the work—that is, it is dealt with by the permanent-way inspectors—and that the equipment is laid down with proper regard for the service to be met, £50 per annum per mile of single track should cover all likely contingencies. It is more difficult to ascertain the cost of the increased wear on crossings, curves, etc., nor could any assumption be justified until experience has been considerably extended. In any case it would not be fair to debit electrical working with the wear due to the rapid acceleration obtained, as without this acceleration the increased schedule speed would not be possible, and steam locomotives for this acceleration would, owing to the increase of weight, be equally if not more severe on the track.

During the busy hour in the evening, fifteen trains are dispatched from two terminal platforms at the Central Station, while during the "rush" traffic, five trains are dispatched at one-minute intervals, each carrying upward of 500 passengers. In the mornings, when traffic is even more concentrated, trains up to 550 ft. long are employed. During the summer the holiday traffic between Newcastle and the coast is very heavy, upward of 100,000 passengers being dealt with during the day. The cityward traffic in the evening at these times is largely concentrated into less than three hours, and whereas the present train service deals with such loads with ease, the superseded steam trains were frequently working until 2 a. m. after a holiday. Although the number of trains has been doubled, the train and signal movements at the central railway station have been reduced.

ABSTRACT OF DISCUSSION

Dr. Harrison said that he did not intend to fight the single-phase system, but he did think that one good point in favor of the third-rail system was that repairs could be effected without cutting off the current. He had also been struck with the fact that apparently the motor cars of the single-phase system weighed more than those on the North Eastern line. The latter weighed only about 30 tons, while he understood that the Siemens and Westinghouse cars on the Heysham railway weighed 37½ tons and 40½ tons, respectively. It was well known that electric motor-cars affect the rails to a certain extent and if more weight were added it must have some damaging effect on the rails.

John A. F. Aspinwall said Mr. Shaw's paper was a very good illustration of the way in which an electrical system enabled a great deal more work to be got out of trains. In one case it was shown that more useful work was obtained with a 250-seat electric train than a 310-seat steam train. With reference to Dr. Harrison's paper, he said that he had not the slightest doubt that the rapid wear of the rails upon curves was due entirely to the fact that the center of gravity of the vehicles was so low; hardly any of the weight except that of the comparatively light car body was much more than 2 ft. above the rails. Hence, in going around curves the whole weight was thrown with great force against the outer rail, thereby causing considerable grinding. This would disappear, however, if one were to adopt the new type of electric locomotive designed by the Pennsylvania Railroad in which the center of gravity has been brought much higher, thereby making an electric engine very much like a four-coupled steam locomotive with a forward pony truck. Mr. Harrison stated that the cost of third-rail work might be taken at £50 per mile per annum. He was not quite sure what was included in that figure, but he might say that the expenses of the Liverpool-Southport Railway included the third-rail, the fourth-rail, all the insulators, all the bonding and all the accessories connected with the third and fourth-rail, totaled to about £40 per mile per annum.

Philip Dawson agreed with what Mr. Shaw had said as to the impossibility of making a comparison between steam and electric traction on any basis such as ton-mileage or train-mileage for the simple reason that electricity afforded possibilities of utilizing existing facilities in a way that was impracticable with steam. The only fair comparison was one made on a financial basis. He was a thorough believer in the d. c. system, which had given very satisfactory results, but that was no reason why, under other conditions, or possibly, under the same conditions, the single-phase system should not also give an excellent account of itself. He had worked out some data from actual motor performance curves for a given run with a distance of ¾ mile between stations, that being practically the average distance on the section between Battersea Park and Peckham Rye on the London, Brighton & South Coast Railway, which had been operated with single-phase since the beginning of January, 1909. In these calculations he had taken various average speeds from 20 m.p.h. up to 28 m.p.h. These speeds did not include stops, but were the average speeds for traveling over the given distance. The potentials were 500 volts d. c. and 6000 volts a. c. The weights were 147.3 tons for the d. c. train and 162.6 tons for the a. c. train. The equipments consisted, respectively, of eight GE-66 and eight Winter-Eichberg-51 motors. The tests with the three-car a. c. train loaded up to 160 tons and run over a distance of ¾ mile at varying speeds had fully borne out his calculations. The energy consumption per train-mile for the d. c. train was smaller than that of the a. c. train—the watt-hours being watt-hours on the train up to an average speed of just over 20 m.p.h. This was because of the fact that of two electric trains equipped, respectively, with a. c. and d. c. motors, equal in

size and number, the former was considerably heavier, and naturally the watt-hours were more for the heavier train. The curious fact was noticed that, after passing a certain average speed, notwithstanding the greater weight to be propelled, alternating current became more economical than continuous current. Making the comparison simply on the basis of watt-hours per ton-mile, there was practically nothing to choose between either system up to 24 m.p.h. or 25 m.p.h., but beyond that, alternating current was more economical. This alone, however, was not a fair basis of comparison, because, after all, the amount of energy that had to be paid for was not that actually utilized on the train, but the amount generated at the power station.

Mr. Dawson then gave the results of a number of test runs which he said were made under the best possible conditions and should be considered in that light only. The tests consisted of a series of six runs between Battersea Park and Peckham Rye and return. There were four intermediate stops of 20 seconds at each station, and the average distance between the stations was ¾ mile. The shortest distance between any two stations was 1900 ft. On those six runs, the average energy per ton-mile measured on the train, including everything except switching, was 71.8 watt-hours per ton-mile. The average speed, including stops of 20 seconds at the four intermediate stations, was 21.2 m.p.h. The maximum acceleration was 2.06 ft. per second per second, and the average acceleration from rest to a speed of 37 m.p.h. was 1.5 ft. per second per second, the train weight being made up to the figure agreed upon in the original contract, namely, 148 tons. The average power-factor for the six runs was 80.8 per cent. The starting current on the level never exceeded 120 amp at 6600 volts, and the maximum current at any time never exceeded 184 amp. On another day, when a great deal of switching was necessary, the average power consumption worked out at 81 watt-hours per ton-mile and the average distance per train run on that day was just a little more than 100 miles. The average speed was about 25 m.p.h., excluding stops, and 21.8 m.p.h. including stops. The average distance between stations on these runs was 4620 ft.

Mr. Dawson said that it had been sometimes suggested that with collecting bows in use the wire would wear seriously, or if the wire did not wear, the collector strip would wear in consequence of its pressure against the conductor wire. In his experience, some of the trains had run nearly 5000 miles and the bows were still in excellent condition and probably would last many thousand miles more. The experience on the Hamburg-Altona single-phase railway was that the bows lasted about 16,000 miles. With regard to the large difference of weight which had been mentioned as existing between d. c. and a. c. equipment, he thought that the maximum difference between a train having a. c. and d. c. machinery was less than 10 per cent and that the minimum was nearer 5 per cent.

H. M. Hobart said he would much rather stop arguing and come to the understanding that single-phase equipment had substantially the same efficiency as d. c. equipment because he did not believe himself that the difference was great enough to be worth discussing. He would not have discussed it at all if the statement had not been made that the d. c. apparatus required more energy per ton-mile. He did not assert that the difference in favor of the Lancashire & Yorkshire Railway d. c. trains was 7 per cent. It might be 10 per cent or it might be 4 per cent, but it was enough to justify the statement that single-phase equipments were, as regards energy consumption on the train, distinctly less economical on the ton-mile basis than equivalent d. c. equipments.

Charles H. Merz said that the results presented in the papers showed the advantages of electric traction under certain conditions of service and illustrated its revenue-earning abilities. For instance, Mr. Shaw showed that whereas the train mileage per passenger increased from 0.046 to 0.059, the ton-mileage per passenger decreased from 6.49 to 4.91. Dr. Harrison also showed that while on the North Eastern Railway the train-mileage had increased by 100 per cent the ton-mileage actually had decreased. When going into the question of electrification from the standpoint of the commercial results, the question was not what system should be adopted, but what speed and service were desired.

C. A. Carus-Wilson said in connection with the wear of rails that engineers needed to go back to the experience of steam-railway engineering and abandon the attempt to run their trains with such exceedingly heavy trucks; it would be better to adopt the steam-locomotive type with the driving wheels direct-coupled and rigidly connected with the locomotive, the whole being steered by a light pony truck.

J. R. Chapman, who was chief engineer of the London Underground Electric Railways at the date of this discussion, said that much of the trouble from rail wear attributed to the electric rolling stock might be due to the fact that electric cars were frequently called upon to run over a roadbed that was not adapted to them. As an instance, he mentioned the absence of corrugation and side cutting on the London tubes which were designed for electric operation in contrast to the trouble on the older underground lines which were using exactly the same trucks and motors.

A communication received from W. Geipel asked why high-tension direct current could not be used for electric traction. The writer recommended a method of working shunt-wound motors on the regenerative d. c. system, including a modification of the Ward Leonard motor-generator method.

A communication from A. Schmit contained figures on the cost of three high-tension overhead lines as given to him by the Siemens-Schuckert Company with reference to the Hamburg-Altona Railway in Germany, the Seebach-Wettingen Railway in Switzerland, and the Rotterdam-Hague-Scheveningen Railway in Holland. The Hamburg-Altona line is operated at 6000 volts, 25 cycles, and cost, inclusive of high-tension feeders, automatic tension devices, section insulators, cut-off switches, etc., about £1,100 per mile of single track. The Seebach-Wettingen line is operated at 15,000 volts and 15 cycles. Its overhead construction consists of wooden poles, instead of the elaborate lattice poles and bridges used on the Hamburg-Altona line. Its total cost, therefore, was only £840 per mile of single track. The Rotterdam-Hague-Scheveningen Railway uses lattice poles and light bridges. The cost of construction, increased because of unfavorable soil conditions, was about £1,200 per mile of single track. On the Hamburg-Altona line the average distance between the overhead bridge is about 48 m (157 ft.); on the Seebach-Wettingen line the average distance between poles is 50 m (164 ft.), and on the Rotterdam-Hague railway about 48 m (157 ft.). Experiments on the Seebach-Wettingen line have shown that spans up to 100 m (328 ft.) can be used. With this spacing the average cost of overhead line construction would not exceed £800 to £900 per mile of single track.

J. Sutherland Warner wrote that as long as rigid trucks were employed, in which the axles were held parallel to each other by the truck frame, it would obviously be impossible to reduce flange pressures. The expedient of raising the center of mass and thus affording a limited relief by the rotation of the locomotive around a longitudinal axis, was certainly not worth resorting to, because it involved chains or connecting rods to the drivers. Such an arrangement could not be conveniently adopted for electric motor cars.

MEETING OF CENTRAL ELECTRIC TRAFFIC ASSOCIATION

The Central Electric Traffic Association met at Lima, O., on April 16 and discussed a variety of business. It was finally decided not to issue any milk and cream tariff for the present, but to postpone the matter indefinitely. The question of checking a tariff covering Merchants' Despatch freight was discussed and it was decided to leave this matter open to the call of the chairman. A table of distances was discussed, and it was decided to issue such a table, the same to be formulated along the same lines as the Joint Passenger Tariff. The mileage between all points covered by the Passenger Tariff will be shown in the same manner. This tariff will be issued after the chairman has the necessary data. The meeting adjourned to meet at the Anthony, Ft. Wayne, on May 14.

CITY TRACK CONSTRUCTION*

BY W. A. HEINDLE, SUPT. CONST., TRI-CITY RY., DAVENPORT, IA.

In the preparation of this paper the aim has been to touch upon the materials and methods employed in track construction, suitable for cities of small size and for railway companies with limited expenditures. The types and methods described refer particularly to the track construction recently carried out in the cities of Davenport, Rock Island and Moline.

RAILS

The selection of rail type is more or less limited by the city authorities. From the viewpoint of design and serviceability the standard T sections are certainly the best, and should be used on all unpaved work. They will be selected from the standpoint of economy, as they cost about $8 less per ton than high T or girder rails. Standard T-rails are not deep enough to permit the laying of a satisfactory piece of pavement. All T-rail track, when paved with brick, has a tendency to rut on the gage side of the rails, especially under heavy wagon traffic. The best results, however, are obtained with the high T or girder rail. We are limited in our Davenport work to a 7-in. T-rail, while we are compelled to use a 7-in. girder rail on the Illinois side of the river. All things considered, the high T will be found most suitable and serviceable, provided a satisfactory form of pavement be installed. When vehicular traffic is heavy, the girder rail has special advantages. It is the writer's opinion that a rail, 7 in. in depth, is ample for all ordinary requirements. A high T of 70 lb. to 80 lb., or a girder rail of 80 lb. to 90 lb. weight per yard, is strong enough as a beam to care for any ordinary city service, provided good quality of material is secured. Granted that the joints are the weakest part of the track, it seems logical to spend money in improving joints rather than in purchasing excessive weight of rail. A study of rail wear shows some astonishing results. An examination of scrap rails on a prominent eastern road indicates a total wear of 15 per cent. in an original weight of 107 lb. per yard. As new rail costs approximately $41 per ton, and the scrap value is about $12 per ton, at present prices, the cost of this 15 per cent. wear is certainly excessive. An examination of girder rail sections indicates that 15 per cent. wear is obtained only after the wheel flanges have cut into the base of the groove, so that further depth of rail or increased weight will not add materially to its wearing qualities, the limiting feature being the depth of flange and depth of groove. For city work, rails should be purchased in 60-ft. lengths, with a certain percentage of shorts that are multiples of the tie-rod spacing, thus avoiding the necessity of selection in track laying.

JOINTS

The joints, as made by the rail mill, will be found rather deficient in strength, and one is obliged to resort to some special form of joint. Both the Nichols and Clark joints possess excellent merits, but are rather too expensive for small systems, as they involve special appliances for their application. The thermit and electric weld joints, both excellent, and not requiring bonding, have the same disadvantage, but are both to be preferred to the cast weld joint, in which the large bulk of molten cast iron must necessarily affect the wearing qualities of the rail at the joint. The selection of a suitable joint therefore narrows down to the Continuous, Weber or Atlas type. These joints, being easily applied without any special tools, have the further advantage of holding up the rails by their sole plate form. These joints are purchasable at about $3.50 per joint, and appear to be the best joints on the market to-day. They are specially designed for giving clearance space for concealed bonds. I believe for city work, in paving, joints should be 6 bolt, 26 in. long, with bolts 1 in. in diameter. The bolts need not necessarily be fitted with nut locks where the work is laid in pavement.

*Paper presented at Annual Meeting of Iowa Street & Interurban Railway Association, Sioux City, April 21-23.

TIE RODS OR BRACED TIE PLATES

With high T or girder sections, provision, other than the ties themselves, must be made for holding the rails to gage. With some roads, braced tie plates are standard, but are dependent upon the holding power of the spikes, and are therefore liable to failure. The use of tie rods spaced from 6 ft. to 7 ft. 6 in. assures the best results.

SPIKES

The standard railroad spike, 5½ in. x 9/16 in., is almost universally used. I would like to call attention to the merits of the screw-spike, especially in soft wood ties, where its holding power is far superior to that of the ordinary spike.

BONDS

It is the consensus of opinion that a satisfactory bond has not as yet been invented. Present-day practice has narrowed this question down largely to the bond with the compressed terminal, fitted to either the base or the web of the rail, to the twin terminal for application to the rail head and to the soldered or brazed bond for application to the base, web or head of rail. Each type has its merits and demerits. Personally, I believe the brazed bond gives the best results under all conditions, and insures absolute contact between copper and rail. I have not as yet lost faith in the soldered bond; we are applying these in the Tri-City construction with excellent results, all being concealed under the joint. Our bonds have very large contact areas and give us a margin of safety, should the solder not flow over the whole area. Our good results, however, are dependent upon careful installation, which in a nutshell is the secret of all successful bonding.

Whatever kind of bond is applied, its design should be such as to give a contact area, between copper and steel, of at least 13 times the cross section of the bond. Crossbonding, in city work, should occur at intervals of about 400 ft. The bonding of special track depends upon the character of the layout. No dependence should be placed upon the various pieces for the return circuit. Independent long bonds or jumper cables must span the entire job.

TIES

Steel ties of I-beam section have certain merits, especially in track work with concrete foundation. These can be purchased punched to gage, are easily installed, hold the rails firmly and furnish an excellent means of anchoring the rail to the foundation. The ordinary wood tie should be of standard size, 6 in. x 8 in. x 8 ft. long, and if untreated, of the best wood obtainable, preferably white oak. Owing to the scarcity of white oak, several softer woods are available, especially if they are treated. It will be found good practice under all circumstances to purchase creosoted ties. The treatment need not be 10 or 12 lb. per cubic foot, as in standard railway practice, but as low a treatment as 7 lb. will be found satisfactory for city track work. We have been using red oak with 7 lb. treatment. This tie costs approximately 80 cents, Davenport delivery.

The spacing of steel ties may vary from 4 ft. to 7 ft. 6 in. on centers; that of wooden ties, from 2 ft. to 4 ft., depending upon the type of construction. The writer's preference is to lay all rail with staggered joints and to have joints suspended rather than supported.

TYPE OF CONSTRUCTION

The character of the construction is entirely dependent upon local conditions, and is frequently specified by the city engineer. The most substantial form of construction, with the use of either steel or wooden ties, is secured with the solid concrete foundation. In this type, the excavation is made full width and to a depth of 4 in. or 6 in. below the base of ties. After the ties and rails are put in position and blocked up to grade, concrete is thrown in the trench and brought to proper height for forming the paving base. Where crushed stone is used for ballast the same method is pursued, the broken stone being filled to such a depth as will allow for the depth of the paving with its base. The concrete stringer construction, which is in vogue abroad and is coming into more frequent use in this country, is very suitable for light service. In this class of construction, the trench is excavated to the depth of the

paving base, after which extra excavation is made for the concrete stringer and cross cuts for ties. The concrete stringer is ordinarily made about 18 in. in width and 9 in. to 10 in. thick. The ties are embedded in concrete, and it is the writer's practice to put in the entire bulk of concrete, including the paving base, as one mass. In this class of construction it is absolutely necessary that the rail be anchored to the concrete and not allowed to work under passing wheels.

In all cases special attention must be paid to the nature of the subsoil. All bad spots must be carefully rolled or tamped, to guard against undue settlement. In our work at Davenport the relative cost of materials makes our concrete stringer construction slightly cheaper than the stone ballast. This, however, we do not recommend for very heavy service, preferring to install the solid concrete or stone ballast construction where heavy interurban cars are to be handled. Another advantage of the stone ballast construction is the fact that car service can be turned upon it immediately, whereas any concrete foundation requires about seven days for setting before it can be opened to service.

For solid concrete work, concrete made of 1 part of Portland cement, 3 parts sand, and from 6 to 9 parts of stone is suitable. The exact proportion of the stone depends on its coarseness, or, more correctly, on its voids. For the concrete stringer, concrete made of 1 part of Portland cement, 3 parts of sand and 5 to 6 parts of stone should be used. In this mixture the mortar will more than fill the voids of the stone. This, however, is desirable, as the concrete should be mushy and pack solidly under the base of the rail. Rather than specify any definite size of stone, I prefer to use the run of crusher, with dust taken out. For the paving base, proportions of 1, 3 and 9 are recommended. The use of mechanical mixers undoubtedly secures more uniform concrete than mixing by hand.

PAVING

The selection of paving materials rests principally with the city authorities. While asphalt presents the neatest appearance, it is hardly suitable for track work, as it disintegrates under vibration and water. Where asphalt must be laid, however, it is advisable to lay longitudinally, three or four courses, or a toothing course of brick, adjoining the rail. Creosoted wood block is coming into extensive use, and is a very satisfactory paving material, but somewhat expensive. With care the wooden block can be laid so that any swelling due to moisture will not affect the track gage.

All things considered, vitrified paving brick seems to afford the best material for the purpose. The use of T-rail may require special brick for forming the flange-way. Where vehicles use the railway right-of-way, these special bricks will cut out in the course of two or three years, and the pavement will become unsightly. Better workmanship can be secured by using beveled stone blocks for forming the flange-way or by using standard brick, starting the first course entirely beneath the rail head and giving the pavement the proper crown. This is satisfactory, provided the depth of wheel flange is not greater than the depth of rail head.

Before laying the paving, the space between head and base of rails, not occupied by the brick or block, should be filled with a slightly moist mixture of 1 part of cement to 9 parts of sand. If this is not made too moist, it can readily be applied with a shovel.

Whatever type of pavement is adopted, it is essential that a suitable concrete base 5 in. or 6 in. thick be provided. The wood block or brick should be laid upon a sand cushion and the joints filled with paving pitch. In the Davenport track construction, the brick joints were originally poured with cement grout. No allowances were made for expansion, and in some instances the brick has cracked. Repairs are extremely difficult under these conditions, as the brick will break rather than part at the joint. Pitch jointing has the advantage of being waterproof, provides for expansion, is less noisy than cement grout, and the brick can be torn up and relaid without much damage. With cement grout, several days must elapse to provide for setting, whereas with pitch joints traffic can be turned on within a few hours.

DRAINAGE

Track drainage is essential and depends entirely upon local conditions. Poor subsoil can frequently be made suitable by drainage, and it is advisable to install a drain at each low point in the track grade to care for surface water.

SPECIAL TRACK WORK

As indicated above for ordinary track work, only in a greater degree, the foundation for special track work must be practically perfect. I believe it to be money well spent to have a concrete base under all special track work. This base will serve for frequent renewals of the rail and special pieces. The special work itself should be the very best obtainable. The output of the three principal makers is of very good quality, and improvements are being constantly made. It should always be of solid manganese, "hard centered" or "guaranteed" construction. It may be either iron bound, in which the rolled rail is held together by a body of cast iron, or the pieces may be all cast steel. In either case the parts subjected to the most wear should be inset and renewable, if necessary. The three latest types of tongue switches, the "Wharton heelless," the "Lorain tadpole," and the "Pennsylvania steel pinless," are all an advance in design and worthy of installation. By careful designing of special track layouts, it may be possible to have the same radius for all switches and mates, and perhaps numerous frogs could be of the same angle. With this in view, the number of spare pieces carried in stock can be minimized. The question of compromise joints between special track work and the abutting rails should be given more careful consideration. One frequently finds very poor connecting joints. These should either be properly designed and installed or a piece of the abutting rail should be supplied the maker for welding to the section forming the special track work. In conclusion, city track should be well built, on solid foundation, with paving substantial, durable and pleasing to the eye, and laid with all possible economies to reduce costs, provided the economy is not carried to such an extent as to mitigate in the least the goodwill and sufferance of the public.

COMMUTER TRAFFIC COMPETITION BETWEEN STEAM AND ELECTRICITY

Evidence multiplies to show the tendency of increased electric railway facilities to decrease the service on competing steam roads in distinctly suburban territory. Practically every city and State supply examples of this kind, but it is not often that specific figures showing parallel columns of population and train service are available. Hence statistics of this kind recently presented to the Massachusetts Legislature in connection with the main line of the Boston & Maine system show that between Beverly and East Somerville, respectively 19 and 2 miles from Boston, decided reductions in train service accorded way stations have followed trolley competition in 5 recent years. At Danvers the train service decreased 13.8 per cent in face of a population increase of 20.6 per cent; at Peabody the train service fell off in the same proportion although the population gained 37.9 per cent; Swampscott had its service cut 3.9 per cent against a population gain of 70.3 per cent; Revere lost 38.1 per cent of its steam trains and gained 115.5 per cent in dwellers; Chelsea had its service reduced 25.4 per cent against a population growth of 30.3 per cent; Everett lost 19 per cent of its trains and gained 105.6 per cent in population; and at two stations the train service was entirely cut off. In practically every case successful trolley competition has been enhanced by the operation of through cars of the Boston & Northern Street Railway Company into the Sullivan Square elevated terminal or into the Scollay Square loop of the Boston subway, and there is no question that the expanding suburban service of the Boston Elevated Railway Company has influenced the situation. On the west of Boston a curious example of the effect of street car competition is afforded by the Boston & Albany station at Cot-

tage Farm, 3 miles from the South Station, in the Longwood district of Brookline. Not a train stops at this station from Boston until about 11.30 a. m., and the last train stopping leaves the city at 6.35 p. m. This station is barely outside the Back Bay district. At Allston, 4 miles out, the frequent trolley service has been followed by a gap of nearly ¾ hour between trains on the steam road in the evening rush period.

MEETING OF THE COMMITTEE ON SHOP ACCOUNTING

On April 14, there was held at the headquarters of the American Street & Interurban Railway Association in New York a meeting of the joint committee on shop accounting containing three members from each of the Engineering and Accountants associations. Those present were John Lindall, superintendent of rolling stock and shops, Boston Elevated Railway Company, N. E. Stubbs, auditor of the United Railways & Electric Company of Baltimore, Charles Hewitt, superintendent of motive power, Philadelphia Rapid Transit Company, and P. S. Young, comptroller of the Public Service Railway Company, Newark, N. J. Owing to the resignation of W. G. Gove, superintendent of equipment, Brooklyn Rapid Transit Company, as chairman, the meeting was to have been held under the direction of the new chairman, A. D. McWhorter, master mechanic of the Memphis Street Railway Company. Mr. McWhorter, however, found it impossible to be in New York for this meeting and in consequence, the direction of affairs was turned over to Mr. Young. In addition to the members of the committee as named, there were also present H. H. Adams, superintendent of rolling stock and shops of the Metropolitan Street Railway Company, and M. R. Boylan, general auditor of the Public Service Railway Company.

Referring to the previous meetings of the committee, Mr. Hewitt said that the plan had been for Messrs. Gove, Lindall and Hewitt to submit individual detailed reports on the subjects of track, shop and power respectively. The idea in the committee's mind was to work up some kind of a cost system that would give the engineers information which is not furnished by the standard system of accounting without, however, interfering with that classification. Mr. Lindall agreed with this idea and submitted a tentative division of the various items which came under shop work, showing how they could form proper subdivisions of the standard classification. He suggested the 1,000-ton mile basis as the most practicable for comparison, but said that a knowledge of the age of equipment is also essential. There was some discussion among the members of the committee on the advisability of separating the results secured with revenue and non-revenue cars which did not carry passengers.

Mr. Young said that his idea of the committee's work was that it should develop a system of keeping cost accounts of a character not necessarily to be shown in reports to any commissions. He thought that the work of the committee should be a development of that done by the joint committee of the Engineering and Accountants Associations on blanks for shop records and accounts as presented at the St. Louis convention in 1904.

Mr. Adams explained that his method of getting shop costs of certain details interfered in no way with the account numbers of the auditing organization. When he desired to know the cost of a certain motor detail, for instance, he made a job number under the proper account number and eventually the job number item was charged to the proper heading by the auditor upon advice from the mechanical department. Mr. Hewitt thought it would be practically impossible to bring about any changes in the existing primary accounts, but it seemed to him that certain of the items were now illogically arranged. Thus fuel, which is the most important item under power, is the fourth or fifth account, while the wage item is the first on the list. Lubricants also were given a separate subdivision account instead of being placed under supplies, although the lubrication only amounted to a fraction of 1 per cent. Mr. Young believed that if an attempt were made to arrange the items in the order of their importance, it would upset a great deal of the work that had been done in the past. It developed during the discussion that in the Public Service shops the men make up their own time accounts.

The committee then took up the matter of subdivisions of various primary account numbers as presented in the final pamphlet of the Accountants' Association. Mr. Hewitt suggested the further subdivision of account No. 30 on power plant equipment as follows: (1) boiler repairs; (2) engine repairs; (3) electric repairs, including the generators and generator parts, cables, switches and other items as mentioned in the classification; (4) miscellaneous machinery repairs. He said that boiler cleaning is now sometimes charged to operation and sometimes charged to maintenance. He charged it to maintenance as he thought that removing scale from a boiler was as much a matter of maintenance as replacing the tubes. Boiler compound was charged by him into maintenance as a special cost, but ordinarily he charged boiler compound to miscellaneous supplies and operation. Another suggestion made by Mr. Hewitt was the subdivision of fuels into hard and soft coal, crude oil, natural gas, etc. He did not think it necessary to keep separate accounts for individual batteries or types of boilers. His company operated fire tube and water tube boilers of five different manufacturers and there was not enough difference in the unit cost to warrant such a subdivision. He had found it desirable, however, to separate boiler repairs into cleaning and setting, as this made it possible to trace unusual expenses under certain items, but probably such a division would not be necessary for companies operating only one power house. He did not think that flue costs and stack costs should be included with the boiler costs. They were not very large items and were misleading as to the proper cost of boiler maintenance. Feed water heaters and economizers would be placed by him under miscellaneous machinery as the charges against them were not continuous enough to warrant separation. This was true of other auxiliaries.

Mr. Young then read a portion of the 1904 joint report with reference to a system of shop records and accounts. In this connection, Mr. Hewitt said that he had worked out a form of flexible time card covering the division of repair work, as many of his men worked for fractions of a day in different places. The impulse for getting up a card of this kind was due to a discussion on time cards at the previous meeting of the committee. He promised to bring a copy of the card to the next meeting.

The committee then discussed in detail the schedule presented by Mr. Lindall. One of the changes made in the schedule was to use the word "superintendence" in connection with equipment rather than titles which are not the same in different companies for the identical work. Another change was the addition of steam locomotive costs to electric locomotive costs owing to the fact that quite a number of electric railways use steam locomotives for shifting purposes, handling freight, etc.

After some further discussion of Mr. Lindall's report, it was decided that copies of it should be sent to the committee members together with copies of the power and track reports of Messrs. Hewitt and Gove. The individual members, therefore, will have an opportunity to study these proposed subdivisions beforehand and be ready to discuss them in full at the next meeting, which will be held at the Association headquarters on April 29.

The Compagnie Generale de Railways et d'Electricité of Brussels, in its annual report for 1909, announces that the Cairo Electric Railways and the Heliopolis Oases Company have almost completed their 5-mile railway between Cairo and Heliopolis. The power station, which is located on the Nile River at Choubrah, has a capacity of 10,000 hp. The plant has been completed, and the electrical equipment is being tested. The cars are being built in the shops at Heliopolis.

PRIZE ESSAYS ON ACCIDENT PREVENTION ON THE ILLINOIS TRACTION SYSTEM

The Illinois Traction Co. recently offered a series of three prizes of $10, $5 and $2.50, respectively, for essays on the best methods of preventing accidents. The contest was open to all trainmen on the interurban lines of the company. Digests of those contributions receiving the prizes are presented herewith. They were handed to the general superintendent of interurban lines, C. F. Handshy, signed by assumed names, and the awards were made Apr. 16. The judges were H. C. Dillon, J. H. Manning and George W. Black, all assistant attorneys in the legal department of the Illinois Traction System.

FIRST PRIZE ESSAY

Although thousands of dollars are expended for appliances to reduce accidents, they still occur. Someone blunders and there is loss of life, suffering, and great expense to the company, together with a loss of its reputation for safety. As we are interested in electric railways we shall deal with them alone.

The two men who directly operate a train, the conductor and motorman, must both be cool-headed, careful and understand all their duties, and they must work in harmony, as no two forces pulling in opposite directions will be successful. Each man should understand all the different equipment, because a man who is thoroughly familiar with the mechanism of his car and his duties, will be more apt to avoid an accident than the man who takes just enough interest in his work to be able to receive his pay. When a man in the employ of an electric system is called for duty, he should cast all other thoughts from his mind and attend strictly to business. He may have unlimited ability, but if his mind is elsewhere he will not successfully avoid accidents.

The motorman, in the majority of cases, is responsible for the accidents. He should make a careful study of the air brakes, be on the lookout for open switches, and when approaching a meeting point should always try his air a short distance back from the switch to see that the brakes are working properly. He should also carefully examine his car before going out on the road. He should not be contented with the instructions he receives from his superiors, but should strive to learn everything it is possible for him to know with regard to the operation of his train. Having that knowledge and interest he will be more prepared to avoid accidents, and in case one should happen he will know what to do, and how to do it, so that the best interests of the company may be served.

When the motorman starts out on his trip he should calculate the weight of his train, the condition of the track and rails, and of the machinery on his car so that he may know at what rate of speed he can safely run his train and avoid any mishap. To examine his train thoroughly before starting out, he should be on duty at least 30 minutes before the time of departure.

The motorman should never forget to whistle at all whistling boards, and when approaching a road crossing he should whistle in such a way that he will make a continuous sound from the whistling board right up to the crossing.

When approaching a derail he should try the air brake far enough back from the derail, calculating the weight of train, condition of rails and the grade, so in case of failure of the air brake he would have a chance of stopping with the hand brake. He should watch his time card to know just what time he is due at certain sidings and meeting points, and in case he should become 10 minutes late he should call the dispatcher so that the latter may have a chance of keeping the other trains on schedule time. When going in on a siding for trains to pass, he should see that the switch is properly opened and closed, and should not move his train until he is certain the switch is properly lined up.

Before starting on his run the conductor should be certain that the train is provided with the proper flags and fuses, have his lanterns filled and in proper working order before going out on the road, and if the weather is cold, should see that the car is warm and comfortable and has enough fuel for the trip. He should make sure that his passengers are on the right train.

When the car passes over tongue switches he should be on the ground watching the trucks so that if the switch point flies over he can signal the motorman to stop in time to avoid splitting the switch and doing damage to the track and equipment. When stopping to discharge passengers he should alight from his train first and remain near the steps of the car to assist passengers off the car, and when all passengers are off assist those who desire to get on, and then follow the last one to prevent him falling when the car starts up.

The conductor should not forget to be polite and considerate in his intercourse with the public at all times and to look after the welfare and comfort of the passengers. He should occasionally walk up and down the aisle to see that all are comfortable and that no one puts some heavy parcel in the overhead rack where it is liable to fall and hit someone. If there are little children on the train he must see that they do not run up and down the aisle nor get hurt in any way. He should follow the rules absolutely in regard to the taking of train orders, be very careful in the receipt and reading of them and then put them in some place where they will not be forgotten. He should not stand on the lever-derail when it has been turned down, as he might lose his balance before the hind wheels are over. It is better to hold the lever down. On taking a siding after opening the switch the conductor should hang the lock in the switch, and when car is in the clear should give the proper signal for the approaching train.

Never act in haste while on duty. Be self-reliant and responsible; use your best judgment in all things.

SECOND PRIZE ESSAY.

When we roll out of the terminal at the beginning of our run we have thousands of dollars of our employer's property in our hands, as well as the lives of the traveling public. We should bear these facts in our minds and should crowd out all thoughts antagonistic to our work. An overlook, or a lapse of memory, ofttimes for only a moment, and the harm is done; after that, no amount of mental anguish can repair the damage.

The first requirement of every railroad man should be a clean life. No man, who has spent his time, previous to starting out on his run, in drunkenness and dissipation can give satisfactory service on the road, nor can he be depended upon to handle his train safely. The employee should also study the rules of the company, not to be able to repeat them "poll parrot" fashion, but so as to act according to them in case of necessity. He should school his mind to act quickly. There may be places suited to a sluggish mind, but they are not in the train service.

Self-reliance is another requirement. Caution is of sterling virtue, but should not be practiced to the point of cowardice.

After an accident does occur never discuss its probable cause or result, nor place the blame, for by so doing the reputation of an innocent person may be tarnished. We should do all we can to alleviate suffering, should any person be injured, and never lose sight of the fact that while in uniform we represent the company which gives us employment, and whose standard of efficiency is often judged by our conduct.

THIRD PRIZE ESSAY.

Employees of a railroad are, at all times, both in the discharge of their duties as employees and as citizens, under the constant view of the public. Failure to be efficient as employees or valuable as citizens in the community brings reproach upon them and the company with which they are connected. Nearly all accidents can be attributed to someone's carelessness. The man who has a habit of doing his work right at all times, no matter how long it takes, is the safe man, but the man who doesn't care how the work is done so long as he gets through with it makes trouble for all.

Conductors, don't allow your trains to be backed unless you

are at the rear end, because someone should always be there to give signals to the motorman and warn people of the danger. Don't allow your motorman to back out of a siding until he gets a signal, either hand, lamp, or bell signal. Give proper signals. Do not whistle or halloo; anyone may do that and move your train when you don't want it moved. Warn passengers to stay on the car at meeting or passing points or unusual stops as they may step in front of the passing cars. Don't hurry when taking train orders. Don't hurry when flagging a railroad crossing. Look both ways on all tracks, before giving the motorman a signal to proceed. Don't try to put your part of the responsibility on others. no matter how much experience they have had or how careful they are, as they will not be held responsible in case an accident should happen. Don't carry old orders that have been executed. They are dangerous. When your motorman whistles out a flag don't go up to the front end to find out what the trouble is; get back with danger signals, as something may hit you while you are finding what is wrong. Stay out until called in by the motorman and leave a fusee out to protect yourself going in. When protecting the rear end of your train you can't go too far back. When a switch is thrown the points should always be examined to know that they fit up properly. It takes a little more time, but it may save time and money afterwards.

If the employees are loyal and true to the company's interests the company will be loyal to them in time of trial. Make all company business private business. Be on the lookout for things that might happen and cause an accident and do something, if possible, to prevent it, and no bad results will follow.

CONVENTION OF THE MISSOURI ELECTRIC, GAS, STREET RAILWAY & WATER WORKS ASSOCIATION

The fourth annual convention of the Missouri Electric, Gas, Street Railway and Water-Works Association was held at the Madison Hotel, Jefferson City, Mo., April 14, 15 and 16. The total registration was more than 60, central-station and electrical delegates being in the majority among the operating men. The first session was called to order Thursday afternoon, April 14, the delegates being welcomed to Jefferson City by Mayor Heinrichs. The first paper on the program was on "The Luminous-Arc Rectifier System" by Louis Friedman, of the Chicago office, General Electric Company. J. E. Harsh then read a paper on "Securing Profitable Day Load." Thursday evening was devoted to the annual smoker.

The Friday session opened with Charles S. Lewis' paper on "Condensers for Small Central Stations." Mr. Lewis advocated the greater use of condensing plants by the smaller central stations. This paper was illustrated with sketches of the various types of condensers described. P. A. Bertrand mentioned a surface-type condenser in which the cooling water is sprayed on the condenser coils, from which it is evaporated by fan draft, the latent heat of evaporation thus rendering a relatively small amount of water sufficient. C. C. Barnard explained that with a crude condenser system which he has installed a saving of 35 per cent per month in the water bill (at 20 cents per 1000 gal.) is effected, while a 25 per cent decrease in the coal consumption has been noted, although the latter may be partially due to a new engine and improved operating methods. However, the condenser has rendered 25 per cent more engine capacity available. The pumps for this condensing system are maintained at considerable expense, and the city hydrant water, sometimes 80 deg. Fahr. in summer, must be taken through a cooling tower before use. In answer to the question of P. W. Markham as to whether a condenser could be advantageously installed in a plant where coal costs $1.50 per ton, P. A. Bertrand declared that since in any case equivalent condenser capacity is cheaper than engine capacity, the former should be considered when augmenting plant. Prof. H. B. Shaw told of a series of practical problems given his students in Missouri State University by which they were asked to obtain the total annual costs of engines of different sizes and types, including all fixed charges, interest, etc., with various prices of coal. The results of all these studies invariably show condensing equipment to be cheaper than all other types, although this consideration does not include cost of attention. Professor Shaw also declared that as the cost of turbine units decreases very rapidly at about the 500-kw size, this type of machine should receive more attention in the choice of prime movers for small stations.

An appropriate talk was made by Governor Hadley, of Missouri, who presented to the public-utility operators his views of the present and proposed Missouri public-service commission laws. He explained how the present Missouri law permits each municipality to appoint a local public-service commission which has the power to investigate the workings of companies in its territory, but can only recommend its findings to the local councils, having no power to enforce its rulings. Thus encumbered the work of the commission is not effective, the enforcement of its findings returns to political circles and the companies investigated are often subjected to considerable annoyance without result. Governor Hadley favors a State commission with powers comparatively similar to those of Wisconsin and New York, its members to be composed of technically qualified experts whose opinions will be weighted with sufficient authority to make them acceptable to both companies and public. The idea of such a State-wide commission seemed to take favorably with the members of the convention, and several requested the Governor to advise them of ways to assist in securing the passage of a bill creating such a commission by the next Legislature. Governor Hadley declared that he would appreciate any individual or co-operate aid in obtaining this commission for Missouri. Following the Governor's talk, Secretary C. L. Clary explained how his company had recently undergone an investigation by the local commission, which. probably through its ignorance of the electrical business, had settled upon rates so ruinous that operation would have been impossible.

Following a paper on "Vertical Gas Retorts," by S. Watts, H. W. Clark submitted a description of his electrically driven water-works plant at Mattoon, Ill.

"Questions of Public-Service Plant Operation and Management" was the title of a paper on the electricity supply business by George McCullum, an attorney for the central-station interests of Springfield, Mo. The convention banquet was held in the hotel parlors Friday evening.

Saturday morning's session was opened with the reading of Prof. H. B. Shaw's paper, "Data on Electric Plants," which was followed by a paper on "The American Diesel Oil Engine in Public Service" by Edwin S. Harrison. This type of internal-combustion oil engine possesses marked economy of operation and will operate at from one-half to its full rated load with a fuel consumption of from 6.5 gal. to 8 gal. of oil per hour. This fuel costs from 2 cents to 3 cents per gallon, delivered, producing a kw-hour at the switchboard for from 0.375 cent to 0.3 cent, including all operating costs. The simplicity of fuel supply, which is controlled automatically by the engine governor, and the avoidance of coal and ash handling were pointed out as important advantages of the Diesel engine. This engine is claimed to have a net efficiency of about 32 per cent—twice that of the producer-gas outfit and almost three times that of the best steam plants. The cost of Diesel equipment, however, is about $70 or $80 per horse-power, including all equipment up to the generator. P. A. Bertrand brought out the point that owing to the inability of internal-combustion engines to carry overloads, the engine capacities of such outfits must be figured large enough to carry the generator overload for emergency service. C. L. Clary thought that with the low power-factors often encountered, engine sizes were usually chosen too high, so that the generators frequently became overloaded with extra-phase current, while their prime movers were yet only partially loaded. Mr. Bertrand showed that the installation of oil engines in place of his present steam plant would have cost five times as much, although Mr. Harrison assured him that the saving in buildings and in other

accessories would greatly reduce this ratio. He also called attention to the sustained efficiency and extremely low operating cost of the Diesel engine over a wide range of loads within its rating.

The election of officers and executive committee for 1910 resulted in the following: R. J. Irvine, Marshall, Mo., president; F. E. Murray, Louisiana, Mo., P. A. Bertrand, Jefferson City, Mo., and J. E. Harsh, Joplin, Mo., vice-presidents; and N. J. Cunningham, Springfield, Mo., secretary and treasurer. The executive committee comprises P. J. M. Loewe, Moberly, Mo.; S. E. Bronson, Ozark, Mo.; Herman Spoehrer, St. Louis, Mo., and Percy W. Markham, Brookfield, Mo. The next meeting of the association, on the invitation of Herman Spoehrer, secretary and treasurer of the Union Electric Light & Power Company, St. Louis, will be held at St. Louis, in April, 1911.

STATISTICS OF NEW YORK CITY RAILWAYS

Statistics of a number of electric railway companies in New York City for the year ended June 30, 1909, have been made public by the Public Service Commission of New York, First District. They appear in the table on this page.

STATISTICS OF EIGHT ELECTRIC RAILWAY COMPANIES IN NEW YORK CITY FOR YEAR ENDED JUNE 30, 1909

Year Ended June 30, 1909	Interborough Rapid Transit Company			Union Railway Company	Hudson & Manhattan R. R. Co.	Coney Island & Brooklyn R. R. Co.	Dry Dock, E. Broadway & Battery R. R.	Third Avenue R. R.	Forty-Second St., Manhattanville & St. Nicholas Ave. Ry. Co.	Central Park, North & East River R. R. Co.
	Subway Division	Elevated Division	Total							
Miles of road operated	25.63	37.68	63.31	54.38	3.31	24.136	15.39	16.97	11.41	12.80
Miles of track operated	81.94	118.05	199.99	108.72	6.80	48.75	24.16	35.14	23.05	27.043
Average number of passenger cars operated	613	1,274	1,887	270	45	157	47	181	99	56
No. of passenger car trips during year	1,744,475	3,543,424	5,287,899	992,110	279,198	474,154	304,131	475,081	428,255	292,304
No. of passenger car hours during year	2,568,105	4 148,274	6,716,379	1,106,147	110,888	753,738	317,368	980,799	546,943	(No record)
No. of passenger car miles during year	46,220,888	62,519,959	108,740,847	9,319,844	1,700,902	6,383,698	1,896,216	6,996,588	3,661,116	1,840,042
No. of passengers carried at 5 cents	237,451,171	275,737,974	513,189,145	37,712,596	14,192,352	27,880,446	10,839,730	45,115 175	24,121,915	9,763,346
No. of passengers carried at other rates	978,975	512,222	1,491,197	0	0	2,510,372	0	0	0	0
Total amount of fares	$11,911,717.55	$13,807,387.58	$25,719,105.13	$1,885,629.80	$709,617.60	*$1,466,167.17	$541,986.50	$2,255,758.75	$1,206,095.75	$488,167.30
Average per revenue car mile—cents	25.77	22.05	23.63	20.23	41.72	23	28.58	32.25	32.94	26.53
Number of transfers collected	.....	.....	(No record)	14,895,135	0	6,255,171	†3,074 043	5,772,237	5,226,797	634,436
Passengers carried free	.....	.....	(No record)	(No record)	(No record)	465,815	(No record)	(No record)	(No record)	(No record)
Total revenue car-miles	46,220,888	62,612,507	108,833,395	9,327,753	1,700,902	6,383,698	1,896,216	6,998,375	3,661,116	1,849,707
Non-revenue car miles	543,001	395,909	938,910	28,028	50,711	33,060	3,987	7,977	3,989	.....
Income Account (a)										
Total revenue from transportation	$11,917,313.00	$13,858,079.44	$25,775,392.44	$1,892,443.08	$709,617.60	$1,466,167.17	$541,986.50	$2,257,815.51	$1,206,095.75	$488,167.30
Advertising, privileges, etc	204,791.64	250,751.36	455,543.00	28,650.00	33,944.96	11,539.04	7,200.00	25,250.00	24,000.00	13,142.89
Sale of power	68,242.30	192,250.95	260,493.25	265.64	.....	.....	.....	1,127,654.12	.....	.....
Rent of yards, land, etc	.....	31,393.99	31,393.99	.....	.....	1,467.10	78,827.43	165,865.95	5,025.00	10,979.95
Miscellaneous	653.58	917.86	1,571.44	.....	138.76	.....	1,665.74	.....	5,462.00	464.66
Total revenue from st. ry. operations	$12,191,000.52	$14,333,393.60	$26,524,394.12	$1,921,358.72	$743,701.32	$1,479,173.31	$629,679.67	$3,576,585.58	$1,240,582.75	$512,754.80
Maintenance of way and structures	$603,335.08	$839,306.44	$1,442,641.52	$120,087.65	$100,577.00	$50,813.52	$24,132.86	$184,347.41	$75,364.55	$11,234.78
Maintenance of equipm't	776,204.75	832,614.03	1,608,818.78	155.818.17	42,669.45	79,096.69	15,729.57	466,529.87	478.43	28,933.09
Operation of power plant	1,092,233.61	1,083,717.23	2,175,950.84	320,703.63	182,680.98	205,734.44	x87,881.24	(b) 880,194.70	x171,915.47	‡178,496.42
Operation of cars	1,614,947.81	2,704,175.53	4,319,123.34	614,914.53	146,028.30	427,552.37	223,181.04	564,831.80	425,617.20	172,311.77
General expenses	460,898.79	740,009.93	1,200,908.12	212,652.38	58,391.75	244,088.60	93,804.50	280,545.76	112,769.28	31,047.31
Total expenses of st ry. operations	$4,547,620.04	$6,199,823.16	$10,747,443.20	$1,424,176.36	$530.347,48	$1,007,285.62	$444,729.21	$2,386,449.54	$786,144.93	$422,023.37

*Including chartered car earnings. xIncluding horse power—revenue car service. †Including stable supplies and expenses (horse car service).

INTERNATIONAL ASSOCIATION NOTES

P. T. Serstevens, secretary of the International Street & Interurban Railway Association, has announced an addition to the program of the convention of the association which will be held in Brussels on Sept. 6 to 11. This is a report on the best methods of cleaning grooved rails and will be presented by Mr. Schorling, chief engineer of the Hanover tramways. C. H. Julius, manager of the Haarlem Electric Tramways Company, has found it impossible to prepare the report which was referred to him on auxiliary car equipment parts, and this subject has been assigned to Mr. Stahl, manager of the Düsseldorf municipal tramsways.

The head office of the association and of the secretary has been moved in Brussels from Rue des Colonies 6 to Avenue de la Toison d'Or 15.

WHY STREET RAILWAY FARES SHOULD NOT BE LOWERED*

BY L. D. MATHES, GENERAL MANAGER UNION ELECTRIC CO., DUBUQUE.

Back in the "stone age" when urban transportation consisted of a light animal-drawn vehicle operated on strap rail, which was attached to fence post ties at 4 ft. and 5 ft. centers, the 5-cent piece was generally adopted as reasonable exchange for the service rendered. The horse car lines at the adoption of this rate of fare provided its patrons with a ride of 2 or 3, and in no known instance an excess of 4 miles. With the wonderful development of the population of American cities and suburbs, and incidentally the cultivation of the art of electric railway construction, we have noted many instances where with the uniform 5-cent fare the companies are providing 10, 15 and 20 miles of transportation, which means an income ranging as low as one-quarter cent per mile.

Edwin S. Webster, the eminent Boston authority, in a recent expression is quoted as follows: "The problem of securing an adequate revenue from passenger fares appears to be the most serious issue now confronting the electric railway industry." This problem is particularly pronounced as with the flood-tide increase of recent years involved in the cost of providing a transportation system and the operation and maintenance of same, finds us with a unit of individual fare income which is sadly shrunken in its purchasing power; though in the hands of the public this medium of exchange purchases from two to ten times the quantity of transportation as when it was originally adopted as a just and equitable price.

It is unnecessary to dwell on the increase in the costs incident to the conduct of our business. Over a period of ten years these increases range in groups, or classes, from 25 per cent to 100 per cent. The public often advances the argument that with the adoption of larger and heavier cars which are capable of more pronounced acceleration and a greater average speed, we increase our carrying and consequent earning capacity. Against this pretty theory we have the ever

*Paper presented at annual meeting of Iowa Street & Interurban Railway Association, Sioux City, April 21-23.

constant factor of obsolescence—that terrible four-headed steel tusked monster, which like DeWolf Hopper's elephant, constantly wants more hay, but in this case he wants more old cars and trucks, and motors, and rails, and ties, and poles, and boilers, and compound engines, and other faded hot-house delicacies, for which the deluded stockholder has in the comparatively recent past paid long prices.

There is not, in my opinion, a universal or even a general demand for the reduction of urban fares—that is, a direct reduction such as would hold in making the fare 3 cents or 4 cents rather than our present 5-cent fare. The demand is there, however, though present in a different form. It comes through municipalities demanding an extension of the already over-burdened and abused transfer system, of demands that street railway companies pave more and more of the streets, that companies will sprinkle the streets, that the companies will be taxed on their stock as well as personal property, that frequent headway be maintained on lines which penetrate unprofitable territory, that an all-night service be provided even though it means an actual loss to the company, that in some instances a percentage of the gross receipts be given to the city for the maintenance of its park system, or other purposes.

At the last National convention at Denver James H. McGraw advocated publicity, that the companies should take the public in on the ground floor on the problems incident to operation and the costs involved in providing the service. This appears to be the only salvation of the situation, the policy which if properly handled will win the fair-minded consideration of the public and curtail to some extent, at least, the constantly increasing flow of demands on the operating companies. The public gives little thought to the enormous increase of taxable value as brought about through the extension of street railway lines into barren territory. The people have not been generally informed that transporting to their homes the residents of these newly created suburban districts means increasing the long haul and a decrease of the short haul, the former in many cases being conducted at a loss and the elimination of the latter meaning the throttling of the only profitable portion of the business.

If through a cultivation of the public mind it can be generally shown that taxation is excessive, that the conditions of franchise involve the payment by the company for much which the taxpayer would be taxed for if the company did not exist, that a low income per mile operated means inferior service, much will be done to the end that there will be a lessened reduction of our fares or income, thereby directly contributing to the combating of the reduction of fares.

To summarize—street railway fares should not be lowered for the following reasons: First, the 5-cent piece in the hands of the purchaser assumes a greater purchasing power through the longer rides and superior accommodation afforded by the company. Second, the 5-cent piece in the hands of the company has a constantly lessened purchasing power through the greatly increased costs of labor, material, and equipment required to provide the service demanded by an exacting public. Third, the never-satisfied demands of municipalities involving assumption by the utility companies of increased burden in the way of taxation, street improvement, expansion of free transfer system, etc. Fourth, the attitude of the public in advocating short term franchises, thereby prohibiting the companies from affording to the purchasers of its securities the creation from profits of a sinking fund of ample proportion to protect the security holders upon the expiration of the short term franchise.

In my opinion there will be no country-wide crusade for the reduction of the 5-cent fare, but there will be a continuation of exactions and demands, in the consummation of which the company will suffer an increase in the cost of providing the service thereby creating a deduction from the possible profit per passenger transaction.

From my point of view the most effective method of protecting the operating companies from conducting their business with little or no profit will be to follow the lines recommended by Mr. McGraw. In the centers of population within the confines of our own State this is a matter which can be more readily and effectively handled than in the larger cities where the companies are not enabled to come so closely in touch with their patrons.

HEARING ON FENDERS AND WHEELGUARDS

A hearing was held before Milo R. Maltbie, of the Public Service Commission of the First District of New York, on March 31, 1910, on the question of the use of fenders and wheelguards on the cars of the Yonkers Railroad in the Borough of the Bronx, New York. H. H. Whitman represented the commission as counsel and Leverett F. Crumb represented Leslie Sutherland, receiver of the Yonkers Railroad.

Mr. Sutherland said that since his appointment as receiver of the company he had observed the operation of the projecting fender, and that his former impression that projecting fenders frequently caused accidents was confirmed and that the advantages of a projecting fender were very problematical. He cited a number of places on the Yonkers Railroad in substantiation of his objections. The H. B. wheelguard particularly fulfilled the good offices of the projecting fender. Mr. Sutherland did not want to be understood as opposing the use of the fender. He thought that if the company could not have wheelguards it ought to have fenders.

James A. Roosevelt, general superintendent of the Third Avenue Railroad, said that people were very apt to trip over projecting fenders; that they frequently tipped wagons over; that they very often injured people who were prone on the track and that there was more room for a motorman to stop a car if it was not equipped with a fender. Fenders took up room in the car house even when folded, were particularly liable to be damaged and frequently interfered with mechanics in the shops. A wheelguard filled all the offices of a fender. During the 18 months that the cars of the Third Avenue Railroad carried wheelguards between 30 and 40 people had been picked up.

John S. McWhirter, superintendent of equipment of the Third Avenue Railroad, said that he had had experience with, perhaps, a dozen different types of fenders, and recited the objections to fenders instanced by both Mr. Sutherland and Mr. Roosevelt. Since the wheelguards had been in use on the Third Avenue Railroad Mr. McWhirter had not been in the transportation department, but he received all the reports of the operation of the apparatus in service and felt that a wheelguard would meet all the requirements of a projecting fender. Mr. McWhirter said that once when he was running a car at about 2 m.p.h. he had struck a man. Despite the fact that the car was under control the fender tripped the man, and when the car was stopped the fender was lying on top of the man, who fortunately was not injured. No case of persons being picked up by fenders had come under his personal observation. It cost approximately $4,000 a year to keep wheelguards in repair on 325 cars on the Third Avenue Railroad.

George J. Murphy, superintendent of the Yonkers Railroad, agreed with the conclusions of Mr. Roosevelt and Mr. McWhirter.

Mr. Crumb said that since Jan. 18, 1908, he had been counsel for the receiver of the Yonkers Railroad in direct charge of the claim department and that all accidents had been reported to him. At the request of the persons interested, he had given more attention to accidents than was ordinarily done by an attorney in charge of a railroad, and had compiled a list of accidents during 1908 and 1909 on the Yonkers Railroad which had been caused by projecting fenders. The list in 1909 showed that 48 and that of 1908 showed 29. All these accidents would have been avoided if there had been no fenders. In two years Mr. Crumb had knowledge of only one case where a person had been picked up by a fender.

The hearing was then adjourned for a week to give the company additional time in which to submit any evidence which might occur to it as being relevant, but on April 7, 1910, the hearing was closed without additional evidence being offered.

BRIGHTON CLUBHOUSE AND EMPLOYEES PROTECTIVE ASSOCIATION OF THE CINCINNATI TRACTION COMPANY

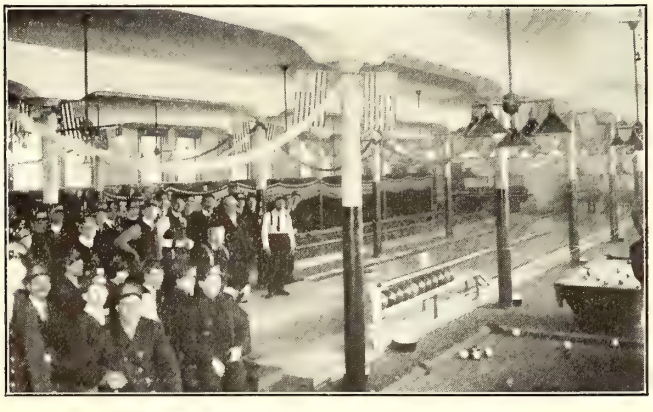
The Cincinnati Traction Company has recently opened to its employees a large, fully equipped clubhouse. Views are reproduced of the exterior of this building and of the bowling alley and the auditorium. The building is a brick structure located at a division headquarters. It is occupied by the 400 men of the Brighton and Avenue divisions. The first floor of the structure is subdivided into an amusement room, toilet and bathrooms and division headquarters offices. On this floor are four bowling alleys, two pool tables, four tables used for making out reports, 300 steel clothes lockers, manufactured by Merritt &



Clubhouse for Cincinnati Traction Company's Employees

Company, three marble shower baths and four rows of raised seats from which bowling games may be watched. The bowling alleys are cared for by a charge of 2½ cents per person for each game. Six pin boys tend the bowling alleys and are paid, one at $8 and five at $6 per week.

The upper floor of the clubhouse is subdivided into an assembly hall reading-room and an office for the secretary of the association maintained by the employees. The assembly-room shown will seat an audience of 900. One hundred solid oak chairs are usually available for small regular meetings, but 600 folding chairs for use at large gatherings are kept under the large raised platform. Short exits to ground are provided by



Bowling Alleys in the Clubhouse

four doors leading to fire escapes and a broad stairway leading to the first floor. The assembly hall has an oak floor finished for dancing. The entire building is wired in conduit and is brilliantly illuminated by tungsten lamps.

WORK OF MUTUAL PROTECTIVE ASSOCIATION

The Mutual Protective Association of the street railway employees at Cincinnati, has just issued the reports of its president and secretary for 1909, the twenty-second year of the organization's existence. The report of the secretary, which is included in the pamphlet, shows cash on hand and securities to the amount of $45,871.65. In the past six years the association has paid out $63,885 in sick benefits and $48,725 in death benefits and has accumulated a surplus. The dues of the association are $3 a year payable in January, May and September. On the death of a member the heirs are paid $800. If there is not that much in the death fund, which is a separate fund from that realized from the association dues, each member is assessed $1. The membership now includes about 1900 men.

A survey of the results according to this plan shows that the actual cost per week for insurance against sickness or death, has been 11 cents. The organization maintains a paid secretary with offices in the Brighton clubhouse.

A review of the benefits paid during the past year may be of interest. The 257 members who drew sick benefits received



Auditorium of the Cincinnati Clubhouse

in the one year 80 per cent of all that they had paid into the association during their entire membership. The men received on an average $33.13 in sick benefits and had paid into the association since initiation an average of $40.90 each. A table accompanying the report shows the death benefits paid the families of six members during 1909. These men altogether paid into the fund $238.50 and they or their families received from it in sick benefits and death claims $5,321.

If a man leaves the service he can withdraw one-half of the amount he has paid in, providing he has not received sick benefits. Membership in the association is limited to platform, shop and roadway employees of the rank and file only.

The association has an agreement with W. Kesley Schoepf as president of the Cincinnati Traction Company, which in brief, states that whenever the association accumulates an additional $20,000 in its treasury, the company will give the association $5,000.

DEED AND CONTRACT RECORD

A loose-leaf form for a record of deeds and contracts has been adopted by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company. Until this form was adopted, the company had not had a permanent record for copies of documents of this character. The original deeds are filed in vaults, but for all purposes of reference the book adopted by Mr. Hixson is now used.

The form for this record is 14¾ in. by 11¾ in. It contains a complete copy of the instrument, a number corresponding with one given by the engineer of the company and shown on his map, a summary of the main facts, the date on which the original was recorded and the initials of the employee who made the copy and the one who checked the copy with the original. The number on the record corresponds also with that placed on the original deed.

All the information on the record is typewritten. In making the deed and contract record, two carbon copies are prepared, one of which is on thin paper and is used for the file in the engineer's department. Two copies are kept in the auditor's department. The original copy is filed geographically according to the location of the property on the line and one carbon copy is filed alphabetically.

PHILADELPHIA STRIKE DECLARED OFF

At a meeting of the former employees of the Philadelphia (Pa.) Rapid Transit Company on April 16, 1910, it was decided to determine by secret ballot on April 17, 1910, whether to return to work under substantially the same terms offered by the company through Mayor Reyburn on March 21, 1910. As a result of this vote the executive committee representing the men adopted a resolution on the evening of April 17, declaring the strike at an end and ordering the men to return to work. The resolution of the executive committee follows:

"Resolved, That sincerely believing that the best interests of the Philadelphia carmen are served by acceptance of the proposition given us by International Chairman C. O. Pratt, who represented us while on strike, and after carefully weighing the circumstances involved in our situation, and the lack of decisive authority (the slim majority) in the referendum of our membership taken to-day and last night, and after consulting the National Board at Detroit, we, the local Executive Board of Division 477 of the Amalgamated Association of Street Electric Railway Employees of America, hereby direct that our members on strike return to work."

The terms of settlement offered by the company through Mayor Reyburn on March 21 were later embodied in a set of rules to govern the employees in the future. These rules, which are the basis under which the men will be reinstated, were advertised in the newspapers in Philadelphia on April 5 and 6, and were reproduced in the Electric Railway Journal of April 9, 1910, page 671.

The following letter addressed by Clarence Wolf, vice-president of the company, to Mayor Reyburn on April 15, 1910, was the final word from the company about the terms of settlement:

"We will accept back into the service such motormen and conductors who desire to return to our employ, and believe that all of such regular men can be given regular runs within a short time, say, within three months; but in the meantime those reporting for duty to whom regular runs cannot be assigned will be paid a minimum of $2 a day for such work as is assigned to them (or for no work if they report for service and there is none assigned them) until they are assigned to runs that pay at least that much. This does not apply to men who were on the extra list. They will come back as extras, and be paid for such work only that they do.

"We will review the evidence in the cases of the 174 men discharged Feb. 18, 1910, with a representative of the men. We believe we can make a just and satisfactory decision in every case. Any of these employees reinstated will be paid for time lost between date of the acceptance of this proposition and date of reinstatement.

"We give the assurance that all men will be treated fairly, without discrimination, favor or prejudice."

In a communication addressed to the United Business Men's Association of Philadelphia under date of April 8, 1910, the Railroad Commission of Pennsylvania refused to investigate street railway conditions in that city at this time. The substance of the letter follows:

"The commission realizes that the powers it is intended to exercise have special reference to normal conditions and the ordinary and orderly conduct of business, and that they were not intended to be exercised for the purpose of attempting to coerce parties when engaged in labor disputes or in the conduct of strikes.

"At such times a company is not always able to carry out its own will or to enforce its own desires, nor is there any power in this commission to assist it in so doing. The same may be said of the other party to any labor dispute, whose wishes and purposes they might desire to have the commission further.

"If the commission were to undertake an investigation of the electric railway situation in Philadelphia it would be to act upon conditions which are not normal, and for which possibly neither of the parties to the strike is entirely responsible. Nothing could be effected to improve those conditions so long as the strike continues, so that any effort in that direction would necessarily be abortive at present.

"As the company needs many additional motormen, to remove all those whom you or others might think unfit for the position would but further cripple the service. You must remember that while the commission might recommend the employment of other motormen for those now in the service, it cannot dictate who the new motormen should be nor where they shall be procured, nor the wages to be paid them.

"It might be thought that if the commission made such an order that it was intended directly to be a mandate to the company to re-employ the motormen who formerly were in its employ and who are now on strike, and that that would lead to the employment of these men on their own terms. Such would not be the case, however, and if it were, it would be coercion of the company, and so interpreted, and regarded as an act of the commission favorable to the strikers.

"In fact, any action by the commission as you suggest would be construed as an effort on the part of the commission to favor one party or the other to the present strike, and the instance respecting the motormen shows the direction sentiment might take in case of such action by the commission.

"To secure any reliable data of the true status of the traction situation in Philadelphia for the purpose of making recommendations for the permanent improvement of the service it is essential that the investigation be prosecuted during a period of normal conditions and not at a time when affairs are disturbed and disarranged. The commission is of the opinion that any such action by it at this time and under the present conditions would be unwise and could accomplish no good results."

DEBATES ON ELECTRIC RAILWAY SUBJECTS AT CORNELL

A series of debates on electric railway subjects has been introduced this term as part of the electric railway course at Cornell University. The members of the senior class have been divided into a number of debating teams, and each week one team is scheduled to present the affirmative or negative sides of an assigned topic for discussion. As far as possible each member is given the choice of the topics selected and the side which he desires to uphold.

These debates were introduced by Professor Norris for a number of reasons. They relieve the monotony of the technical work of the course. The men are stimulated to investigate live topics, and thus relate their technical knowledge to practical operating conditions. The debates teach the students to condense material into a small compass, as the time allowed is limited. The practice gained in extemporaneous speaking, in which engineers are often weak, prepares the men to take active part in association work. The faculty believes, also, that debates of this kind also teach the young engineer self-reliance, because the men have to champion and defend the ideas they present; they develop so-called engineering conviction.

The topics during April and May related to whether the steam locomotive furnishes the best motive power for long hauls; whether the present tendency to electrify trunk-line terminals is warranted from the standpoint of economy; whether the alternating-current repulsion motor is superior to the alternating-current series motor for general traction purposes; whether the experience of the New Haven Railroad justified its adoption of alternating-current traction; whether the experience at Cleveland, Ohio, warranted a higher rather than a lower rate of fare, and whether commission control of electric railways, as at present practiced in New York State, produces unnecessary hardships upon the railway managements.

Each side is given a total of 15 minutes for general presentation of argument and five minutes for closing. Five minutes is then allowed for general discussion of topic and five minutes for the announcement of the decision by the judge. The latter in general is a teacher in a non-electrical department. Each side is also expected to file with Professor Norris a brief of the argument within one week after the debate. Credit for this work forms a part of the term's work.

SOME NEW HIGH-TENSION SPECIALTIES

The Electrical Engineers' Equipment Company, Chicago, Ill., has recently developed several specialties for the protection of the ends of cables carrying high voltages and for other purposes. Fig. 1 gives details of a cable-end bell for 28,000-volt service, delta-connected. Fig. 2 shows a 13,000-volt cable bell and Fig. 3 a series of split-copper tee connectors. Fig. 4 represents iron-pipe clamp insulator pins and Fig. 5 an improved busbar support.

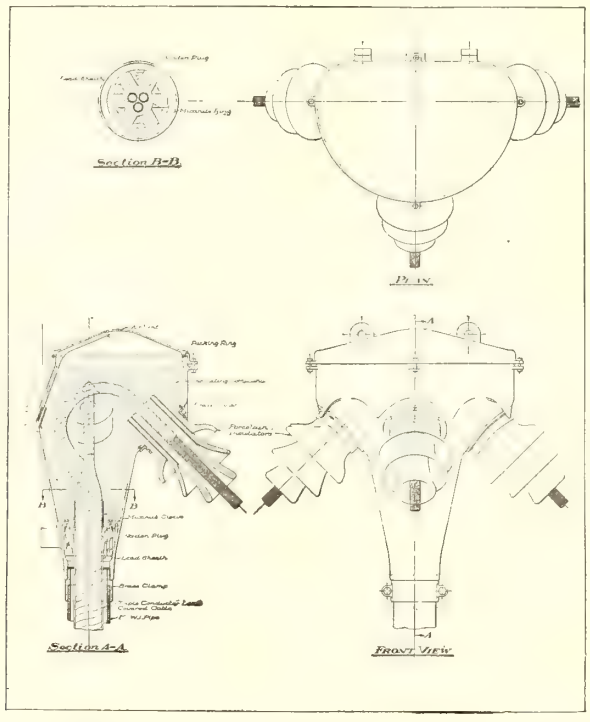


Fig. 1—Details of Cable-End Bell for 28,000-Volt Service

The cable-end bells are made of very soft cast iron. They are also made of malleable iron, hard brass, aluminum, copper and cast steel. Forty-eight different types are available. The bells are all equipped with a grounding clamp ring, which eliminates the soldering or wiping of joints from the cable sheath to the cable bell. This patent grounding clamp is bored out to fit the outside diameter of the lead sheath, and is made of brass for the outside or weather cable bells. It is also tinned to make a better contact with the lead sheath.

With each bell is furnished a special filled compound, the flow-point of which is not less than 244 deg. Fahr. The compound is manufactured in two grades, one testing to 64,000 volts and the other to 86,000 volts. Porcelain bushings are used for the leads from the cable bells, and are guaranteed to test not less than 2½ times the working voltage on the bells, delta voltage being assumed at all times. It is well known that the static discharge at the end of the cable strikes through the insulation to get to the ground, and the grounding clamp ring, clamping, as it does, the cable within a few inches of its end, prevents this static discharge and grounds it, thereby saving the insulation from static puncture.

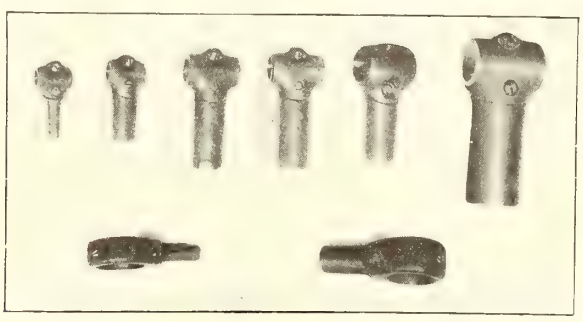


Fig. 3—Split Copper Tee Connectors

It is contended that all cables carrying alternating-current voltages of 400 or more should be protected by cable bells. The company manufactures a special cable-end bell for mounting between oil switches on pipe framework. This is a very narrow bell. The cable bells made by the company are manufactured for voltages up to and including 28,000 volts, delta-connected. The bells provided for outside work are made for mounting directly on the pole, without weather protection of any kind.

The malleable-iron and cast-steel insulator pins for supporting high-tension insulators are intended for use either upon pipe framework or for mounting on a flat surface, such as busbar compartments. These pins are made either with U-bolts or with a solid base; sizes from a height of 32 in. down to the "baby pin," which is only 5 in. high.

New designs in busbar insulation supports are also available, the insulating medium being wet-process porcelain. All metal parts connected to the busbar support are of malleable iron or brass, depending upon the amperes carried on the support. These busbar supports are made for all voltages up to and including 110,000 volts, and are made either for pipe framework or bus compartment work. Another specialty is a new design of wet-process line insulators made for potentials up to and including 100,000 volts. Extra heavy, all-glazed, long head floor tubes are also among the new appliances of this company. They are manufactured for differences of potential up to and including 44,000 volts in the multiple type and up to and including 110,000 volts in the disk and multiple design.

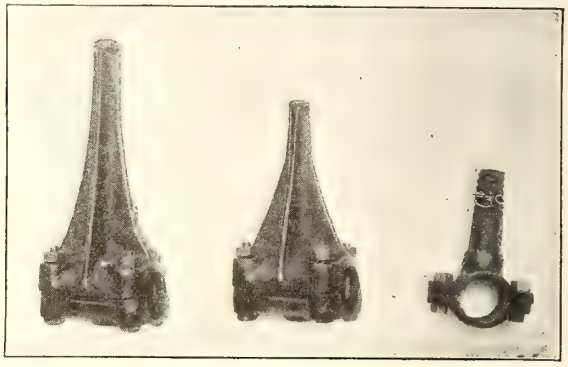


Fig. 4—Iron Pipe Clamp Insulator Pins

Among other specialties is a complete line of solid cast-copper split-type tee connectors for clamping on the run to conductors of 2,000,000 circ. mil and on the tap for 2,000,000 circ. mil. These devices are made for cables and wires as small as No. 14 on the run and No. 14 on the tap. Another novelty is an insulated pin with a locust wood top, which is made for mounting on flat surface or on pipe framework. The sizes carried in stock are for 1¼-in. and 2-in. pipe and up to 8 in. in height.

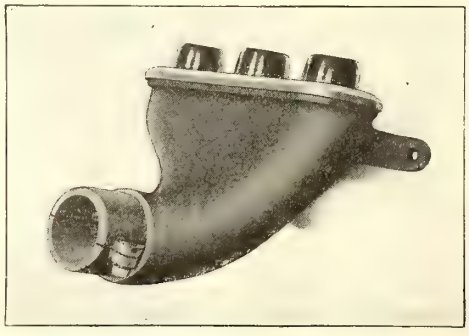


Fig. 2—13,000-Volt Cable Bell



Fig. 5—Busbar Support

News of Electric Railways

Judge Tayler, of Cleveland, Third Arbitrator in Detroit—Date Set for Hearings

Claudius B. Grant, the representative of the Detroit United Railway on the board of arbitration which is to consider the appraisals of the property of the company, and Judge James O. Murfin, of the Wayne County Circuit Court, the representative of the Committee of Fifty on the board, decided to extend an invitation to Robert W. Tayler, Judge of the United States Circuit Court, at Cleveland, to act as the third member of the board of arbitrators, and on April 14, 1910, after visiting Judge Tayler in Cleveland, Mr. Grant and Judge Murfin announced that Judge Tayler had agreed to accept the appointment. It was arranged at the conference in Cleveland to begin the hearings on April 25, 1910. The announcement made by Mr. Grant and Judge Murfin after their conference with Judge Tayler follows:

"Judge Robert W. Tayler has agreed to act as one of the arbitrators in connection with the Detroit United Railway appraisal. The court desires the public to understand the following facts in connection with their work:

"1. All the members of the court are acting without compensation and expect to act judicially and without regard to the source of their selection.

"2. All hearings and arguments to be public in the council chamber, with a competent stenographer in constant attendance. Meetings to be held from 9.30 a. m. to 12.30 m., and from 2 p. m. to 5 p. m. each day until concluded.

"3. Hearings to commence Monday morning, April 25. The city through Mr. Hally, the Committee of Fifty through Mr. Webster, and the Detroit United Railway through its counsel, shall be requested to participate in the examination and cross-examination of any witnesses, and to be further permitted to address the court on any disputed points as they are being presented.

"4. The Barcroft appraisal shall be used as the basis from which to direct our work, and the Detroit United Railway will be invited to present facts and figures as follows:

"(a) Any matters, if any, omitted from the Barcroft appraisal.

"(b) Any errors, if any, in the Barcroft appraisal.

"(c) Any other pertinent matters not hereinbefore specifically covered."

Cleveland Traction Situation

The most important recent development at Cleveland was the resignation of Horace E. Andrews as president of the Cleveland Railway on April 12. Mr. Andrews felt that the recent readjustment afforded him the opportunity which he desired, to devote himself to his affairs in New York. Mr. Andrews has stated that he will aid in financing the improvements and extensions to be made in the future, as stated in the Electric Railway Journal of April 16, 1910, Mr. Andrews will continue as a director of the company. With the retirement of Mr. Andrews and the election of Mr. Stanley as his successor, one of the vice-presidencies is left vacant and will not be filled. C. F. Emerey will continue to occupy the other. Mr. Stanley will be both president and general manager of the company.

The company has announced that $441,600 of the new stock offered some time ago was subscribed by the stockholders within the prescribed time. It has been decided by the company to accept the grant to lay tracks on Lorain Avenue from the car house to the city limits, although arrangements are pending with the Cleveland, Southwestern & Columbus Railway to use its tracks over that section of the street.

Messrs. Andrews and Stanley have discussed the subject of the new cars with the representatives of several car manufacturing companies and Mr. Stanley has told Street Railway Commissioner Dahl that no new cars will be ordered at present, as the company could not pay for them until the stock was sold. He asked the Commissioner to approve an extension in the Collinwood district, to cost about $18,000, and also brought up the proposal to purchase the Puritas Springs line of the Cleveland, Southwestern & Columbus Railway. The company has been operating a number of cars not equipped with air brakes because it is short of cars, and City Solicitor Baker has advised Mr. Dahl that the law requiring air brakes does not apply to these cars.

Mr. Baker has advised Mr. Dahl that technically the company can charge a 10-cent fare to passengers who ride beyond Adams Avenue in Collinwood, but has pointed out that passengers could alight at the old city limits and board a car within the old Collinwood territory, and thus escape the 10-cent exaction. He said that it would be economy on the part of the company to have an ordinance providing for a fare of 8 cents, since there would be no trouble in transferring in that way.

Transit Affairs in New York

The Public Service Commission adopted a resolution on April 15, 1910, for a public hearing on the draft form of contract for the construction, equipment and operation of the Broadway-Lexington Avenue, the Canal Street, the Broadway-Lafayette Avenue, and the Fourth Avenue lines, to be held on May 9, 1910, and for a public hearing on the draft forms of contracts for the construction of such lines by sections at municipal expense, to be held on May 16, 1910. After the hearings have been held the contracts will be placed in form for approval by the Corporation Counsel. After such approval has been obtained, advertisements will be begun for letting the contracts. Should no satisfactory bid be received for equipment, construction and operation, the commission can then, with the approval of the Board of Estimate and Apportionment, let contracts for as many sections of the system as can be done with the money available for that purpose. The Board of Estimate and Apportionment has announced that it was ready to set aside for subway purposes $13,700,000 after July 1, 1910, and also the $47,000,000 which it is hoped will be obtained as a result of the passing of the constitutional amendment at the last election, authorizing the exemption of revenue producing bonds from computation in ascertaining the debt limit.

Adrian H. Joline, one of the receivers of the Metropolitan Street Railway, and Arthur E. Masten, counsel for the receivers, asked Mayor Gaynor on April 13, 1910, to assist them to have the franchise taxes adjusted in accordance with the decision of the court, so that they could be paid. The receivers acknowledged that the company owes at least $2,183,000 franchise taxes.

The Public Service Commission gave a hearing on April 18, 1910, to a committee from the Downtown Interborough Association, who pleaded for an extension of the proposed Broadway-Lexington Avenue subway route from Cooper Square, South, through the Bowery, New Bowery and Pearl Street to South Ferry. Commissioner Eustis said that if the Broadway-Lexington Avenue subway was made to await the consideration of the change in route proposed by the association, it would delay the commencement of construction probably for a year.

The tunnel of the Pennsylvania Railroad in New York will be equipped and ready for service sometime between May 15 and June 15, and a portion of the station will be available for use, but it will be impossible to inaugurate the proposed service at that time because of insufficient equipment. The Long Island Railroad is having 40 new steel cars built, to be electrically equipped for tunnel service. The contracts provided for the delivery of these cars between Feb. 1, 1910, and May 1, 1910. On account of delays which were beyond the control of the company, the first consignment of cars on this order will be received about May 15, and deliveries will continue from that date until about Oct. 1, when the whole order will be completed.

Chairman Willcox of the Public Service Commission and President Shonts of the Interborough Rapid Transit Company called on Mayor Gaynor on April 19, 1910. It is understood the subway situation was discussed, but no official announcement regarding the purport of the conference was made public.

The Public Service Commission has acknowledged the letter addressed to it on April 11, 1910, by the Brooklyn Rapid Transit Company, in which application was made by the company for the extension of the operation of its elevated lines from the Manhattan terminal of the Williamsburg Bridge through the so-called Centre Street subway. The commission concluded its letter as follows:

"The matter being presented in a general way, the commission desires a more definite and detailed written statement as to the various features involved, such as the value, nature and extent of the operations, the compensation to be paid by the company, etc. Upon the receipt of the statement, the commission will be glad, in accordance with your suggestion, to arrange an immediate conference at a time mutually agreeable."

F. W. Stevens on Electric Railway Problems

F. W. Stevens, chairman of the Public Service Commission of the Second District of New York, addressed the Board of Commerce of Detroit at its membership acquaintance meeting, held recently in the Hotel Cadillac, Detroit. Previous to the meeting the work of the Committee of Fifty and the question of the franchise extension which is now up for settlement in Detroit were explained to Mr. Stevens. In the course of his remarks Mr. Stevens is reported to have said:

"I know very little about the situation in Detroit. It may be that the conditions here are the same as they are in Cleveland, but I do not believe so. In New York State we have from 40 to 50 cities that have street car systems, and in no two of them are the conditions the same. One city may receive helpful suggestions from another with respect to street car and other problems, but no city can successfully copy another's plan. An arrangement that has been found entirely satisfactory in one community might prove a dismal failure in another. Every city must work out its own problems according to local conditions.

"In my experience I have found that it is impossible to determine the cost of service in a given case. In our State a question arose over the rate charged by the steam roads for carrying milk. We tried to determine the cost of service, but there were so many factors that entered into it that the task was impossible. A man boards a street car and rides two blocks, we will say, while another gets on at the next corner and rides 2 miles. There is no way to fix the cost of carrying either of these men. The best that can be done is to average up the cost.

"In New York State the fare for carrying a passenger from one point to another within the limits of a city is fixed by the statute at 5 cents, but our commission is given the power of changing it at any time the conditions warrant. The great problem with traction companies in New York is the abuse of the transfer system. Under the law, in order to carry a passenger from one point to his destination it is often necessary to give him a transfer on a transfer. In spite of all the precautions that have been taken by the companies to protect themselves, the privilege is greatly abused by passengers. It is possible for a man to ride half a day for a nickel.

"A public service corporation, in order to serve the public properly, must continually increase its capital to provide for increased business. Any corporation that does not do that is bound to be a failure. But capital must be given an opportunity to secure a fair return, and by that I do not mean an excessive return."

Stone & Webster Club of Washington

At a meeting of representatives of Stone & Webster in the Pacific Northwest at the Butler Hotel, Seattle, Wash., on March 3, 1910, it was decided to form a club among the employees of Stone & Webster in Washington. Temporary officers and committees on constitution and by-laws and nominations and organizations were appointed, and at a meeting held in Tacoma on April 4, 1910, at which 65 representatives of various companies controlled by Stone & Webster were present, the Stone & Webster Club of Washington was permanently organized along the lines of the New England Street Railway Club. Its object, as set forth in Article II. of the constitution, follows: "To promote intercourse and social relations between the officers of the various Stone & Webster Companies operating in Washington, and to provide for an exchange of views on different phases of the business of the various companies, and to promote the best conduct of the business."

All of the Stone & Webster companies in Washington are represented in the club. These companies include the Whatcom County Railway, Light & Power Company, Bellingham; Everett Railway, Light & Power Company, Everett; Seattle-Everett Traction Company, Everett; Seattle Electric Company, Seattle; Tacoma Railway & Power Company, Tacoma; Puget Sound Electric Railway, Tacoma; the Stone & Webster Engineering Corporation, Seattle. The following officers have been elected for the year: A. L. Kempster, superintendent of transporation of the Seattle Electric Company, president; F. A. Boutelle, superintendent of transporation of the Tacoma Railway & Power Company and Puget Sound Electric Railway, vice-president; J. C. Hector, assistant treasurer of the Whatcom County Railway, Light & Power Company, vice-president; J. B. Howe, general counsel of the Seattle Electric Company, vice-president; A. M. Chitty, contract agent of the Everett Railway, Light & Power Company, vice-president; W. E. Wilmot, assistant treasurer of the Tacoma Railway & Power Company and Puget Sound Electric Railway, secretary; A. W. Q. Birtwell, assistant treasurer of the Seattle Electric Company, assistant treasurer. The president, vice-presidents and the following gentlemen comprise the board of trustees: E. H. O'Dell, claim agent of the Tacoma Railway & Power Company; Thomas Newman, counsel of the Whatcom County Railway, Light & Power Company; W. R. Leonard, assistant treasurer of the Everett Railway Light & Power Company.

Chicago 55 Per Cent Fund.—The Controller of Chicago has announced that the compensation which the city received from the Chicago City Railway for 1909 was $473,942, and from the Chicago Railways for the same period $811,320, making the total from both companies $1,285,262. There is a grand total of about $4,300,000 in the city's traction fund, which is derived from the division of the net receipts of the electric railways in the ratio of 55 per cent to the city and 45 per cent to the railways.

Toledo Franchise Suggestion.—The communication from A. E. Lang, president of the Toledo Railways & Light Company, Toledo, Ohio, suggesting that the extension of the franchise of the company should be considered, has been referred to the committee of the Council on railways and telegraphs. J. B. Merrell, chairman of the committee, says that Mayor Brand Whitlock will be consulted regarding the proposal and that the administration expects to formulate a plan of settlement which the committee will work out.

American Museum of Safety.—An exhibit hall for demonstrations, under power and otherwise, of devices to prevent industrial accidents, has been opened by the Museum in the Engineering Societies' Building. This will be a permanent, free exhibition for those who will profit by it particularly, and for the public generally. The hall will contain models, charts and photographs of devices which need no power demonstration. The president of the club is Philip T. Dodge. The vice-presidents are Charles Kirchhoff, T. Commerford Martin and F. R. Hutton. William H. Tolman is the director.

Reinforced Concrete Trestles for Railways.—C. H. Cartlidge, bridge engineer of the Chicago, Burlington & Quincy Railroad, presented a paper on "Reinforced Concrete Trestles for Railways," before the Western Society of Engineers, on April 13, 1910. Mr. Cartlidge advocated the use of concrete trestles built similar to pile bents, using concrete piles capped with reinforced concrete stringers and surmounted by concrete floor slabs. Such structures had been built in lengths from 80 ft. to 250 ft. at a total

cost of from $20 to $26 per lineal foot, using machine-molded and square-molded concrete piles.

Reunion of Pacific Coast Party.—A reunion of those who participated in the Pacific Coast trip of the Massachusetts Railway Association last autumn was held on March 14, 1910, at the Exchange Club, Boston, Mass. About 60 of the 80 persons who took the trip to the coast were present. After a banquet, Charles S. Clark, secretary of the Massachusetts Street Railway Association and organizer of the party, was presented a handsome hall clock as a mark of appreciation of the ability which he had displayed in conducting the excursion and as a token of friendship. Several informal speeches were made and a selection of some 200 views taken by members of the party were thrown upon a screen by means of a stereopticon.

Southwestern Electrical and Gas Association.—Preparations are fast being made for the convention of the Southwestern Electrical and Gas Association, which is to be held in Beaumont, Tex., on May 12, 13 and 14, 1910, and it is expected that the program of the meeting will soon be announced in detail. The program of entertainments has been partially arranged. On May 12 there will be an automobile ride for visiting ladies from 10 a. m. to 12 m., and at 4 p. m. there will be an automobile ride for all visitors to the oil field and other points of interest. In the evening there will be a theater party. On May 13, from 2 p. m. to 6 p. m., there will be a boat trip on the Neches River. From 9 p. m. to 12 p. m. the ladies will be entertained at the Women's Reading Club, while the men during the same hours will be entertained and will entertain with the Sons of Jove. At 3:30 p. m. on May 14 the visitors will tour the city on street cars. The business meetings will be held during the forenoons on all three days. The storeroom and the lobby in the Kyle Theater will be used as an exhibit hall. The secretary of the association is E. T. Moore, 300 Commerce Street, Dallas, Tex.

Chicago Subways.—On April 18, 1910, the Supreme Court of Illinois heard the final arguments on the city's authority to construct a subway and its right to use the $4,300,000 traction fund for this purpose. Briefs in this case which have been filed by Walter Fisher, representing the city, have been summed up as follows: "The city's right to build subways has been granted by the Legislature in general and specific terms. The complete authority over its streets conferred upon the city by law empowers it to control the subsurface as well as surface facilities. Chicago's powers are not curtailed by the fact that it purposes to co-operate with the street railways. The funds paid to the city out of traction profits are subject to the action of the City Council. Even if they were not, a taxpayer could not restrain the city from expending them for corporate purposes other than those named in the ordinance." The right of Chicago to build and finance a subway has been established in the lower courts, and engineers are preparing a report on which the City Council may base its action after the case in the Supreme Court has been closed. It was announced in Chicago on April 19 that the tentative offer of George W. Jackson, Inc., to build a $75,000,000 system of subways in Chicago, in which surface and elevated cars could be operated would be reduced to permanent form and submitted to the City Council before June 1, 1910.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—Hearings were continued during the week ended April 16, 1910, by the committee on metropolitan affairs upon the bills to compel the railroads in the Boston district to electrify their lines. Francis Peabody, Jr., urged that electrification within a 10-mile radius of Boston should be required by July 1, 1913. Samuel J. Elder, for the New York Central lines, and William H. Coolidge, for the Boston & Maine Railroad, opposed the bills on the ground that expenditures for electrification would be premature if made at the present time. The committee on street railways has voted leave to withdraw the bill to require electric railways to equip their cars with lifting jacks. An effort has been made to revive the bill to grant municipal authorities the right to give limited franchises to street railways to carry express and freight. Perpetual franchises are now granted subject to the approval of the Railroad Commission. The House has accepted the adverse report of the committee on street railways upon the Mellen bill, which prohibits persons from riding upon the running boards of cars. The bill relative to the purchase by street railways of the property of foreign companies has been ordered to a third reading in the Senate. Many petitions in favor of the passage of legislation to permit the New York, New Haven & Hartford Railroad to acquire electric railways in western Massachusetts have been presented to the General Court. In connection with the proposed co-ordination of electric and steam railroad service under these bills the committee will visit Shelburne Falls to examine the interchange of traffic between the Shelburne Falls & Colraine Street Railway and the Boston & Maine Railroad. The bill which provides that no street railway shall require passengers whom it permits to ride upon the platform to do so at their own risk has been passed to be engrossed by the House.

New York.—Senator Schulz of New York City has introduced a bill which provides that no railroad owning, maintaining, operating or controlling a steam or electric railway through the Boroughs of Manhattan and the Bronx, with two or more stations along its route in these boroughs, shall charge more than 5 cents for carrying passengers between points on its lines. A bill has been introduced to place the public service corporations in Westchester County under the supervision of the Public Service Commission for the First District instead of the Commission for the Second District. The bill to permit the operation of moving platforms and give operators the right to purchase power from outside interests, with the approval of the Public Service Commission and authorizing the leasing of acquired property until required for subway purposes has passed the Assembly. A bill has been introduced in the Assembly ostensibly in the interest of the Manhattan Bridge Three-Cent Line, to modify the present railroad law by permitting one company to use the tracks and electrical equipment of another company for an indeterminate length subject to the approval of the Public Service Commission, with which power is to be vested to determine the amount of compensation that shall be deemed reasonable. The amendment is to apply only to cities of the first class.

Two bills are before the Legislature to render effective the amendment exempting from the New York City debt limit bonds for self-sustaining improvements. One of these measures, the Wagner-Lee bill, was drafted by the Citizens' Union. The other bill, the Travis-Shortt measure, represents the views of the New York City administration with reference to the method by which such bonds are to be taken out of the debt limit. On April 15 Mr. Shortt introduced a bill which amends his previous measure by providing for the exclusion from the debt limit only debts incurred by the city for rapid transit or dock improvements prior to Jan. 1, 1910. The Lee bill excludes debts for improvements after that date. Like the earlier bill, the new measure provides for an application to the Appellate Division by the Board of Estimate and Apportionment for an order determining the amount of debt to be excluded. Another debt limit bill introduced by Assemblyman Lee has been placed on the order of final passage in the Assembly. It provides for a judicial determination by the Appellate Division without a previous determination by the Board of Estimate and Apportionment of the amount of indebtedness to be excluded. A measure which would permit the Interborough Rapid Transit Company of New York to operate the unused Steinway tunnel under the East River was introduced on April 18 by Assemblyman Parker. On April 19 the Assembly passed the bill introduced by Mr. Parker which amends the Public Service Commission law by broadening the powers of the commissioners with particular reference to transfers, and gives them authority to order a single fare over joint routes of street railways operating a continuous line.

Ohio.—Probably the last public hearing to be accorded to the Woods public utilities bill took place before the Senate committee on the evening of April 12, when representatives of the steam railroads proposed that a commission should be appointed to consider the need of such a commission as is proposed and the laws governing the operation of public utilities.

Financial and Corporate

New York Stock and Money Market

April 19, 1910.

For the last week the stock market has been left almost entirely in the hands of traders. It is true there were fairly large price changes during the week, but they seem not to have been related in any way to the week's developments. For instance, on Thursday afternoon prices advanced sharply following the announcement of the engagement of more than $5,000,000 gold for export. Again on April 19 the market advanced in spite of heavy shipments of gold. Interborough-Metropolitan issues have been influenced by the statement of the Interborough Rapid Transit Company for nine months.

Since the present movement in the money market began on April 1, $17,000,000 has been engaged for shipment. Despite this the market continues easy. Rates to-day were: Call, 2¾ to 3 per cent; 90 days, 4½ to 4¾ per cent.

Other Markets

Philadelphia Rapid Transit and Union Traction are weak. On Thursday Rapid Transit reached the low point of 19, and to-day declined again 1¼ points to 19⅜. Union Traction also declined on Thursday to 47⅞.

There was a considerable display of strength in the Boston market on Saturday, but to-day prices eased off again. Boston Elevated shows a gain for the week of a point in the asked price and Massachusetts Electrics only a fractional change in both issues.

The same general apathy characterizes the Chicago market which has cast a spell over trading for several weeks. Few sales are recorded, and these at prices which show only a slight variation from prices which have been prevalent for some time.

Quotations of various traction securities as compared with last week follow:

	April 12.	April 19.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a126	a127
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	a75	75
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a46	a47
Brooklyn Rapid Transit Company	78⅜	a80¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	*84¼	86
Capital Traction Company, Washington	*133	a132½
Chicago City Railway	*195	a190
Chicago & Oak Park Elevated Railroad (common)	*3½	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a100	a100
Chicago Railways, ptcptg., ctf. 2	a32	a30
Chicago Railways, ptcptg., ctf. 3	a18	a13
Chicago Railways, ptcptg., ctf. 4s	a8	*8
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104½
Detroit United Railway	*64	61
General Electric Company	152	151½
Georgia Railway & Electric Company (common)	a110	a109½
Georgia Railway & Electric Company (preferred)	a87	a86
Interborough-Metropolitan Company (common)	22¼	23⅝
Interborough-Metropolitan Company (preferred)	57¼	60⅛
Interborough-Metropolitan Company (4½s)	*81	*81
Kansas City Railway & Light Company (common)	a31	a31
Kansas City Railway & Light Company (preferred)	a77⅝	*77⅝
Manhattan Railway	134	137
Massachusetts Electric Companies (common)	17¼	a19
Massachusetts Electric Companies (preferred)	a88	a88
Metropolitan West Side, Chicago (common)	a17	a16
Metropolitan West Side, Chicago (preferred)	a54	a53
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	77½	*77½
Northwestern Elevated Railroad (common)	a17½	a15
Northwestern Elevated Railroad (preferred)	a50	60
Philadelphia Company, Pittsburg (common)	a50¾	a50½
Philadelphia Company, Pittsburg (preferred)	a44½	a44½
Philadelphia Rapid Transit Company	a21	a19¾
Philadelphia Traction Company	a87	a87
Public Service Corporation, 5 per cent col. notes	a96½	a96½
Public Service Corporation, ctfs	a104½	a104½
Seattle Electric Company (common)	a113½	a115
Seattle Electric Company (preferred)	103¼	103½
South Side Elevated Railroad (Chicago)	a53	a53½
Third Avenue Railroad, New York	8	6¾
Toledo Railways & Light Company	10¼	*10¼
Twin City Rapid Transit, Minneapolis (common)	*115¼	114½
Union Traction Company, Philadelphia	a49¾	a48¾
United Rys. & Electric Company, Baltimore	a13¾	a13¼
United Rys. Inv. Co. (common)	37	*37
United Rys. Inv. Co. (preferred)	*67	*67
Washington Ry. & Electric Company (common)	a38½	a38½
Washington Ry. & Electric Company (preferred)	*91¼	91¾
West End Street Railway, Boston (common)	88¼	a90
West End Street Railway, Boston (preferred)	*83	a102
Westinghouse Elec. & Mfg. Company	66¾	66
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

American Light & Traction Company, New York, N. Y.—The American Light & Traction Company has increased the dividend on its common stock one-half of 1 per cent quarterly by the declaration of a quarterly dividend of 2½ per cent, payable on May 1, 1910.

Catskill (N. Y.) Traction Company.—The Public Service Commission of the Second District of New York has authorized the Catskill Traction Company, which has taken over the Catskill Electric Railway, to make a mortgage for $400,000 and to issue presently $60,000 of its bonds at not less than 85, and $48,000 of its capital stock. The proceeds are to be used to purchase and acquire from W. C. Wood property rights and franchises of the Catskill Electric Company. The company is also authorized to issue $12,000 additional common capital stock to be used in payment for new pavements, changes in the company's machinery at the power plant of the Catskill Electric Company, organization expenses and working capital.

Delaware & Hudson Company, New York, N. Y.—The Delaware & Hudson Company, in its annual report for the year ended Dec. 31, 1909, makes the following reference to the earnings of the electric railways in which it is interested: "The earnings of the electric railways show a substantial improvement, the several roads showing increases in the net earnings as follows: United Traction Company, $141,772.55; Hudson Valley Railway, $32,573.03; Troy & New England Railway, $12,477.97; Schenectady Railway (including electric express company), $110,659.91, and Plattsburg Traction Company, $1,394.47. Dividends of 4 per cent for the year 1909 were declared on the capital stock of the United Traction Company, Schenectady Railway, the Troy & New England Railway and the Plattsburgh Traction Company."

Holmesburg, Tacony & Frankford Electric Railway, Tacony, Pa.—The United States Circuit Court has fixed on June 1, 1910, as the date for the sale of the property of the Holmesburg, Tacony & Frankford Electric Railway at foreclosure. The upset price of the property is $330,000. The sale had previously been fixed for May 25, 1910, but the decree ordering the sale on May 25 was vacated for lack of proper notice. Two committees have been formed in the interest of the bondholders. Of the $400,000 of first mortgage bonds outstanding $243,000 has been deposited with one committee and $97,000 with the other.

Hudson & Manhattan Railroad, New York, N. Y.—At the annual meeting of the stockholders of the Hudson & Manhattan Railroad on April 13, 1910, C. W. King and William H. Corbin were elected directors to succeed E. C. Converse and G. Tracy Rogers.

Metropolitan Street Railway, New York, N. Y.—The property of the Metropolitan Street Railway is advertised to be sold under foreclosure of the general collateral trust mortgage, of which the Guaranty Trust Company is trustee, at the County Court House in New York, on May 12, 1910, at 2 p. m. All bidders must first deposit $100,000 in cash or a certified check with William L. Turner, special master. No bid for less than $10,000,000 will be accepted. Any purchaser or purchasers will be allowed one year from the date of the confirmation of the sale within which to elect to adopt and continue in force or to refuse to adopt any lease, traffic or trackage or operating agreement or other executory contract which may be included in the property sold or may constitute an incident or appurtenance thereof, such election to be made in the manner and with the effect provided in the decree dated on April 6, 1910.

New York (N. Y.) City Railway.—The United States Circuit Court of Appeals has handed down a decision upholding the appeal of William W. Ladd, as receiver of the New York City Railway, from the decision of the lower court dismissing the claim of that corporation for interest on notes given by the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, and directing that the decrees of the lower court of June 15 and Dec. 29, 1909, be reversed, "with instructions to the court below to enter a decree referring the same to the special master for further proceedings in accordance with this opinion."

Scranton (Pa.) Railway.—The Scranton Railway has called all its outstanding 5 per cent collateral trust bonds for exchange for bonds of the Carbondale Railway of like amount and rate of interest.

Traffic and Transportation

Hearing on Westboro and Worcester Fares.

The Massachusetts Railroad Commission gave a hearing recently on the petition of the Selectmen of Westboro for a fare of 15 cents between Westboro and Worcester on the Marlboro & Westboro Street Railway. Selectman Jackson, who represented the petitioners, stated that Westboro also desired the restoration of power-plant service in the municipality, on account of the employment which is furnished citizens.

F. H. Dewey, president of the company, stated that the capital stock of the company was $160,000 and that $160,000 of bonds have been issued. The floating debt was $84,000, and until 1909 the company had deficits which amounted to $31,000. The deficit was now $24,000. The road had never paid a dividend. Last year the company had a surplus of $7,000. The obligation of a 15-cent fare could not be fulfilled without the consent of the Worcester Consolidated Street Railway, which operates between Worcester and Grafton. The situation was not the same as when a company operated and owned its service from terminal to terminal. The present fare is 20 cents, with free transfer privileges in Worcester. At one time a 15-cent fare was tried, half going to the Worcester Consolidated Street Railway and half to the Marlboro & Westboro Street Railway, but the plan was not a success. The company could not place any more securities if the fare was reduced. If the fare was made 15 cents there would probably be a loss of $5,500 in yearly revenue, leaving a net income of only $1,500. It was more to the town's interest that the road should be wisely managed than that the fares should be so low as to prohibit proper service. The following table of fares charged on other lines of similar character running out of Worcester was submitted by Mr. Dewey:

Trip			Fare	Miles
Worcester	to	Spencer	20 cts.	12
"	"	Leicester	10	6
"	"	Millbury	10	6
"	"	Fisherville	20	12
"	"	Shrewsbury	10	6
"	"	Oxford	20	12
"	"	Clinton	20	14

Comparing these with the Worcester-Westboro fare of 20 cents for 12 miles, the rates on the latter were not too high. The community had a decided advantage in the transfer facilities at Worcester. The Worcester Consolidated Street Railway Company was not obliged to lower its fare between Grafton and Worcester, so that if the reduction should be made it would be necessary to charge only 5 cents for the six-mile ride between Westboro and Grafton, which would be so low as to be prohibitive. Regarding the power house and car house request, Mr. Dewey said that it was no longer economically desirable to operate the Westboro station, as the load on the station had decreased greatly by the loss of the Westboro & Hopkinton Street Railway as a customer. The Marlboro & Westboro Street Railway must secure its power at the lowest possible cost in order to meet its charges. The hearing was closed.

Pension Fund for Employees of the Northern Ohio Traction & Light Company.

The Northern Ohio Traction & Light Company, Akron, Ohio, has arranged to pension employees who are 65 years old and have been in service 20 years with a regular payment of at least 40 per cent of their wages for the 10-hour day. The proposal to adopt a plan of this kind was referred to briefly in the recent report of Henry A. Everett, president of the company, to the stockholders. The details were worked out by a committee consisting of Will Christy, first vice-president of the company, and Charles Currie, second vice-president and general manager. The recommendations of this committee to the board of directors follow:

"The committee appointed by your board for the purpose of framing a proposition for the creation of a pension fund for our employees beg to submit the following:

"(1) Any employee attaining the age of 65 years will be subject to retirement, providing such employee has given continuous service for 20 years.

"(2) Any employee who has given continuous service for the company for 20 years, and who is required by the pension board to be retired, will be entitled to a pension.

"(3) The amount to be paid for pensions to be 40 per cent of the employee's wages so retired, on a basis of 10 hours per day, at the rate which the employee is drawing at the time of such retirement.

"(4) Any employee who should become totally and permanently disabled while in the service of the company while on duty, and said disability is not caused by his own negligence, is to be retired on pension, provided such finding is made by the pension board.

"(5) Any employee injured while in the service of this company shall receive during the period of total disability the pension provided for in Section 3 for such period of time as the pension board may fix, provided said disability has not been proximately caused by his own negligence.

"(6) Any employee receiving any compensation under the provisions of this board shall accept such compensation in full for all claims for damages by reason of any alleged or claimed negligence on the part of this company.

"(7) If any employee, after being pensioned by the company, is able to perform duties in any capacity outside of the company's employ, this fact will not bar him from securing his pension from this company.

"(8) The pension board to consist of the president, vice-president, general manager, general superintendent and three men from the employees selected by the above officials.

"(9) One-quarter of 1 per cent of the gross earnings to be charged off monthly, and the amount deposited in a 'special pension fund.' The company to set aside in the hands of a trustee at once $100,000 of 4 per cent bonds, this amount to be held by said trustee in a 'special pension fund' until there is accumulated in cash the amount of $25,000. When the 'special pension fund' shows a balance in cash of $25,000, the company will be allowed to withdraw the deposit of 4 per cent bonds, and may from time to time reduce the percentage of gross earnings credited monthly to said fund, in excess of an amount sufficient to maintain a balance in said fund of $25,000.

"(10) The surplus of said pension fund, if any, to be reinvested for the benefit of the pension fund at the discretion of the pension board.

"(11) Said pension board shall have power to adopt reasonable rules and regulations for the transaction of business pertaining to the making and filing of claims for benefits under said pension fund as in their judgment may be deemed expedient, and said board shall also have power to pass upon the claims of persons claiming the right to share in said pension fund, and all other matters pertaining to the disbursement of moneys of said fund."

The fund became effective on April 1, 1910.

Increase in Wages in Milwaukee

On April 14, 1910, John I. Beggs, president and general manager of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., addressed the following communication to the employees, in which he announced an increase in wages effective on May 1, 1910:

"Your pay was voluntarily advanced on Sept. 1, 1909, and in recognition of the conscientious efforts made by nearly all of our men to serve the public with care and courtesy (thereby serving this company better) and as an encouragement and incentive to put forth greater efforts to render efficient and acceptable service to the public, your pay, commencing on May 1, 1910, will be voluntarily advanced to the following rates: 22 cents per hour the first year of continuous service; 23 cents per hour the second year; 24 cents per hour the third year; 25 cents per hour the fourth year; 26 cents per hour after four years.

"As stated in the announcement of the increase which took effect on Sept. 1, 1909, the pay of our motormen and conductors prior to June, 1900, ran for 15 cents to 19 cents per hour, therefore, the present advance makes an increase of practically from 40 per cent to 45 per cent in a period of 10 years. Notwithstanding this, the average rate received by the company for carrying a passenger has gradually but steadily fallen from about 4 cents in 1900 to about 3.15 cents per passenger at the present time. As thoughtful, practical men you can realize the extreme care necessary to conduct the business of the company without loss. For this care we must depend upon you, as you

come directly and constantly in contact with the public. If you are careless or discourteous it reflects upon the company. I, therefore, appeal to every motorman and conductor in our service to avoid at all times and under all circumstances giving reasonable cause of complaint or offense to any of our patrons. I furthermore bespeak your continued and increased care and fidelity in advancing and protecting the company's interest, and assure you of my earnest desire to maintain the cordial relations which have always existed between us."

The wages in force since September, 1909, follow: 20 cents per hour the first year; 21 cents per hour the second year; 22 cents per hour the third year; 23 cents per hour the fourth year; 24 cents per hour the fifth year, and 25 cents per hour after five years of continuous service.

Appeal from Decision of Washington Commission in Seattle-Tacoma Fare Case

The Puget Sound Electric Railway, Tacoma, Wash., has appealed to the Thurston County Superior Court to set aside the recent order of the Railroad Commission of Washington, for certain readjustments in fares between Seattle and points south of Englewood and between Tacoma and points on the branch line between Willow Junction and Puyallup. In October, 1909, the company adopted a schedule which increased the regular rates to practically 2 cents per mile. The through rate of $1 for the round trip between Seattle and Tacoma was also increased to $1.50. The commission refused to order a reduction in the round-trip fare between Seattle and Tacoma or in the one-way fare between the cities. The order of the commission was published in the Electric Railway Journal of March 19, 1910, page 508. In appealing to the court to set aside the order of the commission, the company alleges that it is required to carry passengers at less than cost, while the Chicago, Milwaukee & St. Paul Railway and the Northern Pacific Railway are permitted to collect 3 cents per mile between Seattle and Tacoma. The company further alleges:

"Said order contains so many manifest inconsistencies on its face and is so self contradictory that it is impossible for your petitioner or anyone else to prepare and make a tariff in conformity therewith, and for that reason your petitioner declined participation of making any tariff and protests against the order of said commission going into effect 20 days from March 21, 1910, or at any other time.

"The Railroad Commission of Washington has no jurisdiction over the line of railroad in said State owned and operated by your petitioner, for the purpose of fixing rates on said line of railroad, or for the purpose of determining the justice and fairness of rates in effect thereon. All of the proceedings of the said Railroad Commission of Washington hereinbefore referred to are void. In support of this allegation, your petitioner will show that it operates an interurban railway between Seattle, Tacoma, Puyallup and Reton. Said railroad is operated as a part of the street railroads of said cities."

Recommendation Covering Service in Los Angeles

The Board of Public Utilities of Los Angeles, Cal., has filed with the City Clerk of that city a report regarding the operation of railways in Los Angeles, in which it says in part:

"The Board of Public Utilities has spent considerable time in an investigation of problems of transportation and operation along the lines of the various street and interurban railways, and as a result we make the following recommendations:

"That as the result of a practical test in a specially equipped car of the Los Angeles Railway, those present came to the conclusion that there was no good reason why a different rate of speed or different district speed limits should be provided for street cars from that prescribed for other vehicles. We therefore recommend that the ordinances be amended so that the provisions as to speed of vehicles be made to apply to street cars. That is to say, that in the business and congested districts of the city the speed limit be 12 miles per hour, with six miles per hour over crossings and outside that district 20 miles per hour.

"We recognize, however, that much of the phenomenal growth of Los Angeles is due to our excellent system of interurban electric railways and that it is to the interest of the city that no unnecessary regulations be adopted which will prevent interurban railways from making quick time between the city and outside points. We therefore recommend that the speed regulations do not apply on private rights of way, the crossings of which over public streets are protected in such manner as may be ordered.

"Ordinance No. 14,261 provides that street cars shall come to a full stop at all points where the lines intersect other tracks. There are certain well-known thoroughfares on which the traffic is very heavy and is constantly increasing, at which, we believe, it would also be to the interest of the public to require street cars to come to a full stop before crossing.

"We recommend the passage of an ordinance that men employed as flagmen and gatemen shall not exceed 50 years of age and must pass the same examination as is usual for employees in the operating department of the respective companies. We have discovered that some men are employed as many as 13 or 14 hours consecutively, and we therefore recommend that it be provided by ordinance that no man be employed at such work for more than nine hours in any day."

Transfer Announcements in Chicago

The Chicago (Ill.) City Railway uses the backs of its transfers to carry messages to the public. Some of the recent announcements have to do with the prevention of accidents. They read as follows:

"One-third of all street car accidents occur when people are getting on or off cars. Some of these are the fault of the company. Many are caused by carelessness of passengers. Most of them can be avoided by the mutual exercise of care and caution. This company is earnestly endeavoring to do its part. Will you do yours?"

"Flipping Cars.—One in every ten of our accidents is caused by people attempting to board moving cars. This shows how dangerous it is to "flip" a moving car, or to run after and attempt to get on a car after it has started. A misstep may result in a bad fall or fatal injury. Take no chances. Wait for the next car."

Gates in Memphis.—The Memphis (Tenn.) Street Railway is installing gates on its cars, and is conducting an educational campaign through the newspapers designed primarily to teach the public how to avoid accidents by exercising care in boarding cars and alighting from them.

New Record Between Louisville and Indianapolis.—The "Dixie Flyer" of the Louisville & Southern Indiana Traction Company, which is operated between Louisville and Indianapolis, recently established a new record of three hours and eight minutes between these cities. The usual time for the run is four hours.

No Special School Fares in Oakland.—The Oakland (Cal.) Traction Company has stated in a communication to the Council of Oakland that it cannot comply with the recent ordinance of the Council fixing a rate of fare of three cents for school children on account of being compelled by the Council to widen the devil strip of its line on Broadway, a work which it is estimated will cost more than $100,000.

Increase in Wages in St. Louis.—The United Railways, St. Louis, Mo., has posted the following notice in its car houses announcing an increase in the wages of its employees: "Beginning May 1, 1910, the rate of wages of conductors and motormen of the United Railways will be as follows: Twenty and 21-cent men will be advanced to 22 cents an hour; 22-cent men to 23 cents; 23-cent men to 24 cents; 24-cent men to 25 cents; 25-cent men to 26 cents. And in the future employment will begin at 22 cents per hour, advancing 1 cent each year until the 26-cent rate is reached."

Sleeping-Car Service of Illinois Traction System.—The publicity department of the Illinois Traction System, Peoria, Ill., has issued an attractive folder on the sleeping-car service of that road, illustrated with four half-tones of the new type 20-berth sleeping cars which has been put into service between Peoria and St. Louis. These cars were described in detail in the Electric Railway Journal of March 19, 1910, page 476. The folder is 3 in. x 6 in., and

is printed in two colors on white stock. Advertising capital is made of the fact that the Illinois Traction System "is the only electric railroad in the world which runs sleeping cars." The running time of the Springfield-St. Louis and the Peoria-St. Louis sleeping cars and the rates are given.

Steam Service Decreased.—Electric Service Increased.—On April 17, 1910, the New York Central & Hudson River Railroad withdrew six of its accommodation trains on the western division, between Syracuse and Rochester, on account of the decrease in traffic. Simultaneously with this announcement C. D. Beebe, vice-president and general manager of the Rochester, Syracuse & Eastern Railroad, stated that that company would soon put additional local cars in service between Syracuse and Rochester. At present the Rochester, Syracuse & Eastern Railroad operates only single cars over its line, but it has been decided to operate trains of two cars on some of the runs in the near future. The work of equipping cars for operation in trains is now being carried out at the shops of the company.

Operation of the Trenton No-Seat-No-Fare Ordinance.—Although the Townsend "no-seat-no-fare" ordinance passed recently by the Council of Trenton, N. J., and signed by the Mayor became effective on April 18, 1910, the public showed no disposition to take advantage of its provisions. The method of handling traffic during the rush hours was not modified by the company, but the conductors reported that in cases where it had been impossible to furnish seats there had been no refusals to pay fare. The Trenton Street Railway, which operates most of the lines in Trenton; the Camden & Trenton Railway, which has about 3½ miles of city track, and the New Jersey & Pennsylvania Traction Company, which operates only 1.6 miles in the city limits, were all made subject to the provisions of the ordinance, which was published in the Electric Railway Journal of April 16, 1910, page 720. The public regards the ordinance as unnecessary badgering of the Trenton Street Railway.

Electric Railway Baseball Calendar.—The Detroit (Mich.) United Railway has issued a wall calendar 10¾ in. wide by 14 in. high covering the baseball season in the American League, in which Detroit is represented by a team known familiarly as "The Tigers." The games at Detroit are indicated in red, the name of the team opposing "The Tigers" being given. The games which "The Tigers" are to play in other cities are indicated in black, the city in which the team plays also being given. At the top of the calendar a space 9 in. wide by 6½ in. high has been ruled off, and here the trade-mark of the Detroit United Railway is printed in black, together with the heading, "Where 'The Tigers' Play," under which the admonition appears: "Of course, the proper way of going to Detroit to see the games at Bennett Park is by the fast and frequent electric interurban railway service of the Detroit United lines." This is the second year the company has issued the calendars, and it reports an unprecedented demand for them. The calendar is copyrighted by R. G. De Lisle, who represents the Detroit United Railway in Toledo.

Ohio Interurban Railways Increase Wages.—The Lake Shore Electric Railway, Cleveland, Ohio, and the Northern Ohio Traction & Light Company, Akron, Ohio, have voluntarily increased the wages of their trainmen. The old scale of the Lake Shore Electric Railway provided that employees should receive 21 cents an hour for the first year, 23 cents the second year and 25 cents the third year. Hereafter men who have served three years will receive 27 cents, and as rapidly as the others have served the proper time their wages will be advanced in the same way. The increase in the wages of the employees of the Northern Ohio Traction & Light Company is from 5 to 7½ per cent, and will go into effect on May 1. About 750 employees are affected. On the city divisions in Akron, Canton and Massillon, the new scale will be from 20 cents to 24 cents an hour, depending upon the length of service. On the Kent, Ravenna, Barberton, Wadsworth and Tuscarawas divisions the scale will be as follows: First year, 20½ cents; second year, 21 cents; third year, 22 cents; fourth year, 23 cents, fifth year, 24 cents; sixth year and thereafter, 25 cents. On the Akron, Bedford & Cleveland, Canton & Akron, and the Canton and New Philadelphia divisions the scale will be 21 cents to 26 cents per hour, depending upon the term of service.

Personal Mention

Mr. W. A. Diddle has resigned as auditor of the Winona Interurban Railway, Warsaw, Ind.

Mr. Fred A. Berg, formerly with the Seattle (Wash.) Electric Company, has been appointed master mechanic of the Everett Railway, Light & Water Company, Everett, Wash.

Mr. L. M. Levinson, who has retired as secretary and general manager of the Shreveport (La.) Traction Company to become connected with the Salt Lake & Ogden Railway, Salt Lake City, Utah, was presented a traveling outfit by a committee of the employees of the Shreveport Traction Company as a token of esteem.

Mr. Frank E. Payne, of the Railroad Commission of Indiana, has been appointed a member of the subcommittee of the National Association of Railway Commissioners on construction and operating expenses of electric railways, to succeed Mr. Henry M. Dowling, who was formerly a member of the Railroad Commission of Indiana.

Mr. W. B. McKinley, president of the Illinois Traction Company, Peoria, Ill., has been elected president of the Topeka (Kan.) Railway, to succeed Mr. E. W. Wilson, whose interest in the company, with that of the Wilson estate, Mr. McKinley and his associates in the Illinois Traction Company purchased recently, as announced in the Electric Railway Journal of April 9, 1910, page 677.

Mr. James M. Ambler has been appointed a member of the Public Service Commission of Maryland by Governor Crowthers. Mr. Ambler was born on Aug. 21, 1854, in Winchester, Va. After attending private schools Mr. Ambler went to William and Mary College and then to the University of Virginia. He taught school several years in Virginia, and was admitted to the bar at Richmond in 1881. Shortly thereafter he entered the law office of Barton & Wilmer, Baltimore. He became a member of the firm later.

Mr. J. T. Lavelle has been appointed trainmaster of the Eastern division of the elevated lines of the Brooklyn (N. Y.) Rapid Transit Company. Mr. Lavelle began his railroad career with the Lehigh Valley Railroad, which he served as telegraph operator and yardmaster. He entered the employ of the Brooklyn Rapid Transit Company in 1903 as towerman and was soon after made dispatcher. He was subsequently advanced to assistant trainmaster of the Southern division and was promoted from this position to trainmaster of the Eastern division.

Mr. W. W. Atwood has recently been assigned to special duty in the general offices of the Brooklyn (N. Y.) Rapid Transit Company. Mr. Atwood's first railroad work was with the Erie Railroad. He subsequently became the agent of the Delaware, Lackawanna & Western Railroad at Waverly, but resigned from this company to become general superintendent of the Addison & Pennsylvania Railroad. He was also connected for a time with the Long Island Railroad. He entered the employ of the Brooklyn Rapid Transit Company as trainmaster seven years ago and has recently had charge of the Eastern division of the elevated lines.

Mr. W. A. Sullivan has been appointed general manager of the Shreveport (La.) Traction Company to succeed Mr. L. M. Levinson, whose resignation as secretary and general manager of the company to become connected with the Salt Lake & Ogden Railway, Salt Lake City, Utah, was announced in the Electric Railway Journal of April 16, 1910. Mr. Sullivan has been engaged in operating and constructing steam and electric railways for 20 years. He began his railroad career with the Boston & Maine Railroad in New England, and for a number of years was employed by Ford, Bacon & Davis, New York, N. Y. He has recently been connected with the Little Rock Railway & Electric Company, Little Rock, Ark.

Mr. J. F. Turner, who has recently been appointed superintendent of the Fresno (Cal.) Traction Company, to succeed Mr. C. B. Jackson, resigned, was connected with the Pacific Improvement Company of the Southern Pacific system before entering electric railway service. On Jan. 23, 1903, Mr. Turner was appointed agent and operator of the power system for the Pasadena & Mt. Lowe Railway, and subsequently was appointed superintendent of the company and manager of the hotel properties. When the Pacific

Electric Railway bought the property of the Pasadena & Mount Lowe Railway it was consolidated with the northern division of the Pacific Electric Railway and Mr. Turner was appointed assistant superintendent of the northern division, with headquarters at Pasadena, making his service with the company continuous for 17 years.

Mr. W. W. Abell has been appointed a member of the Public Service Commission of Maryland by Governor Crowthers. Mr. Abell was born near Pikesville, Md., in 1872. He was educated in private schools and at Georgetown University. After finishing his education he was a clerk in the National Marine Bank, Baltimore, for a time. Later he became associated with the Baltimore *Sun*, which was founded by his grandfather. He was elected vice-president of the A. S. Abell Company and performed for many years the duties of general manager of the *Sun*, under the direction of his father, who was president of the company. After the death of Edwin F. Abell, in 1904, Mr. W. W. Abell was elected president of the company and continued in that capacity until April, 1909, when he determined to make a trip around the world. He is now on his way home from Japan.

Judge James Alfred Pearce has been appointed a member of the Public Service Commission of Maryland by Governor Crowthers. Judge Pearce was born at Chestertown on April 2, 1840. At the age of 14 years he entered the Washington College at Chestertown, and was graduated from Princeton University in 1860. From January, 1861, until December, 1862, he was a member of the faculty of the Washington College. Shortly after severing his connection with Washington College he entered the office of Brown & Brune, Baltimore, and was admitted to the Baltimore bar on May 1, 1864. He immediately began to practise law in Chestertown. In 1867 Mr. Pearce was elected State's Attorney of Kent County, and served in that office until 1875. He was appointed Maryland Tax Commissioner in 1888. In 1897 Mr. Pearce became a candidate on the Democratic ticket against Mr. George M. Russum for judge of the Circuit Court. He was elected, and became the chief judge of the circuit and a member of the Court of Appeals. The circuit comprised the courts of Cecil, Kent, Queen Anne's, Caroline and Talbot Counties. His term would have expired in 1912.

Mr. Albert Eastman has resigned as general passenger and express agent of the Utica & Mohawk Valley Railway, the Oneida Railway and the Syracuse Rapid Transit Railway to become general manager of the Windsor, Essex & Lake Shore Rapid Transit Railway, Windsor, Ont., effective on May 1, 1910. Mr. Eastman was originally engaged in steam railroad work, in which he served from 1892 to 1901, first for a long period with the Grand Trunk Railroad as freight and ticket clerk and telegraph operator at Detroit, and later with the Michigan Central Railroad as assistant agent at Detroit. It was from the latter position that he resigned in November, 1901, to become traveling express passenger agent on the Detroit United Railways. In December, 1902, Mr. Eastman resigned from the Detroit United Railways to become general express agent of what now is the Utica & Mohawk Valley Railway, under Mr. C. Loomis Allen. Returning to Detroit in May, 1903, Mr. Eastman became a division superintendent on the Detroit United System, and in November, 1903, resigned from the company to accept the position of superintendent of employment of the Public Service Corporation under Mr. Albert H. Stanley, with whom he has been associated in the management of the Detroit property. Mr. Eastman subsequently was appointed general express agent of the Utica & Mohawk Valley Railway, the Oneida Railway and the Syracuse Rapid Transit Company, and in October, 1908, was appointed general passenger and express agent of these companies.

OBITUARY

Charles O. Johnson, vice-president and general manager of the Winona Interurban Railway, Winona Lake, Ind., is dead.

Frederick Mortimer Robinson, who has been connected with the Pressed Steel Car Company, Pittsburgh, Pa., as sales agent for the last six years, died on April 2. Mr. Robinson was 33 years old. Before he entered the employ of the Pressed Steel Car Company Mr. Robinson was connected with the Chesapeake & Ohio Railroad.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Griffin City & Suburban Railway, Griffin, Ga.—Chartered in Georgia to build a 5-mile line in Griffin. Capital stock, $25,000. Incorporators: H. H. Bass, J. P. Nichols, D. R. Blakeley, Joseph D. Boyd, Thomas J. Brooks and R. F. Strickland. [E. R. J., March 19, '10.]

***Clarksville & New Providence Railway, Clarksville, Ky.**—Incorporated in Kentucky to build an electric railway from Clarksville to New Providence. Capital stock, $25,000. Incorporators: Austin Peay, N. L. Carney, L. Bloch, Elwyn Trahern and A. C. Murray.

***Blue Ridge Railway, Hagerstown, Md.**—Incorporated in Maryland to build a 3-mile electric railway from Pen-Mar Park to Blue Ridge Summit. Capital stock, $15,000. Officers: George B. Beaver, president; John G. Benedict, secretary, and W. B. Stottlemyer, treasurer.

FRANCHISES

Birmingham, Ala.—The Birmingham Railway, Light & Power Company has been granted a franchise to build a new track over certain streets in Birmingham. Application has also been made for a franchise to build an extension from Ensley to Corey. A. H. Ford, president and general manager.

***Gadsden, Ala.**—H. H. Rogers, representing the Noccalula & Southwestern Railway, has applied for franchises to build an electric railway in Gadsden and to develop an amusement park at the Falls. This company was organized to build a railway from Gadsden to the Falls in Black Creek on Lookout Mountain.

Fresno, Cal.—The Fresno Traction Company has applied to the Board of Supervisors for a franchise to build an extension of its line.

Golden, Colo.—Rees C. Vidler has applied to the City Council for a franchise to build a railway in Golden. [E. R. J., June 20, '08.]

Sycamore, Ill.—The Woodstock & Sycamore Traction Company, Chicago, has asked the Council for a franchise to build an electric railway in Sycamore. This is part of a plan to connect Woodstock, Franklinville, Marengo, Genoa and Sycamore, a distance of 36 miles.

Davenport, Ia.—The City Council has granted a 25-year franchise to the Iowa & Illinois Railway, Clinton, for an electric railway in Davenport.

Algiers, La.—Peter Lawton, J. J. Mansom, and associates, have been granted a 50-year franchise to build an electric railway in Algiers. It is expected to extend this line eventually to Grand Isle.

Grand Rapids, Mich.—At the spring election in villages along the proposed route of the Detroit, Lansing & Grand Rapids Railway, Detroit, the question of granting franchises was submitted to the voters. The result shows that in every town along the route it was decided to grant franchises. The line will pass through Plymouth, Northville, South Lyon, Brighton, Howell, Fowlerville, Webberville, Eagle, Portland, Saranac, Mulliken, Sunfield and Lake Odessa, with terminals at Detroit and Grand Rapids. It will be about 156 miles in length. F. A. Bean, chief engineer. [E. R. J., March 19, '10.]

Hibbing, Minn.—W. N. Brown, T. N. Butchard, H. P. Reed and John Redfern have asked the Council for a franchise to operate a gasoline motor line in Hibbing and extend it to Alice. [E. R. J., April 16, '10.]

***McComb, Miss.**—W. M. White and J. J. White, Jr., owners of the Liberty White Railroad, have been granted a franchise to build an electric railway over the principal streets of McComb.

Kansas City, Mo.—The Council has granted franchises to the Kansas City Railway & Light Company, Kansas City, to build several extensions and double-track some of its lines in Kansas City.

Havelock, Neb.—The Council has granted a franchise to

the Omaha, Western & Lincoln Railroad, Lincoln, to build a railway over certain streets in Havelock. Application has also been made to other towns along the route. This is part of a plan to build a 219-mile electric railway from Omaha to Hastings, with a branch to Lincoln. Frank F. Schaaf, president and general manager. [E. R. J., Feb. 29, '10.]

Brooklyn, N. Y.—The Brooklyn Rapid Transit Company has asked the Board of Estimate for a franchise to operate a railway over the Manhattan Bridge and through Canal Street tunnel, Manhattan.

Brooklyn, N. Y.—The City & Suburban Railway has applied to the Board of Estimate for a franchise to operate a railway between Brooklyn and Amityville over the 72-in. pipe line. It also has asked for a franchise to operate a spur track from the Ridgewood reservoir to Jamaica Bay. [E. R. J., April 9, '10.]

Seneca Falls, N. Y.—The Geneva & Auburn Railway has been granted new franchises covering the operation of its present line through Seneca Falls. [E. R. J., Sept. 11, '09.]

Akron, Ohio.—The Northern Ohio Traction & Light Company, Akron, has asked the Council to have its 14-year franchise extended for a period of 25 years. It is stated that the company would then consider building new lines in Akron in return for an extension of its franchise.

McConnelsville, Ohio.—The Council has granted the Muskingum & Morgan Railway, Light & Power Company, Zanesville, a franchise to construct an electric railway over certain public highways within the corporate limits of McConnelsville. This is part of a plan to build a railway between Zanesville and Duncan Falls. [E. R. J., Jan. 15, '10.]

Queenston, Ont.—H. H. Collier has applied to the City Council for a franchise for an electric railway in Queenston, for the Niagara & St. Catharines Railway, which is projecting a railway between St. Catharines and Niagara-on-the-Lake. [E. R. J., March 5, '10.]

Milton, Ore.—The Council has granted a franchise to the Walla Walla Valley Traction Company, Walla Walla, Wash., to construct an electric railway in Milton.

Salt Lake City, Utah.—The County Commissioners have granted a 50-year franchise to Le Grand Young, representing the Emigration Cañon Railway, to build an interurban railway from Salt Lake City to Holliday. According to the terms of the franchise construction must begin within one year and the railway must be completed and in operation within two years.

Morgantown, W. Va.—The court has granted a franchise to H. R. Warfield, representing the Union Utilities Company, for the construction of an electric line in Morgantown and extending to the State line near Cheat Haven. [E. R. J., April 16, '10.]

Oconomowoc, Wis.—The Common Council has granted the Milwaukee Light, Heat & Traction Company, Milwaukee, a franchise to build an electric railway in Oconomowoc. It will be an extension of the line planned from Milwaukee.

TRACK AND ROADWAY

Florence, Ala.—Preliminary surveys of the proposed route for a 75-mile electric railway between Huntsville and Florence have been finished. It is stated that this railway project is backed by ample capital and that there is water power in abundance to be obtained from several streams in the vicinity of the route. Thurston H. Allen, Florence, is interested. [E. R. J., April 2, '10.]

***El Tigre Mining Company, Douglas, Ariz.**—Press reports state that this company proposes to build an electric railway from Douglas to El Tigre. It also contemplates the erection of a central power plant in Douglas.

Sacramento & Sierra Railroad, Sacramento, Cal.—This company, which is building a railway from Sacramento to Lake Tahoe via Orangevale Bluffs, has completed surveys, secured all rights of way and has completed grading for a distance of 16 miles. Work is being rushed in the vicinity of Orangevale. B. F. Hulings, Sacramento, local representative. [E. R. J., July 10, '09.]

Jacksonville (Fla.) Electric Company.—This company expects to start work soon on the construction of the Phœnix Park line extension to Cummer's Mill. Hardy Croom, manager.

Idaho Falls (Idaho) Electric Railway.—It is reported that rights of way have been secured by this company and work will begin July 1 on the projected railway to connect Idaho Falls, Lincoln, Ammon, Iona and Heise. J. L. Milner, Idaho Falls, president. [E. R. J., Feb. 5, '10.]

Peoria (Ill.) Railway Terminal Company.—This company advises that it expects to build 4.4 miles of new track in Peoria. R. W. Bailey, Peoria, general superintendent.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind.—This company has laid 12 miles of track between Bluffton and Geneva. Grading is being done on the remainder of the route from Geneva to Celina, Ohio, via New Corydon and Dublin. [E. R. J., April 9, '10.]

***Milford, Ind.**—Omer E. Neff is said to be backing a project to build an electric line from Bremen to Mishawaka, through Woodland, Wyatt and Coalbush, now void of rail transportation. The project is not wholly new, as a line from Logansport to South Bend was surveyed over the same route in 1894. Mr. Neff says his plans are sufficiently advanced to commence work in a few weeks.

***Utica, Ind.**—Dix Brothers, Utica, are promoting a plan to build a 6-mile railway to extend from Utica to Jeffersonville. A line from Bethlehem to Owen and Charlestown is also proposed.

Charles City & Western Railway, Charles City, Ia.—This company advises that surveys have been completed and construction has been started on its 20-mile railway in Charles City and extending into the surrounding country. It will operate McKeen gasoline motor cars for passenger service and gas locomotives for hauling freight. The company's car house and shops are now under construction at Charles City. It is stated that contracts will be let soon for the construction of several sections of the line. Capital stock, authorized, $300,000. Officers: C. W. Hart, Charles City, president and general manager; E. M. Sherman, Charles City, vice-president, and C. H. Parr, Charles City, secretary.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company has awarded the contract for building the grade of its proposed extensions from Denver Junction to Waverly and from Waterloo to Belle Plaine to Harrington Brothers, St. Louis, Mo. [E. R. J., March 26, '10.]

Louisville, Lincoln Farm & Mammouth Cave Traction Company, Glasgow, Ky.—This company announces that preliminary arrangements have been made and work will be started within 90 days on its proposed 70-mile railway between Louisville and Mammouth Cave via Glasgow, Bear Wallow, Uno, Goodnight, Hardyville, Cannier, Magnolia, Buffalo and Hogenville. L. W. Preston is interested. [E. R. J., March 19, '10.]

Louisville (Ky.) Railway.—This company has recently had proposals made to it regarding extensions of several of its suburban lines. Efforts are being made to secure an extension of the Orell line a distance of 3½ miles to Kosmosdale, and in order to enable it to do so citizens in that section have secured rights of way which will be given to the company. It is stated that the company has been asked also to build an extension of its line to Mt. Washington and Bardstown.

Boston & Northern Street Railway, Boston, Mass.—This company opened a new line between Stoneham and Spot Pond, in the Middlesex Falls district of Boston, on April 15. Through service is now given between Stoneham and the Sullivan Square station of the Boston Elevated Railway, the running time being 33 minutes and the headway 20 minutes. The new line is about 2 miles long.

Gallatin Valley Electric Railway, Bozeman, Mont.—This company is reported to have awarded a contract to Callahan Brothers, Logan, for grading and bridge work on its 27-mile extension from Bozeman northwest to Three Forks. Work was started April 6 and it is expected to have the extension completed by Sept. 1.

Virginia City Southern Electric Railway, Virginia City, Mont.—This company has completed surveys and secured considerable right of way. It is expected to begin soon

the grading of this proposed 12-mile railway between Virginia City and Alder. The directors have recently authorized a bond issue of $200,000 and elected the following officers: Karl Elling, president; Luther H. Leher, vice-president; A. J. Bennett, treasurer, and M. M. Duncan, secretary. [E. R. J., April 11, '10.]

Kansas City Railway & Light Company, Kansas City, Mo.—This company expects to build a 2-mile extension in Kansas City from Belleview Avenue and Forty-eighth Street to the Country Club. W. W. Wheatley, Kansas City, general manager.

St. Louis-Kansas City Electric Railway, St. Louis, Mo.—This company announces that 75 per cent of the route for its proposed 250-mile electric railway has recently been surveyed. It plans to construct a double-track line between St. Louis and Kansas City. W. B. Cauthorn, Columbia, chief engineer. [E. R. J., Nov. 27, '09.]

Nebraska Traction & Power Company, Omaha, Neb.—It is reported that this company will extend its line from Ralston to Papillion this spring. C. J. Chapman, traffic manager.

Jersey Central Traction Company, Keyport, N. J.—This company is now constructing 4 miles of new track between Perth Amboy and South Amboy.

Rome & Oneida Electric Railway, Rome, N. Y.—This company is securing right of way for its proposed 13-mile railway to connect Verona, Blackman's Corners, Greenway, Hatches Corners and Rome. Dewitt C. Hadcock, Oneida, is interested. [E. R. J., Nov. 7, '08.]

Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y.—This company has completed plans for the double tracking of its railway between Long Branch and Baldwinsville, a distance of 3 miles.

Cincinnati, Portsmouth, Pomeroy & Pittsburgh Traction Company, Cincinnati, Ohio.—This company is said to have completed surveys on its proposed railway from Cincinnati to Pittsburgh along the Ohio River valley, a distance of 466 miles. The company expects to let contracts for construction this summer. A. E. Cox, 1502 Third Avenue, Huntington, W. Va., president. [E. R. J., Nov. 27, '09.]

***Muskogee (Okla.) Transit Company.**—This company was recently organized by Muskogee and St. Louis capitalists to build an electric railway in Muskogee and extending to Tulsa and Sapulpa. E. W. Mangson and C. J. Barwick, St. Louis, are interested.

Hummelstown & Campbellstown Street Railway, Hershey, Pa.—This company advises that during the last few weeks contracts have been let for between 8000 and 10,000 ties. It is also building 2 miles of additional track. J. R. Kreider, superintendent.

***Hollidaysburg, Pa.**—Capitalists of Blair and Huntingdon counties are said to be interested in a plan to build a railway between Hollidaysburg and Huntingdon, a distance of about 40 miles.

Southern Cambria Railway, Johnstown, Pa.—This company advises that during the next four weeks it expects to place contracts for 13 miles of single track. F. R. Newman, Johnstown, general manager.

Reading (Pa.) Transit Company.—This company expects to relay the entire 5-mile line of the Lebanon-Annville line with 80-lb. rails. The present track is laid with 40-lb. rails. This work will be commenced in a short time and when completed all the lines in this section, except the short line to Avon, will be of standard construction.

Bryan & College Interurban Railway, Bryan, Tex.—This company reports that it has begun construction on its 6-mile line between Bryan and College. Repair shops will be located at Bryan. Capital stock, authorized, $20,000. Officers: O. E. Gammell, Bryan, president and general manager; W. E. Saunders, Bryan, vice-president, and J. Maloney, Bryan, secretary. [E. R. J., April 9, '10.]

Eastern Texas Traction Company, Greenville, Tex.—This company advises that right of way has been secured for its proposed railway between Greenville, Wolfe City, Bonham, Denison, Caddo Mills, Rockwall, Dallas, Paris and Clarksville. It is the plan to operate either gasoline or gasoline electric cars. Repair shops will be erected at Greenville, Tex. Capital stock, $12,000, which will be increased when the line is under construction. Officers: S. B. Perkins, Greenville, Tex., president; J. H. Blockus, Wolfe City, vice-president; K. N. White, Greenville, Tex., treasurer, and J. B. Murphey, Greenville, general manager

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company will build a waiting room and depot adjoining its car house on North Raymond Avenue and Mary Street in Pasadena. It will probably be similar to the Los Angeles station.

Peoria (Ill.) Railway Terminal Company.—This company advises that it is now building a new car house, 70 ft. x 200 ft. in Peoria. Estimated cost is $20,000. [E. R. J., Dec. 25, '09.]

Louisville & Interurban Railway, Louisville Ky.—This company, which operates the suburban lines of the Louisville Railway, will build a freight and express station on Linden Avenue, Louisville, and in order to secure the desired site the company has petitioned the Jefferson County Court to condemn property affected.

Rochester, Syracuse & Eastern Railway, Syracuse, N. Y.—This company expects to build four standard stations at Lyons, Newark, Fairport and Brighton this summer. The waiting room will have a seating capacity of 35 persons. The freight section will be 50 ft. x 20 ft. They are estimated to cost $10,000 each. C. D. Beebe, Syracuse, general manager.

Tidewater Power Company, Wilmington, N. C.—This company advises that it is now building a new repair shop, 50 ft. x 110 ft., at Wilmington.

El Paso (Tex.) Electric Company.—This company will erect a new car house in El Paso. The structure is estimated to cost $11,000. [E. R. J., Jan. 16, '09.]

POWER HOUSES AND SUBSTATIONS

Indiana Union Traction Company, Anderson, Ind.—This company advises that it expects to purchase soon a 2500-kw low-pressure turbine for its power house at Anderson. H. A. Nicholl, Anderson, general manager.

Peoria (Ill.) Railway Terminal Company.—This company advises that it expects to install duplicate units having a capacity of about 1500 kw.

Athol & Orange Street Railway, Athol, Mass.—This company has contracted for 7 miles of trolley wire to replace old wire. W. D. Smith, manager.

Frederick (Md.) Railway.—This company is considering the erection of a new power plant.

Rockland, Thomaston & Camden Street Railway, Rockland, Me.—This company is building an addition to its power house at Glen Cove, in which it will install a 500-kw generator to be connected to a 700-hp cross compound engine. This will more than double the present capacity of the plant.

Kansas City (Mo.) Railway & Light Company.—This company plans to purchase new substation equipment and to build a new power house at Forty-eighth Street and Troost Avenue, Kansas City. W. W. Wheatley, Kansas City, general manager.

Hanover & McSherrystown Street Railway, Hanover, Pa.—This company expects to place contracts during the next two weeks for new coal-handling machinery. Robert E. Manley, Hanover, general manager.

Southern Cambria Railway Company, Johnstown, Pa.—This company advises that during the next four weeks it expects to purchase one 1000-kw unit, consisting of generators, engine and boilers, for 1200-volt d.c. operation. F. R. Newman, Johnstown, general manager.

Kittanning & Leechburg Railways, Kittanning, Pa.—The power house of this company and the Kittanning Electric Light Company was destroyed by fire April 14. It was a brick building covering an entire block. The loss is estimated at $200,000.

Fairmont Park Transportation Company, Philadelphia, Pa.—This company advises that it expects to purchase a new generator and boiler. W. C. Martin, secretary.

Manufactures & Supplies

ROLLING STOCK

El Paso (Tex.) Electric Railway will soon purchase five pay-as-you-enter cars.

Lincoln (Neb.) Traction Company is reported to be in the market for a number of new cars.

Galesburg Railway & Light Company, Galesburg, Ill., is in the market for four pay-as-you-enter cars.

Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., may buy three passenger cars.

South Side Elevated Railroad, Chicago, Ill., is contemplating the purchase of from 20 to 30 new cars.

Michigan United Railways, Jackson, Mich., has purchased 10 single trucks from The J. G. Brill Company.

Southern Cambria Railway, Johnstown, Pa., contemplates buying four 50-ft. interurban cars complete within four weeks.

Jacksonville (Fla.) Electric Company expects to place an order within the next two months for five pay-as-you-enter cars.

Rock Island-Southern Railroad, Monmouth, Ill., is reported to be planning the construction of a number of electric locomotives.

Cincinnati (Ohio) Traction Company has drawn specifications for 50 single-truck, open cars and will order this rolling stock at once.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., expects to buy one second-hand, double-truck car within one month.

British Columbia Electric Railway, Vancouver, B. C., has ordered one single-truck, centrifugal sprinkler car from The J. G. Brill Company.

Winona Interurban Railway, Warsaw, Ind., desires to rent four or five interurban passenger cars for a direct-current line of from 500 to 600 volts.

Atlantic & Suburban Railway, Pleasantville, N. J., has been rebuilding its entire rolling stock, repainting the cars with Chicago Varnish Company's paint.

Enid (Okla.) City Railway has placed an order with the Barney & Smith Car Company for three single-truck cars, to be 21 ft. 4 in. long over corner posts and 31 ft. 4 in. long over all.

Twin City Light & Power Company, Centralia, Wash., a road under construction, has placed an order for two cars with 30-ft. bodies with the Niles Car & Manufacturing Company, Niles, Ohio.

Municipal Traction Company, Cleveland, Ohio, reported in the Electric Railway Journal of April 2, 1910, as contemplating the purchase of 50 cars at once, will not place contracts for any rolling stock at the present time.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex., is in the market for two cars, either open, closed or semi-convertible. The company wants 35-ft. to 40-ft. cars, either single or double-truck, preferably the former.

Metropolitan Street Railway, Kansas City, Mo., which was stated to be planning the purchase of some cars in the Electric Railway Journal of March 26, 1910, will buy 50 cars. It is reported they are to be of the pay-as-you-enter type.

Missoula (Mont.) Street Railway has placed an order with the American Car Company for four cars, to be mounted on Brill No. 39-E trucks and equipped with Consolidated Car Heating Company's electric heaters. This rolling stock is in addition to that which was reported in the Electric Railway Journal of Jan. 15, 1910.

Chicago & Joliet Electric Railway, Joliet, Ill., which was reported in the Electric Railway Journal of April 16, 1910, to have ordered two cars from The J. G. Brill Company, has contracted for two 36-ft. combination passenger and smoking cars, to be mounted on Brill No. 27-M.C.B. trucks, and also to have four single-truck cars built by the same car builders.

Washington Railway & Electric Company, Washington, D. C., mentioned in the Electric Railway Journal of Feb. 12, 1909, as having ordered 50 pay-as-you-enter closed cars from The J. G. Brill Company, has decided on the following details:

Length of body...28 ft. 3 in.	Hand brakes..... Peacock
Length over vest..41 ft. 1 in.	Heaters ..... Consolidated
Width over sills....7 ft. 7 in.	Headlights ..... Neal-Kirby
Width over posts at belt..8 ft.	Journal boxes ...Symington
Body ..... wood	Motors GE-210B
Interior trim..... cherry	Paint ..... Felton & Sibley
Underframe ..... composite	Sanders ..... Dumpit
Brakeshoes....A. S. I. R. A. Standard.	Seats ..... Winner
	Springs .....Brill
Bumpers....Brill angle iron	Steps ..... Stanwood
Curtain fix....Curtain S. Co.	Trucks ..... P 21 No. 39-E
Curtain material...Pantasote	Varnish .... Hildreth
Destination signs... Hunter	Ceilings ..... Agasote
Fare boxes .....Brill	Floor paint.....Patterson & Sargent.
Gears and pinions.....G. E.	
Gongs ..... Dedenda	

Northern Texas Traction Company, Fort Worth, Tex., reported in the Electric Railway Journal of March 26, 1910, to have ordered 15 double-truck closed cars through Stone & Webster, Boston, from the American Car Company, has drawn the following specifications:

Seating capacity..... 40	Hand brakes.....Brill, with Sterling - Meaker attachments.
Length of body..... 26 ft.	
Length over vestibule..39 ft.	
Width over sills....8 ft. 6 in.	Heaters ..... Consolidated
Width over posts at belt, 8 ft. 6 in.	Headlights .. Crouse-Hinds
	Journal boxes ..... Brill
Body.....wood and metal	Motors GE-219
Interior trim ..... bronze	Push button signal.....Brill
Underframe ..... wood	Registers ..... International
Air brakes ... Westinghouse	Roofs ..... turtle back
Bolsters, body & truck..Brill	Sanders ..... Brill
Brakeshoes ..... Brill	Seats .....Heywood Bros.
Center bearings...Symington	Seating material....wood slat
Couplers ..... Brill	Step treads ..... Universal
Curtain fix....Curtain S. Co.	Trucks ..... Brill 39E
Curtain material...Pantasote	Varnish ..... Murphy
Destination signs ....Hunter	Wheels .....St. Louis
Gongs .....Brill mechanism Wall gong.	

Southern Pacific Railroad, New York, N. Y., reported in the Electric Railway Journal of Feb. 5, 1910, as having ordered 125 all-steel cars from the American Car & Foundry Company, will have this rolling stock built according to the specifications given below. The order specifies 40 motor passenger coaches, 25 combination motor passenger and baggage coaches and 60 trailers, to have seating capacities of 116, 88 and 116, respectively:

Weight (car body)..76,500 lb.	Couplers .....McConway & Torley.
Bolster centers.....45 ft.	
Length of body.....58 ft.	Gears and pinions.....G. E.
Length over all...72 ft. 4 in.	Gongs..New Departure Mfg. Co.
Width over sills...10 ft. 4 in.	
Sill to trolley base..9 ft. 4 in.	Headlights ..... G. E.
Height rail to sills..3 ft. 8 in.	Journal boxes ... Symington
Body ..... steel	Motors 4; GE-207
Interior trim..... steel	Sash fix.....Curtain S. Co.
Underframe ..... steel	Seats.....H. & K.
Air brakes... Westinghouse	Springs.....Ry. Steel Spring
Axles ..... Taylor, iron	Trucks .....Baldwin M.C.B.
Bolsters..Double Body Bolster Co.	Ventilators ..... Globe
	Wheels ..... Standard
Brakeshoes..Am. B. S. & F. Co.	Platform gates ..... Pitt
	Marker lamps...A. & W. Co.
Control system..... G. E.	

TRADE NOTES

Rail Joint Company, New York, N. Y., has moved its Pittsburgh office from the Park Building to the Oliver Building.

W. E. Baker & Company, New York, N. Y., have moved their offices from 27 William Street to the Tilden Building, 105 West Fortieth Street.

Scully Steel & Iron Company, Chicago, Ill., has moved its offices from Halstead, Fulton & Wayman Streets, to 2364 South Ashland Avenue.

Ohio Brass Company, Mansfield, Ohio, has received an order from the Chicago & Joliet Electric Railway for 20 Tomlinson automatic couplers.

U. S. Metal & Manufacturing Company, New York, N. Y., has appointed Charles E. Castle manager of its railroad department, effective on May 1, 1910.

Railway Steel Spring Company, New York, N. Y., will remove its Chicago sales office from 1380 Old Colony Building to 1111 People's Gas Building on May 2.

Q & C Company, New York, N. Y., after April 26 will have its Chicago office located in the People's Gas Building, where all correspondence regarding track appliances should be addressed.

F. H. Herring, New York, N. Y., has moved his office from 1912 Park Avenue to larger quarters in room 454, 50 Church Street, where he will continue to carry on his second-hand equipment business.

Sellers Manufacturing Company, Chicago, Ill., will move its general sales offices from the Western Union Building to the new McCormick Building, located at the corner of Michigan Avenue and Van Buren Street.

W. J. Jeandron, New York, N. Y., will move his offices to 172 Fulton Street on May 1, where he will occupy larger quarters to facilitate the handling of his increased business. Mr. Jeandron represents Le Carbone Company of Paris, France.

Boston Belting Company, Boston, Mass., announces that the Jewell Belting Company of Chicago is no longer acting as its Western agent, but that it has opened a branch store at 177 Lake Street, Chicago, which will be in charge of M. S. Curwen, manager of sales.

Federal Creosoting Company, Indianapolis, Ind., which is a consolidation of the Federal Creosoting Company of Toledo, Ohio, the National Creosoting Company of Paterson, N. J., and the Colonial Creosoting Company of Hillsboro, N. Y., has been incorporated with a capital of $1,000,000.

Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., has obtained the services of George L. L. Davis as assistant to the vice-president, with headquarters at 1401 Syndicate Trust Building, St. Louis. Mr. Davis was formerly with the U. S. Metal & Manufacturing Company, New York.

Ackley Brake Company, New York, N. Y., has received the following orders for the Ackley adjustable brake recently: Omnibus & Tramway Company, Lyons, France, 20 brakes; Electric Tramways, Geneva, Switzerland, brakes for the company's entire rolling stock; Nice & Littor Tramways, Nice, France, 16 brakes.

Frank W. A. Campbell, Houston, Tex., has opened an office in Houston as a consulting and constructing electrical engineer. Mr. Campbell was connected with the construction department of the General Electric Company for five years, first at the Schenectady works and later at the Chicago office. During that time Mr. Campbell installed a large variety of apparatus, especially that which pertains to central stations, heavy electric traction and industrial plants.

American Tie & Timber Company, New York, N. Y., has recently increased its timber holdings by acquiring a large tract of timber near Jacksonville, Fla. A yard has just been opened at Tampa, Fla., from which the company is shipping a large amount of timber. The company shipped over 200,000 cypress and pine cross ties from Jacksonville and Fernandina, Fla., and Brunswick, Ga., during March, which is the largest number ever shipped in one month by the company.

Davis-Bournonville Company, New York, N. Y., will be represented by the Ohio Welding & Manufacturing Company in Cincinnati. A large demonstrating plant, including welding equipment and an oxygen plant, has been installed at Cincinnati, so that the latter company may handle all classes of repair work to which the oxy-acetylene process can be applied. The Davis-Bournonville Company contemplates opening a demonstrating and repair shop in Cleveland at 2121 East Second Street, S. E.

Acme Supply Company, Chicago, Ill., whose factory is located at West Lake Street and Fifty-second Avenue, has increased its capital stock from $12,000 to $60,000. The company is enlarging its plant from three to four stories, and when this addition is completed a floor space of 50,000 sq. ft. will be available. The officers of the company are as follows: H. H. Schroyer, president; H. U. Morton, vice-president and secretary. The company makes a specialty of car curtains and fixtures and general railway supplies.

Allis-Chalmers Company, Milwaukee, Wis., reports a very satisfactory growth in its railway air brake equipment sales. The chief demand is for the standard double-end AA-6 equipments. Some of the recent orders for these are: The Connecticut Company, 175 equipments; Chicago City Railway, 12 equipments; Transit Supply Company, 70 equipments; Worcester Consolidated Railway, 15 equipments; Springfield Street Railway, 25 equipments; Portland Railroad, 6 equipments; Fresno Traction Company, 10 equipments; Northern Ohio Traction & Light Company, 10 equipments; Peoria Railway Terminal Company, 5 B-4 quick-action automatic equipments.

ADVERTISING LITERATURE

Hess-Bright Manufacturing Company, Philadelphia, Pa., is mailing a post-card calling attention to HB and DWF ball bearings.

Jordan Brothers, New York, N. Y., have issued a leaflet describing the Jordan single-belt adjustable geared grip-hoist, which is adaptable for transforming hand hoists and elevators into power elevators.

Ridgway Dynamo & Engine Company, Ridgway, Pa., has issued Bulletin No. 24, in which its alternating-current generators are described and illustrated. The sizes range from 35 kva to 750 kva in the engine type and from 30 kva to 300 kva in the belted type.

C. A. Wood Preserver Company, Austin, Tex., is distributing a folder containing an article by H. H. Gerhard, entitled "Wood Preservation by the Superficial Method," which was reprinted from *Telephony* of March 19, 1910. The company is also mailing a novel post card, entitled "Hot Shots." It is in the form of a folder, and when it is opened a revolver is unsheathed. This publication contains the story of the C. A. wood preserver, according to the United States Forest Service method of analysis.

D. & W. Fuse Company, Providence, R. I., has issued a supplement to Price List No. 12A, in which are covered the latest types of secondary fuse boxes and service switches and transformer and junction cut-outs for both aerial and subway lines which are manufactured by the company. Large capacity fuses up to 1000 amperes which have never before been listed are included in the supplement to Price List 12A. The original Circular 112 was entitled "Service Switches and Fuse Boxes for National Code Fuses, 250 and 600 Volts." It was dated September, 1909. Circular No. 113 was dated September, 1909, and was entitled "Fuses and Cut-Outs for Inductive Circuits."

Electric Storage Battery Company, Philadelphia, Pa., has issued Bulletins No. 121, dated March 15, 1910, and No. 122, dated April, 1910. Bulletin No. 121 has for its subject the installation of the Chloride Accumulator in the mills of the Indiana Steel Company, at Gary, Ind., while the installation of the Chloride Accumulator and the Eride battery in yachts and power boats is illustrated and described in Bulletin No. 122. The description of the installation in the mills of the Indiana Steel Company is very complete. A double-page view of the exterior of the works of the Indiana Steel Company and a double-page floor plan and outline diagram of the power house are presented. Accompanying the text are views of the interior of the power house, showing the gas engines, switchboards, the battery room, the converters, etc. A mill curve is presented of the estimated maximum load and an actual load curve is also shown. In addition there is an a.c. wiring diagram and voltage charts with the battery turned on and the battery turned off.

NEW PUBLICATIONS

Field Practice of Railway Location. By Willard Beahan. New York, 1910: The Engineering News Publishing Company. Cloth, 252 pages. Price, $3.

This is a second edition of Mr. Beahan's book on the practical side of railroad location. The subject matter has been carefully revised and brought up to date by the substitution of more modern data on train operation. The chapter on train resistance is particularly complete.

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Increase in Wages

One of the most notable features of electric railway operation during the past year has been the announcement in many cities that the wages of the trainmen would be advanced. These increases have not been brought about through strikes or under the pressure of threatened strikes, but have been justified in most instances because of the increased cost of living, of which so much has been said recently. Without taking up the question of whether there has been a halt in the upward course of the prices of necessities, as seems to be the case from the latest compilations, it is pertinent to inquire how long electric railway companies can continue to increase their expenses of all kinds unless there is a corresponding addition in the average rate of fare. Manifestly the time will be reached—indeed has already come on many roads—when the rising tide of expenses will absorb all of the profits. Such a result is one which would be equally unfortunate to the employees, the company and the public, but is inevitable in many instances unless some radical improvement is made in the conditions surrounding electric railway operation.

Transfer Abuse the Great Problem

Chairman Stevens of the New York Public Service Commission, Second District, in an address made at Detroit recently, characterized the abuse of the transfer system as the great problem with traction companies in New York. What is true of New York in this respect is true of all sections of the country. It is the intent of the companies, and undoubtedly of the law also, to make the reasonable use of transfers legal and to make the abuse of the privilege illegal. How this application of the system is to be attained in practice in large cities as well as in theory, however, no one has yet been wise enough to determine. The transfers have been furnished by the companies, but the public authorities have not enforced the laws against their abuse. When it is understood that the solution is of just as much importance to the general public as to the companies, better progress may be made. Excessive burdens, such as those that result from widespread perversion in the use of transfers, deplete railway revenues and necessarily hamper the railway companies in rendering good service and earning fair returns upon their investments. Correction of the impositions of those who take unwarranted advantage of transfer benefits is a public service that may well engage the attention of the State commissioners.

Defining the Fields of High and Low Tension D. C. Lines

Mr. Eveleth's recent paper before the Philadelphia section of the American Institute of Electrical Engineers is notable as the first comprehensive statement "with facts and figures" on the 1200-volt d. c. railway. The data given show the superiority of this higher potential over 600 volts for railway lines within a field ranging from a light interurban service

with stops every half mile and a schedule speed of 15 m.p.h. to the heavy service calling for stops every five miles and a schedule speed of 45 m.p.h. It will be seen that these upper and lower limits fairly coincide with those of most American interurban railways. Mr. Eveleth could have expatiated even further than he did upon the advantages of the wider spacing of substations permissible with the 1200-volt system. For instance, under most traffic conditions, 600-volt substations are just too near together to secure the best economy in attendance, but with an opportunity of placing them two or three times farther apart it would often be a simple matter to locate a substation at a passenger station where one set of attendants would answer for both. The author made no comparison with single-phase equipment because he apparently had in mind the use of even higher d. c. voltages than 1200 for interurban railways with city connections, and it cannot be denied that the interurban field affords the greatest possibilities for the use of 1200 and 2400-volt systems because these systems do not involve the complexities of mixed current operation. If this principle should be generally recognized as correct, the principal application for the single-phase system, as indeed Mr. Murray remarked during the discussion, would be for trunk line traffic.

Steam and Electric Traffic Agreements

In the past interurban roads have found it difficult to convince steam lines that the business of both had so many points of contact that concerted, harmonious action in traffic matters was desirable. One reason for the inability of the electric companies to impress their views upon the steam railroad companies has been that the limited field which each electric line has usually served has not given it sufficient standing to permit its officials to present a strong case when discussing rates with the steam railroad. The condition is rapidly changing, however, with the growth of electric systems, a fact which is instanced by a recent agreement made by the Illinois Traction System. This road has nearly 600 miles of interurban track and is handling more than 1500 carloads of freight each month In addition, it operates hourly passenger trains, fast limited trains and a sleeping-car service. Its strong position from the traffic standpoint has just been recognized in a passenger-rate conference, which included the Chicago & Alton, Illinois Central, and Chicago, Peoria & St. Louis steam railroads, and the steam lines suggested that rates affecting passenger traffic in competitive territory should be maintained. Heretofore no recognition in this respect has been given the electric railway company, which in consequence has been at a disadvantage, because it was not a member of the steam line traffic associations. But at the recent conference a readjustment of passenger rates was discussed, whereby the Illinois Traction System can enjoy the same rates as steam lines in the local territory and receive a slight differential on long-haul business, commensurate with the conditions that exist. The result of the conference shows that all steam railroad companies do not look now upon traction lines as "pirates."

Public Service Commissioners

A great deal of attention is being given by the legislatures of different States to framing laws to organize new public service commissions or to amend the statutes under which they act, but experience has shown that the personnel of a commission is equally as important as the extent and scope of its powers. In their work the members of such a commission are required to pass upon technical questions where an expert knowledge of the conditions which they have to consider is almost essential to enable them to reach correct decisions, yet the announcement of the establishment of one of the most recent of these commissions—that in Maryland—where there are three commissioners, was followed by the statement that positions on the commission had been offered to two lawyers and one newspaper man. So far as the published records of these gentlemen show none had any experience with the operation of steam or electric railroads nor of any of the other public utilities whose services they are to control, although this qualification would seem to be one of the most important to be considered. In Massachusetts, on the other hand, where the railroad commission is composed of three members, it has been the practice for a long time for the Governor to make his appointments so that one member of the commission shall have a practical knowledge of railroad operations, one shall be a business man and one shall be a lawyer. The statute under which the Wisconsin Railroad Commission acts provides that one of its three members shall have a general knowledge of railroad law and that each of the others shall have a general understanding of matters relating to railroad transportation. It is by no means improbable that the success of these two commissions in the adjudication of matters which have come before them has been due largely to this method of selection.

NECESSITY FOR REVISING BLANK FORMS

A periodical examination of the blank forms used by a railway organization is very desirable. One city railway has just reviewed all its printed stationery and found, not only a possible saving of $5,000 in the cost of the paper and forms, but it has learned of many little details of its organization that can be improved. Such a large saving, of course, is only possible by a big railway, but scarcely any road can afford not to devote some serious attention to its operating blanks and record sheets. The study will no doubt be the means of suggesting simpler and better ways for handling some of the steps in routine work. This feature alone should make profitable the time spent in reviewing the forms.

Perhaps the best plan of undertaking this work systematically is for the heads of departments to analyze the forms as a yearly event. Advancements made in operating methods during one year often afford reason for a change in the manner of keeping the records. The primary purposes to be borne in mind in this criticism are standardization, simplification and elimination. A consideration of the blanks from these viewpoints will clearly show the responsible head of each department just how well the forms are serving their purposes and quite possibly will bring out more efficient methods for obtaining the desired information. So long as a blank is available for some step in the operating system, some one must be responsible for filling it out. A good way to gage the value of a blank is to ask: Will it save clerical work and will the information it requests sufficiently cover the needs of the case?

A form is justified as a part of an operating organization only when a number of employees are concerned in a given operation or when one operation is repeated many times. Notwithstanding this principle, which axiomatic, as an organization grows new forms accumulate until there is danger lest their real purpose is defeated.

Some observations upon this subject may be of value

elsewhere. Considering first the question of standardization, it is advisable to reduce all stationery to some multiple of 17 in. x 22 in., in which size all grades of paper may be obtained. This brings an economy in the purchase of material, eliminates waste at the printer's and makes it convenient for him to print a number of different blanks at one time. Also, with standard sizes the space for storing and filing is fully utilized. A good grade of railroad manila stock can be purchased in the open market for about 3½ cents per pound, and it is hard to justify the use of more expensive stock for general operating blanks. A railroad can well afford expensive stationery for outside correspondence if the inter-department blanks are printed on cheap paper. Very many forms now ruled in colors would serve equally well if printed in black ink. This would reduce the cost and the lines could be accented as desired by a variation in width or by the use of dots.

A good way to analyze a set of forms is to submit to each department head copies of all forms in which he or his subordinates are interested. The official then should consider each form from the standpoint of the coming year, noting his criticisms of it on each blank. At a general conference the entire system of blanks should be discussed as a unit. No blank should be used unless it will save clerical work and meet the needs more fully than would a written statement. We have seen a great many forms which by a critical study of this kind could be greatly simplified, if not eliminated altogether.

Blank forms are tools of the men who operate a road and the maxim, "No man should be a servant of his tools," is applicable.

INTERURBAN RULES IN IOWA

Revision of the standard code of interurban rules of the American Street & Interurban Railway Transportation and Traffic Association was the subject of a committee report presented last week at the annual convention of the Iowa Street & Interurban Railway Association. The report, which is printed elsewhere in this issue, was only preliminary and tentative as the committee was unable to complete its work of considering all the rules in time for the meeting. As far as the committee went, however, it recommended numerous changes, consisting for the most part, of the elimination of some rules which it considered useless, and the substitution in others of the phraseology of the standard code of steam railway rules of the American Railway Association. It will be remembered that at the time the standard code of interurban rules was adopted at the Denver convention, many members of the association objected to the rules offered by the committee, and urged the adoption, substantially as a whole, of the American Railway Association code. Those who have been trained under steam railway rules are naturally prejudiced in their favor; to them, the meaning is perfectly clear and any other wording seems confusing or unnecessarily explanatory. This was the attitude, no doubt, of the members of the committee of the Iowa Association who seem to favor the steam railway rules in preference to any others.

We believe, however, that the conditions of employment on most steam and electric lines, particularly as regards the apprenticeship served by the men, are so unlike as to justify a difference in the wording of the rules. Steam railroad conductors learn their duties by prior service for several years as brakemen and a locomotive engineer is promoted only after a long period of employment in the round house and as a fireman. Knowledge of the rules on the part of these men is absorbed by long familiarity with them and many things which are not specifically stated in the rule book become second nature to a steam railroad employee. On the other hand, previous railroad experience is not a prerequisite for engagement as conductor or motorman on many electric lines; indeed, a large number of companies prefer men without previous training of this kind, provided they are otherwise fitted for the work and show an aptitude to learn. But such men must be told exactly what to do in the rules which are given them for their guidance.

A German professor once said: "It is never possible to overestimate the stupidity of your pupils," and this axiom applies in the framing of a code of rules for the instruction of any class of men who have had no extended experience in the occupation in which they are to be engaged. Hence, we believe that it is better to err in the direction of making the rules clear, even at the expense of some repetition and profuse explanation, and we hardly agree with the committee that the general rules of the standard code Nos. 1 to 32 "set forth a great many things which are in a measure an insult to the average intelligence of trainmen." A man must learn these things either when he is hired or when he is fired, and it is better to have these commandments in black and white in the rule book than to have them delivered by word of mouth from the superintendent. Later examples of rules which the committee considered were unnecessary to a man of ordinary intelligence were Rules 65 and 66, which define respectively a meeting point and a passing point. The terms "meeting point" and "passing point" are used frequently in the rules covering the movement of trains, and a different procedure is required when meeting an opposing train and when passing a train moving in the same direction. The terms in railway parlance are, of course, entirely opposite in meaning, yet they are so nearly synonymous to the beginner that their definition in the rule book seems advisable, so that there shall be no doubt as to their sense when employed in subsequent rules.

Substantially the only change in operating methods recommended by the committee was the modification of Rule 54 by the addition of a clause conferring on trains superiority by direction. The committee explains its position in recommending this change by stating that superiority by direction is not applicable in all cases to short lines, but that on an average interurban road the provision of superiority by direction has many advantages from an operating standpoint.

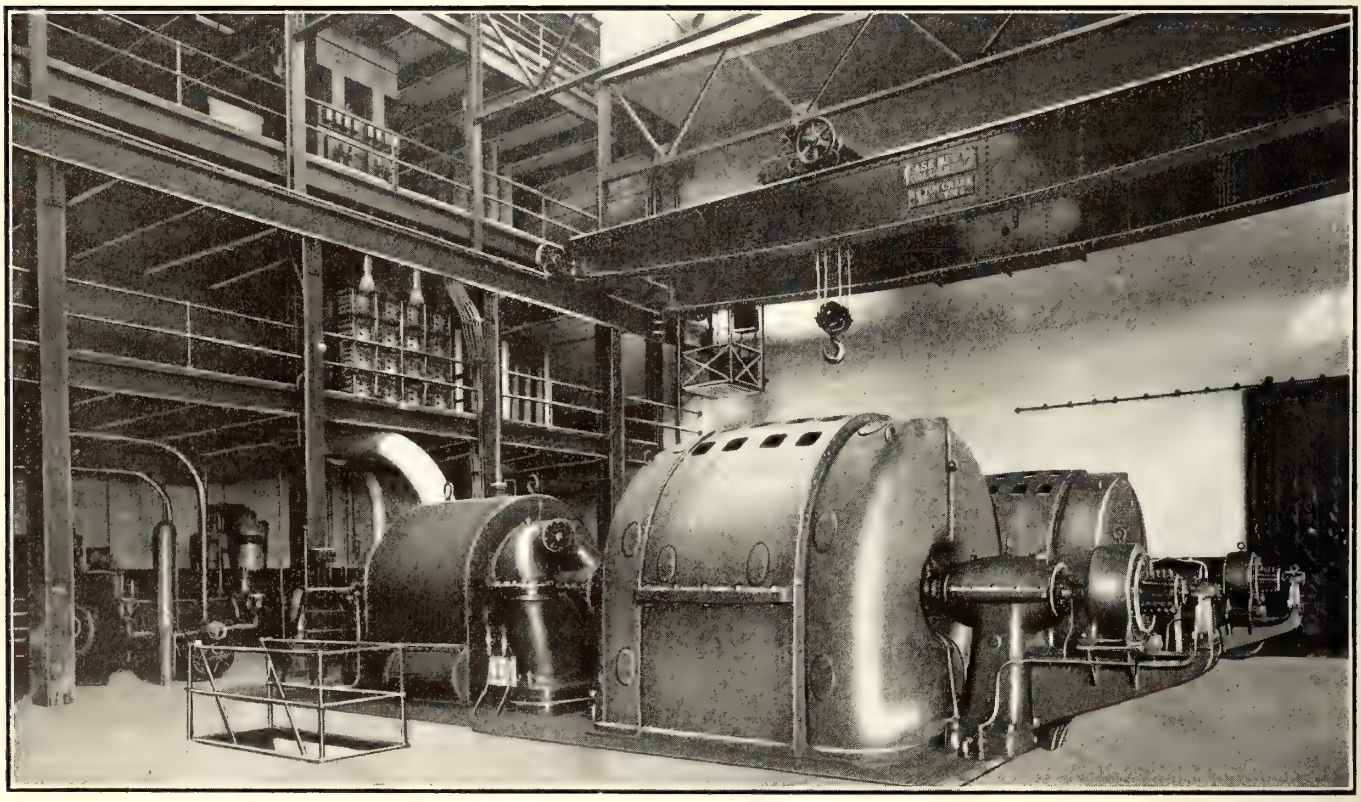
The action of the Iowa Association in appointing a committee to propose changes in the standard code is evidence of the interest which is being taken in this important matter. The present standard code by no means is perfect, but it is a good beginning, and fair criticism will promote future improvement. The committee of the American Association is collecting information regarding accidents caused by failure to observe or to understand rules now in effect on interurban roads throughout the country and, undoubtedly, will be very glad to have suggestions and criticisms such as are contained in the report of the committee of the Iowa Association. It is to be hoped that any others who have fault to find with the rules, as they now stand, will give the committee of the American Association the benefit of their views so that it can be guided intelligently in recommending at the convention next fall any changes which should be made in the present code.

NEW TURBINE STATION AT CINCINNATI

The Cincinnati Traction Company has just completed an 18,000-kw generating station at Pendleton, on the Ohio River, about 5 miles above the commercial center of Cincinnati. The company plans later to double the capacity of this plant by adding a duplicate section with three 6000-kw turbo-generator units. Because of the great variation in the level of the Ohio River, approximately 70 ft., the design and construction of the power-plant substructure and the circulating-water system involved especially noteworthy features.

GENERAL POWER SCHEME

Previous to the installation of the new Pendleton station, all the current for running the 700 cars normally scheduled was furnished by four d.c. generating stations located at advantageous points in Cincinnati. These stations are equipped with Corliss engines and large d.c. generators. The company is installing rotary-converter substations which are fed with power from the new Pendleton plant and thus the d.c. generators are to be released from active service.



Cincinnati Turbine Station—Interior View

The new Pendleton generating station is built on the same property with one of the older plants, which at first was equipped with five engine-driven d.c. generators and later with a 1500-kw, 6600-volt, three-phase, 25-cycle Westinghouse turbine unit. The old boiler plant has just been rebuilt and now its two sections will form a part of the ultimate station scheme. The new engine-room building will accommodate three 6000-kw units, two of which are now operating. When this plant is extended to its ultimate capacity of six 6000-kw units the property occupied by the older plant will be appropriated and occupied by the enlarged boiler house and turbine room.

BOILER PLANT

The newly rebuilt boiler plant furnishes steam for the old engine-driven units as well as the new turbo-generators. This plant comprises two sections, one of which has four and the other eight boilers. These sections are on opposite sides of the old engine room. A typical section across one bay of one of the two boiler houses is shown. At the present time the installation on one side of the center line only has been completed, but the company plans to complete the entire installation according to the design here illustrated.

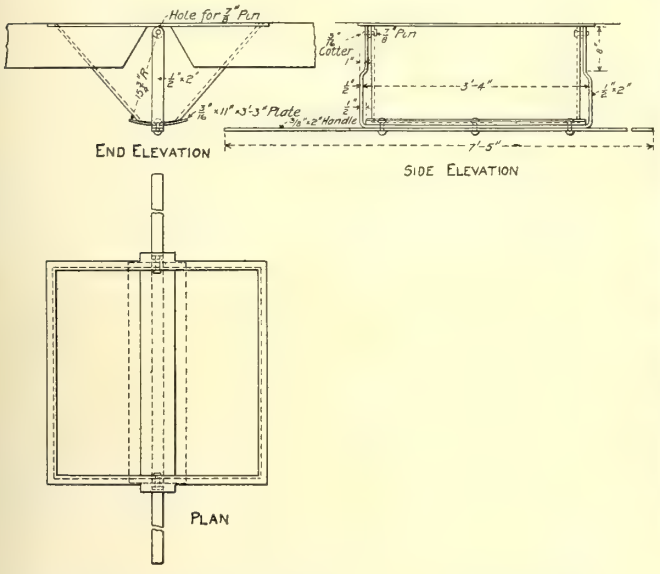
The boiler-house structure is of a type very economical to construct. The most noteworthy feature is the arrangement of the coal bunker and roof. The bunker is carried on a single row of structural steel columns, spaced 20 ft apart, and standing parallel with the boiler fronts and 14 ft. therefrom. These columns are 33 ft. high and carry the bottom of the bunker structure 28 ft. above the boiler-room floor. They also support the main header and a steel runway directly thereunder. The coal bunker is 9 ft. wide at the top, 2 ft. wide at the bottom and 6½ ft. deep. It is made of riveted steel plates reinforced with structural sections. This V-shaped structure has two sloping webs which are riveted to a 24-in. I-beam laid flat for a base and are tied together at the top with I-section tension pieces supporting a coal-car track. The bunker structure serves as the ridge section of the roof over the firing aisle.

The roof over the boilers is supported by 10-in. 25-lb. I-beam rafters carried on 12-in. stringers resting on the tops of the vertical columns at the corners of the boiler settings. These rafters carry a reinforced concrete roof slab which has a pitch of ½ in. per foot. The flat concrete roof extends inwardly from the boiler fronts 5 ft. 6 in. toward the bunker, and at its extremity supports a line of stationary sash which extends the full length of the boiler room. The upper ends of the sash are fastened against the top of the coal bunker. This long skylight furnishes excellent illumination in the firing-aisle space directly below. The type of roof designed for this boiler house is very economical to construct. The coal bunker supports the section over the aisle, and the flat concrete covering is carried directly by the boiler framework.

The present boiler equipment includes eight 525-hp B. & W. boilers with Murphy automatic smokeless furnaces and four similar boilers with Roney mechanical stokers. Foundations have been prepared for the installation of five more boilers in the section of the plant nearer the turbine building. Each boiler is equipped with a B. & W. superheater designed to raise the temperature of the steam 75 deg. above saturation at 160 lb. Each main steam header is 14 in. in diameter and is carried on the line of bunker columns between the boiler fronts. The boiler connections are 8 in. in diameter. The main steam headers of the two boiler houses are tied together with a line extending across one end of the old engine room. Thus

either or both boiler plants can supply steam to the reciprocating engine station or to the large turbines in the new station.

The combustion chambers exhaust into rectangular-shaped flues leading to two stacks 180 ft. high and 12 ft. in internal diameter. These stacks are made of radial brick furnished by H. R. Heinicke. The ashes from the automatic furnaces fall into hoppers below the boiler fronts and are drawn away in push cars. A much appreciated feature of this boiler plant is the large door leading from the basement space into the bottom of each boiler setting. These doors are large enough to admit a wheelbarrow for removing ashes and dust from the combustion chambers. The settings have a large space below the combustion chambers, and therefore frequent cleaning is not needed.



Cincinnati Turbine Station—Plan of Hopper Valve

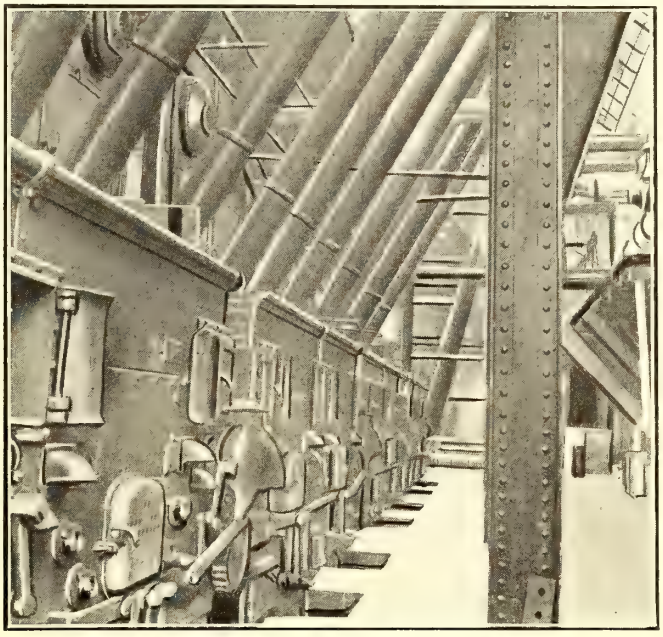


Cincinnati Turbine Station—View of Elevator Shaft Bridge for Coal Tracks

COAL-HANDLING SYSTEM

The coal-handling plant includes a Hunt industrial railway with two-ton side-dump cars, which are pushed along tracks extending over the tops of the bunkers. Coal is received on a steam railroad siding about 100 ft. away from one end of one boiler house. The push cars are loaded by gravity from a tunnel underneath the railroad siding and pushed onto the floor of a steam elevator, which raises the loads to the elevated tracks. These reach the boiler house bunkers over a plate-girder bridge spanning Eastern Avenue. A track scale is provided near the elevator house, so that all coal may be weighed before it is dumped into the bunkers.

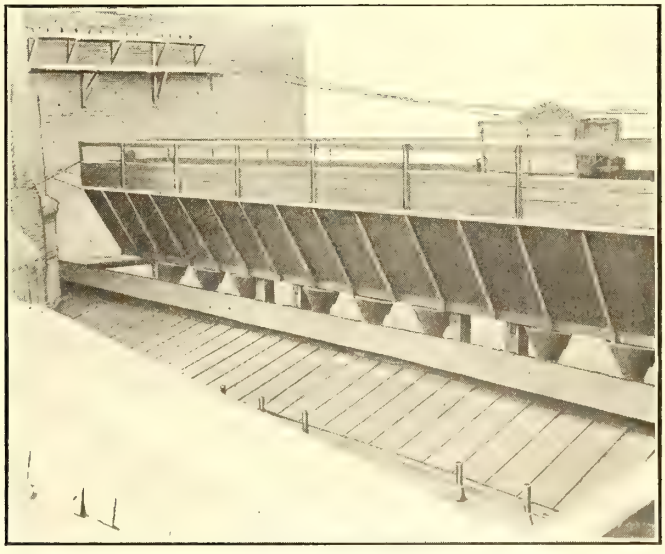
Two views of the coal-handling plant are presented. One shows the elevator tower and bridge across the street and the other shows the roof of one of the boiler houses, with a car of coal standing on the track above the bunker. A sketch of the hopper valve designed for use in loading the coal cars is presented. This valve is of simple construction, and has given excellent satisfaction.



Cincinnati Turbine Station—Boiler Plant

NEW GENERATOR BUILDING

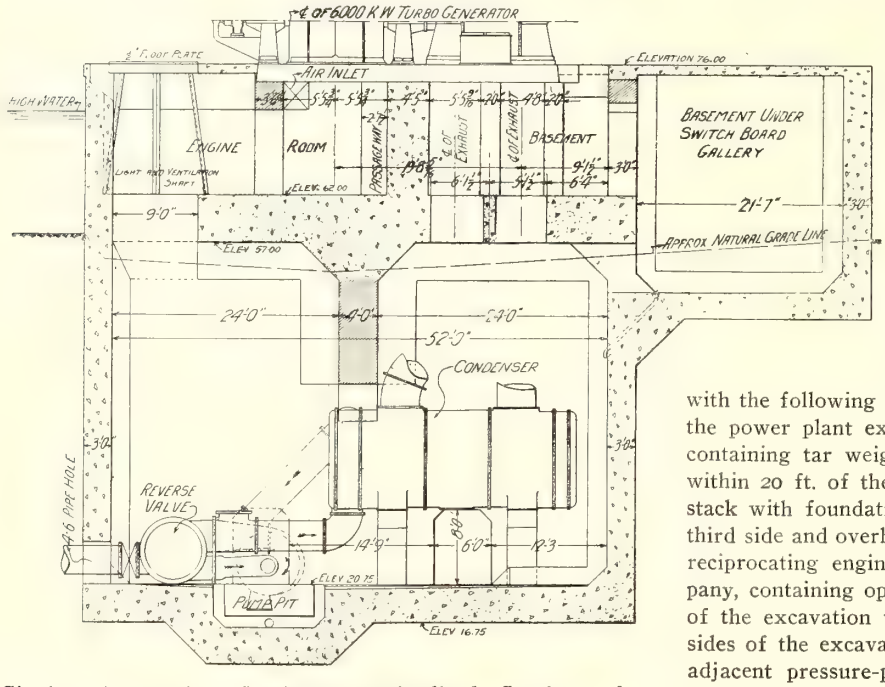
The building which encloses the turbines, auxiliaries and electrical equipment was designed with a view to doubling the capacity of this station when the increased power is needed. A vertical section through the entire plant from the coal-receiving end to the turbine building, including a profile of the circulating-water conduits, shows the general arrangement of the engine room, switchboard gallery, vacuum pump bays and the condenser pits. In designing this plant it was, of course, necessary not only to provide for an ample supply of condensing water at all stages of the Ohio River, but also to build water-tight basement walls to a height safely above the high-water level. Referred to the established datum, which is 3 ft.



Cincinnati Turbine Station—Coal Bunker Above One Boiler House

below low-water level, the highest water level is 71 ft., and the turbine-room floor is at an elevation of 76 ft. The floor of the basement, which extends under the entire turbine room, is at an elevation of 20.75 ft. The basement structure between the engine-room floor and the basement floor has a depth of 55.25 ft., and of necessity had to be built to withstand water pressure for its full height.

The superstructure is built of brick and steel according to the plans of modern fireproof construction. The turbine room proper is 53 ft. wide and 71 ft. long in the clear. Its entire floor area is served by a 30-ton Case crane, with runways supported on the steel building columns at an elevation of 25 ft. above the floor. The crane is built with a wide bridge to provide for long drums on which there is sufficient cable for a lift of 80 ft., thus making it possible for the crane to handle the condenser equipment in the pits 55 ft. below the turbine-room floor. The roof trusses of the turbine room are 33 ft. above the floor. The roof is of reinforced concrete. A skylight 22 ft. wide extends the full length of the turbine room roof.



Cincinnati Turbine Station—Longitudinal Section of a Basement Subdivision, Showing Turbine Base and Condensers in Place

Facing the turbine room and opening onto it is a series of four balcony bays, one above the other. The lower bay, which is at the turbine room floor level, contains the large dry-vacuum pumps; the next two bays above contain the high-tension busbars and switchboard apparatus, and the upper bay encloses the lightning arresters and outgoing high-tension leads, a vacuum header and a supply tank for gland water. Ventilation of the engine room is had through large louvres in one side of the upper bay.

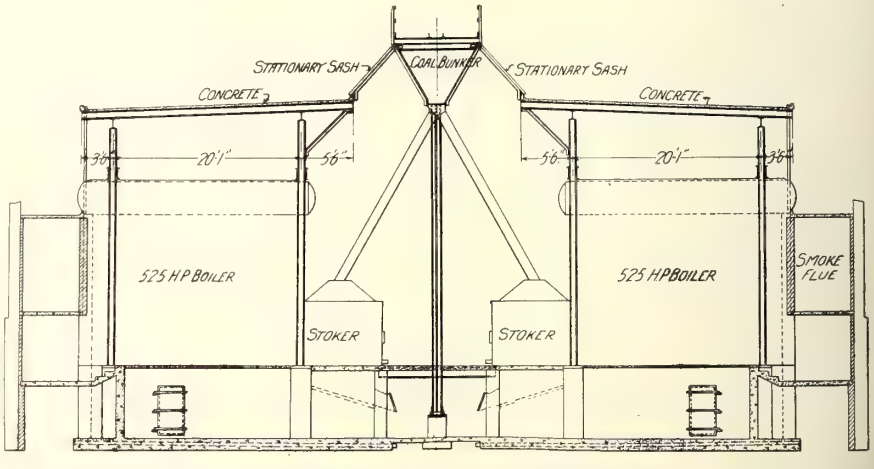
FOUNDATION WORK

The turbine room substructure is a massive concrete box subdivided by a heavy floor which forms an upper and lower basement. The upper basement is used as a valve room and for ventilating chambers. The lower basement is subdivided into three sections, each 52 ft. long by 21 ft. wide, and occupied by the condenser equipment of one 6000-kw turbo-generator, which stands directly above it on the machine room floor. The side and partition walls of the basement sections are 3 ft. thick and the floor is 4 ft. thick. Each condenser pit is 36 ft. 3 in. high from floor to ceiling. A typical longitudinal section of one of these basement subdivisions, which shows the turbine base and condenser in place, is presented.

The concrete floor which covers the condenser pits is 5 ft. thick, heavily reinforced with Kahn bars, as shown in an accompanying illustration. This extreme thickness and the heavy reinforcement were necessary because the floor over each of the three condenser sections of the subbasement serves to support the columns which carry the turbo-generators directly above it. Two vertical exhaust connections from the double-flow turbines pass directly downward through the two floors to the top of the condenser in the pit immediately below.

The contract for constructing the foundation work up to the machine room floor covered the excavation and disposal of approximately 12,000 cu. yd. of earth and rock and the placing of approximately 6000 cu. yd. of concrete for walls and floors of the power station building below the water table, which is located about 30 ft. above natural grade. In making the excavation the contractor had to contend with the following obstacles: Within 20 ft. of the river side of the power plant excavation is a steel tank 75 ft. in diameter, containing tar weighing 8000 tons. On the opposite side, and within 20 ft. of the brink of the excavation, is a 200-ft. brick stack with foundations extending 25 ft. below grade. On the third side and overhanging the excavation is one wall of the old reciprocating engine station of the Cincinnati Traction Company, containing operating machinery. Thus the chief problem of the excavation work was that of satisfactorily bracing the sides of the excavation against the lateral thrusts of the three adjacent pressure-producing structures.

After consideration of the many methods of excavating, it was decided to open the entire basement area, 70 ft. x 85 ft., and take out approximately half of the material, or about 6000 cu. yd., by working downward within the area of an inverted pyramid. Thus the natural slope served to withhold the side thrust while one-third of the material was being removed. After this had been taken out it was necessary to brace the entire excavation as the work proceeded. The bracing was done by starting at the top of the excavation and placing a series of timber frames built of 12 x 12-in. sticks, having crossing frames in the same plane so as to maintain rectangular openings 10 ft. square in each frame. For the first half of the depth excavated these frames were spaced every 5 ft., and for the remaining half, where the great pressure from the adjacent structures developed, it was necessary to introduce these heavy frames over the entire area of the excavation at a vertical spacing of 2½ ft.



Cincinnati Turbine Station—Section Across One Bay of Two Boiler Houses

The excavation was carried down to bedrock and a 5-ft. depth of this rock was taken out, the final level being approximately 55 ft. below natural grade and 70 ft. below the high-water level of the river. During the progress of the work, and after the concrete walls had been brought up to grade, the Ohio River reached the flood stage, and although neither leakage nor any perceptible damage developed, the entire excavation was filled with water to counterbalance the thrust from the outside. The water afterward was pumped out without difficulty.

A total amount of steel reinforcing material of 250 tons, consisting of twisted bars in the walls and Kahn bars in the floors and other spans, was used in reinforcing the 6000 cu yd. of concrete deposited in the substructure of this plant. The entire work of excavation and placing the concrete was completed in a period of five months by the Falkenau Electrical Construction Company, Chicago.

TURBINES

The present plant is designed for three generating units, two of which are now installed. These units are Westinghouse double-flow, 1500 r.p.m. turbines and 6000-kw, 6600-volt, 3-phase, 25-cycle generators. Each turbine has an independent 14-in. steam connection from the main header which extends between the two boiler plants. Two exhaust connections from each unit lead directly downward through suitable openings in the basement floor to the condenser in the subbasement. The back-pressure valves and the free exhaust connections are located in the engine room basement. The free exhaust lines are 36 in. in diameter, and lead to a common pipe carried up one corner of the switchboard gallery section and terminating above the roof. The back-pressure valves are of the Chapman type 48 in. in diameter, two for each turbine, and are motor-operated.

The turbines are spaced 24 ft. between centers, and the centers of the end turbines are 10 ft. 6 in. from the end walls of the building. Each turbine carries a 50-kw, 125-volt exciter on an extension of its main shaft. The speed of the turbines is remotely controlled from the switchboard.

The turbine generators are cooled wiith air taken directly from the engine room through openings in the top half of the casings. Fresh air enters the engine room through a row of louvres 4 ft. high, extending across the building just under the room of the switchboard gallery. After it has passed through the generators the air is discharged through an opening in the floor into a chamber in the engine room basement. This room is connected with the outside of the building by a row of louvres, one under each window on the river side of the building.

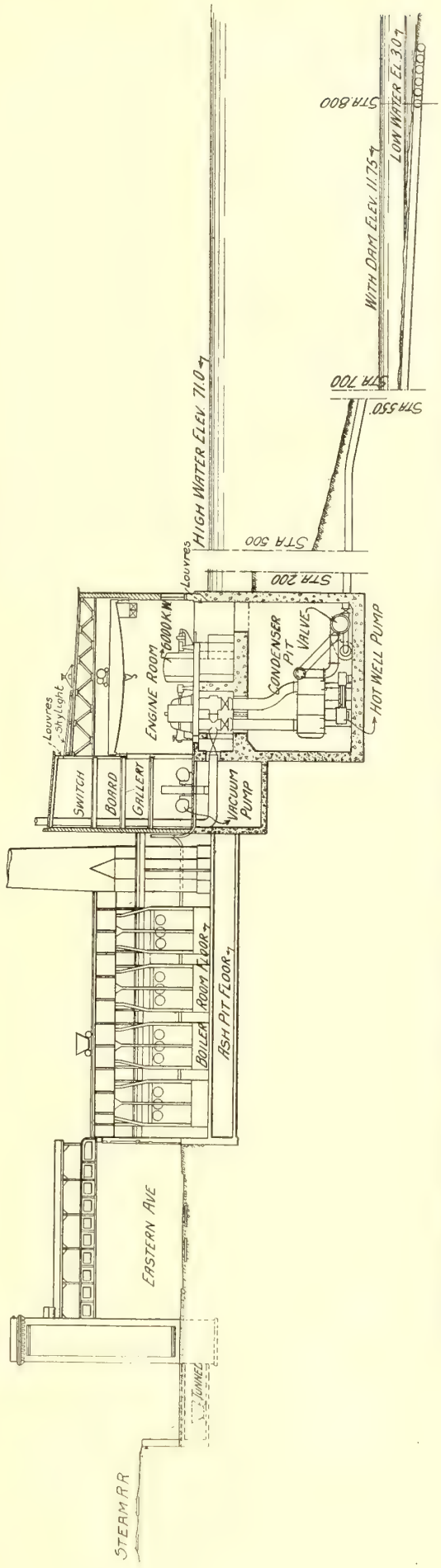
ELECTRICAL SWITCH GEAR

The electrical switching apparatus of the new Pendleton power plant is centralized in a Westinghouse remote-control benchboard with edgewise instruments. This board is located on the second balcony, from which point the operator has an unobstructed view of the machine room floor. All of the switches regularly used are motor-operated and have control buttons and pilot lamps on the bench board. Control buttons also are provided for the generator circuit-breakers, electrically operated field switch and electrically operated turbine governor. The board is in two sections, each complete for one generating unit.

High-tension busbar compartments also are installed on the second balcony. Generator buses, group buses and a ring bus are all interconnected with type C non-automatic electrically operated switches. Two feed lines are taken off each group bus and are controlled by type C electrically operated automatic circuit-breakers. All of the large oil switches and circuit-breakers may be isolated by opening knife disconnecting switches.

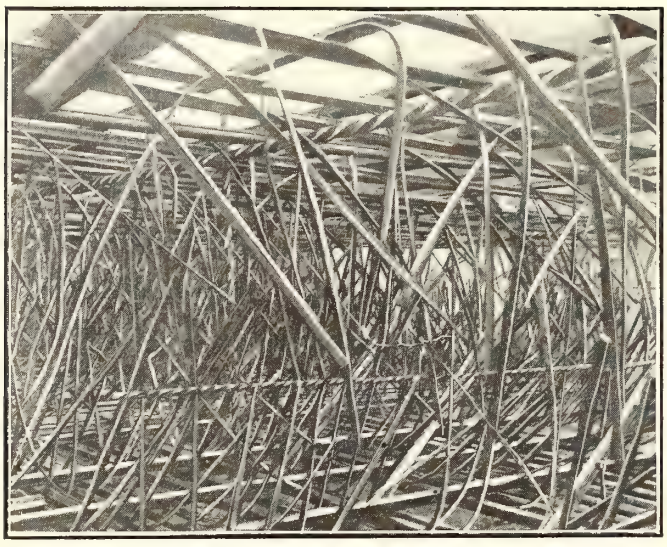
The switch cells stand on the first electrical balcony in two rows directly under the busbar structure, which is on the second balcony. This arrangement permits a simplified scheme of vertical connections between the buses and the switches. Each conductor is enclosed in a concrete septum.

The outgoing feeders pass upward through vertical bus



Cincinnati Turbine Station—Vertical Section, Showing General Arrangement of Plant, Also Circulating Water Conduits

structures and through the floor to the roof over the third electrical gallery, thence horizontally to outlets through the station wall. Three outgoing three-phase feeders are installed. A choke coil is inserted in each phase of the outgoing feeders, and each also is protected by a Westinghouse Type E electrolytic lightning arrester with a horn gap. A view of the lightning arrester installation, showing the method of mounting the



Cincinnati Turbine Station—Reinforcement for 5-Ft. Engine Room Basement Floor

horn gaps on a wooden framework, and the arrester jars as installed in individual trays on the pipe rack beneath, is presented.

CIRCULATING WATER SYSTEM

One of the most noteworthy features of this large turbine station is the method adopted for obtaining circulating water from the Ohio River. Because of the great expense for installing the usual type of intake well, screens, tunnels, etc., and providing for handling water varying in level practically 70 ft., there have been very few large generating stations built along the Ohio River. The method used at this plant is said to give good service, notwithstanding the fact that its cost is far below that for the installation of the more common form of intake.

Essentially the circulating water system for each unit is made up of two 36-in. pipes alternately used for intake and discharge, a reversing valve for changing the direction of flow, and an engine-driven circulating pump. The pipes leading to the river are 650 ft. long and extend nearly 200 ft. outward from the shore line at low-water level. Each has a horizontal right-angle bend at its extremity and an unscreened bell mouth. The six bell mouths point downstream, and are anchored in line by heavy wooden stringers and 12-in. piles driven into the bed of the river. The ends of the pipes are 5 ft. apart on centers, and following government regulations, no part of a pipe or its flanges is less than 2 ft. below the bed of the stream.

At the power station each pair of pipes enters one of the condenser pits close to the floor. Gate valves connect the two pipes in each condenser unit with a reversing valve. This valve is cylindrical in form, and is 6 ft. in diameter by 12 ft. long. Circulating-water connections are made on the river side of the valve, and pump and condenser connections on the other side. By shifting the position of the valve piston, the direction of flow of the water in the entire circulating system is changed. The valve piston is moved in about 55 seconds' time by a 12-in. hydraulic plunger. Cooling water is circulated by a 36-in. American Well Works certrifugal pump for each condenser. These pumps operate at 250 r.p.m. and are driven by tandem-compound Ball engines. Each pump has a capacity for handling 25,000 gal. of water per minute.

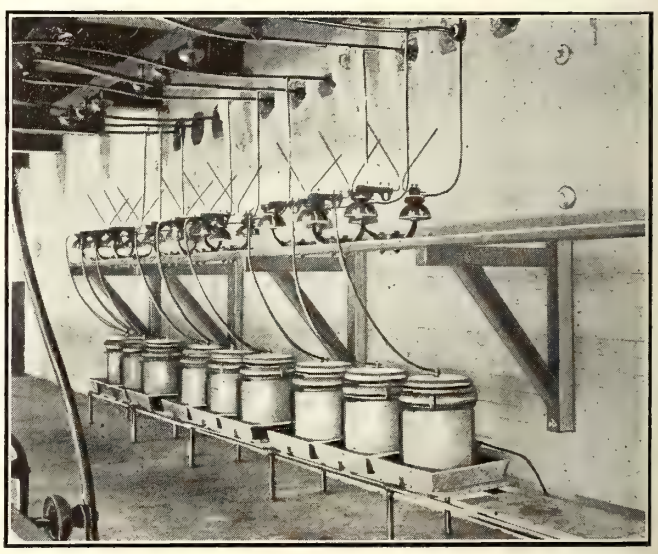
The success of this circulating-water scheme depends upon the performance of the reversing valve. With the intake and drift matter only by being pointed downstream, it is possible for foreign material to be drawn in with the water. The great discharge pipes open to the river and being protected from length of these pipes, however, provides against heavy bodies reaching the reversing valve, but smaller matter may reach the condenser tubes. When the condenser begins to clog and it is found impossible to maintain a uniformly high vacuum, the reversing valve is thrown over and the flow through the condenser and the circulating-water system is reversed. Thus the foreign material is forced back into the river and fresh water is drawn in through the pipe formerly used for discharge. It is stated that when this system was first put into service it was necessary to reverse the flow two or three times a day, but now that the bed of the stream near the ends of the pipes has been cleared, a high vacuum can be maintained with a reversal of flow only once in two days. Normally the circulating pumps lift the water about 14 ft. In times of flood there is a head of nearly 45 ft. on the pumps.

CONDENSER EQUIPMENT

Each turbine unit has an independent condenser installation excepting dry-vacuum pumps, two of which serve the entire plant. The condensers are of the Wheeler surface type, with 25,000 sq. ft. of cooling surface made up of 4800 1-in. tubes. Each condenser rests on concrete pillars, which support it at a height of 8 ft. above the floor of one of the basement subdivisions. The exhaust steam connections are practically straight and vertical from the outlets under the turbine casings to the top of the condensers. Daylight is admitted to each of the condenser pits through a hatchway extending from the machine room floor down through the basement and through the basement floor, which forms the ceiling of the condenser rooms. Each of these hatchways is made of No. 12 plate reinforced with angles. All three of the condenser pits drain to a common sump, which is emptied by a 3-in. Lunkenheimer steam ejector. The hot-well pumps are located in the condenser pits close to the condenser foundations. These pumps are of the Boytts-Porter type, with cylinders 20 x 20 x 48 in.

VACUUM SYSTEM

The dry-vacuum pumps are installed under the switchboard gallery in a bay on the machine room floor. Each vacuum pump is made up of a 16 x 42-in. Hamilton-Corliss 50 r.p.m. engine, to which a crank, connecting rod and a Laidlaw-Dunn-Gordon

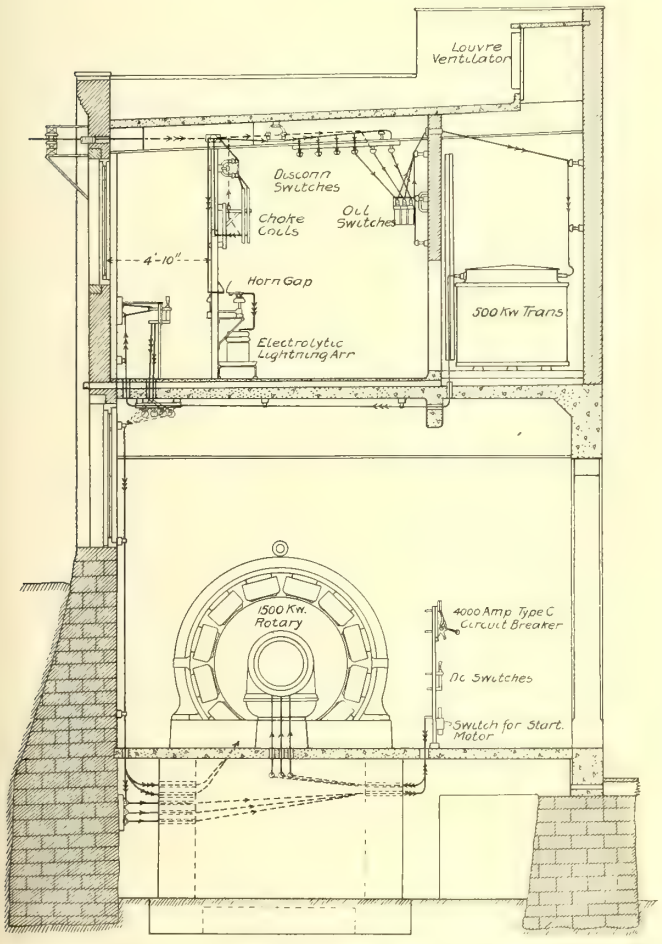


Cincinnati Turbine Station—Electrolytic Arresters on Out-Going Feeders

vacuum cylinder 36 x 60 in. have been added. The vacuum cylinders have semi-rotative valves operated similarly to the Corliss exhaust valves.

For removing the air from the intake line and elevating the water from the river to prime the centrifugal pumps, a connection is made from the circulating system to the valve chamber on each end of the vacuum pumps. When the piston has

reached the end of its stroke the rotative valve closes the opening on the suction side and establishes communication with the discharge side; then air is drawn into the cylinder from the circulating system. That is to say, after the pump has exhausted the air from the condenser it then exhausts the air from the circulating system, and does this without reducing the volumetric capacity of the pump for removing air from the condenser. The scheme of performing two services with the vacuum pump, however, does impose additional work on the steam side of the unit, because it is called upon to compress a greater quantity of air to atmospheric pressure. It is stated that when carrying 29.4 in. vacuum in the condenser the vacuum in the circulating system adjusts itself to the amount necessary to raise the water from the river to the circulating pump, depending upon the stage of the river.



Cincinnati Turbine Station—Transverse Section of Hunt Street Substation

The dry-vacuum pumps are protected against water charge by the use of a 14-in. vacuum header installed 115 ft. above low-water level and 40 ft. above the main floor. The vacuum header, from which the vacuum pump exhausts the air, is connected with the suction side of the large reversing valves which form an essential part of the circulating-water system. The vacuum header is drained by gravity to a water seal in the basement, 90 ft. below. This seal is made of a 10-in. pipe 18 ft. long, into which the 4-in. drain pipe has been inserted. The use of the vacuum header and connections with the circulating-water system not only permits the water to be lifted for priming the pumps, but is of principal importance in connection with the scheme for reversing the flow through the intake and discharge pipes, since it prevents the circulating pumps from losing water when reversing under load.

FEED WATER HEATERS

The feed water heaters are of the open type of 3000 hp each, and were made by the Pratt Iron Works.

NEW SUBSTATIONS

Two substations equipped with two 1500-kw rotary converters each, and one substation with one similar rotary, have recently been put into operation, receiving current from the new Pendleton power plant. As earlier stated, the substation equipment has been installed to replace d. c. generating machinery. A transverse section of the substation built at the site of the old Hunt Street power plant is presented. The equipment of this substation includes two 1500-kw Westinghouse three-phase rotary converters on the first floor and an installation of 500-kw, oil-insulated transformers in a fireproof room on the second floor, adjoining which are grouped the high-tension switching and lightning protection apparatus. The electrical equipment is all of the remote-control type, operated from a control desk similar in form to that of the Pendleton station.

Attention is called to the transformer arrangement and the method of ventilating the transformer vaults. A constant current of cooling air is delivered under the transformers by a row of 4-in. pipes laid in the concrete floor and extending outside the building. As the air about the transformers is heated it rises and passes out through louvre ventilators installed on the roof. The upward movement of the heated air draws fresh air in through the pipes, and this is discharged directly under the transformer cases. The 4-in. tubes laid in the floor are given a slight fall away from the transformer vaults, and so will quickly carry off any oil that might boil out of the transformers should they catch fire. This feature reduces the fire risk to a minimum.

CHANGE IN ROLLING STOCK STANDARDS AT RICHMOND, VA.

The Virginia Railway & Power Company now operates about 320 closed and open cars of various types, but it is now planning to make standard a semi-convertible car with maximum traction trucks and two 65-hp motors. These cars will be similar to the last pay-as-you-enter car of the Metropolitan Street Railway Company of New York, as described in the Electric Railway Journal for Dec. 5, 1908. With this end in view, the company has ordered 20 double-end cars from The J. G. Brill Company. The new cars will have 32-ft. bodies, 5-ft. 9-in. platforms, closed vestibules and the regulation exit and entrance doors. All of these cars will have the prepayment fixtures made under the license of the Pay-as-You-Enter Car Corporation. The question whether two-motor or four-motor equipment should be used in these cars was a very important one as it was feared that, owing to the narrow-grooved rail used in Richmond, sufficient traction could not be secured with two 65-hp motors. After making a number of tests for more than six weeks under the worst track conditions in Richmond in regular service operated in winter, it was found that two 65-hp commutating-type motors with single-motor, center-bearing trucks were fully capable of giving the desired service. The trucks are of The J. G. Brill Company 39-E type. It is the intention to make this type of two-motor equipment standard for city lines, while the equipments with four 50-hp motors will be transferred to the suburban and interurban service.

Aside from the 20 new double-end cars mentioned, the company has available 20 single-end, double-truck semi-convertible cars with Detroit platforms and 30 other cars which can readily be converted to pay-as-you-enter service. A long step toward the adoption of the pay-as-you-enter system has been made by enforcing a rule that the front platforms must be used only for exit. This order has already cut down fare losses and accidents to quite an appreciable extent. The company had little difficulty in bringing about this change in operation as it advertised its purpose for some time by taking considerable space in the newspapers, as well as in the cars. An unlooked for, but welcome, result of the new rule is that few people now ride on the front platform, and there is, therefore, much less interference with the motorman.

The Baku municipality, Russia, is said to have voted $425,000 for the purchase of the local street railway system. It is the intention to electrify the system and build several extensions.

SEVENTH ANNUAL MEETING IOWA STREET & INTERURBAN RAILWAY ASSOCIATION

The Seventh Annual Meeting of the Iowa Street & Interurban Railway Association was held at the West Hotel, Sioux City, Ia., April 21, 22 and 23. The Iowa Electrical Association held its annual meeting at the same time and the combined registration of members and supply men was about three hundred. At the closing session of the convention the following officers were elected to serve during the coming year: President, L. D. Mathes, Union Electric Company, Dubuque; vice-president, J. F. Porter, Tri-City Railway Company, Davenport; secretary, George W. Macartney, Des Moines City Railway. The next convention will be held at Davenport, Ia., in April, 1911.

On the morning of the first day both associations listened to an address on "Public Service Commissions," by J. U. Sammis, member Iowa State Senate, Le Mars, Iowa. The speaker discussed the public service commission law as now being considered by the Iowa State Legislature. It was held to be one of the most important issues of the time. The speaker gave his reasons for believing that a public utility law should be enacted and why it would prove of benefit to those interested in public service corporations. It was a good thing as a business proposition and still better when considered from the moral standpoint.

A public service commission would be of immense value because it would remove public utilities from the field of politics. One of the worst features of public utility work in Iowa, as well as other States, had been that, often of necessity, the railway and lighting companies had been forced to protect themselves by getting into politics. Mr. Sammis said that during the last eight years more than 800 laws had been passed in different States to regulate corporations. These laws might be grouped as follows: First, to establish commissions; second, to amend the first laws; third, to define freight and passenger rates; fourth, to regulate service; fifth, to regulate corporate affairs, and sixth, public safety measures. In five years 15 railway commissions had been appointed. These might be graded into three classes—those with the power to revise rates; those with the power to take the initiative, and, lastly, the commissions with less power.

Considering the proposed Iowa commission, Mr. Sammis held that it should be strongly established and that the law should so be framed that the commission might accomplish its aims and that its orders would be recognized. If the railways were to be controlled, the means for doing so should be firmly established and the control fairly executed.

An important question when considering public service commissions was: Should the rates be made by local councils or by non-partisan commissions? The final results of a good law would be improved service, publicity of corporate affairs and stability of investment; also, free service would be abolished, as well as rebating, and this should eliminate the feuds frequently occurring between citizens and managers of public service corporations. The public service commission law of Wisconsin had done a great deal of good in showing many small companies the detailed cost of their operations, as well as in eliminating rebating. It certainly was true that if rebating was not correct in principle for steam railway use, it should have no place in other public utility operations. The requirements for uniformity in accounting methods and the publication of statistics would do for the companies what a trust company does for its subsidiary organizations; it would put managers in competition with each other.

Mr. Sammis said that when a new law had taken the corporations out of politics, then an important step toward better conditions would have been made. The uniformity in accounting and the regulation of corporate affairs and services would make investments more valuable because then they would not be jeopardized so frequently by local limitations.

Among the objectors to such a new law were those who gained their livings by political work; objections from such should be judged on their merits. Others objected to the granting of perpetual franchises. Mr. Sammis held that a perpetual franchise would be of benefit to the people giving it, providing the corporations were under impartial regulation. Certainly such a franchise would make its securities more stable and protect the invested capital. Moreover, a franchise would not be perpetual unless the company did not comply with the orders of the regulating body, and so long as a company did obey, it should be protected. Some reasons for his approval of the interdeterminate franchise were because the real purpose of a public utility was to serve the public. To do this most effectively the company should be a "public" monopoly as contrasted with a private monopoly.

Mr. Sammis reinforced his arguments with statements of the results accomplished by the Wisconsin and New York commissions, citing the many complaint cases—nearly 100 a month in Wisconsin—that were settled out of court. He held that in discussing the subject of commissions and the advisability of their establishment, the moral question of fair treatment of both parties was greater than any business one. He believed that a well-established, carefully chosen commission, made up of competent experts, would be best for the people of Iowa and the corporations. Believing this, he urged the public service companies to favor the proposed laws and assist in educating the people to the same idea.

FIRST SESSION, RAILWAY ASSOCIATION

P. P. Crafts, president of the association and manager of the Iowa & Illinois Railway Company, presided at all sessions. The report of the committee on operating rules was read by J. A. Du Bois, Cedar Rapids and Iowa City Railway. This was a report of progress, and on motion the committee was instructed to continue its work. A digest of the report is published elsewhere in this issue.

L. D. Mathes, secretary and treasurer of the association and general manager Union Electric Company, Dubuque, reported that the finances of the association were in good condition and distributed to the members bound volumes of a report of the last annual meeting. The report contains 113 pages.

President Crafts then presented his address to the association. An abstract follows:

PRESIDENT'S ADDRESS

"It is difficult to realize that a year has elapsed since this association met at Cedar Rapids, and enjoyed three days of profitable meetings and the hospitality lavishly bestowed by the various electric public utility companies and by their friends. In the meantime many history-making events have happened in the electric railway field.

"The forcing of the 3-cent fare upon the Cleveland traction lines is one of the most important events. Repeated exposition by the companies that the 3-cent fare cannot produce a reasonable return upon the investment, for reasons well known to the owners and operators of street railway properties, seemed to have no effect upon the majority of the Cleveland votors, and they apparently yielded to that sentiment that is all too common at the present time, namely, 'force the situation on the company; it will work out its salvation in some way.'

"The public demands constantly better service, better equipment and better track. These demands must not only be met by heavier expenditures, along the line of improvement, but the cost of all materials and supplies, and of all labor entering into the construction and maintenance of electric railways is constantly increasing, and at a greater ratio than the increase in railway earnings.

"The electric railways are bound in their unit of earnings by the terms of their franchises or by the ruling of State, or of Federal Commissions. Generally speaking, this unit is automatically reduced as traffic increases, either through further rulings of the bodies mentioned above or by concessions granted by the companies upon demand, and in a few cases voluntarily. On the other hand, general lines of business are not bound by anything as to the prices which shall be made, except by the leveling influence of competition, which in many cases is materially reduced by associations that divide territories and fix

prices, only too often to the maximum the market will bear, regardless of the cost to the agent, manufacturer, etc. Naturally, therefore, the electric railways must endeavor to maintain passenger fares and freight tariffs at as high a plane as possible rather than to decrease them.

"No doubt the campaign of education of the public that is now being conducted by the public utilities of the country will sooner or later have a beneficial effect and they will be permitted to conduct their business under less trying conditions than at present and enjoy better returns. Unless, however, this condition prevails within the near future, the confidence of investors, which has already been severely shaken, will be disturbed to such an extent that development of public utilities will be brought practically to a standstill, with a consequent loss to communities whose welfare depends greatly upon the growth of the utilities located therein. But those who own and operate properties should not cease for a moment their efforts to further educate the public regarding the conduct of their business and to do so in a frank and open manner.

"The prepayment type of car for street railways is gaining favor every day principally because it has caused an appreciable increase in the earnings of roads adopting it, and it has minimized step and platform accidents. The full field of usefulness of this type of car has not yet been fully determined, and no doubt as improvements are made and its first cost lessened it will be more generally adopted by the smaller roads. We are fortunate in having with us a representative of one type of prepayment car, who will enlighten us on a few of the points mentioned above.

"I desire to call your particular attention to the fact that most of the papers to be presented before this convention cover a line of subjects which in the past have not received the consideration which perhaps they have deserved.

"Very little attention has been given to the man who in case of personal injury to passengers or to the public has it in his power to work great good or serious damage to his client. I refer to the company surgeon. He must be a man having business and executive as well as surgical ability, quick to act, positive, and diplomatic. I commend your careful attention to the very able paper on that subject to be presented here.

"Great progress has been made in the past few years in the character of track and overhead construction, both in paved streets and on interurban rights-of-way. The standard is being constantly raised from year to year, and what was considered standard practice five or six years ago is now almost obsolete. City track construction is becoming more simplified by the use of T-rail properly installed, the placing of long, easy curves, high-grade special work, etc. Interurban construction is conforming more closely to accepted steam railway standards for high speed and heavy traffic, and the more extended use of catenary overhead construction shows great improvement in that direction. Joint papers on this subject will be presented by gentlemen thoroughly conversant with and well able to handle the subject in a manner which should be very interesting and instructive to the delegates.

"We are now facing a situation which is becoming more urgent every year, and which may be forced upon us at some time in the future, namely, that of providing for depreciation of our properties beyond normal maintenance. Two very knotty problems in connection with this matter are, what basis should be used, and what amounts should be allowed on the various portions of property and equipment in making up depreciation charges. So far there seems to be as many different opinions as there are electric railway properties in the country, but I trust that delegates to this convention may at least get started on some basis which will be accepted by all of the companies in this State. The paper on this subject will be presented by a gentleman whose experience in this line eminently fits him to start us in the right direction.

"Papers will be presented on the question of "Fares," both city and interurban, and a paper on the "Prepayment Car," which will be presented by gentlemen thoroughly well fitted to handle the subjects.

"Many of the members of this association are fully conversant with the work which has been, and is being done, by the American Street & Interurban Railway Association, and the benefits that are being derived by its members, by State associations directly and indirectly, and by the electric railway interests of the country in general. The scope of work of that association has enlarged tremendously in the past few years, and the association should be encouraged by having all electric railways of the country as active members and many of the officers and employees of said property as associate members. I take this opportunity to ask you to consider this matter carefully and to lend to the American Street & Interurban Railway Association all possible assistance by becoming active or associate members.

"Manufacturers and supply houses most certainly co-operate with this association more heartily as each year passes, as is evidenced by the number of their representatives at this convention and the number and class of the exhibits. I trust that you will accord to these representatives and their exhibits the full measure of attention which they so richly deserve.

"Where has this association held a convention before where we have received more courtesies, have been so well provided for, and have been given a better program of general and special entertainment than has been provided by the street railway and the lighting interests of Sioux City, aided by their friends. It will be impossible for us to show our appreciation except in a very feeble way, but I beg to assure our Sioux City friends that our appreciation is warm and deep.

"The officers of your association have not been called upon to handle so many matters in the past year as the year immediately preceding; they have, however, been accorded full support of the member companies, and I want to thank those gentlemen and the members of the various committees for their hearty support and efficient attention to the matters placed before them."

MEDICAL DEPARTMENT

A paper on the medical side of the claim department was read by Dr. A. J. McLaughlin, Sioux City. Dr. McLaughlin laid special emphasis on the value of the company surgeon, comparing him to the claim agent and lawyer. The steam railroads maintained well-organized surgical departments, and therefore their value must have been established. If a company has a surgeon regularly employed he can more than earn his pay in consultation with the heads of departments. He will be of inestimable value for consultation purposes, whether or not he is called upon actually to handle the injured claimant. Dr. McLaughlin said that as the electric railroads grew older and as business increased they would look more and more at the scientific handling of damage cases.

In introducing the discussion, Mr. Crafts spoke of the importance of the subject from the dollars and cents point of view.

Arthur W. Gross, general claim agent, Omaha & Council Bluffs Street Railway, said that his company did not maintain a medical department. He thought that the most important point brought out by the paper was the need for greater care in employing motormen and conductors. During the past two years he had directed the trial of more than 50 lawsuits and had not called on a medical expert for testimony. It had been said that the testimony of the medical men who represent a company has but little weight with the jury, although the jurors believe them to be honest. Based on this opinion, Mr. Gross had saved the company considerable money by eliminating expert medical witnesses. He felt that the attending physician usually would give a fair report. In 90 per cent of the accidents the company was not liable and therefore should not bear the medical expense. The Omaha trainmen had positive instructions to call the nearest physician in an emergency, and he would be kept on the case until the arrival of the police ambulance with its surgeon. By following this method the company did not get into difficulty with the doctors and the hospitals. In a liability case the company assumed the bill of the medical man and made a settlement with the patient. Considered from the non-humanitarian viewpoint, he did not feel that the company should be

put to any expense in non-liability cases, and so it merely provided first aid.

J. P. Walters, Tama & Toledo Railway, was connected with a small road which had injured but one passenger and but three or four employees. This company had been using the first available physician, and it included the physician's fees in the settlement. Mr. Walters realized the importance of having a medical department for the examination of employees and also held that in choosing an employee the home conditions of the applicant should be taken into account. Good home surroundings for the employees would have much to do with the prevention of accidents.

Mr. Crafts told of two instances which had firmly impressed him with the value of thorough medical examinations. One applicant made a good appearance and passed the mental examinations high, but the medical examiner found that the applicant had a weak heart. Another man appeared to have an excellent physique, but on examination it was found that he was very slow in perception. The Illinois & Iowa Company had a surgeon at each end of its line, but the employees were all examined at the main office.

F. J. Hanlon, Mason City & Clear Lake, said that his company employed a physician, and also an eye and ear specialist in examining men. The steam roads had concered this to be good practice, and therefore he held it to be of more value for the electric roads, with their shorter headways. Mr. Hanlon's company furnished a surgeon for all accident cases, whether liable or not, and thus obtained the good will of the public. In very flagrant cases of negligence, after the first aid had been given, the claimant's friends, surgeon and hospital were notified that the company would not meet the bills for the medical attention. Mr. Hanlon's company called medical men representing the company for witnesses in trial cases.

F. McDonald, Waterloo, Cedar Falls & Northern, said that his company had adopted some methods similar to those used in Omaha. Preference was given to two or three physicians, but the trainmen were instructed to get the first doctor available in an emergency. When cases were being tried the company seldom called medical experts. In 15 years' experience Mr. McDonald had always found it possible to get a fair statement of the facts of an accident case from a physician or surgeon called by the claimant. In liability cases Mr. McDonald's company protected the physician's bill, and in all cases the bill was protected if the company had called the physician. Referring to the medical examination of trainmen, Mr. McDonald said that very careful examinations were made by the superintendent, using charts and color tests for eyesight and the usual watch tests for hearing.

TRACK CONSTRUCTION

Wm. A. Heindle, Tri-City Railway Company, read a paper on city railway track, which was published in last week's issue. In discussing this paper several members spoke of the satisfactory results obtained from track substructures which included rock ballast and a concrete foundation for brick pavement. When questioned, Mr. Heindle expressed the opinion that it hardly ever was necessary to bond rails up to their full capacity, except near power stations, where the joints should be double bonded. In the Tri-Cities the 70-lb. rails had been bonded with 300,000 circ. mil bonds. Mr. Heindle did not favor any particular device for testing bonds, unless it were the Herrick test car, which he did not think available for service in Iowa. Regarding the comparative cost of cast welded and other joints, Mr. Heindle had installed in Washington about 3,000 cast welded joints at a cost of $3.40 each. The cost for Continuous joints complete on the same rail was $4.10, of which amount 50 cents was for bonding.

Mr. Mathes described track construction in Dubuque, which had not lasted anywhere nearly as long as had been expected at the time of its installation. The 6-in. 72-lb. rails had been laid over a 6-in. concrete base and regular angle-bar joints were used. After this track had become rough the joints were renewed by using Continuous joint plates, which were installed with bonding complete for $4 apiece. Mr. Mathes had had a bid of $5 from a firm which proposed to cast weld the joints and so he asked for the relative merits of the two kinds of joints when considered from the mechanical and electrical standpoint. Mr. Heindle replied that he was now tearing up cast welded track and at many of the joints the rails were cupped and some rails could be drawn from the iron joint, showing no welding contact.

Mr. McDonald described his experience with track laid on a bridge. This track comprised 72-lb. standard section rails, first laid with angle bar joints. When it has been in service 2½ years the joints needed renewing and Continuous joints were adopted. These, shortly after installation, had brought the rail ends up to surface, so that now the track was in as good shape, if not better, than when first installed. In paved streets the Waterloo, Cedar Falls & Northern used 75-lb. rails, carried on concrete stringers 18 in. deep. This rail gave ample space for brick pavement. In an emergency the company had reinforced some joints with 2-ft. sections of 60-lb. rails, inverted and placed directly under the angle bar joints. When concreted in, this base support gave excellent results. A good track foundation had also been made by laying a mixture of stone, sand and cement, tamped under the ties without water.

Mr. McDonald was convinced that hard center special work was best for steam intersections. He had installed such crossings at intersections where 3-rail construction with plates under the full length of the steam rails would last but six months.

Mr. Crafts told of the experience of his road with built-up special work. In five years the built-up special work at several intersections of his road had worn so that it needed renewing while other parts of the road were still in good condition.

Mr. Mathes told of the good results his company had had from the use of four electrically operated switches manufactured in Louisville, Ky. The maintenance of these had not been high and their use had saved a great many car-hours on the trunk lines, where cars operated on 2-minute headway. He also had obtained good results from a switch point spring lock, which could be applied to any switch and would lock the point in either position and return the point to that position after a car had trailed through the switch.

F. J. Hanlon, Mason City & Clear Lake Railway, then read a paper on track and overhead construction for interurban railways. This paper is published elsewhere in this issue. Mr. Crafts introduced the discussion by calling particular attention to the following subjects brought out in the paper: (1) Blind vs. through sidings; (2) Choice of ties; (3) Weight of rail; (4) Preserving poles from butt rot.

Mr. McDonald favored the use of 70-lb. rather than 60-lb. rail, because the heavier steel could be kept in alignment with less maintenance work and by the use of fewer ties. He also favored a dump 16 ft. wide, with poles set 9 ft. from the track center. On the Waterloo road side bracket construction with poles having a rake of 6 in. has stayed in position for nine years.

Mr. Crafts favored the use of catenary construction and grooved wire. His company was now facing the proposition of renewing trolley ears which were less than six years old.

H. W. Garner, Oskaloosa Traction & Light Company, described 3 miles of catenary construction which had given excellent service after the slack accumulated during the first winter had been taken out. The task of readjusting the sag was rather difficult because the hangers were clamped to the messenger cable, and each needed loosening before the cable could be pulled up. Then they had to be tightened afterward.

Mr. Du Bois said that the Cedar Rapids & Iowa City Railway obtained satisfactory service from grooved wire. Regarding sidings he favored the practice of requiring all trains to head in and back out of stub sidings, although it was advisable to have long through sidings to assist the movement of freight trains.

Mr. McDonald said that the practice on the Waterloo, Cedar Falls & Northern was to use cedar ties on tangents, white oak ties on sharp curves, and mixed oak and cedar ties on long radius curves. He favored the use of tie plates, if they were of heavy material. Regarding the advisability of installing loading tracks, with a view to encouraging freight, Mr. McDonald

noted that the usual cost for a siding was about $700, and he questioned the too frequent installation of sidings by interurban roads. In one instance, at a county poor farm, he had installed a siding on condition that the county pay for the original installation and be reimbursed according to the earnings from freight originating there.

Mr. Hanlon had noted in Mason City that a cement company which moved about 80 cars in and out each day had been obliged to build its own steam railway siding. This was the general practice of the steam roads, and Mr. Hanlon thought that where sidings were installed as an accommodation to shippers the road should not be required to carry the cost. Regarding the use of light rail, Mr. Hanlon noted that several steam roads in Iowa were operating heavy trains over 60-lb. rail, and that the service was rather good, if care was taken of the joints.

CITY FARES

A paper on why fares should not be lowered, written from the standpoint of the city railway, was read by L. D. Mathes, general manager, Union Electric Company, Dubuque. It was published in this paper last week.

E. L. Kirk, Sioux City Service Company, called attention to the need for aggressive educational work on the part of the roads, with a view to preventing agitation for the lowering of fares. As excellent material for such educational work he cited the papers read before the midwinter association meetings, referring particularly to the paper by W. J. Clark, which was published in the Electric Railway Journal for Feb. 12, 1910, page 279.

E. M. Walker, Citizens Railway & Light Company, Muscatine, described the fare situation on his property. At the time the franchise was granted the promoters accepted a low rate of fare in their desire to get permission to build the road. The rates were, 3 cents for workingmen's tickets during the morning and evening rush hours, six tickets for a quarter all day; children's fares, 3 cents, and the company was obliged to carry all city officials free. The average rate of fare per passenger was a very little more than 4 cents, and the maximum ride was 4 miles. In accounting for the free rides of the city officials the company made a book charge of 3 cents each, handling the charge similarly to that for taxes. The free riding by city officials averaged from 50 to 60 passengers per day on a road normally operating from 8 to 10 cars.

R. A. Leussler, Omaha & Council Bluffs Street Railway Company, stated that low fares had been requested in the cities served by his company, and for that reason the management had been obliged to study the question thoroughly. There were many logical reasons for resisting the demand; also, the demand did not come from the people, who usually desired better service rather than fractional fares. Such demands usually originated with politicians or "yellow" newspapers, and later the people were drawn into the controversy because the merits of the case had been wrongly presented by the agitators. Not only were publicity and educational methods needed generally, but sometimes among a road's own stockholders. The extensive educational campaign carried on last year by the Omaha road had done much good, but the results were, of course, difficult to gage.

Mr. Hanlon called attention to a company which by franchise had the right to collect a full 5-cent fare, but had given six rides for a quarter in order to stimulate traffic. This plan had not succeeded, and rates of 24 rides for $1, and 120 rides for $5, successively, had been put into effect. In all but the last instance the plan had been unsuccessful because the people whom the company desired to reach did not buy the tickets. Even the sale of 120 tickets for $5 had not fully met expectations, so the company was considering other plans. Mr. Hanlon did not believe it advisable for any road to attempt to stimulate traffic to the extent of cutting down the rate of fare.

INTERURBAN RATES

A paper on "Why Interurban Fares Should Not Be Lowered" was read by H. W. Garner, general manager, Oskaloosa Traction & Light Company. It is published in abstract on another page in this number.

Mr. Hanlon saw no reason why interurban railway fares should be any lower than those on steam roads. His road charged higher fares than a competitive steam line, and the passengers were willing to pay for the superior service. Passenger rates in Iowa had been established with a maximum of 2 cents per mile. This should be fully used by interurban companies, but the present freight rates were too low, and the interurban lines should be willing to join in any movement leading toward their equitable increase. One road had attempted to handle sugar beets in large quantities at the scheduled tariffs of Iowa, and had met with positive loss.

The Iowa & Illinois Railway, Mr. Crafts said, was particularly interested in the fare question. When service was started five years ago, the one-way rates were based on 2 cents per mile, and 5-cent increases. Round-trip rates were about 1¾ cents per mile, and special park rates were at about 1½ cents per mile. Mr. Crafts felt that the interurban railways were entitled to a rate of fare equal to that received by the steam roads.

DEPRECIATION

The paper on depreciation, by H. E. Weeks, secretary and treasurer, Tri-City Railway, Davenport, Iowa, which is published elsewhere in this issue, was then presented. Mr. Luessler agreed with the author that depreciation due to obsolescence should be charged to capital account. He also held that the cost of developing a property should be capitalized, but he favored showing depreciation as a part of operating expenses. Mr. Weeks stated that those companies whose depreciation reserve was only a book account would not want to show it in expenses. He classed depreciation with taxes, and believed in treating them similarly because the size of each was outside the control of the management.

Mr. Leussler said that whatever percentages had been so far adopted in practice, depreciation reserves were yet too small, and that the more thoroughly the question was studied the more alarming became the need for careful handling of the depreciation question. His company set aside 10 per cent of its gross receipts, which seemed a large amount, but was not so in effect The determination of the proper percentage was entirely an estimate, and so lump sums were set aside, according to the business done. The present deduction amounted to $240,000 a year. In addition to this depreciation fund the company accumulates the usual reserves, among which was one for painting the bridge over the Missouri River. This painting was done every five years, and required about $7,000.

Mr. Crafts spoke of the inaccuracies of published reports of the financial returns of companies, which emanated from various sources. One newspaper had published the annual report of his company for four years, and taken no note of fixed charges in its comment on the earnings of the road. At the fifth publication a student of financial matters had written the article, which showed the condition of the company to be contrary to that set forth by the earlier reports. Because of the ill effect of such reports broadly published, Mr. Crafts held that as a matter of policy it would be advisable to show depreciation as an operating account.

Mr. Walker stated that the Muscatine company set aside 10 per cent of its combined railway, water and lighting receipts to meet depreciation. Mr. Hanlon also called attention to the incomplete reports which were distributed. None of these reports, as published in the newspapers, showed taxes and other deductions made from the revenue, and, therefore, a false impression of the profitableness of the business had been spread.

C. D. Cass, Waterloo, Cedar Falls & Northern Railway Company, noted that some bond houses now required that a certain per cent of the gross earnings, varying in amount, be set aside each year for depreciation. The requirements permitted this fund to be used for additions to property, at the discretion of the directors. Mr. Cass thought that a depreciation fund on a new and growing road, which must extend its lines, would work a hardship on the property unless the fund could be reinvested in the property. It was his experience that the bond houses desired to have the depreciation fund sufficient in amount so as practically to retire the bonds at their expira-

tion. This fund would be in addition to a regular sinking fund.

When questioned, Mr. Weeks replied that he had not found the Interstate Commerce Commission to be exacting in its rulings regarding the handling of depreciation accounts and funds. Regarding taxes, he had questioned a great many roads, and came to the conclusion that they should appear as a deduction from income.

Mr. Mathes criticized the setting up of theoretical funds not available for immediate purposes of renewal. Other operating items were settled monthly, and unless the money were available for making renewals, the monthly statement frequently would be overbalanced. The best plan, in his mind, was to make a deduction according to a certain percentage of the gross income and pay the money into a separate account, just as a company would pay for its coal; then, when replacements were needed, they could be made without overbalancing the monthly financial condition. Mr. Mathes did not think that any hard and fast rule for determining the proper amount of this depreciation charge could be applied to all properties; it was rather a local question. He also stated that the Dubuque company had accumulated a book fund of more than $100,000 and that when the company needed new money for extensions or improvements this surplus could be used, but meanwhile checks could not be drawn against it, and it was necessary, when buying a new car or truck, to get the cash from regular earnings. If the fund had been independently maintained, renewals could be made much more regularly. Mr. Mathes thought that the depreciation situation had not been fairly and squarely handled by the majority of the companies throughout the country. There was too much bookkeeping, and too little real business practice in the various solutions of the local problem. His company was classed with the others. A general discussion on the ways and means for handling the details of depreciation accounts followed.

PREPAYMENT CARS

Mr. Crafts introduced A. J. Varrellman, New York City, representative of the Pay-As-You-Enter Car Corporation, who read a paper on the "Prepayment Car and Its Advantages." This paper is published on another page in this issue. Mr. Crafts stated that the paper was intended to encourage the general principle of fare prepayment, and not the adoption of any particular type of car.

An interesting discussion followed the reading of the paper, and included the opinions of various members, and observations on how small companies could improve service by the use of prepayment cars. Many objections raised to such cars before they had been installed were found to be easily met when the cars were put into service. Among these was the objection that it was difficult to arrange for flagging crossings. This criticism had been overthrown in a number of different cities, and hardly two of the companies used the same solution. Prepayment cars also were used on roads having the zone system of collecting fares; the prepayment feature being used while leaving a terminal city, and the car being operated according to the old method as the zone sections were passed.

An executive session was held on the last day of the convention, and at this session the plans proposed for the next year of association work were considered. Following the executive session resolutions of thanks and appreciation for the entertainment of members and guests provided by the Sioux City railway and lighting companies, and by the manufacturers and their representatives, were passed unanimously.

The program of entertainments included: An electrical show at the Auditorium; complimentary smoker given by the supplymen; a theater party given by the Sioux City railway and lighting companies, and a rejuvenation of the Sons of Jove.

It is reported that an electric railway, to have a gage of 3 ft. 6 in., will shortly be built between Agua de Maiz and Los Dios Caminos, Venezuela, by J. A. Mosquera, A. Michaud and A. Aveledo.

INTERURBAN RULES*

In analyzing the standard code of interurban rules adopted by the American Street and Interurban Railway Transportation and Traffic Association at the 1909 convention, the principal fault which has been found is the unnecessary encumbering of this book by useless and unimportant rules. The operation of the average interurban railway is not and should not be much different from the operation of an average steam railroad. The committee has proceeded with this idea in mind, taking the American Railway Association's standard code of rules as a guide, with the object of making it as easy as possible to interchange train service employees with steam railroads. The committee believes that the years of constant experience behind the standard code of rules of the American Railway Association should not be too lightly considered. The principal object of any book of rules is safety in operation, and it would hardly be possible for new seekers in the field of railway operation to obtain in a short time the experience necessary to devise and promulgate a set of rules such as is standard in steam railroad practice in this country. Therefore, the committee has adhered as strictly to the American Railway Association's standard code of rules as the conditions of interurban operation permit.

The following are the principal changes recommended:

First.—Discard all of the general rules of the interurban code and substitute the general rules of the American Railway Association standard code, which are more brief and salient. The committee considered the value of the general rules that it discarded, but believes that a great many of these rules are not applicable and that those companies desiring to use any or all of these general rules should use them in the form of special instructions. The interurban code general rules are very long and tedious, and set forth a great many things which the committeee considered were in a measure an insult to the average intelligence of trainmen.

Second.—Under definitions in the interurban code, the committee has changed the heading of Rule 51 from "Scheduled Train" to "Regular Train," and the definition following has been made to read: "A train authorized by a time-table schedule. It may consist of sections." This definition and heading conforms to the American Railway Association code. The committee considered that a scheduled train might not be a regular train with reference to daily or weekly regularity, and decided, therefore, that the American Railway Association definition conveyed a much clearer meaning to the average trainman's mind than "scheduled train."

Third.—Rule 53 changed to conform with the American Railway Association code, making the definition of an extra train: "A train not authorized by a time-table schedule. It may be designated as extra for any extra train except for work extra; work extra for work train extra."

Fourth.—Rule 54, which is a definition of "Superior Train," changed to the old American Railway Association code definition instead, reading as follows: "Superior Train: A train having precedence over another train. A train may be made superior to another train by right, class or direction. Direction is superior as between trains of the same class." There was a great deal of discussion among the members of the committee with reference to this rule. It was finally concluded to recommend the adoption of this rule as quoted above and to insert in the book of rules a note calling the attention of small roads to the fact that "superiority by direction" is hardly applicable to short runs on small lines, recommending that the managers should in every instance before promulgating a standard code consider carefully the local conditions before adopting the "superiority by direction" clause of this rule. The committee believes, however, that on the average interurban run of 20 miles or more with frequent turn-outs, it is a mistake to overlook the value of superiority by direction.

*Abstract of report of committee presented at the annual meeting of the Iowa Street and Interurban Railway Association, Sioux City, Ia., April 21-23, 1910.

Fifth,—The committee recommends eliminating Rule 65 defining a meeting point, as it assumes that any man of ordinary intelligence, while possibly not being able to express himself, would know what a meeting point was.

Sixth.—Eliminate Rule 66, defining a passing point; Rule 71, defining a block and automatic block system; Rule 72, defining a home signal; Rule 73, defining a distance signal; Rule 74, defining an advance signal; Rule 75, defining a dwarf signal, and Rule 76, defining a pot signal.

Seventh.—Under "Standard Time" substitute the American Railway Association standard rules, and eliminate Rules 78, 79 and 80 from the interurban code. However, instead of using the American Railway Association wording for Rule 80, make this rule read as follows: "Watches of conductors, motormen, enginemen, brakemen and ———, must be compared before starting on initial trip for the day with a clock designated as a standard clock. The time when watches are compared must be registered on a prescribed form."

Eighth.—Discard Rules 81 and 82 of the interurban code.

Ninth.—Substitute the following for Rule 83 for the interurban: "All employees whose duties are in any manner affected by the time table must have a current copy in their possession while on duty."

Tenth.—Discard Rules 84 and 85 and substitute Rule 4 of the American Railway Association standard code of 1906.

Eleventh.—Discard Rules 88 and 89 and substitute a new rule reading as follows: "Indication of meeting and passing stations. Scheduled meeting or passing stations are indicated by figures in full-face type. The number or numbers of trains they are to meet or pass are shown in small type. Both the arriving and leaving times of a train are shown in full-face type when both are meeting or passing times, or when one or more trains are to be met or passed at a siding extending between two adjoining stations the time at each end of the siding will be shown in full-face type.

Twelfth.—Discard Rule 90 of the interurban code and substitute Rule 6 of the American Railway Association.

Thirteenth.—Discard Rule 91 of the interurban code, which is merely a repetition of other information contained in the book.

Fourteenth.—Under "Visible Signals," Rule 95, subhead "b," omit the word "perfect" preceeding "control," as the committee assumes that if a motorman is proceeding under control it means the same as perfect control.

Fifteenth.—Revise Rule 97 of the interurban code to conform with the American Railway Associations standard "Hand, Flag and Lamp Signals," and in addition, the commitee recommends placing the miniature cuts illustrating the hand, lamp and flag signals on the same page with the definitions, or immediately opposite the definitions, so that there can be no confusion with reference to the meaning of the rule.

Sixteenth.—Under "Audible Signals" substitute the American Railway Association standard "Whistle Signals."

Seventeenth.—Discard Rule 100 of the interurban code, since anyone of ordinary intelligence would know what a succession of short blasts of a whistle meant.

Eighteenth.—Under "Communicating signals from Conductor to Motorman" make subhead "d" read as follows: "Four. When train is running, stop at once," and discard subheads "e" and "f" as unnecessary.

Nineteenth.—Make Rule 104, subhead "c," read as follows: "Three. Desirous of backing train. To be given only when train is standing, to be answered by conductor from rear platform, as per Rule 103 "c," after which whistle signal prescribed by Rule 99 "h" must be sounded before train is backed."

Twentieth.—Discard interurban code Rules 105 and 106.

Twenty-first.—Substitute the American Railway Association's Rule 17 with reference to headlights, instead of Rule 107 in the interurban code.

Twenty-second.—Substitute the following in place of Rule 110: "The following signals will be displayed, one on each side of the rear of every train, as markers to indicate the rear of the train: By day, green flags; by night, red lights to the rear, except when train takes a siding to permit a following train to pass and is clear of the main track, then green instead of red lights must be displayed to the rear."

Twenty-third.—Substitute Rule 20 of the American Railway Association in place of Rules 111 and 112.

The committee regrets that it was unable to complete its study of the rules and give recommendations on all of the rules in the standard code at this year's meeting. The committee suggests that it be continued for another year so that it can complete its work.

The report was signed by C. D. Cass, general manager, Waterloo, Cedar Falls & Northern Railway, chairman; J. A. DuBois, chief dispatcher, Cedar Rapids & Iowa City Railway & Light Company; C. P. Wilson, general manager, Rockford & Interurban Railway.

WHY INTERURBAN RAILWAY FARES SHOULD NOT BE LOWERED*

BY H. W. GARNER, GENERAL MANAGER OSKALOOSA TRACTION & LIGHT COMPANY

The meaning of the term "interurban railway" is to-day altogether different than early in electric railway history. When interurban railways were first conceived they partook of the nature of the present "suburban railways," connecting two or three small towns only a few miles apart with some large center of population. They were generally constructed along the highways, the expense of purchasing rights of way being considered as too great for the future benefit to be derived from it. The interurban railway of to-day is as well constructed and as well operated as the steam railroad, the only difference is that it employs electricity instead of steam locomotives for motive power, and gives in almost all cases a much better service, particularly for passenger traffic.

The old type of interurban line usually was built to compete with the suburban service of some steam railroad, and it was considered necessary to offer an inducement in the way of a reduced fare to attract passengers from the steam railroad. At that time the interurban railway, being lightly built, could be constructed and maintained very cheaply. The conditions now are very different. Interurban railways are now built to a great extent into new fields where development is necessary to bring the property up to its earning power, and the company, in many cases, has to operate heavy equipment in trains at high speed, handle baggage and transport express and freight. The cost of maintenance is much greater than formerly, due partly to the heavier construction and partly to the higher individual cost of the various items of supply required, which in many cases have risen in price 25 to 185 per cent. The conditions under which the interurban must obtain and hold its traffic are also becoming more and more exacting. National, State and municipal supervision is becoming more exacting, and taxation keeps pace with the other items.

There is now no reason in connection with the service rendered why the modern interurban railway, if properly operated, should make its fare less than that charged by the steam railroads in the same territory, because it generally gives better service and should, therefore, obtain and hold its share of the traffic. If its fares are lower than those of the steam railroads, they should be increased to meet these conditions and so that a reasonable return may be had on the investment and sufficient margin be provided to meet further and more exacting conditions which will arise from time to time. Of course, local conditions must govern to a certain extent, but service gets the traffic, other conditions being equal. The standard of the interurban must be constantly upward and the returns must be commensurate with the service rendered.

*Abstract of paper read at annual meeting of Iowa Street and Interurban Railway Association, Sioux City, Ia., April 21-23, 1910.

DEPRECIATION*

BY H. E. WEEKS, SECRETARY AND TREASURER, TRI-CITY RAILWAY

In taking up the subject of depreciation, let us look up the definition of the word. Webster gives it as "The falling of values; reduction of worth." It is apparent at once that it will be necessary to make an arbitrary ruling, applicable to the business in which we are engaged, setting forth just what the term shall cover. Much discussion has taken place in the past as to where maintenance ends and depreciation begins; inasmuch as there is no such state as inertia, as in this world either growth takes place or disintegration ensues, it follows that disintegration is taking place and that maintenance is only a partial replacement, as depreciation begins before maintenance is necessary whether the property is operated or not. Accounting authorities have defined "maintenance" as embracing ordinary wear and tear or upkeep, using the word upkeep in the sense that it is commonly accepted, including, only to a limited extent, expenditures for replacements or renewals of any except minor elements. The replacement of major elements being extra, or ultra, wear and tear would be defined as depreciation. A good illustration is found in track work. The upkeep or ordinary wear and tear would not provide for the wearing out of the rail and the replacement of the rail would be a proper charge to depreciation, that is, as much of the cost of the rail as would be necessary to offset the original cost. Depreciation caused by obsolescence or supercessional depreciation raises the question as to whether it is proper to charge depreciation due to obsolescence to capital account or against earnings, as obsolescence is usually due to economic reasons. If the net profit from operation was increased on account of the change, it would seem that renewals due to supercession on account of obsolescence are a proper charge to capital account.

In the testimony of Edward R. Gore in behalf of the city of Milwaukee in the Milwaukee fare case, he stated that "if the company found that it could operate more cheaply by using another type of equipment, then the loss resulting from the abandonment of the old equipment should not go against the earnings of the company to the detriment of the public or as a justification of a higher charge to the public."

The cost of progress should be capitalized. The advent of the Brennan monorail and gyroscope car may again revolutionize the business and make the question a very vital one. The steam turbine has made a great change in power house economy and the gas engine may make further changes necessary in the near future.

Experience with power generating machinery doubtless brings vividly to the minds of many of those present, the fact that the ordinary wear and tear that takes place can hardly be counted as a percentage of the replacement of electrical equipment. A machine becomes obsolete in some cases before maintenance is necessary, and yet the Public Service Commission of New York State includes all obsolescence and inadequacy under depreciation and require that it be included in the expenses.

The growth of the street and interurban railway business has been fraught with kaleidoscopic changes: First, the horse-car, running on two straps of iron supported by wood stringers, later running on rails; then the cable and electric, making it necessary to transform the horse-car construction; the electric roads have been rehabilitated several times, and all of the expenditures were capitalized upon the theory that the increase in earnings would provide for the returns on capitalization. Although the experience of the past has proven this theory to be correct, in most cases, it cannot be kept up indefinitely. The general practice of European countries is to recognize depreciation in their systems of accounting. In some instances, the laws in regard to charging obsolescence out of earnings have been so stringent as to retard development very materially which it seems should be a warning that it is necessary to educate the public to the fact that it is necessary to encourage progress in the art. The financial exploitation of public service properties and the failure to provide properly for maintenance and depreciation are responsible to a large extent for the present attitude of the public. The ambition of every manager has been to operate on 50 per cent—in some instances managers have even boasted of 40 per cent—of their gross earnings. The public naturally argues when statements showing operation on 50 per cent basis come into their hands that out of every 5-cent fare 2½ cents is profit; the natural sequence is an agitation for reduction of fare. The time has come when it is necessary to acquaint the public with the actual conditions that confront the industry. If proper maintenance and depreciation are charged up, no company need fear to advertise its net earnings as a reason that fares should be increased. The Cleveland situation is an illustration of conditions that can be brought about by politicians on account of conditions that have been prevalent in the industry.

It is unnecessary for me to elaborate on the conditions that have brought about the increased cost of operation such as increased cost of labor and material. However, the situation is such that an increase in fares in some sections must be made. The justification for such an increase can only be established by showing a proper charge for depreciation. The form of report required by the United States Bureau of Internal Revenue provides that the deduction authorized for depreciation "shall include all expense items under the various heads acknowledged as liabilities by the corporation making the return and entered as such on its books from Jan. 1 to Dec. 31 of the year for which the return is made." As this form must be filled in by every public service corporation in the United States, the question of setting up depreciation becomes a pertinent one, for if no depreciation is set up no claim can be made including depreciation in the cost of operation in case of rate regulation or to limit the return on capital.

The Bureau seems to treat depreciation under two heads, complete depreciation or abandonment on account of inadequacy or age and incomplete depreciation due to wear and tear and obsolescence. Complete depreciation is provided for separately on the report under deductions from gross income. This depreciation includes only such items as have not been charged out under the depreciation account on the maintenance accounts and is defined as follows:

"Losses.—The deduction for losses must be in respect of losses actually sustained during the year and not compensated by insurance or otherwise. It must be based upon the difference between the cost value and salvage value of the property or assets, including in the latter value such amount, if any, as has in current or previous years been set aside and deducted from gross income by way of depreciation as defined in the following section and not been paid out in making good such depreciation."

As you will notice, this ruling makes it necessary to charge obsolescence against earnings. The ruling on the other deduction for depreciation is as follows:

"Depreciation.—The deduction for depreciation should be the estimated amount of the loss, accrued during the year to which the return relates, in the value of the property in respect of which such deduction is claimed that arises from exhaustion, wear and tear, or obsolescence, out of the uses to which the property is put, and which loss has not been made good by payments for ordinary maintenance and repairs deducted under the heading of expenses of maintenance and operation or in the ascertainment of gross income. This estimate should be formed upon the assumed life of the property, its cost value, and its use. Expenses paid in any one year in making exhaustion, wear and tear, or obsolescence, in respect of which any deduction for depreciation is claimed must not be included in the deduction for expense of maintenance and operation of the property or in the ascertainment of gross income, but must be made out of accumulative allowances deducted for depreciation in current and previous years."

The Interstate Commerce Commission does not require a depreciation charge except in States where the State law required a charge for depreciation. Electric roads are required

* Abstract of paper read before annual meeting of the Iowa Street & Interurban Railway Association, Sioux City, Ia., April 21 to 23, 1910.

to keep two accounts—"depreciation of ways and structures" and "depreciation of equipment." Steam roads are only required to keep the charge for "depreciation of equipment." Steam road practice in taking care of this item might well be followed by some of the larger companies. A car trust, as it is called, is usually formed and the equipment bought by the trust and sold to the operating company, payments being made in annual installments covering the estimated life of the property, the payments including the estimated depreciation. The Interstate Commerce Commission reports of the amount charged to maintenance and depreciation by steam railroads show that an average of over 25 per cent of gross receipts has been set aside each year for the last 10 years. Inasmuch as depreciation is a much larger factor in steam road operation than in electric, and franchise expirations do not have to be accounted for, the comparison of the two is not of much value except as concerns interurban business, in which detailed comparison of similar feature can be made with profit.

The Public Service Commissions of both New York and Wisconsin require depreciation to be set up. The New York commission's requirements shows the effects of the radical political agitation against public service corporations in that State.

What method of setting up depreciation should be used is a question. A depreciation reserve may be established and the proceeds deposited in cash or invested in securities, although the objection is sometimes raised that the money may be diverted for use for other purposes. A good method is to show on statement the actual capital invested with deduction for what has been set up for depreciation, showing the net sum in a separate column.

The charge for depreciation may be made in several ways: A fixed percentage on gross earnings may be taken. This method is usual in Milwaukee, where 10 per cent is set up; also in Chicago, where the franchise provides for 8 per cent in addition to 6 per cent for repair or maintenance. This amount does not seem to be sufficient. In Cleveland about 5 cents per car-mile is applied to maintenance and depreciation account. This method is also in use in several other cities.

Power station depreciation may be figured on the basis of kw-hour output of plant. Although most of the commissions require that depreciation be shown on the basis of 1/12 of the annual charge in the expense account monthly, it seems that as it is an arbitrary charge, and the other figures shown are actual, there is considerable argument in favor of showing it on the monthly statement not as an expense but as a deduction from income, thus separating the actual from the arbitrary figures. In arriving at the figure that is to be used in setting up depreciation each head of department should be required to furnish the detail necessary, as actual experience is valuable and generalizing is sure to result in inaccuracy. Each item should receive consideration. Appreciation of real estate is certainly a correct deduction in making up the total figure, although this is not allowed by some commissioners. Provision should be made for writing off loss on physical property which has been sold at a loss on account of the expiration of a limited term franchise.

The fund required to meet the requirements for estimated obsolescence and other depreciation, based on experience, varies from 10 per cent to 25 per cent; this will not include maintenance and renewals. In considering the subject of depreciation the scrap value of the different items entering into the account should be allowed in figuring the amount to be written off.

The properties with which the writer is connected use the following figures for length of life of property:

	YEARS		YEARS
Ties	7	Boilers	15
Rails	20	Generators	15
Poles	7	Pumps	15
Trolley wire	14	Condensers	15
Feeder	20	Transformers	7
Car bodies	15	Paving	10 to 15
Car equipment	10		
Buildings	50	Shop equipment	15

The boards of directors of many corporations in facing this question squarely will find that if they set aside the proper amount for depreciation they will be paying dividends out of capital. The fact is the same, however, whether the books show it or not and should be used as an argument for increasing fare.

On April 25, 1909, at Des Moines, this association passed the following resolution:

"Resolved, That the Iowa Street & Interurban Railway Association recognized the correctness of the principle of providing out of earnings an adequate annual appropriation for a depreciation reserve; said depreciation reserve account to be separate and distinct from any maintenance account. The fund so appropriated to be used solely for the purpose of paying for renewals of equipment worn out in service or superseded by advances in the art.

"Your committee deems it wise that all member companies shall make public their financial statements at least once a year for the following reasons:

"First—To correct the erroneous idea on the part of the public that the business is productive of excessive profits.

"Second—A true exposition of the net returns to security holders will to a large extent still the clamor for short-term franchises and reductions in fares and rates.

"Third—The public is disposed to be fair-minded, and if they have access to our reports and realize the close margin of profit in the electric railway business much of the effectiveness of the doctrines of the demagogues will be lost."

The happenings of the two years that have elapsed have demonstrated the wisdom of the action.

INTERURBAN TRACK AND OVERHEAD CONSTRUCTION*

BY T. J. HANLON, VICE-PRESIDENT AND GENERAL MANAGER, MASON CITY & CLEAR LAKE RAILWAY

The reports of the interurban railways in Iowa show that during 1908 15½ per cent of their operating expenses were charged to track maintenance. Hence their roadways should be built so as to require a minimum amount of work to keep it in proper operating condition. Every interurban railway now handles freight in standard cars, while I do not contend that we should attempt to hold our grades to the same standards as a trunk line, yet it is very desirable in construction to pay close attention to the idea of a maximum grade and keep within it. Every curve should be made as long as conditions will permit. The right-of-way should be 100 ft. wide, assuming that in this day no interurban railway will be built upon the highway, and should be well fenced, leaving the passengers to board the cars at regular road crossings, or preferably at every other crossing, thus assuring a 2-mile run in the country without the necessity for a stop.

Where trains hauling 75-ton freight cars are operated and where the ballast is from 6 in. to 8 in. under the ties on tangent, the subgrade should be about 14 ft. wide, this will allow for a small shoulder at the end of the ties, but good track can be maintained on a 12-ft. subgrade. The most common error in construction is to make the subgrade too narrow, as the track will sooner or later have to be ballasted, and it will be much more expensive to use the gravel to widen the slope to grade with dirt at the time of building.

Good drainage is a more important aid in maintaining track. For this reason there should always be a crown of from 3 in. to 6 in. in the center of the roadbed and great care should be used to see that there is proper ditching all along the track. In well-known soft spots it is well to lay a tile a few inches under the subgrade in the center of the track as the water will rapidly seep through the ballast and leave the bank very soft Proper culverts should be placed wherever the natural flow of water indicates their necessity, after a careful estimate of the amount of water they will be required to carry.

Cedar is the best available tie for interurban track construc-

* Paper read at annual meeting of Iowa Street & Interurban Railway Association, Sioux City, Ia., April 21-23.

tion. It is cheaper than oak and longer lived, even where tie plates are not used. The most common reason for the removal of cedar ties is the wear of the rail into the tie rather than decay. It is often possible to take a cedar tie out and turn it over, and so get good service out of it for a number of years. Cedar does not hold the spike nearly as well as oak. For this reason on very short curves it might be well to use oak or alternate cedar and oak, but the objection does not obtain on tangents, as the weight of the car tends to prevent spreading of the rails.

Ties should be cut from live timber in the winter so they will be free from sap and should be allowed to season properly in the open air for at least 6 months, and a year is better. The bark should be removed to allow the sapwood in the tie to dry out and the bark should never be put in the track, as it will rot first and deteriorate the rest of the tie and as it interferes with weed cutting and injures the ballast.

Hewn tiles are preferable to sawed. They are less liable to decay, because sawing the tie leaves the ends of many fibers exposed, and it is impossible to tamp the ballast under a sawed tie as well, as the elliptical bearing service of the hewn tie gives better results.

A standard 8-ft., or even longer, tie is the only kind that should be used and the thickness should be as nearly uniform as possible. About 6½ in. is best, with 6 in. as the minimum and 7 in. as the maximum. A thick tie makes the work of tamping hard and liable to be neglected, while a thin tie does not have the requisite strength and is usually split by the spike. A 7-in. tie is approximately 59 per cent stronger than a 6-in. tie.

Rock is the best ballast, but its cost is often prohibitive. Next to rock comes good coarse gravel and after that cinders, which I consider better than sand.

The question of a proper rail section is an inportant one and is decided oftener by guess than any other way. I believe that a 60-lb. section is sufficient for any interurban road in this territory and that a heavier rail is money wasted. The excess material that will have to be scrapped in time, and maintenance cannot be reduced sufficiently to warrant the added investment. Any degree of stiffness desired in the rail may be secured by placing a few extra ties under the rail, at a fraction of the cost of a heavier section. We follow too much the practice of the steam roads which have reasons for their use of immense engines and heavy counter-balanced driving wheels.

The question of station facilities in the way of side tracks depends upon the prospective amount of business to be secured, but it is good economy to be extremely watchful and only lay such tracks as there is reason to believe will be used within a short time. An interurban railway should avoid as far as possible all blind sidings, which make switching expensive and difficult and act as time killers for freight trains. As a usual arrangement at the average small station, the stock yards and elevators can be located on the delivery track without trouble. This avoids the necessity of cutting the main line, which is bad practice when done unnecessarily.

As regards overhead construction, I will describe 5 miles of new overhead work we are putting in this spring. If the money was available I presume all of us would prefer catenary construction, but the average interurban line in this State will have to worry along without it. At least, we shall.

We are using 40-ft., 7-in. top poles set 5 ft. in the ground, with a 6-in. rake, with a two-pin cross-arm 12-in. from the top of the pole and a fourpin arm 18 in. below. For the present, we shall carry a three-phase 13,000-volt line on the bottom arm and later intend to string in the other lines and then carry a three-phase line on each side of the pole. We shall place a 10-ft. trolley wire bracket 23 ft. from the ground and immediately under this bracket place another four-pin cross-arm on the inner side of which we shall carry our 600-volt direct-current feeders and on the outside our telephone lines. We are using a steel pin with wood top for our insulators, as being cheaper than a pin requiring cement and easier to line properly.

In setting the poles we use a sewer pipe with a bell up, placed over the butts of the poles and about 6 in. larger than the diameter of the pole, filling it with a mixture of gas house tar to prevent butt rot and and to keep the grass from growing up close to the pole and damaging the pole by fire when the right-of-way is burned in the fall. It is very difficult to keep the fire away from the poles and it is a well-known fact that the greatest damage is done right at the ground line, and we feel that we are protecting the pole from two dangers at its weakest point.

THE PREPAYMENT CAR AND ITS ADVANTAGES*

BY A. J. VARRELLMAN.

The all important problems of devising some means whereby platform step accidents could be eliminated, and of instituting a "positive system" of collecting fares from each passenger riding without increasing the labors of the conductor, occupied the serious attention and deep study of those engaged in street railway work for many years. When the pay-as-you-enter car was introduced into the street railway world, these problems were practically solved.

The Montreal Street Railway, under the direction of William G. Ross, managing director, and Duncan McDonald, general manager, after many years of investigation and experiment, put the first pay-as-you-enter car into operation in Montreal in 1904 on the St. Catherine Street line. This car was arranged for single end operation and did not differ materially from the general make-up of the cars previously in service, with the exception that the rear platform had been lengthened to 7 ft. to give better accommodation to smokers, who were permitted to remain and ride on the rear platform, behind a railing which designated a place provided for them. The Montreal Street Railway started with one car at the time, but kept putting them on one by one until at the end of the first year they had reached a total of 25. After a year's operation, these 20 cars proved so successful that the Montreal Street Railway began the work of changing over the greater part of its equipment, with the result that to date 400 pay-as-you-enter cars are operated over the Montreal lines.

While we are indebted to the Montreal Street Railway Co. for originating and developing this type of car, a great deal of credit is due the officials of the Chicago City Railway Company, who were the first to inaugurate the pay-as-you-enter system in the United States. On Sept. 27, 1907, the Chicago Railway Company inaugurated the pay-as-you-enter system with 150 cars, and although the officials of the company were somewhat apprehensive as to the results and gave a great deal of time and energy in instructing the public prior to putting the cars into service, the innovation was accepted by both the public and the press in a most satisfactory manner. At the present time, there are being operated in Chicago by the different railway companies 1420 cars, and before the end of the present year, there will be 2184 cars of the pay-as-you-enter type in operation in that city. The complete equipment of an entire line with pay-as-you-enter cars, as in Chicago, presented an untried proposition. The management of the Chicago City Railway, however, carefully planned for the inauguration of the services, and as the design of the cars was fundamentally correct in every particular, the cars secured at once an improvement in operating conditions and the favor of the public. The business districts of Chicago exhibit an unparalleled density of traffic of all kinds, and the electric cars have to handle a large number of passengers at every corner in the business district and contend with a large number of vehicles. The problem was also serious because of the necessity of collecting a fare from every passenger when a large number boards and leaves the cars at every stop. It was the ability to meet all these requirements in a satisfactory manner which made the pay-as-you-enter car such a success in Chicago,

The principal claims of the pay-as-you-enter car are four in

* Abstract of paper read at annual meeting of Iowa Street & Interurban Railway Association, Sioux City, April 21-23.

number: (1) reduction in accidents; (2) increase in receipts; (3) improved service; (4) greater convenience and comfort to the passengers.

That the pay-as-you-enter car has accomplished what has been claimed for it is best evidenced by the extent to which the system has been adopted in a comparatively short time since its introduction in Chicago.

In Montreal, in the year preceding the introduction of the pay-as-you-enter cars, there were 700 platform step accidents, while in the following year only two slight platform step accidents were reported in connection with these cars. In Chicago, on the Chicago City Railway, in the period from Feb. 1, 1908, to July 31, 1908, inclusive, accidents other than fatal with the pay-as-you-enter car showed a decrease of 16.2 per cent, as compared with the same period in the preceding year with almost the entire elimination of that class of accidents sustained in leaving the front platform. Other roads have not made public definite figures on the reduction of accidents since pay-as-you-enter cars were used, but all report a decided decrease.

Figures showing the increase in receipts following the introduction of the cars have been hard to obtain, both because a majority of roads have apparently been inclined to give as little publicity as possible to such matters, and also because it has been difficult to determine the percentage of increase which is due to natural growth, or other conditions. It appears to be generally conceded that the increase in receipts due to the new type of equipment has been from 10 per cent to 15 per cent, and in one instance it is stated to have been 18 per cent. In Montreal, a careful record was kept of the returns from pay-as-you-enter cars, in comparison with cars of a similar size running on the same routes and same hours. The result showed an increase in earnings per car of 10 per cent.

The improvement in service, due to the "pay-as-you-enter cars, has ranged from 5 to 10 minutes decrease in the running time required from terminal to terminal, according to the length of the line. On the Niagara-Grace and Niagara-O'Neal lines in Buffalo, approximately 6 miles long, the average decrease in running time was close to 6 minutes. On the Cottage Grove line of the Chicago City Railway, the decrease was shown to be between 5 and 10 minutes.

The greater convenience and comfort of passengers is a factor of which there is necessarily no tangible proof. It is reflected, however, by the approval with which the pay-as-you-enter car has been received in every city in which it has been introduced. There have been instances in which slight opposition has developed when this type of car was started, but it soon disappeared when it became apparent that the new cars were able to give better service, that it was unnecessary for the conductors to pass continually through the car, that overloading could be restricted, that exit and entrance to the cars could be made without conflicting with other passengers in any way, and that it was unnecessary to fight a way through a crowd of smokers who are constantly blocking the rear platform of the old style of car. The popular approval of the car has been a material factor in the extent to which it has been adopted.

The pay-as-you-enter car has not introduced any new features in the general mechanical construction of the car. The long platform has been in common use on various street railways in this country long before cars of this type were designed. The pay-as-you-enter car should be credited with attaining an equal distribution of the passenger load. On the old style of cars, it is a common thing particularly in rush hours to see the passengers crowded on the rear platform and in the rear part of the car, leaving the front part practically empty. As standing on the rear platform is practically prohibited on these cars, passengers will move inside and will also move to the front, the front door being accessible to them as an exit. That the pay-as-you-enter car was a much needed device is proved by the way the car is generally sought after and adopted in this country, as in the very short period of 2½ years it has been adopted and put into operation by over 50 railway companies in the United States and the number of cars in operation total close to 6000.

DISSECTING THE NICKEL IN NEW YORK STATE

E. F. Peck, general manager Schenectady Railway Company, has recently compiled the operating statistics of the 10 largest electric railway companies in the Second District, New York State, and of all the railway companies in the district, to determine the percentage distribution of the receipts. These figures are presented in the table below.

To assist in popularizing this information the Street Railway Association of the State of New York has sent an analysis of these figures under the title "Dissecting Nickels" to a large number of the daily papers in the State. This analysis shows that out of the 5-cent fare it takes 1 cent to move the cars, another to man them and a third to maintain them. Another cent is required for the interest on borrowed money and more than half-a-cent for the tax collectors and lawyers, leaving, after other expenses are paid, less than one-third of a cent for the companies.

Table showing division of revenue on the ten largest electric railways and on all the electric railways in the Second District, New York State, for the year ended June 30, 1908.

	Ten largest companies.			Seventy-four companies.		
	Total.	Per cent of operating revenues.	Distribution of five-cent fares. cents	Total.	Per cent of operating revenues.	Distribution of five-cent fares. cents
General expenses, including insurance, etc	$934,988	.0619	0.309	$1,551,335	.0732	0.366
Cost of power	1,677,716	.1112	0.556	2,608,705	.1231	0.615
Conductors and motormen	3,217,439	.2132	1.066	4,351,391	.2053	1.027
Other transportation and traffic expenses	1,112,718	.0737	0.369	1,558,187	.0735	0.367
Maintenance of way and structures	1,187,445	.0787	0.393	1,754,505	.0828	0.414
Maintenance of equipment	941,991	.0624	0.312	1,422,599	.0671	0.336
Damages and legal expenses	734,844	.0487	0.244	884,625	.0417	0.209
Rentals	140,239	.0093	0.046	214,567	.0101	0.050
Taxes	763,290	.0506	0.253	1,046,913	.0494	0.247
Interest	2,633,101	.1745	0.873	4,270,515	.2015	1.008
Surplus	1,747,528	.1158	0.579	1,531,144	.0723	0.361
Street Railway Operating Revenue	$15,091,299	1.0000	5.000	$21,194,486	1.0000	5.000
Operating expenses	$13,343,771	.8842	4.421	$19,663,342	.9277	0.639

LIGHTNESS OF CARS

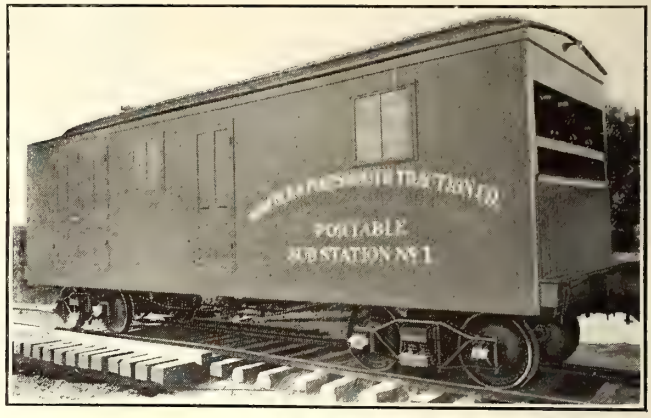
M. V. Ayres, electrical engineer of the Boston & Worcester Street Railway Company, calls attention to an error in his article on page 704 of the issue of this paper for April 16. It occurs in the summation of the figures in the first column of the table of operating expenses near the bottom of the page. Mr. Ayres says that "the figures under the heading 'Denver Estimate' is given as 24 cents, whereas it adds up to 26.6 cents. These figures were copied from my Denver paper and I find that the addition was made correctly in the original paper, but apparently I made an error in copying from that, as I find that my copy of the manuscript I sent you appears as you printed it."

At the annual Easter egg-hunt of the Nashville Railway & Light Company at Glendale Park on April 3, 1910, there were two golden eggs with a $5 prize attached. One was offered by the Mayor and the other by the company. A silver egg carried a prize of $3 and other eggs were full of candy.

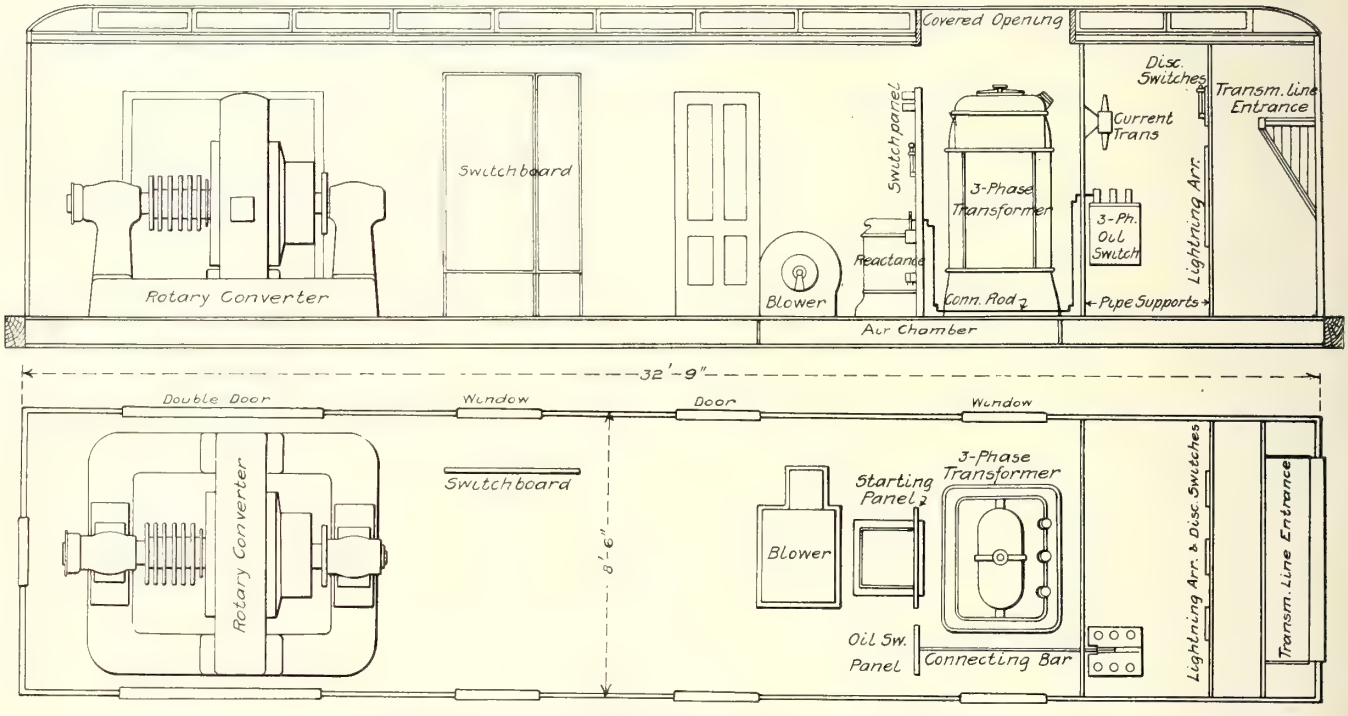
PORTABLE SUBSTATION AT NORFOLK, VA.

It is generally admitted that a portable substation is of the greatest utility on any system where there are radical changes in the load centers, such as on lines serving baseball parks, excursion grounds, and the like. However, the usefulness of the portable substation generally is limited to the summer months so that economy is a prime factor in its construction and maintenance. Among the railways which have settled this problem satisfactorily is the Norfolk & Portsmouth Traction Company, Norfolk, Va., whose simple portable substation is shown in the accompanying half-tone views and drawings. The car body was built in the power station by the company's carpenters at a total labor and material cost of only $800. The M. C. B. trucks on which the body is mounted were secured from a neighboring steam railroad in exchange for an old feed pump which the company valued at $150. Ordinarily, the car body does not rest directly on the trucks, but is raised on four jacks.

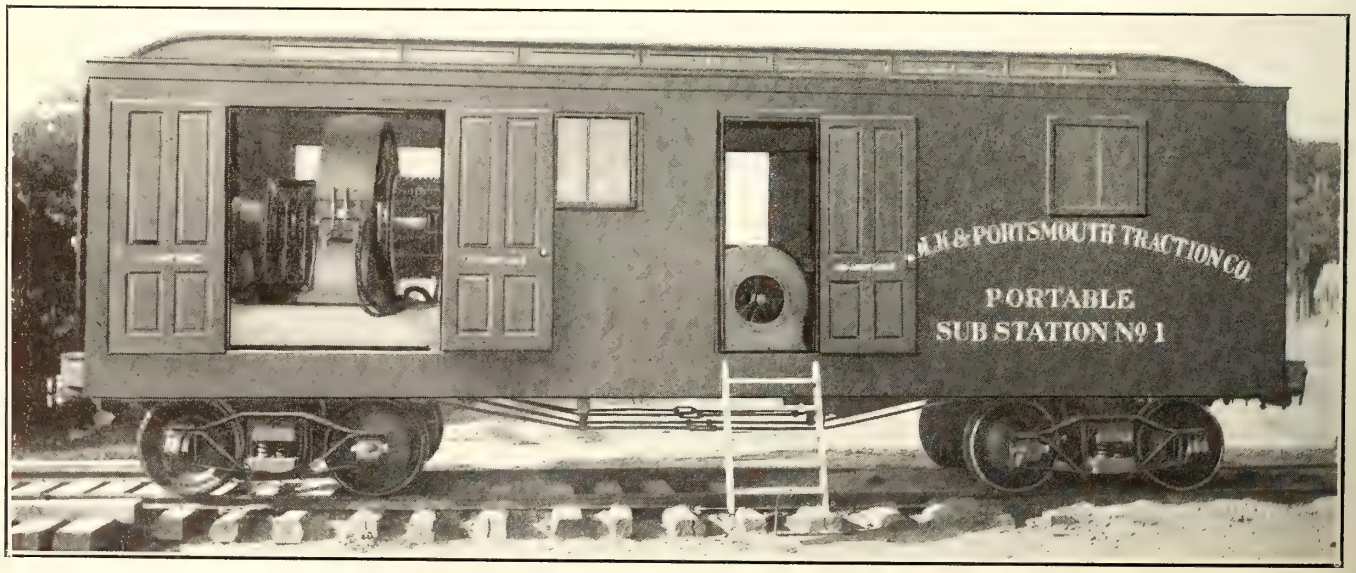
The car is 32 ft. 9 in. over all and 8 ft. 6 in. wide. By using plain swinging instead of sliding doors, the width of the car as well as the cost of installation were minimized. There is just enough room for the comfortable housing of one 500-kw



Norfolk Portable Substation—High-Tension End



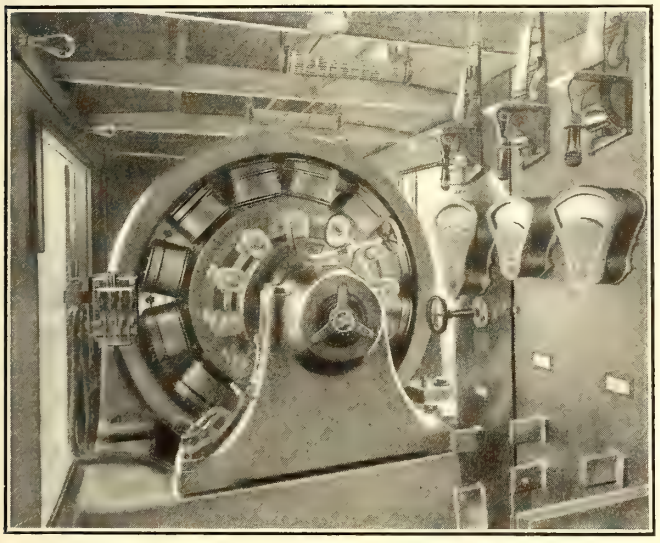
Norfolk Portable Substation—Elevation and Plan



Norfolk Portable Substation—View of Rotary Converter and Blower

rotary converter, switchboard, blower equipment and high-tension apparatus. The switchboard includes switches, circuit-breakers, Thomson astatic ammeters for three circuits and a Weston voltmeter mounted on a swinging bracket. The 550-kw, three-phase, 11,000-volt transformer K-4, hand-operated oil-switches, and the lightning arresters, are of the General Electric Company's manufacture. The transformer is cooled through an air-duct connection under the car floor by means of a Buffalo Forge Company's blower which is driven by a 3-hp induction motor.

Last summer this car was used at White City on the Atlantic Terminal line between Tanner's Creek and the Virginian Railway piers. This park has recently been turned into a negro resort and it is probable that the substation will be transported to some other point in the coming season. As located last summer, the station was at a place 7½ miles from the power house, 6 miles from the Ocean View substation and 6 miles from the Cove Street substation. A 500,000 circ. mil feeder



Norfolk Portable Substation—Rotary Converter and Switchboard

from the power station to Ocean View looped around Ocean View to the portable, from the portable to Cove Street and back to the main power plant. By means of the loop it was possible to take 250 kw each from the Cove Street and Ocean View substations, giving a maximum of 1000 kw at any desirable point in the loop. During the months of inactivity, the rotary is kept under a rubber cover and several incandescent lamps are kept burning all the time to avoid dampness.

HEARINGS BY PENNSYLVANIA COMMISSION

A hearing was held before the Railroad Commission of Pennsylvania at Harrisburg on April 14, 1910, to consider the complaint of the officers of the West Chester Improvement Association against the increase in fare put into effect by the Philadelphia & West Chester Traction Company in October, 1909, when it established six 5-cent fare zones between Sixty-third Street and Market Street, Philadelphia, and West Chester, instead of five.

A. M. Taylor, president of the company, stated that the company was compelled to change the fare zones and increase fares between certain points, in order that the stockholders might have a reasonable return upon their investment. The fares charged previously were not remunerative. In a circular letter issued at the time the increase went into effect and printed in the Electric Railway Journal of Oct. 16, 1909, page 888, reasons were given for raising the fares. Between 1899 and 1909 the company earned only a small dividend on the capital stock, and there was no understanding when the road was built that the fares were to remain at the original figures.

After explaining that in making the changes the company had attempted to make no discriminations between its patrons he said in defense of the general proposition that the cost of maintenance and operation between Philadelphia and West Chester had materially increased since the line was built. Whereas the average wages paid to motormen and conductors in 1899 were 12½ cents per hour, they were 22.127 cents in 1909, an increase of more than 77 per cent. Cars that cost $4 657 in 1899 now cost $11,111. Further, the roadbed had been rock-ballasted, a new power plant built at a cost of $114,585, and other betterments effected. He also said that the company had paid the following dividends: Four per cent in 1905, 4 per cent in 1906, 2½ per cent in 1907, 2½ per cent in 1908 and 2¾ per cent in 1909, making an average annual dividend of 2¾ per cent. The cost of upkeep and operation was such that in order to guarantee to the stockholders an annual dividend of 5 or 6 per cent, it was necessary to increase the fares on the lines that were not paying.

The gross earnings of the company to Nov. 30, 1909, were $203,816.84 and operating expenses $109,857.27, leaving net earnings of $93,959.57, to which were added earnings from other sources, making the gross income $97,709.57, from which $9,992.53 was deducted for fixed charges. During the year ending Nov. 30, 1909, passenger earnings for the main line were $156,969, as compared with $157,606 in 1908, $154,704 in 1907 and $147,022 in 1906.

The fare zones before Sept. 27, 1909, were as follows: Sixty-third Street Station, Philadelphia, to Eagle Hotel; Eagle Hotel to Newtown Square; Newtown Square to Pan Handle; Pan Handle to Milltown. The fare zones between Milltown and West Chester had not been changed, but the intervening territory had been divided into four instead of three zones, leaving Newtown Square in the center of the zone between Broomall and Florida Park. The distance between Broomall and Newtown Square was 2.16 miles, and travel between Broomall and Newtown Square was very light. The line from Philadelphia to West Chester was 19¾ miles, from Philadelphia to Ardmore, 6 miles; from Philadelphia to Collingdale, 5½ miles.

Following the hearing, the commission requested Mr. Taylor to furnish the commission with a statement showing the receipts from passengers on the Collingdale and Ardmore divisions and the earnings per car-mile on each of these divisions on the basis of a 30-minute schedule, as compared with receipts and earnings per car-mile on the West Chester division.

Argument was also heard on the petition of residents in Harrisburg, chiefly railroad men employed at Enola, for an all-night service on the more important lines of the Central Pennsylvania Traction Company in Harrisburg. The company was represented by its counsel, Wolfe & Bailey, and produced records to show that there was no general demand for cars after 12:30 a. m. or 12:50 a. m.; the time service is now discontinued. F. B. Musser, president of the company, said that at least five cars would have to be run at night at a cost of about $5 per car. There had been no general demand for night cars. The receipts on all lines on average nights fall below the cost of operation about midnight. The last cars generally were well filled because many men remain at clubs or hotels until time for the last car. The most economical way in which night cars could be operated would be to buy power from the Valley Traction Company, which is guaranteed against loss in operating night cars by the Pennsylvania Railroad. In January, 1910, the receipts of the Valley Transit Company had exceeded the operating expenses on its night cars by $4.

The Pittsburgh Railways had entered a general denial of charges made by the McKeesport Board of Trade that the condition of its cars was unsanitary.

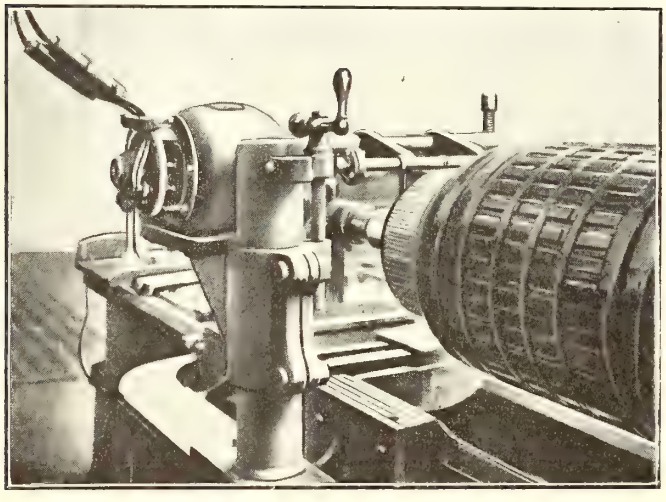
H. C. Eddy, secretary of the District Electric Railway Commission, Washington, D. C., was a guest of the Takoma Park Citizens' Association recently and at the request of the president of the association delivered an illustrated lecture entitled "Electric Railway Development."

NEW SHOP SCHEMES OF THE INDIANA UNION TRACTION CO.

An illustrated description of the shop of the Indiana Union Traction Company at North Anderson, Ind., appeared in the Street Railway Journal for April 4, 1908, page 538. Since that article was presented this paper has published accounts of new maintenance methods inaugurated in the shops by R. C. Taylor, superintendent of motive power of the company. The present article deals with several new shop schemes recently put into effect at these shops.

COMMUTATOR SLOTTER

One of the illustrations shows a form of commutator slotter which does excellent service without impairing the capacity of the lathe on which it is mounted except while the grooving work is actually under way. The lathe upon which this slotting device is mounted was built with a taper attachment. As this was not required for armature work, it was utilized as a very satisfactory support for the slotting device. The mica is cut away by two small saws spaced apart the width of one commutator bar. These saws are mounted on a spindle directly driven at 1750 r.p.m. by a ¼-hp Crocker-Wheeler motor. This motor and an arm which supports the bearings carrying the saw spindle are bolted to a split bracket clamped about a cylindrical post that stands on the part of the lathe carriage originally provided for the taper attachment. The bracket arm may be moved up and down the post by a large square thread screw. In this way a nice adjustment for the depth of cut of the saws can easily be made.



Combination Slotting Device

The forward and backward movement of the saws through the slots is effected by moving the lathe carriage automatically or by hand. Adjustment for commutation of various diameters is easily made. The saws, moving with the lathe carriage, travel directly in line with the center of the armature shaft, so the only adjustment required for commutators of various sizes is a change in the height of the saws. This is easily made by turning a small handle attached to the screw which controls the movement of the bracket up and down the main post. Standard spacing pieces are provided for insertion between the saws so that they may be adjusted for different widths of commutator bars.

As the lathe to which this slotting mechanism is attached is also used for finishing commutators, little extra labor is required in preparing for slotting. When not in use the slotting saws are simply pushed back out of the way, and the lathe is then free for any other work. The apparent advantages of this type of slotting mechanism are that the armature need not be moved from the commutator lathe after it has been turned, and that there is no interference with the use of the lathe for other work except while the actual cutting away of the mica is being done.

ELEVATED HEADLIGHT

For experimental purposes, one high-speed interurban car is being equipped with a luminous arc headlight mounted in a dormer projection built as a part of the front hood. A circular glass window in the front of the dormer protects the lamp from drafts. The inside of the lamp space is open to the motorman's compartment, so that the lamp may be lifted in and out easily or may be adjusted by the crew while the car is running. This method of mounting the headlight high above the track is expected to give a more effective distribution of the light and to reduce the maintenance cost. It was suggested for trial by H. A. Nicholl, general manager of the Indiana Union Traction Company.

DESTINATION AND TRAIN NUMBER SIGNS

One of the illustrations shows the front end of a limited interurban car equipped with new types of signs for indicating the train number and the destination. The indication is effected by illuminating cloth signs carrying white letters or figures on black background. Two types of signs are used, one for destination names and the other for train numbers. The destination sign is carried inside the right-hand cab window close to the bottom of the sash. The train-number sign is carried at the bottom of the center window. The curtain mechanism and the lamps for these signs are enclosed in riveted tin boxes with doors arranged so that the interior fittings are accessible and so that the motorman can read the signs from his position at the controller.

The destination sign box is built to fit between the two window posts. A pair of hinges at one end provide for swinging the whole box back from the car window to facilitate cleaning the glass. There is no glass in the front of this sign box.

Three 16-cp lamps are permanently mounted on the bottom of the sign box. The curtain on which the names of the cities are printed is made of white sun-fast holland. The curtain is about 10 ft. long and is carried on two rollers, only one of which is equipped with springs. The roller without springs is operated by a shaft with a crank outside the sign box. The positive movement of the curtain roller in unison with the turning of the crank is effected by the use of a pair of 45-deg. helical gears. The adjusting crank connects with the gear shaft by means of an eccentric pin so arranged that when the crank handle is turned flat against the box any movement of the curtain is prevented. All the parts of this destination sign, including the gears, were made from the raw materials in this shop at a cost of about $6 per sign.



Destination and Train Number Signs

The train-number box has three separate curtains, each showing all the digits and the letter X, to indicate "extras." The enclosing box is of the same general type as that for the destination sign, only smaller. The curtains within are illuminated by two 16-cp lamps. Each of the small curtains is carried on two rollers without springs. The brass rods which carry these rollers extend through and above the top of the box, and are provided with long and short knobs, so arranged that each curtain can be adjusted independently.

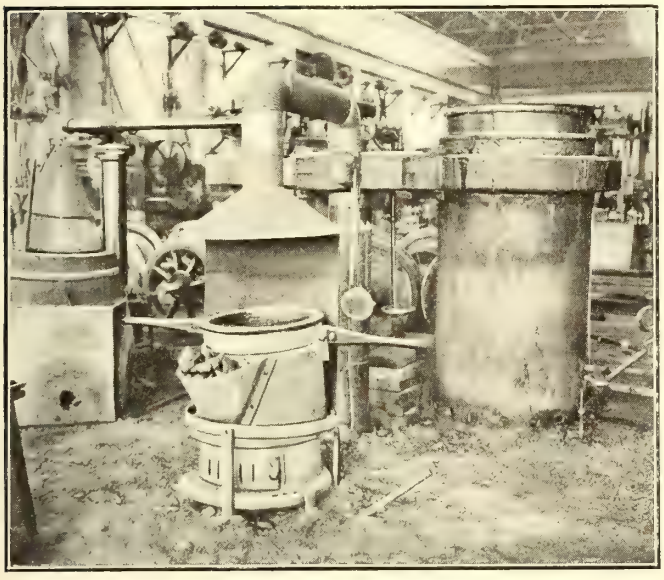
The destination and the train-number signs carry a total of five lamps on an independent circuit within control of the motorman. A small peephole is provided in the top of the train-number box for observing the numerals readily. The motormen find that it is useful in times of low voltage to have the lamp circuit in these boxes close at hand. The condition of power can be observed without the use of the general illumination of the car body and without having a bright, unconfined lamp in the cab.

The Indiana Union Traction Company indicates to intending passengers whether a train is a local or a limited by placing a

neatly lettered sheet-steel sign in the right-hand cab window. Signs for the two kinds of trains are printed in different colors. The limited sign has a blue background with gold letters and the local sign has a black background with silver letters.

EASEL FOR CURTAIN PAINTING

The sign painter at the Anderson shop has rigged up an easel which has been found very convenient during the painting of the curtains for the car destination signs. An illustration of this easel with a curtain on it is shown. The curtains used in the destination sign boxes are 21¾ in. wide, 10 ft. long and carry the names of 18 towns in letters 4½ in. high, spaced according to the length of the name. The easel on which these curtains are painted is so arranged that duplicate curtains can be made without the use of a stencil or any lining.



Home-Made Babbitt Melting Stove

When a curtain is to be painted the top of the cloth is tacked to a strip of wood which rides on the front of the two main legs of the easel. The curtain is supported by a weight carried on a string which is passed over the top of the easel. The end roll of cloth is carried in two supports made of spring steel bent into hook shape and fastened to the lower cross brace of the easel. Just above this cross brace is a sheet of glass about 30 x 24 in., against which the cloth to be painted lies. This glass forms a backing for the cloth and holds it in smooth shape while the paint is being applied.

If a curtain is to be duplicated one of the type desired is partly unrolled and so placed that that portion of the lettering to be copied lies flat against the front of the glass. The rolls of the cloth are supported behind the glass in suitable hooks. The blank cloth then is hung in front of the glass directly over the pattern curtain. As the curtain material is translucent the letters on the first curtain plainly show through the blank cloth and may easily be copied without the use of stencils.

BABBITT STOVE

An accompanying illustration shows a babbitt stove which has been rigged up on the shop floor close to the coil insulating plant. The stove was constructed almost entirely of second-hand material. The fire box consists of an old coal stove, the top half of which has been cut off. A feeding magazine has been attached to the side of the fire box so that when the ashes are shaken through the grate fresh coal falls into the fire pot. A ladle in which the babbitt is melted is supported in the top of the cut-off stove. Compressed air for forcing the fire is led under the grates of this stove. The exhaust fumes from the fire box and the ladle are collected in a hood and drawn in to the suction chamber provided near by for the vacuum impregnating plant. This melting outfit is used only for babbitting work. A very complete brass foundry in a separate building is a much-used part of the North Anderson shop group.

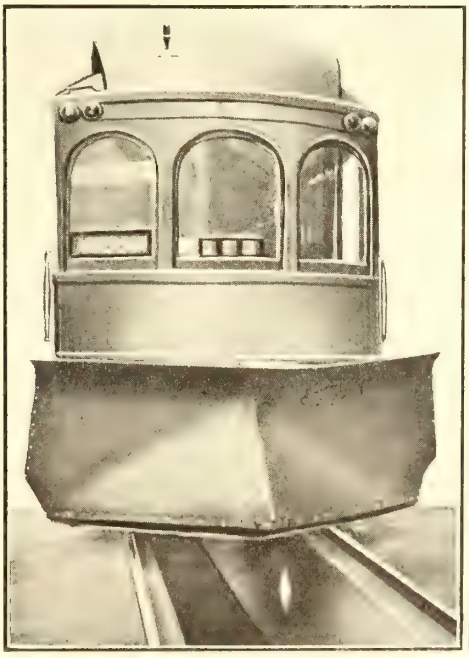
COIL INSULATION

One of the illustrations shows the coil-impregnating plant installed in the main shop. This plant was supplied by the J. P. Devine Company. Since this apparatus was put into use not an impregnated field coil has been lost. In connection with the standard type of impregnating apparatus Mr. Taylor has arranged a gasoline coil burner around the base of the tank. The gasoline supply is received from a sunken reservoir outside the shop building and is distributed under pressure for this use and for heating tires. The impregnating plant is directly under the main shop crane. Standard Varnish Company compounds are used for insulating the coils.

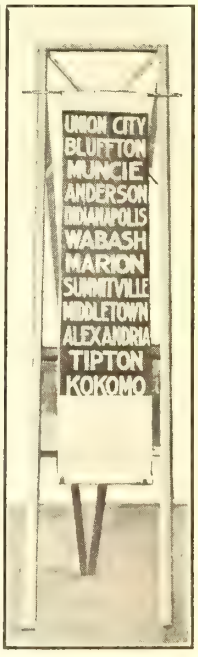
The following particulars regarding the method of operating this vacuum drying and impregnating plant may be of interest. One of the main points which is kept in view is that of maintaining a uniform temperature in both of the tanks while the compound is in a liquid state. The temperature is maintained between 310 and 320 deg. Fahr. When starting up with a supply of cold compound about 15 hours' time is required at the above temperatures to liquefy the compound.

In checking the temperature of the tank containing the compound a section of iron pipe with one end plugged is used to permit the insertion of the thermometer well below the surface of the insulating material. The temperature of the vacuum chamber is found by inserting the thermometer in an oil pipe provided in the cover. It is stated that the temperature of the vacuum chamber as thus found is about 40 deg. below that on the inside of the tank when the cover is in place, so an adjustment of 40 deg. is made. In connection with the use of gasoline for heating, it is found necessary to watch the temperatures of the tanks carefully when the gasoline supply tank outside the building has been filled. For a period of about an hour after this has been done the fresh gasoline seems to make a much hotter fire than at other times.

Coils which are wound with double cotton-covered wire are insulated as follows: The sets of coils are first put in the



Car Front, Showing Position of Illuminated Signs



Easel for Painting Sign Curtains

vacuum chamber and allowed to be heated to a temperature of 320 deg. in about four hours' time; then the vacuum pump is started and the coils kept under vacuum for three hours. Next the vacuum line is closed and the large gate valve between the vacuum tank and the supply tank is opened, allowing the hot compound to run into the vacuum chamber and submerge the coils about 6 in. Next the gate valve is closed and an air pressure of 60 lb. is turned on for three hours. After this

treatment the air pressure is reduced to 15 lb., the gate valve opened and the compound forced back into the liquid supply tank. The coils are then allowed to drain for about half an hour, when they are taken out and the layer of cheap cotton cloth which first had been put on as stripping is removed. This cloth takes away with it the excess compound and leaves the coils with a smooth surface on which the finishing insulation is placed.

COMBINATION PASSENGER, SMOKER AND BAGGAGE CAR, HANOVER, PA.

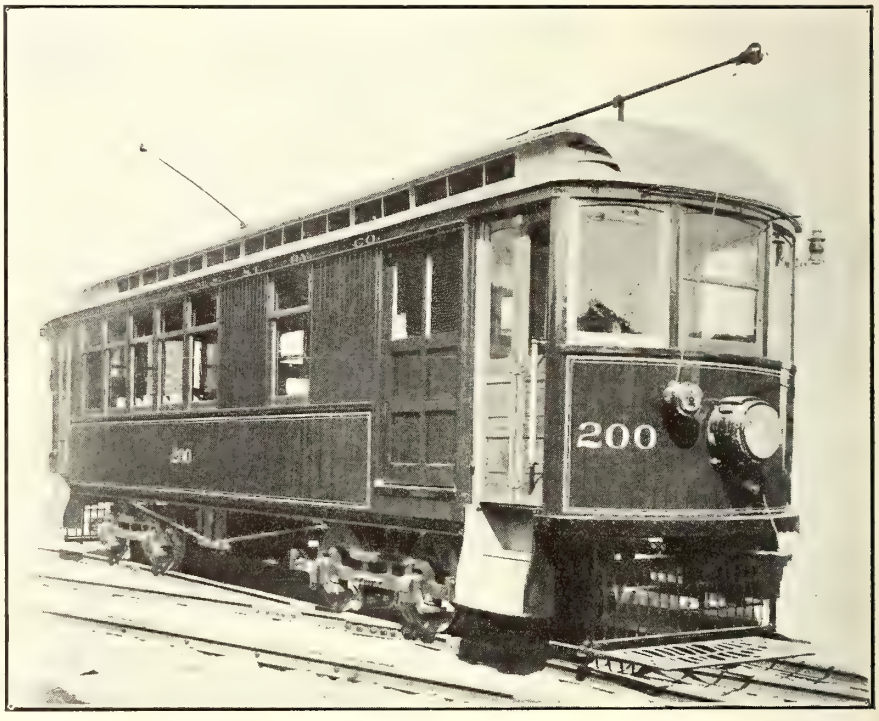
The accompanying illustration shows a fine combination car which has just been completed in the shops of the Hanover (Pa.) & McSherrystown Street Railway Company for use on its Littlestown division. It was designed exactly to suit the operation conditions for this line. This car is 27 ft. 6 in. over the corner posts, 37 ft. 6 in. over the vestibule and 7 ft. 6 in. wide. The side sills are old 6-in. girder rails reinforced by a light T-rail. The bolster is composed of two 4-in. girder rails with an intermediate oak filler. The end sills and center cross-sills are also light T-rails joined to the side sills by angles The platform knees are 4-in. girder rails joined to the bolster and resting upon the end sills. The balance of the inner framing is white oak.

The passenger compartment is 16 ft. long and contains six Brill Winner rattan cross seats and four end seats, giving a total seating capacity of 20. The interior finish is white ash with a small amount of cherry moulding with bird's-eye maple headlinings. The windows raise up and are equipped with Edwards No. 13½ O. D. sash fixtures. In order to gain room the inside sheeting was placed between the posts with the moulding over the joints. The register in the passenger compartment is of the Sterling-Meaker type and is arranged for center rod operation.

The baggage and smoking compartment is 11 ft. 6 in. long, and contains one window on each side, and two sliding baggage doors. The equipment of this compartment is somewhat of a novelty, as it contains two rattan cross seats and one rattan end seat providing comfortable seating facilities for a reasonable number of smokers. In addition to these rattan seats two folding slat seats are provided to seat eight. These slat seats are hinged against the front bulkhead, and fold out of the way in case baggage is handled. This compartment contains a Cooper hot-water heater next to the center bulkhead. The ceiling finish is natural oak varnished down to the plate. The window frames are also oak; the balance of this compartment is painted a light drab. The roof is of the full steam coach type and carries two U. S. No. 11 trolley bases.

This car is mounted on double trucks, which were also built by the company in the manner hereinafter described. Two 16-ft. closed-car bodies, which were withdrawn from service, had been mounted upon two Brill No. 21-E single trucks of 6-ft. 6-in. wheelbase and equipped with GE 81, 30-hp motors. The motors had been purchased only about a year ago to replace Westinghouse No. 3 motors which had been scrapped. The side frames of the trucks as well as the wheels and journal boxes were in excellent condition and it was decided to use these parts to build two double trucks for the combination car. The two side frames and four journal boxes of the No. 21-E single truck were used for each truck. These were cut down from a wheelbase of 6 ft. 6 in. to 4 ft. 6 in. and sp'iced together by shaping off half of the metal of each end for a 12-in. length and bolting together. The top frame is an angle 3 in. x 4 in. x ½ in. resting upon the top of the pedestals of the old frames and bolted in place. This top frame is secured to the bottom spliced frame by two 2-in. x 2-in. angles on the inside to which the transoms are also bolted, the whole forming a light gusset and tieing the two together to make a truss construction. Additional gussets are provided to join the transoms to the top angle frame and these in connection with the rigid end frames make a very stiff truck. The transoms are 4-in. x 6-in. angles cut away and resting upon the angles of the top side frame and bolted rigidly to the same. The bolster construction is of the swing type.

The bolster proper is 6-in. x 9-in. white oak, plated on each side with 6-in. x ¼-in. steel with through rivets and provided with removable chafing plates. The spring plank is made of two pieces of 10-in. channel, forming the spring supports which are tied together by two 3-in. x ⅝-in. steel plates riveted to the channels. The swing links are heavy steel swinging on 1¼-in. steel bolts screwed into the transom and 1¼-in. pins passing through the channels and the side pieces of the swing plank. The bolts carrying the upper end of the swing links are further supported on the outside ends by angles bolted to the top of the transoms and pinned fast. The center bearing is a Symington ball-bearing secured to the bolster by through bolts. The springs used under the bolster are the eight coil springs (four on each side) from the old No. 21-E single truck, but provision was made in case these were too weak to add two of the old semi-elliptic springs from the single truck.



Combination Passenger, Smoker and Baggage Car

The No. 21-E side frames were cut off 20 in. from the outside of the center of the pedestal jaws and angles were bolted to the ends to which the 1¼-in. x 3-in. end frames are bolted and the motor suspensions were mounted on the same. The old wheels, axles and journal boxes of the No. 21-E trucks were used. The wheels were cast iron 30 in. in diameter, but the clearance on the trucks was designed for 34-in. steel wheels with a 3-in. tread. The side swing of the bolsters is cushioned by an ingenious arrangement as follows: The top side frame is drilled to allow a 1¼-in. bolt to project through close to the bolster. A collar was shrunk upon this bolt on the outside, against which a coil spring bears. In turn this coil spring is supported by angles and plates bolted to the frames. This, of course, acts as an effective cushion for the side swing. All important bolts used in this truck were turned to size and fit in reamed holes with Columbia lock nuts.

The brake system is a composite of the Brill No. 27-G and Baldwin trucks, taking the best points of each. It consists of 1-in. x 4½-in. brake beams with live and dead levers for center pull with safety carriers under the beams, hung from the transom. The old No. 21-E trucks were equipped with Christie interchangeable brake shoe heads and these were used on the new rigging, the links being hung from the upper part of the transom. These heads could not have suited the conditions better.

The four motors used were those from the single trucks. The cost to produce these trucks was but a fraction of the cost of new trucks. The braking equipment of this car includes Christensen AA-1 air brakes and the Sterling-Meaker "Giant" hand brakes.

Both the trucks and the car were completely designed by Robert E. Manley, general manager of the company, and built entirely in the shops of the company, under his supervision and that of Leroy Stokes, master mechanic. This car has now been in use for some time, making about 200 miles a day. It has exceeded all the expectations of the designer. The trucks are particularly easy riding and rigid under brake action.

COMPARATIVE COST OF 600-VOLT AND 1200-VOLT D. C. INTERURBAN RAILWAYS*

To obtain an idea of the advantages which may be expected on interurban railways with the use of 1200 volts as contrasted with 600 volts, let us consider four concrete applications to different conditions as presented in the following table:

DESCRIPTION OF LINES

	A	B	C	D
Length of road, miles, all single track	100	100	100	100
Time between trains each direction, minutes	60	60	60	60
Cars per train	3	1	1	1
Seating capacity per car	65	60	50	40
Distance between stops, miles	5	2	1	0.5
Schedule speed, m.p.h.	45	35	25	15
Maximum speeds, m.p.h.	60	48	38	28
Car-miles a day	9,000	3,000	3,000	3,000

It will be seen that the roads vary from the heavy railroad conditions of "A," through heavy interurban "B," light interurban "C" and very light traffic "D." In fact, the rolling stock of "D" will be no heavier than many city cars. Based upon the requirements, the following data may be considered reasonable for the cars.

GENERAL DATA ON CARS

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Number	60	60	15	15	17	17	20	20
Cost each	$15,000	$13,000	$11,000	$10,000	$8,000	$7,000	$5,000	$4,500
Weight, tons	46.5	45	36	35	27	26	18	17
Amp, starting	900	1,650	140	260	100	185	60	110
Amp, running	100	187	47	87	33	62	20	37
Kw-hr, per train-mile	11.16	10.8	2.88	2.80	1.89	1.82	1.08	1.02
Car-miles a day per car	150	150	200	200	176	176	150	150

The power consumption, which is "at the train" is slightly more for the 1200-volt cars because of their heavier equipments. In the following estimate of car maintenance costs, 10 per cent greater maintenance is allowed for the 1200-volt equipment. As a matter of fact, no noticeable increase has been observed up to the present time. Thus on the Pittsburgh, Harmony, Butler and Newcastle Railway, where the service is very severe on account of many grades and curves,

COST OF CAR MAINTENANCE IN CENTS PER CAR-MILE

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Mechanical	1.25	1.25	1.00	100.	.90	.90	.75	.75
Electrical	.99	.90	.77	.70	.60	.55	.55	.50
Total	2.24	2.15	1.77	1.70	1.50	1.45	1.30	1.25
Yearly cost	$73,500	$70,500	$19,400	$18,600	$16,400	$17,000	$14,300	$13,700

many of the original motor brushes are still in service after 150,000 car-miles and the commutator wear is hardly perceptible. The sizes of synchronous converter units for the substations are based on an assumed maximum momentary demand of two cars starting simultaneously, except in the case of "A" where the size is based on the demand of one train starting and one train running. In all cases, a margin is allowed for occasional extra service.

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Substations	6	14	4	9	3	6	3	5
Momentary demand, kw.	1,440	1,320	336	312	280	222	192	154
Units	2	2	2	2	2	2	2	2
Size of each unit, kw.	1,000	1,000	300	300	200	200	150	150
Cost of station, each	$60,000	$56,000	$26,400	$24,000	$20,200	$18,400	$17,100	$15,600

POWER CONSUMPTION

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Kw-hour a day at cars	$33,500	$32,400	$8,640	$8,400	$5,670	$5,470	$3,240	$3,060
Converter load factor	0.31	0.13	0.44	0.19	0.58	0.28	0.45	0.25
Efficiency (average):								
Substation	0.836	0.69	0.87	0.76	0.89	0.823	0.873	0.803
Secondary distribution	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Transmission	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Step-up transformers	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97
Combined	0.722	0.595	0.745	0.632	0.761	0.705	0.748	0.688
Kw-hour a day purchased	46,500	54,500	11,600	13,300	7,450	7,750	4,330	4,440
Cost per year at one cent per kw-hour	$169,000	$199,000	$42,400	$48,600	$27,200	$28,200	$15,800	$16,200

The number of substations depends upon the maximum economical spacing, considered in conjunction with the cost of feeder copper and the allowable line drop with the assumed conditions of load. The addition of another substation to the number given in the data will not save its equivalent in cost of feeder copper.

The investment in feeder copper equivalent to each substation would be: "A"-1200 volts, $110,000 and "A"-600 volts, $106,000; "B"-1200 volts, $58,300 and "B"-600 volts, $55,000; "C"-1200 volts, $38,800 and "C"-600 volts, $46,400; "D"-1200 volts, $43,400 and "D"-600 volts, $41,400. The actual amount should be somewhat greater than these values, for with the addition of a substation there is a reduction in load factor on each substation.

The primary distribution will be the same for either system except that the total length of the 600-volt transmission line will be slightly longer on account of the greater distance between the terminal stations. A flat price of $3,500 per mile of transmission line is taken for "A" and $1,000 per mile for system "B," "C" and "D." It is assumed that power is delivered to the power house step-up transformers at 1 cent per kw-hour. The secondary distribution efficiency of approximately 90 per cent is based on using enough copper to keep the maximum drop within 250 volts on the 600-volt lines and 500

FEEDER COPPER—COST PER MILE INSTALLED

Size	No. 0	No. 00	No. 000	No. 0000	300,000	1,000,000
Cost	$500	$600	$700	$800	$1,000	$2,900

For track bonding $450 per mile has been taken for A and $400 per mile for B, C and D.

*Abstract of a paper on "The 1200-Volt Railroad," by Charles E. Eveleth (General Electric Company), read before the Philadelphia Section of the American Institute of Electrical Engineers, Jan. 10, 1910.

volts on the 1200-volt lines. A table on the previous page gives data on feeder copper costs and power consumption.

The table below, entitled "Comparison of Systems," parallels the 600-volt and 1200-volt railways on the bases of first cost, fixed charges, operation and maintenance, annual cost and revenue. The net saving, figured at 1½ cents to 2 cents per car-mile, will permit a very material increase in dividends. It is clear that the relative value of the higher voltage increases as the demand for power increases, and that below a certain size of equipment there would be practically no justification for adopting the higher voltage.

In conclusion it appears that a conservative estimate of the economy obtained by a 1200-volt system as compared with the 600-volt system with regard to the electrification material, is approximately as follows: First cost, 10 to 20 per cent; fixed charges, 10 to 18 per cent; and operation and maintenance, 10 to 15 per cent. In specific cases the saving has been found materially greater than indicated, notably where the length of road is such that no substations are required for the 1200-volt system while substations are required for the 600-volt system. In some instances the savings in the electrification material have been as great as 25 or 30 per cent.

DISCUSSION

W. S. Murray, electrical engineer, New York, New Haven & Hartford Railroad, regretted that Mr. Eveleth had not introduced the single-phase system for comparison with the others. He thought very highly of Mr. Eveleth's paper but he believed that it was slightly more academic than would be the case if he had had actual field data from which to make compilations. Thus the calculations were based on theoretical assumptions of trains taking current in the vicinity of substations. Upon the basis of this assumption many of the financial considerations of the paper were involved, and one could see in an instant that this was the crux of the whole situation. If he had attempted to write the paper, he should have made the same assumption. While it seemed perfectly reasonable to make these assumptions, this emphasized the fact that there was a lack of data on actual 1200-volt practice. Electricity could certainly wear a great many different suits of clothes. He thought the 1200-volt system had come to stay, and that it was applicable to certain classes of interurban service. The best reasons for its existence of the 1200-volt system were the excellent opportunity it afforded for the reduction or elimination of substations in rural territory, and the facility with which motors operating on lines of this voltage could be made to accommodate themselves to equally efficient operation on 600-volt city lines, bringing into sharp contrast the obnoxious arrangement of the combined alternating and direct current equipment.

One of the points in Mr. Eveleth's paper that had particularly interested him was the gradual betterment in first cost and operating expenses by the use of a 1200-volt system in preference to the 600-volt, as it passed from the conditions imposed by city requirements to light interurban traffic, and finally to those conditions required in heavy interurban traffic. This suggested to him the system that came into play after the 1200-volt system had done its best. It was fair to assume that 1200 volts on the d. c. motor would not be exceeded. Thus, with the motors in series it would be possible to establish a 2400-volt line. This might widen the field of application of the 1200-volt system for interurban work, but its competition under trunk line conditions, such as obtain on the New Haven road, disappeared when compared with single-phase current at 11,000 volts overhead. It was not impossible even to conceive of 22,000-volt a. c. transcontinental lines for the future. In connection with the single-phase system, he wished to say that he thoroughly believed its principal application was relegated to just one thing, trunk line traffic. Except for isolated branch or interurban lines that come within the zone of power supply from a trunk line system, it was not applicable to interurban or city lines.

L. B. Stillwell, consulting engineer, New York, said that within the limits of the problem which Mr. Eveleth considered, the advantages of the 1200-volt system were manifest. It was an obvious and fair deduction that the possibilities and limitations of voltages still higher must be carefully considered. A comparison of the 1200-volt d. c. system with a 10,000-volt single-phase or three-phase a. c. system, as applied to the operation of heavy passenger and freight trains as operated by the steam railroads of the country, would show advantages for the latter analagous to those which the 1200-volt system possessed when compared with the 600-volt system in the classes of service which Mr. Eveleth had considered.

In concluding the discussion, Mr. Eveleth said that while a higher d. c. voltage up to 2000 volts was possible, 1200 volts had been selected because with the motors wound for 600 volts, the car may be operated at the same speed on either 600- or 1200-volt trolleys by connecting the motors all in parallel for 600-volt operation and two in series and two groups in parallel on a 1200-volt section. By exactly doubling the voltage advantage was taken of the economy of higher voltage with minimum complication of equipment. One road was now successfully running with motors wound directly for 1200 volts

COMPARISONS OF SYSTEMS

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
I.—First Cost:								
Track, roadway, etc.	$2,500,000	$2,500,000	$1,800,000	$1,800,000	$1,800,000	$1,800.000	$1,800,000	$1,800,000
Electrification material:								
Car equipments	960,000	840,000	172,500	150,000	136,000	119,000	100,000	90,000
Substations	360,000	784,000	106,000	216,000	61,000	110,000	51,000	78,000
Distribution	988,000	1,285,000	337,000	364,000	340,000	381,000	330,000	338,000
Total	$4,808,000	$5,409,000	$2,415,500	$2,530,000	$2,337,000	$2,410,000	$2,281,000	$2,303,000
In favor of 1200 volts	.....	601,000	.....	114,500	.....	73,000	.....	26,000
II.—Fixed Charges:								
Track, roadway, etc., 7 per cent	175,000	175,000	126,000	126,000	126,000	126,000	126,000	126,000
Electrification material	259,000	315,000	73,000	83,000	62,000	69,000	56,500	58,500
Total	434,000	490,000	209,000	209,000	188,000	195,000	182,500	184,500
In favor of 1200 volts	.....	56,000	.....	10,000	.....	7,000	.....	2,000
III.—Operation and Maintenance:								
Miscellaneous	421,000	421,000	123,000	123,000	87,000	87,000	65,000	65,000
Electrical	282,000	329,000	82,000	97,000	61,000	68,000	47,000	31,000
Total	703,000	750,000	205,000	220,000	148,000	155,000	112,000	116,000
In favor of 1200 volts	.....	47,000	.....	15,000	.....	7,000	.....	4,000
IV.—Annual Cost II + III	$1,137,000	1,240,000	414,000	429,000	336,000	350,000	294,500	300,500
In favor of 1200 volts	.....	103,000	.....	2,500	.....	14,000	.....	6,000
V.—Revenue:								
Additional receipts per car-mile necessary to pay additional cost of operation, etc., for 600 volts	.....	3.1c.	.....	2.28c.	.....	1.28c.	.....	0.55c.

NOTE.—3,285,000 car-miles per year for A; 1,095,000 car-miles per year for B, C and D.

on each commutator. The choice of individual motor voltage was one of the questions which must be considered in any particular case, as they may be wound for either 600 or 1200 volts.

The choice of a system for heavy traction was quite a different problem from the choice for interurban service. Just as one tool fitted one class of work, and another tool fitted another so there seemed to be at the present time no one system best for all classes of service. He would regret very much to be considered an advocate of any one system. He hoped to see the single-phase system make good ultimately because it had been the most promising from its inception on account of the apparent advantages in distribution, simplicity and cost.

THE WAY COMMITTEE MEETS IN HARRISBURG

A meeting of the committee on way matters of the American Street & Interurban Railway Engineering Association was held in Harrisburg, Pa., on April 25. The following committee members were present: E. O. Ackerman, chairman, engineer maintenance of way, Columbus Railway & Light Company, Columbus, Ohio; Martin Schreiber, engineer maintenance of way, Public Service Railway Company, Newark, N. J.; C. L. Crabbs, engineer of way and structures, Brooklyn Rapid Transit Company, Brooklyn, New York; J. M. Larned, engineer, maintenance of way, Pittsburgh Railways Company, Pittsburgh, Pa. The work allotted to this committee is a continuation of the work of last year, particularly with reference to questions of economical maintenance; specifications for open-hearth and manganese steel rails; influence of gage of curves on movement of cars through them; clearance between street surface, or any other obstruction, and the rolling equipment; rail corrugation; standardization of girder rails; and standard layout for special track work.

In outlining the work the committee has made the following assignments: Mr. Schreiber, economical maintenance; Mr. Larned, specifications for open-hearth and manganese steel rails; George Weston, assistant general engineer, Board of Supervising Engineers, Chicago Traction, Chicago, Ill., rail joints; M. J. French, engineer maintenance of way, Utica & Mohawk Valley Railway Company, Utica, N. Y., influence of gage curves, etc.; Mr. Crabbs, rail corrugation; Mr. Ackerman, standard girder rail. The subject of standard layout for special track work is to be included in Mr. Schreiber's report on economical maintenance. Each member of the committee will give primary treatment to the subject assigned to him and then all the other members will contribute to the treatment of the same subject by gathering pertinent data and information and mailing the same to the member who has that subject in hand. The data thus separately assembled are to be formulated into one report by the committee as a whole.

After the meeting the members were entertained at lunch at the works of the Pennsylvania Steel Company, Steelton, Pa. After lunch the committee visited the Steelton Works and obtained valuable information relative to the work carried on there.

TRANSPORTATION AND TRAFFIC MEETING IN CHICAGO

A meeting of the executive committee of the American & Interurban Railway Transportation & Traffic Association was held in the Auditorium Annex, Chicago, Ill., on Tuesday, April 26. The association members present were: Robert I. Todd, vice-president and general manager of the Terre Haute, Indianapolis & Eastern Traction Company; G. W. Parker, general express agent, Detroit United Railway; J. N. Shannahan, vice-president and general manager, Washington, Baltimore & Annapolis Railway; J. W. Brown, superintendent of transportation, West Penn Railways; H. C. Donecker, secretary and treasurer of the association. The other attendants at this meeting were: C. D. Emmons, general manager of the Fort Wayne & Wabash Valley Traction Company, who is chairman of the committee on interurban rules; P. P. Crafts, general manager of the Iowa & Illinois Railway, chairman of the committee on express and freight traffic; G. O. Nagle, general manager of the Wheeling Traction Company, chairman of the committee on the training of transportation employees; F. W. Coen, general manager and purchasing agent, Lake Shore Electric Railway, chairman of the committee on passenger traffic; H. W. Fuller, general manager, Washington Railway & Electric Company, member of committee on subjects. Progress reports were submitted by the representatives mentioned. Written reports were also received from the following absent chairmen: N. W. Bolen, superintendent of transportation, Public Service Railway, New Jersey, committee on construction of schedules and time tables; R. E. Danforth, general manager, Public Service Railway, New Jersey, committee on city rules; M. R. Boylan, general auditor, Public Service Railway, committee on transfers and transfer information.

It was decided that all committees will send out data sheets. The rules committees will develop desirable changes and point out the extent to which the rules have been adopted. The passenger traffic committee will develop the experience of interurban railways which have increased the rates of fare. The committee on freight and express traffic will develop the conditions where the carrying of freight is profitable and also a standard form of expense report. The next committee meetings are scheduled as follows: Interurban rules, May 8, at Fort Wayne, Ind.; express and freight, May 2, at Cleveland, Ohio; training of employees in Buffalo, on date not set; executive committee to meet early in July. The convention program of the Transportation & Traffic Association will follow the same arrangement and days as last year except for the addition of three papers and a report from the committee on the construction of schedules and time tables.

INQUIRY BY PUBLIC SERVICE COMMISSION CONCERNING DEPRECIATION ACCOUNTS

The New York Public Service Commission, Second District, has issued circular letters of inquiry to the street railroad and the electrical corporations subject to its jurisdiction which have not established operating expense accounts to cover depreciation and other amortization. The letters to street railroad corporations state in part:

"The uniform system of accounts for street railroad corporations prescribed by this commission, effective Jan. 1, 1909, contains three operating expense accounts to cover the matter of depreciation of operating property and other amortization of such property and capital. One of these is called depreciation of way and structures, another is depreciation of equipment, and the third is entitled general amortization.

"Charges to the two accounts, depreciation of way and structures and depreciation of equipment, are by the order of this commission covering the uniform system of accounts required to be made by each corporation to which the order applies according to 'a rule determined by the accounting corporation,' and it was further required that 'such rule and a sworn statement of the facts and expert opinions and estimates on which it is based shall be filed with the Public Service Commission on or before July 1, 1909.' The above-named corporation has not yet complied with this requirement. You are therefore required to file with this commission before April 15, 1910, answers to the following questions:

"1. Have you set up on your books the three accounts above named?

"2. If you have not set up such accounts, or any of them, why have you not done so?

"3. What rule are you observing in charges to the account depreciation of way and structures?

"4. What rule are you observing in charges to the account depreciation of equipment?

"5. Why have you not filed a copy of such rule and other matters with this commission as required by the order referred to?

"6. When do you expect to obey the order of the commission in this particular?

"Also, on or before April 15 show in detail, giving dates, amounts, and all other particulars, the several entries which the corporation has made on its books of record in the accounts depreciation of way and structures, depreciation of equipment, and general amortization.

"Reply to this communication, giving specific answer to each of the foregoing questions, should be received before the date named. Your attention is respectfully called to that part of section 46 of the Public Service Commission's law reading as follows: 'The commission may require of all such corporations specific answers to questions upon which the commission may need information.'"

LARGE NEW STEEL CARS FOR OAKLAND ELECTRIC LINES SOUTHERN PACIFIC COMPANY

A contract has been let for the construction and equipment of 125 large steel passenger cars to operate over the 1200-volt suburban lines of the Southern Pacific Company, now being electrically equipped at Oakland, Cal. These cars are noteworthy because of their large seating capacity, 116 passengers, their all-steel construction with turtle-back roofs and their low weight per passenger seat, 896.6 lb. The American Car & Foundry Company will build these cars and the order includes 40 motor coaches, 25 combination coach and baggage motor cars and 60 trailers.

The frame and body design of all cars is the same. The controlling dimensions are as follows:

Length over end sills	58 ft.	6⅛ in.
Length over platforms coupled	72 ft.	4½ in.
Center from bolster to end sill	6 ft.	9 in.
Wheel base of car	52 ft.	½ in.
Wheel base of truck	7 ft.	
Width over sills	10 ft.	4 in.
Width overall at eaves	10 ft.	5⅞ in.
Height top of rail to bottom of sills	3 ft.	8¾ in.
Height top of rail to top of platform	4 ft.	4 3/16 in.
Height top of rail to top of roof	13 ft.	½ in.
Approximate light weight of motor coach complete	104,000 lb.	
Weight of trucks, each complete	13,728 lb.	

The designs for the new cars were prepared by the engineers of the Southern Pacific and Union Pacific Associated Lines.

BODY AND UNDERFRAME CONSTRUCTION

The main members of the underframe of these cars are two ⅞-in. channel-section center sills extending from end to end of the car and similar side and end sills. The body bolsters are cast steel. The underframing within the body is covered with a floor of Flexolith laid ⅜ in. deep on galvanized Keystone flooring. The platform framing is floored over with a ⅛-in. open-hearth steel plate supported by a 3 x 3 x ⅜-in. angles. The wearing surface of the platforms is Mason safety carborundum tread. The platforms have spring buffer attachments providing for passage from one car to another through end doors 40 in. wide. Janney long-stem couplers are used.

The body is made up of steel plates and pressed-steel posts supporting a turtle-back sheet-steel roof of the same type as that used on the Union Pacific and Southern Pacific steel coaches. This roof is reinforced with 1/16-in. pressed-steel carlins.

The motor coaches each have two platforms with step openings 4 ft. 4 in. wide divided by a pipe stanchion extending from the platform floor to the middle of the lower step. Each step opening during running is protected by a steel grill gate, mechanically operated. The interior of the motor coach is not subdivided, except that a toilet room about 3 ft. 6 in. square, is partitioned off at one corner of each car. Folding cabs for enclosing the control equipment and motorman are provided at both ends of the motor coaches and permanent cabs are provided in the baggage end of the combination coaches.

All of the interior finish of the car body is steel and the sides below the windows are only as thick as the steel plate used to cover the framing. In this way an extreme interior width is obtained. Because of the extreme width of these cars, 10 ft. 4 in. at the sills, and the thinness of the sides, it is possible to greatly increase the seating capacity using seats which accommodate three passengers on one side of the aisle and two-passenger seats on the other. The window end of each seat is carried on a pressed-steel bracket riveted to the car siding. Each of the seats has a back 20 in. high and pressed-steel framing of the Hale & Kilburn "walkover" type. Each motor and trailer car has 24 two-passenger seats, 20 three-passenger seats and 4 two-passenger bulkhead seats. On the side of the aisle which has the three-passenger seats the seat nearest the door is of the two-passenger size so that there may be ample clearance for passenger movement. The combination cars have 18 two-passenger seats, 16 three-passenger seats and 2 two-passenger bulkhead seats. The three-passenger seats have cushions 53 in. long with arm rests and are 57 5/32 in. long over all. The two-passenger seats have 33-in. cushions and are 36 29/32 in. long over all. Ventilation of the car body will be effected by the use of 10-in. Globe ventilators above register openings in the car roof.

EXHIBITS AT SIOUX CITY

The following are brief statements of the exhibits made in connection with the annual convention of the Iowa Street & Interurban Railway Association at Sioux City, Ia., April 21-23:

American Car Company, trucks, car seats, fare boxes and noiseless brake hangers.

Ohio Brass Company, overhead material, track bonds, car-signal system, air sanders and Tomlinson couplers.

American Steel & Wire Company, cables and wires, track bonds and bonding, tools and right-of-way fence.

Central Electric Company, high-voltage insulators, span drop-outs, D. & W. car fuses and cut-outs, Okonite wires and cables, Monson and Okonite tapes, Deltabeston wire.

W. R. Garton Company, Bayonet trolley base, Earll trolley retrievers and catchers, Shaw lightning arresters, "M. V. G." arrester with "hydro" ground, "Bradshaw's" car skid, Frank Ridlon Company's field and armature coils and commutators, Electric Railway Equipment Company's overhead supplies, Universal safety treads, Waterbury Company's wires and cables and Heany fireproof wires.

Taylor Electric Truck Company, short wheelbase truck for city service.

General Electric Company, general supplies and apparatus for railway and lighting use.

Interstate Supply Company, Sioux City, Ia., products of the Wagner Electric Manufacturing Company and W. N. Matthews & Brother.

Westinghouse Electric & Manufacturing Company, overhead material, including several types of wood and composition strain insulators and railway and lighting supplies.

Western Electric Company, electric railway materials and machinery, including telephones.

Hensley Trolley Company, wheels, harps and sleet cutters.

Indianapolis Brass Company, overhead materials.

Milwaukee Vacuum Machinery Company, car-cleaning apparatus.

Atlas Railway Supply Company, rail joints, chairs and track fittings.

Rail Joint Company, rail joints, including Weber and continuous types and the "F. & S." continuous joint for frog and switch heels.

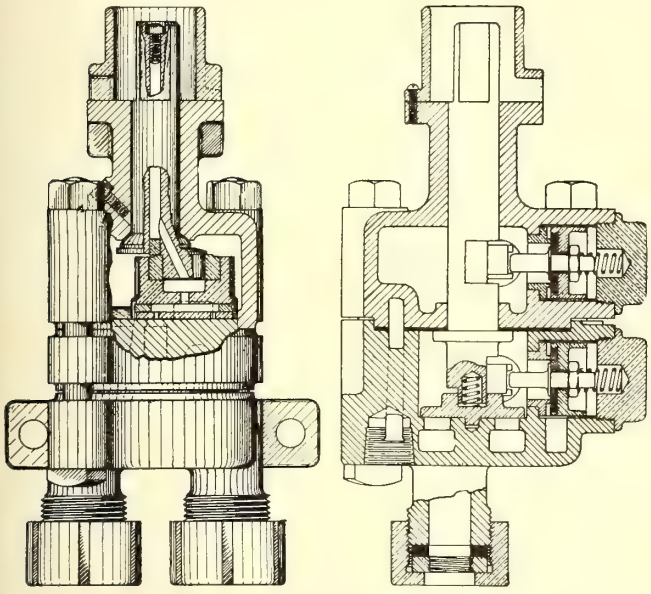
Monarch Electric Company, Monarch wire, Bryan Marsh lamps and general electrical supplies.

The British Columbia Electric Railway, Victoria, B. C., is planning to create a summer resort at Cordova Bay, 6 miles from Victoria, where it has purchased 40 acres of land for amusement purposes.

MOTORMAN'S BRAKE VALVES

The accompanying cuts are sections of two recent types of motorman's brake valve made by the National Brake & Electric Company, Milwaukee, Wis. One of these is the ½-in. "SV" slide valve and the other the ½-in. "PV" piston valve, which has no ground joints.

The ½-in. "SV" valve is a slide valve with ports on the lower face that register with corresponding ports in the valve seat. The valve seat is of cast iron and has three port openings which connect with the reservoir, brake cylinder and atmosphere. Repairs can be easily made as the valve seat, being detachable and provided with removable guides for slide valves, can be refaced on a lathe instead of a shaper. A detachable handle, which tops the valve stem or eccentric spindle, causes this part to revolve, thus manipulating the slide valve and cross-head, the latter having a large wearing surface to compensate for wear between the slide valve and lower portion of the stem. The valve must be in lap position and all ports of the valve seat blanked before the operating handle can be inserted or removed. A shield on the valve bonnet protects the valve stem when the handle is taken off and thus the mechanism is practically locked so that passengers cannot tamper with it.



Sections of Type 1/2-in. "SV" and Type 1/2-in. "PV" Motorman's Brake Valves

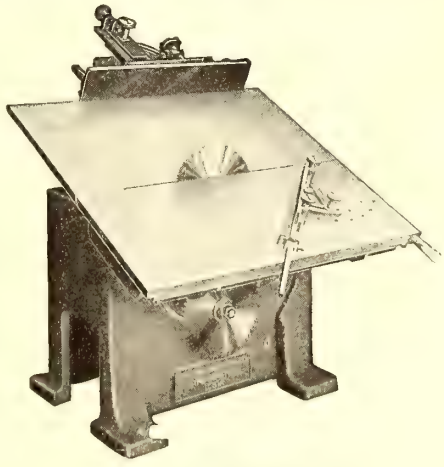
Considerable trouble has been experienced in lubricating air valves even when they are provided with an oil reservoir. This has been due both to moisture deposits and the action of the air which, when passing through the valve bonnet, invariably comes in contact with the reservoir and whips out the oil. These defects have been remedied by extending the cross-head to cover the oil reservoir completely and by conducting oil direct to the latter through the cross-head by means of an opening leading from the top of the valve stem. The air cannot lift the cross-head from the oil reservoir as the cross-head never extends beyond the side of the valve, the air also being deflected by plates which are cast directly over its path. Oil cannot escape, but is brought in immediate contact with all the wearing parts of the slide-valve seat, perfect lubrication being thereby assured. The oil supply is renewed by removing the screw in the upper part of the valve stem. The slide valve adjusts itself to the proper seat without attention. A spring latch in the operating handle engages projections on the valve bonnet so that by the sense of feeling alone an operator soon gages the successive positions of the valve.

Car-house men have had trouble in repairing valves where the air tightness depends on ground joints. The types ½-in. "PV" valve is designed to overcome this, as it is made without ground joints. The valve bonnet is free from air pressure except when the brake cylinder is charged, thus eliminating the leaks around the valve stem, bonnet or seat, which frequently occur in the slide or rotary valves. The admission and release valves have an inexpensive seat of composition material which effectually prevents the escape of air and is so arranged that should this part become displaced or slightly worn, it is an easy matter to adjust the same quickly or replace it with an entirely new seat. The valve can be completely disassembled without disconnecting or draining the main reservoir, although this does not apply when it is desired to remove the admission valve. The only lubrication required is effected by removing the screw in the valve stem.

The sectional view shows the valve with the handle removed, at which position the admission and release valves are seated, while the graduating valve closes the ports leading to the brake cylinder and release valves. The valve stem is so milled that when the operating handle is moved to the right of center, the lever of the admission valve is pushed outward, thus forcing the valve from its seat; likewise, a movement of the handle from left to center displaces the release valve. The admission and release valves are interchangeable and have a seat of composition material that renders them impervious to moisture and oil. The graduating valve is a flat disk with face and seat accurately machined, the upper part of the valve being milled to engage the lower portion of the valve stem, thus transmitting movements of the valve stem to the graduating valve.

DOUBLE CIRCULAR SAW

The accompanying cut shows a novel combined ripping and cross-cutting machine designed especially for pattern work in car shops by the J. A. Fay & Egan Company, Cincinnati, Ohio. Both saw arbors are carried on a revolving frame, and it is easy to take off or put on saws without disarranging the table. Two saws up to 16-in. diameter, one on each arbor, can be carried at the same time and the frame revolved, or if only one saw is used, it may be as large as 20 in. in diameter. The table is made in two sections, one moving section moving easily on frictionless rollers, and a stationary section having an extension so that material up to 20 in. in width may be ripped. The moving section of the table has sufficient motion to edge or cut-off material up to 35 in. and will open to permit the use of 2-in. grooving head. The whole table can be tilted by a hand-wheel to an angle of 45 deg. from the saw. A gage registers the angle to which the table is tilted.



Double Circular Saw

The ripping fence may be set to take stock up to 20 in. wide and used on either the right or left section of the table. A micrometer adjustment is provided on this fence for use when certain adjustments are too fine to be made by hand. The miter cut-off fence is used on the sliding table and covers a range of 45 deg. back of the fence to 60 deg. in front. This fence is furnished with a stop-rod, to be used for stock of various lengths. The mechanism of the tool is completely enclosed.

News of Electric Railways

Transit Affairs in New York

The Public Service Commission has made public the form of contract proposed for the construction, equipment and operation of the tri-borough subways route, in so far as that route is offered to private capital to build, equip and operate. This contract is the forerunner of another covering the construction of the subway only and by funds derived from the sale of city bonds. As previously announced in the Electric Railway Journal, there will be a public hearing on May 9, 1910, on the form of contract made public, and a week later a hearing will be given on a form of contract, to be published in the meantime, providing for the construction of the tri-borough route with city funds and its equipment and operation by private capital. This second form of contract will cover the tri-borough route in sections, and will follow the general form of the contracts for the construction of the Fourth Avenue (Brooklyn) route, which have already been let.

It has been reported that the Hudson & Manhattan Railroad will apply to the Public Service Commission for permission to extend its subway south on Manhattan Island from Ninth Street and Sixth Avenue to the Cortlandt Street terminal.

An order signed by Judge Lacombe of the United States Circuit Court on July 15, 1909, was filed on April 23, 1910. It authorizes William H. Ladd, receiver of the New York City Railway, to sell to the receivers of the Metropolitan Street Railway 500 shares of the capital stock of the Bridge Operating Company and to transfer the agreement of the New York City Railway for the operation of cars over the Williamsburg Bridge for a consideration of $150,000 in cash.

Justice Greenbaum, in the Supreme Court, in a decision rendered on April 21, 1910, said that the charter of a company is entirely distinct from its franchises to use the streets. While the Attorney-General must get the court's permission to sue to dissolve the charter of the Bleecker Street & Fulton Ferry Railroad, which has not been operated for some time, the Attorney-General may sue of his own volition to dissolve the right to occupy the streets. This right, the Attorney-General has, says the court, in case a railroad ceases to operate its cars.

The hearing before the Public Service Commission on the application of the Manhattan Bridge Three-Cent Line for a certificate of necessity and convenience for a franchise in the boroughs of Manhattan and Brooklyn has been closed. A review of some of the testimony introduced before the commission was published in an article in the Electric Railway Journal of April 16, 1910, page 705.

Detroit United Railway Files Bill of Particulars in Arbitration

On April 28, 1910, the Detroit United Railway filed with the board of arbitration which is to consider the appraisals of the property of the company the following communication, in which the reproduction value of the property on March 1, 1909, is placed at $24,676,181.75:

"In response to your request for a statement in the nature of a bill of particulars relative to the value of the Detroit United Railway properties, we state:

"First—It is our understanding that it is the purpose of the court to ascertain the value of the property which may be written into a proposed contract between the railway and the city, which value should be that of a going concern or operating railway, and should include all values, tangible or intangible, which in any way enter into a correct valuation.

"Second—The Barcroft appraisal to which you direct our attention does not disclose any method of ascertaining such value.

"Third—The reproduction value of the property on March 1, 1909, as we claim it to be, is $24,676,181.75.

"The foregoing does not include any reduction for depreciation, but does include the track and appurtenant property extending to the Log Cabin Park and other tracks and property devoted to city service, the mileage of said outside tracks amounting in all to 24.41 miles. It also includes the items mentioned hereafter in paragraph 5 as having been omitted from the Barcroft appraisal, but which are not yet separately tabulated so as to now be presented in this paper.

"As to depreciation, the company claims and will undertake to show that it maintains its entire system within the city at 82½ per cent of its reproduction value.

"Fourth—The Barcroft appraisal omits parts of the company's property, including real estate, paving, tracks, building and other items, and does not include all of the property of the railway used for city service.

"Fifth—The Barcroft appraisal omits to take into consideration such items as cost of separation of grades, street widenings, changes of track location, conversion of suburban tracks to city tracks, legal expenses, carrying charges during construction, brokerage, engineering, and in some cases contingencies. Neither does it take into consideration the matters of development cost and obsolescence, which are necessarily items which should be included in the capital account.

"Sixth—It omits the additions to the property of the railway since March 1, 1909, which is the date of the inventory and appraisal.

"Seventh—The Barcroft appraisal is, therefore, incorrect in stating the cost or reproduction value of the items going to make up the railway property, in that it does not include the entire property and items.

"Eighth—In some instances the depreciation fixed by the Barcroft appraisal is wholly arbitrary and without known rule or method. We instance in this respect the depreciation of tracks and rolling stock as stated in said appraisal."

Frederick T. Barcroft, who appraised the property for the committee of fifty, made public on April 22, 1910, a letter in which he gave his reasons for not appearing before the board of arbitration. Previously P. J. M. Hally, corporation counsel of the city, wrote an open letter to the arbitrators declining to be present on behalf of the city on the ground that the hearings were not official, although at the meeting of the Council on April 26, 1910, he was requested by that body to represent the city with full power to incur whatever expense he deemed necessary.

The board of arbitration has adjourned until May 9, 1910, to enable the committee of fifty to select an engineer in place of Mr. Barcroft. On April 26, 1910, the City Council approved the board of arbitration as now constituted.

Cleveland Traction Situation

G. M. Dahl, street railway commissioner of Cleveland, distributed the first of his "Street Car Talks" on the cars of the Cleveland Railway on the evening of April 21, 1910. Mr. Dahl intends to issue these leaflets whenever he has anything to say to the people who use the cars. In this first talk he discussed his recent orders forbidding passengers to smoke or stand on the rear platforms of cars. The purpose of the order was to facilitate the movement of cars by avoiding congestion that interferes with ready ingress and egress.

J. J. Stanley, president and general manager of the Cleveland Railway, has proposed that the schedules on the Superior, Woodland-Lorain, Cedar and Central lines be shortened through the day. Mr. Dahl says that service should be increased in the morning and in the evening when the travel is heavy. He contends that service during the day meets all demands. Mr. Stanley proposed to install the schedule in force when the Cleveland Electric Railway turned its lines over to the Municipal Traction Company. This would increase the car miles operated over the present schedules as follows: 1075 on the Woodland-Lorain line,

513 on the Superior line, 390 on the Payne line, 296 on the Cedar line and 236 on the Central line. Mr. Dahl says that it would require 12,656 extra fares to pay for the operation of cars on the increased schedules and he does not believe that the additional traffic would compensate for the change.

Mr. Dahl conferred with Mr. Stanley on April 22, 1910, about the purchase of additional cars. Mr. Stanley feels that the funds at the disposal of the company at this time should all be expended for improvements to the track, overhead work and power equipment.

Engineers in Mr. Dahl's office have placed the values of the portion of track on Lorain Avenue which the Cleveland Railway has proposed to purchase from the Cleveland, Southwestern & Columbus Railway at $26,000 and Mr. Dahl has indicated that he is willing to approve a contract upon that basis. The price asked by the Cleveland, Southwestern & Columbus Railway was $86,000. It is possible that arrangements may be made between the Cleveland, Southwestern & Columbus Railway and the Cleveland Railway for the joint use of the track.

Some time ago Mr. Dahl asked the Cleveland Railway to consider the proposition of a fare of 5 cents to Euclid Beach and reply in advance of the meeting of the Council on April 18. Mr. Stanley furnished figures showing that the present fare of 10 cents would aid materially in making 3-cent fare in the city a success. Councilman Laferty offered an ordinance to provide for the lower fare. Mr. Dahl said that the ordinance had been prepared and presented without his knowledge.

Mr. Dahl has ordered that all pay-as-you-enter cars be equipped with fare boxes. About 60 cars have not yet been equipped.

Meeting of the New England Street Railway Club.—The monthly meeting of the New England Street Railway Club was arranged to be held at the American House, Boston, Mass., on the evening of April 28, 1910. Henry E. Rhodes, past assistant engineer of the United States Navy, was to recount his experience in foreign countries as a naval engineer and as a member of a relief expedition to the polar region.

Decision in Geary Street, Park & Ocean Railroad Case.—In the suit brought by Horace G. Platt, president of the Geary Street, Park & Ocean Railroad, San Francisco, Cal., as a taxpayer, to enjoin the Board of Supervisors of San Francisco from proceeding with the issuance of bonds for the reconstruction of the railway as a municipal enterprise, the franchise having expired, Judge Ellison of the Supreme Court of Panama County has sustained the demurrer of the city, denied the application for an injunction and ordered judgment entered for the city.

Central Station Energy for Gary & Interurban Railway.—The Gary & Interurban Railway, which connects Gary and Hammond, Ind., has entered into a contract with the North Shore Electric Company, Chicago, Ill., to purchase 500 kw of electrical energy at 12,000 volts and 60 cycles, with the privilege of taking 1000 kw, delivered at the State line between Indiana and Illinois, at a point east of Bernice, Ill. The Gary & Interurban Railway will have a substation near Gary, and will take its entire supply of current from the central station company.

Plea for Lower Taxes in Indiana.—Representatives of most of the interurban electric railways in Indiana appeared before the State tax board of Indiana recently and pleaded for a lower assessment in order to meet the demand for improvements and renewals to their systems. Notwithstanding that the gross receipts of the companies for 1909 were greater than for any previous year, the cost of operation, of materials and of labor and the increase in taxes due in part to the 3-mile road law, reduced the net earnings appreciably. In most cases a reduction in the assessment was asked. All those represented contended that an increase would be unjust. The board will fix the assessments and will then grant another hearing.

Summer Courses at the University of Wisconsin.—The 10th annual session of the summer schools for engineers and artisans, under direction of the College of Engineering of the University of Wisconsin, Madison, Wis., will open on June 27 and continue for six weeks. Advanced courses are offered in direct and alternating currents, hydraulics, machine design, descriptive geometry, applied mechanics, shopwork, steam and gas engineering and surveying. Elementary courses are offered in applied electricity, engines and boilers, fuels and lubricants, mechanical drawing, machine design, materials of construction, shopwork and surveying. F. E. Turneaure is dean of the College of Engineering.

Indianapolis, New Castle & Toledo Electric Railway.—Following a recent inspection of the Indianapolis, New Castle & Toledo Electric Railway, it was officially announced that the road would be placed in operation between June 15, 1910, and July 1, 1910. The road extends from Indianapolis to New Castle, a distance of about 40 miles, and passes enroute through Mt. Comfort, Mohawk, Wilkinson, Shirley and Kenwood. In 1907 the company was placed in the hands of the Union Trust Company, Indianapolis, Ind., as receiver, and from November, 1907, until September, 1909, very little construction work was done. The receiver was then ordered by the court to complete the line.

Paper Before Chicago Electric Club.—Under the title, "The Problem of Railroad Electrification—The Transmission of Power from the Power House and its Distribution to Moving Trains," Frederick Darlington, Pittsburg, electrical engineer with the Westinghouse Electric & Manufacturing Company, read an interesting paper before the Electric Club of Chicago on April 20, 1910. The main point of the speaker was that the transmission and distribution of electricity from the power house to heavy train units was the important problem in heavy railroading; further, that the use of high-voltage energy, specifically the single-phase system, reduced the cost of this transmission and distribution. Mr. Darlington's paper did not apply especially to railroad terminal electrifications, but rather to the whole problem of operating by electricity ordinary steam railroads.

Maryland Utility Commission.—When Governor Crowthers, of Maryland, announced the appointment of James M. Ambler, W. W. Abell and Judge James Alfred Pearce as members of the Public Utility Commission of Maryland, he said that none of the gentlemen had been consulted regarding his appointment, but that he felt they would all agree to serve unless some obstacle should present itself with which he was not acquainted. Judge Pearce has, however, declined the nomination. He gave his reasons for not accepting the nomination in a letter to the Governor, but has refused to discuss the matter for publication. Mr. Ambler has accepted the appointment. Mr. Abell is on his way to Baltimore from Japan. He has not been formally notified of his appointment. Philip D. Laird, Rockville, has since been named by the Governor for the place on the commission declined by Judge Pearce, and has accepted the appointment.

Association Notes.—The American Street & Interurban Railway Association has published a booklet entitled "Standardization," in which a brief description is given of the work of the association in the interest of standardization. The association has also distributed a series of standard employment, reference and physical examination blanks for transportation employees which were adopted by the Transportation and Traffic Association at the convention in Denver. The contents of this set is as follows: (a) Application for employment; (b) reference inquiry (sent to previous employer); (c) reference release (sent to previous employer); (d) reference inquiry (sent to individual named as reference); (e) record of examination of sight, color sense and hearing; (f) surgeon's certificate of examination; (g) instructions to surgeon. In addition the association is distributing an associate membership folder, in which are set forth the advantages derived by members of the association during the past year.

Suit to Annul Franchise in San Francisco.—Attorney-General Webb, of California, has filed a suit in the Superior Court asking that the franchise of the Sutter Street Railway for the outer tracks from Sutter Street to the ferry at the foot of Market Street, San Francisco, Cal., be forfeited, and that the Sutter Street Railway and the United Railroads be excluded from operating thereon. The complaint sets forth that on Nov. 14, 1870, the Sutter Street Railroad

acquired a franchise along Market Street, to Sutter, and out Sutter to Central Avenue, and that this franchise was assigned to the Sutter Street Railway, which in turn assigned to the United Railroads all its franchise except that part of Market Street from the city front to Sutter Street. After the last assignment it is alleged the Sutter Street Railway stopped operating cars on Sutter Street, but continued to operate cars from the city front along Market Street to Sutter Street. This service has been maintained, so it is charged, by the United Railroads under the name of the Sutter Street Railway to prevent any other road from using lower Market Street. The desire of the city is to secure the use of the section of the street now occupied by the Sutter Street Railway for the municipal street railway, which the city contemplates building.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The joint committee on street railways and railroads spent two days recently going over the electric railways in the Berkshire district which the New York, New Haven & Hartford Railroad desires to acquire. The bill exempting transit bonds of Boston from the provisions of the law relative to Boston loans has been passed by the Senate to be enacted. The committee on street railways has presented an adverse report on the bills reducing the hours of labor of street railway employees, and the committee has drawn up a bill authorizing the Shelburne Falls & Colerain Street Railway to fund its floating debt and refund its funded debt. The House has passed to be enacted the bill permitting street railways to purchase the property of foreign companies. The effort made to secure a reconsideration of the bill to bestow the right to grant freight and express certificates to street railways upon municipal authorities has been defeated. The House has amended the bill for half fares on street and elevated railways for pupils of normal schools and business colleges by excluding students at business colleges from its provisions.

New York.—On April 21, 1910, the Assembly passed the two bills introduced by Assemblymen Lee and Shortt, designed to carry out the provisions of the constitutional amendment approved by the people last fall, eliminating bonds upon subways and docks, which are self-supporting, from the constitutional debt limit computation of New York City. An attempt to agree upon a compromise bill will be made when these two bills are received by the Senate cities committee. Senator Cobb has introduced the consolidated railroad law which Governor Hughes vetoed last year because it contained section 38 of the old railroad law, which guaranteed 10 per cent dividends to railroad corporations before passenger or freight rates could be reduced. The bill this year does not contain this section. The special committee which investigated the operations of telegraph and telephone companies last fall and recommended that these corporations be placed under the jurisdiction of the Public Service Commission of the Second District drafted a bill carrying out this recommendation. This bill was introduced in the Legislature and the committee gave hearings on it on April 20 and April 21. Assemblyman Dana has introduced a bill to amend the law of 1903 providing for the regulation of terminals and approaches of the New York Central & Hudson River Railroad in New York City. It adds to the territory in which lands and easements may be granted to the company by the Board of Estimate and Apportionment certain described territory west of Park Avenue between Forty-eighth Street and Fifty-second Street.

Ohio.—Governor Harmon has issued a statement in which he says that he favors the enactment of a public utilities bill and the establishment of a utilities commission. The restrictions regarding stock ownership should apply largely to competing companies and the rule regarding a depreciation account should not be too oppressive. It is said that an effort will be made to include a depreciation provision in the present bill before the Senate acts upon it, and that an amendment will be proposed that will require joint use of tracks, wires and other appliances of competing companies under certain circumstances. The Senate has concurred in the House amendments giving interurban railways the right to condemn land in municipalities for union depot purposes.

Financial and Corporate

New York Stock and Money Market

April 26, 1910.

For a week the Wall Street stock market has been weak and irregular, with light trading. The serious storms in the West, the disturbance in the cotton market and the heavy exportations of gold have all contributed to this condition. The traction issues have stood the strain fully as well as any upon the list. The Interborough stocks continue to be active and the declines have not been serious.

The money market continues to be remarkably easy, in spite of the drain of gold to Europe. Quotations to-day were: Call, 2¾ to 3 per cent; 90 days, 3¾ to 4 per cent.

Other Markets

The heavy selling pressure directed against Rapid Transit and Union Traction continues to depress prices in the Philadelphia market. Since the strike the efforts to sustain prices have been relaxed, with the result that there has been little recovery from the low point.

In the Boston market, there continues to be active trading in the issues of the Massachusetts Electric Companies at prices that are nominally unchanged. Outside of this there is no trading of importance. A few shares of Boston Elevated have changed hands at former prices.

In Chicago there has been little trading in tractions. A few lots of Chicago Railways, Series 2 and 4, have been sold at prices slightly lower than those of a few weeks ago.

In Baltimore trading is inactive in the bonds of the United Railways at prices that have prevailed for months. There has also been some dealing in the stock at 12½ to 12⅞.

Quotations of various traction securities as compared with last week follow:

	April 19.	April 26.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a127	a126
Boston & Suburban Electric Companies	a16	a16
Boston & Suburban Electric Companies (preferred)	75	73
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a47	a45
Brooklyn Rapid Transit Company	a80¾	a77⅝
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	86	83⅞
Capital Traction Company, Washington	a132½	a132
Chicago City Railway	a190	a195
Chicago & Oak Park Elevated Railroad (common)	*3½	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a100	a100
Chicago Railways, ptcptg., ctf. 2	a30	a29
Chicago Railways, ptcptg., ctf. 3	a13	a13
Chicago Railways, ptcptg., ctf. 4s	*8	a7¼
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104½
Detroit United Railway	61	*61
General Electric Company	151½	148¾
Georgia Railway & Electric Company (common)	a109½	111
Georgia Railway & Electric Company (preferred)	a86	a87
Interborough-Metropolitan Company (common)	23⅝	21¼
Interborough-Metropolitan Company (preferred)	60⅜	55⅜
Interborough-Metropolitan Company (4½s)	*81	80¾
Kansas City Railway & Light Company (common)	a31	*31
Kansas City Railway & Light Company (preferred)	*77⅝	*77⅝
Manhattan Railway	137	136
Massachusetts Electric Companies (common)	a19	a18
Massachusetts Electric Companies (preferred)	a88	a88
Metropolitan West Side, Chicago (common)	a16	*16
Metropolitan West Side, Chicago (preferred)	a53	*53
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*77½	72¾
Northwestern Elevated Railroad (common)	a15	a17
Northwestern Elevated Railroad (preferred)	60	a70
Philadelphia Company, Pittsburg (common)	a50½	a50¼
Philadelphia Company, Pittsburg (preferred)	a44½	a44½
Philadelphia Rapid Transit Company	a19¾	a19⅝
Philadelphia Traction Company	a87	a86
Public Service Corporation, 5 per cent col. notes	a96½	a96½
Public Service Corporation, ctfs.	a104½	a104½
Seattle Electric Company (common)	a115	a115
Seattle Electric Company (preferred)	103½	104½
South Side Elevated Railroad (Chicago)	a53½	*53½
Third Avenue Railroad, New York	6¾	6½
Toledo Railways & Light Company	*10¼	*10¼
Twin City Rapid Transit, Minneapolis (common)	114½	113
Union Traction Company, Philadelphia	a48¾	a48
United Rys. & Electric Company, Baltimore	a13¼	*12¼
United Rys. Inv. Co. (common)	*37	37
United Rys. Inv. Co. (preferred)	*67	65
Washington Ry. & Electric Company (common)	a38½	a39
Washington Ry. Electric Company (preferred)	a91¾	a92
West End Street Railway, Boston (common)	a90	a88
West End Street Railway, Boston (preferred)	a102	a102
Westinghouse Elec. & Mfg. Company	66	62½
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Athens Railway & Electric Company, Athens, Ga.—The Athens Railway & Electric Company has been incorporated with a capital stock of $1,050,000, of which $750,000 is common and $300,000 5 per cent preferred, to consolidate the Athens Electric Railway and the James White power plant, which is on the Oconee River, 10 miles from Athens. An issue of $2,000,000 of 5 per cent first and refunding gold-sinking fund 40-year bonds has been authorized by the stockholders, $400,000 to be held as against underlying bonds and $425,000 to be used for the acquisition of properties, the remainder for the future needs of the company. The total power equipment of the company will be 7000-hp hydroelectric and 3000 hp from a steam turbine plant.

Brooklyn (N. Y.) Rapid Transit Company.—The $125,000 of first mortgage 6 per cent bonds of the Greenpoint & Lorimer Street Railroad maturing on May 1, 1910, will be paid on or after that date at the office of the Long Island Loan & Trust Company, Brooklyn, N. Y.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—The Charleston Consolidated Railway & Lighting Company was incorporated at Columbia, S. C., on April 19, 1910, with a nominal capital stock of $2,000,000, of which $1,500,000 is to be common stock and $500,000 6 per cent preferred stock, by Julian Mitchell, P. H. Gadsden and F. H. Horlbeck, Charleston. The Charleston Consolidated Railway & Lighting Company will lease the property of the Charleston Consolidated Railway, Gas & Electric Company for 99 years, guaranteeing dividends on the stock of the company. The Consolidated Railway, Gas & Electric Company will issue $500,000 of 6 per cent preferred stock, which it will sell at par to the new company, using the proceeds to provide for extensions and betterments. It is announced that there will be no changes in the personnel of the Charleston Consolidated Railway, Gas & Electric Company.

Everett & Tacoma Railway, Tacoma, Wash.—The Everett & Tacoma Railway has filed a mortgage to the Chicago Title & Trust Company, Chicago, Ill., as trustee to secure an authorized issue of $5,000,000 of 30-year 5 per cent gold bonds to provide for the construction of its proposed electric railway between Everett and Tacoma.

Havana (Cuba) Electric Railway.—The Havana Electric Railway has declared an extra dividend of 1½ per cent on its common stock, payable on May 14, 1910.

Interstate Railways, Philadelphia, Pa.—The directors of the Interstate Railways have decided not to pay before May 1, 1910, the interest defaulted on Feb. 1, 1910, on the 4 per cent bonds as the company has not sufficient funds. The three months of grace from Feb. 1, 1910, expire on April 30, 1910, and after that the company is liable to foreclosure under the mortgage if 25 per cent of the bondholders demand such action. There are now on deposit with the Real Estate Trust Company, Philadelphia, Pa., $6,705,000 of the bonds of the company and several hundred thousand dollars are assured to be favorable to the plan for the reorganization of the company proposed by George H. Earle, president of the Real Estate Trust Company. It is not thought possible that the $2,700,000 of bonds necessary to be pledged to bring about foreclosure could be concentrated in opposition to the Earle plan, which has for its end a reorganization of the company without foreclosure if possible.

Lehigh Valley Transit Company, Allentown, Pa.—A meeting of the stockholders of the Lehigh Valley Transit Company will be held on May 19, 1910, to authorize the creation of a $10,000,000 refunding and improvement mortgage. The issue of $6,000,000 of these bonds will also be authorized to retire $2,500,000 of consolidated 4 per cent bonds and $900,000 of 6 per cent debenture notes. The balance of the bonds will be used for extensions and improvements under proper restrictions.

Lexington (Ky.) Railway.—The Lexington Railway has amended its articles of incorporation so as to increase its funded debt to $2,500,000.

Lewisburg, Milton & Watsontown Passenger Railway, Milton, Pa.—The Lewisburg, Milton & Watsontown Passenger Railway has been purchased from the Railways Company General, New York, N. Y., by J. F. Whittaker and D. R. Diehl, Harrisburg, Pa. The company has been reorganized and the following officers have been elected: John F. Whittaker, Harrisburg, Pa., president; L. G. Brown, York, Pa., vice-president; D. L. Diehl, Greencastle, Pa., secretary and treasurer; W. B. Rankin, Harrisburg, Pa., assistant secretary and treasurer; Richard Barrett, Milton, Pa., superintendent; Chas. S. Johann, Philadelphia, Pa., chief engineer. The directors of the company are: J. F. Whittaker, L. G. Brown, C. S. Johann, D. L. Diehl, Claud Simpler, Philadelphia, Pa. The old mortgage has been replaced by a new one for $300,000.

Ocean Shore Railway, San Francisco, Cal.—J. Howard Smith, who is interested in the Ocean Shore Railway, has served notice on F. S. Stratton, receiver of the company, that an application will be made to the United States Circuit Court to direct Mr. Stratton to bring suit against the stockholders to recover $2,300,000 to liquidate the debts of the company and place it on a substantial basis. Mr. Smith contends that if this amount is raised from the stockholders the company will be able to carry out its projected work and possibly within a reasonable time be on a paying basis. V. G. Bogue, A. W. Foster and W. H. Hener, who constitute the board of engineers appointed by Judge Van Fleet, of the United States District Court, to investigate the physical condition of the Ocean Shore Railway, as noted in the Electric Railway Journal of Feb. 5, 1910, have filed their conclusions with the court. The members of the board estimate that the cost of operating the road under present conditions should not exceed the annual revenue, not taking into consideration the expenses of the receivership. They place the annual earnings of the company when the property is fully completed at $503,000 and estimate that the cost of operation and maintenance would be $337,275, leaving net earnings of $166,225. The cost of completing the road is estimated at $3,190,029. Of this amount $1,351,115 would be needed for the road bed, $1,227,441 for terminal facilities, $132,320 for ballasting and $479,153 for equipment. If receiver's certificates should be issued to cover these expenditures the interest charges on them at 5 per cent would be $159,501, $6,824 less than the estimated net earnings of the company. The total cost of that part of the road now constructed is given as $7,459,414, or about $109,000 a mile. A detailed statement gives the deficit as $269,415. The engineers reviewed the prospect of the road and concluded their report as follows: "In view of these conditions we believe the traffic possibilities are excellent, and that when the road is finished its passenger and freight traffic will grow rapidly, and that the railway itself, as a property, will rapidly increase in value. We have been mindful, however, in preparing our estimate of the annual revenue, that development must follow completion of the railway before the property can produce large and profitable returns."

Philadelphia (Pa.) Rapid Transit Company.—The stockholders of the Philadelphia Rapid Transit Company will vote on June 20, 1910, on the question of authorizing an increase in the indebtedness of the company from $5,000,000 to $10,000,000. As announced in the Electric Railway Journal of April 16, 1910, page 719, the company has applied to the City Council of Philadelphia for permission to make a loan of $2,500,000. It is stated that it is not the intention to increase the amount of the loan which the Council has been asked to authorize, but merely to obtain permission from the stockholders for a larger amount to provide for contingencies.

San Francisco, Oakland & San José Consolidated Railway, Oakland, Cal.—E. A. Heron, president of the San Francisco, Oakland & San José Consolidated Railway, said recently: "No project is being considered by which Eastern or any other capital is to purchase the holdings of F. M. Smith in the San Francisco, Oakland & San José Consolidated Railway. There is, of course, an effort to invade our territory, but there is no proposition of sale under consideration."

Susquehanna Railway, Light & Power Company, Lancaster, Pa.—The Susquehanna Railway, Light & Power Company has taken over the property of the Wilkesbarre Gas & Electric Light Company and the Wilkesbarre Heat, Light & Motor Company.

Tampa (Fla.) Electric Company.—A semi-annual dividend of 4 per cent has been declared on the stock of the Tampa Electric Company, payable on May 16, 1910, to holders of

record on May 2, 1910. This compares with 3½ per cent paid semi-annually during 1909 and 1908 and 7 per cent in 1907. Prior to 1907 10 per cent in dividends was paid for several years.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company has purchased a majority of the $5,000,000 of stock of the Indianapolis Traction & Terminal Company, and to finance the purchase it has sold a block of bonds to Drexel & Company, Philadelphia, Pa., and Lee, Higginson & Company and Estabrook & Company, Boston, Mass. The exchange is said to have been made on the basis of 80 shares of preferred stock and 80 shares of common stock of the Terre Haute, Indianapolis & Eastern Traction Company for each 100 shares of stock of the Indianapolis Traction & Terminal Company.

Third Avenue Railway, New York, N. Y.—The Third Avenue Railway was incorporated at Albany on April 21, 1910, with a capital stock of $16,590,000, as the successor to the Third Avenue Railroad, the property of which was purchased under foreclosure on March 1, 1910, in the interest of the bondholders. The directors of the new company are: James N. Wallace, Adrian Iselin, Harry Bronner, James Timpson, Frederick H. Shipman, W. Emlen Roosevelt, Albert W. Scholle, Joseph H. Seaman, Edward A. Maher, Franklin L. Babcock, Milton Ferguson, John W. Platten, New York, and George W. Davison, Brooklyn. The report of the Third Avenue Railroad for the seven months ended Jan. 31, 1910, shows total operating revenue of $1,889,373, expenses of $1,003,267 and net earnings of $886,106. The traffic statistics show that during the seven months ended Jan. 31, 1910, 28,819,857 fare passengers were carried and that 4,235,553 passengers were carried on transfers.

United Railways Investment Company, San Francisco, Cal.—At the annual meeting of the United Railways Investment Company, to be held on May 6, 1910, there will be submitted for the consideration of the stockholders a resolution adopted by the directors, declaring it advisable to create a series of bonds, not to exceed $6,000,000, to bear such date subsequent to May 31, 1910, as the directors may determine, drawing interest at a semi-annual rate of 3 per cent, payable in 20 years, and subject to redemption at the option of the company at 105. The bonds shall be convertible at par at the option of the holder into fully paid common stock at par, from and after a date to be fixed by the directors, not less than two years from the date of issue, or any date to maturity. A resolution will also be presented to confer power on the directors to utilize a portion of the authorized but unissued preferred stock of the company, at par, to pay or adjust the arrears of dividends on the outstanding preferred stock. On any shares of the preferred stock thus issued, dividends shall accrue only from and after April 1 or October 1 next ensuing from the date of issue. Another resolution will direct that the capital stock of the company, which is now $50,000,000, be increased to $56,000,000, the increase to be all of common stock, and that it be reserved in the treasury of the company, and issued on demand to holders of the above-mentioned bonds.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—The Public Service Commission of the Second District of New York has authorized the Western New York & Pennsylvania Traction Company to increase its capital stock from $2,000,000 to $2,600,000. Of the present capital stock, all of which is outstanding, one-half is 5 per cent cumulative preferred stock. As constituted under the increase to $2,600,000 the stock would consist of $1,000,000 of common stock; $600,000 of first preferred 6 per cent cumulative stock and $1,000,000 of second preferred non-cumulative 5 per cent stock. The common stock is to be issued share for share in exchange for the existing common stock; the second preferred non-cumulative stock is to be issued in exchange, share for share, for the existing 5 per cent cumulative stock; not more than $500,000 of the 6 per cent first preferred stock is to be issued in exchange for a like amount of first and refunding mortgage bonds dated Dec. 1, 1906; the remaining $100,000 of first preferred stock to be issued in payment for extensions and improvements.

Traffic and Transportation

Accidents to Children

The United Railways & Electric Company, Baltimore, Md., included the following about accidents to children in a recent issue of *Trolley News*, which is addressed by the company to the public:

"Every reasoning man must realize that accidents are bound to happen as the price of modern civilization pays for rapid transit. We wish, however, to do all we can to lessen the number.

"Accidents to young and thoughtless children, who run suddenly on the track, are the most distressing of all.

"The best results in preventing such accidents can be obtained only by hearty co-operation on the part of fathers, mothers and teachers with our efforts, and we, therefore, make the following suggestions:

"(1) Teach the children to have a healthy fear of car tracks.

"(2) Teach them, also, never to pass behind a car or other vehicle which may obstruct their view of a wagon, automobile or car approaching in the opposite direction.

"(3) Whenever possible see that some older member of the family has a watchful eye on them.

"(4) As a sure preventive have the children play on streets where there are no car tracks. There are many such streets, and they furnish an infinitely safer playground.

"Our motormen are not heartless machines, but, for the most part, are married men with children of their own, and they all exert every effort to avoid accidents. What we ask of the Baltimore parents and teachers is co-operation."

Accidents in New York in March

The Public Service Commission of the First District of New York has issued the following comparative summary of accidents which occurred during March, 1908, March, 1909, and March, 1910, on the railways in the territory under its jurisdiction:

March.	1908.	1909.	1910.
Car collisions	146	82	81
Persons and vehicles struck by cars	905	942	980
Boarding	574	574	765
Alighting	454	513	694
Contact electricity	27	20	28
Other accidents	2,246	1,794	1,957
Totals	4,352	3,925	4,505
Injuries:			
Passengers	1,525	1,550	1,989
Employees	474	364	459
Not passengers	632	520	543
Totals	2,631	2,434	2,991
Serious (Inc. in above):			
Killed	44	20	18
Fractured skulls	8	17	19
Amputated limbs	1	6	8
Broken limbs	33	32	34
Other serious	101	114	144
Totals	187	189	214

Prizes for Flower Displays.—The Berkshire Street Railway, Pittsfield, Mass., has offered prizes of $10, $5, $3 and $2 for the best displays of flowers along the lines of the company.

Sunday Service Between London and Port Stanley.—The London & Lake Erie Transportation Company, London, Ont., will establish a Sunday service between London and Port Stanley.

Freight Petition in Massachusetts.—The Worcester & Southbridge Street Railway, Worcester, Mass., has petitioned the Railroad Commission for authority to carry freight and express matter in Southbridge.

Fare Re-adjustment Asked in Raynham, Mass.—The Selectment of Raynham, Mass., have petitioned the Railroad Commission for a re-adjustment of fares on the lines of the Old Colony Street Railway in Raynham.

Freight Train Wrecked.—Five cars of a freight train on the Spokane & Inland Empire Railroad were ditched about a mile west of Garfield on April 16, 1910. The accident is said to have been caused by a broken flange.

Half-Fares for Children Discontinued.—Effective on May 20, 1910, the Chautauqua Traction Company, Jamestown, N. Y., will cancel local one-way and round-trip, one-half fares for the transportation of children between four and 12 years of age and charge full fare thereafter.

Excursion Fare Over Niagara Gorge Railroad.—Effective on May 16, 1910, the Niagara Gorge Railroad, Niagara Falls, N. Y., will establish an excursion fare for the season of 1910 of 15 cents per capita for parties of ten or more persons from Youngstown to Fort Niagara Beach and return.

Elevated Employees in Chicago Request Increase in Wages.—The employees of the elevated railways in Chicago have asked for an increase in wages of from 2 cents to 8 cents an hour. At present the wages of the motormen average 30½ cents an hour; conductors, 24 cents; guards, 22 cents; ticket sellers, $1.90 a day.

Increase in Wages in Montreal.—The Montreal (Que.) Street Railway has increased the wages of its employees as follows: Men who have served one and two years from 18 cents per hour to 19 cents per hour; men who have served from two to five years, from 19 cents per hour to 20 cents per hour; men who have served more than five years, from 20 cents to 21 cents per hour.

Electioneering by Trolley.—George H. Voight, who is a candidate for the Democratic Congressional nomination in southern Indiana, chartered one of the cars of the Indianapolis & Louisville Traction Company recently, and visited Scottsburg, Underwood, Henryville, Sellersburg, Watson, Charlestown and New Albany, using the tracks of the Louisville & Northern Railway & Lighting Company for the latter part of the trip.

Indiana Commission to Publish Tariff Sheet.—The Indiana Railroad Commission has issued a circular advising shippers that it is preparing to publish a monthly bulletin, in which it will give changes made in tariffs on the railroad and electric railways in the State. The commission has notified the companies to include with new tariff schedules all data concerning increases or decreases between points or in the various classes of freights. The first issued will be published in May.

Pay-as-You-Enter Cars in Louisville.—The 33 pay-as-you-enter cars ordered recently by the Louisville (Ky.) Railway from the Cincinnati Car Company, to be built under license from the Pay-as-You-Enter Car Corporation, New York, N. Y., are being delivered, and the company is placing them in service on its Fourth Avenue line and transferring the cars of the same type now in use on that line to the Preston, Main and Eighteenth Street and other lines. By May 1, 1910, four-fifths of the cars in use on the Louisville Railway will be of the pay-as-you-enter type. Eventually cars of this type will be used exclusively by the company.

Owl Service Campaign in Toledo.—The Toledo Railways & Light Company, Toledo, Ohio, has started a campaign to popularize owl car service. The company is advertising in the newspapers the various lines on which owl cars are operated and the time of leaving, and has placed timetables in every car. These tables are printed in several colors, and are made prominent by the picture of a large car on the front of which is a face of an owl. The tables are also being distributed to railroad stations, interurban depots, hotels, saloons and restaurants. The service was installed quite recently, and the business has been very satisfactory.

Pennsylvania Commission.—An order has been issued by the State Railroad Commission requiring motormen of street cars, upon approaching a grade crossing of a steam railroad, to bring their cars to a full stop and not proceed until the conductor has signaled from the far side of the crossing. The commission has also ruled that the Schuylkill Railways, Girardville, Pa., shall not issue miners' tickets at reduced rates, holding that the restricted sale of such tickets is "discriminatory and unlawful," and that the tickets should be open to purchase by anyone who desires to use them and who will subscribe to and observe the conditions thereof.

Service Order Which Affects Electrified Lines of Long Island Railroad.—An order has recently been adopted by the Public Service Commission of the First District of New York which relates to cars and stations on lines of the Long Island Railroad now operated by electricity. All cars on electric lines are to be provided with platform gates or with vestibule doors. Trap-doors also are to be provided, which, when let down, will cover the steps. These trap-doors are to be kept lowered while trains are in motion, and there must be enough men in all train crews to provide a guard for each train opening. It is also provided that the station platforms are to be raised to the height of the car platforms, wherever such platforms have not yet been provided.

Pay-As-You-Enter Cars in Toledo.—Three of the 20 cars ordered recently by the Toledo Railways & Light Company, Toledo, Ohio, from the Kuhlman Car Company, Cleveland, Ohio, have been delivered and will soon be placed in operation. The cars are the first pay-as-you-enter pattern in Toledo, and it is possible that the other cars of the order may be used as prepayment cars, but this has not been determined. The new cars will seat 44 persons. The rear platform is much larger than that on the ordinary cars and is so constructed that it may be enclosed in glass in bad weather. There are two doors at the rear arranged especially for the pay-as-you-enter feature. In the front vestibule there is a lever for the motorman to close the door and fold the step. The interior of the car is finished in natural cherry with an olive green ceiling. Seats are rattan. The straps are covered with celluloid, which can be cleaned easily.

Pay-as-You-Enter a Reasonable Rule.—A jury in the Third Division of the Jefferson Circuit Court at Louisville, Ky., under instructions from Judge Lincoln, held recently that the rule requiring passengers to deposit their fare in a box as they enter a car is reasonable. In instructing the jury the judge said: "The court instructs the jury that the defendant company has the right to make and enforce reasonable rules for the operation of its cars, the collection of fares by its conductor and the control of its passengers, and if the jury believes from the evidence that the rule requiring passengers on pay-as-you-enter cars to deposit fares in the box on the platform, or not allow conductors to collect same from passengers in the car, and that the conductor on the occasion referred to executed and carried out said rule without any insult, violence or abuse, the law is for the defendant, and the jury should so find." The decision was rendered in a suit for $5,000 damages brought by a woman who on July 19, 1910, in boarding a car of the Louisville Railway, claimed that the conductor had abused and insulted her because she had refused to comply with the rule of the company which requires passengers to deposit their fares in a fare box on the platform of the car before entering the car proper.

No City Passengers on Interurban Line in Buffalo.—The Public Service Commission of the Second District of New York has ordered the International Railway, Buffalo, N. Y., to carry only interurban passengers on Lancaster cars. At the hearing before the commission regarding service on the Lancaster line it developed that one of the chief causes of delay in the operation of cars between Buffalo and Lancaster was the carriage of city passengers. The order provides that: All Lancaster cars east-bound between the starting point at the junction of Main and Clinton Streets, Buffalo, and Lancaster shall stop at all streets and regular stopping places in Buffalo to receive and take on interurban passengers only; but shall not stop between the starting point at the junction of Main and Clinton Streets, Buffalo, and the Broadway city line for passengers to alight. Lancaster cars west-bound shall stop at all streets and regular stopping places in Buffalo between the Broadway city line and the junction of Main and Clinton Streets, Buffalo, for passengers to alight only; but shall not stop at any point between the Broadway city line and the junction of Main and Clinton Streets to pick up passengers. Lancaster cars leaving and coming into the city shall carry signs reading as follows: "No city passengers carried on this car," and in addition before cars leave terminals, and also when stopping for passengers on the outbound trip or discharging passengers on the inbound trip, the conductor shall announce, "No city passengers carried on this car." The company is required by the commission to give publicity to the rules through announcements in the Buffalo newspapers.

Personal Mention

Mr. W. D. Frazer has been appointed acting general manager of the Winona Interurban Railway, Warsaw, Ind., to succeed C. O. Johnson, deceased.

Mr. F. T. Hepburn, formerly general manager of the lines of the Ohio Electric Railway entering Lima, Ohio, has been appointed general manager of the Saginaw Valley Traction Company, Saginaw, Mich.

Mr. Leslie A. Andis has been appointed chief electrician of the Indianapolis & Louisville Traction Company, Louisville, Ky., to succeed Mr. Charles C. Wyman, who has become connected with the Scott County Telephone Company.

Mr. Edwin W. Frink, formerly auditor and traffic manager of the Sandusky, Norwalk & Fremont Railway, Norwalk, Ohio, has been elected president of the company to succeed Mr. George A. Bartholomew, and Mrs. Anna M. Stenz has been elected vice-president of the company.

Mr. C. A. Wilkinson has been appointed superintendent and chief engineer of power plants of the Coney Island & Brooklyn Railroad, Brooklyn, N. Y. Mr. Wilkinson was previously engaged in building and operating large steam and internal combustion power plants in the East for railways, electric light companies and isolated owners.

Mr. W. N. Keiser has resigned as engineer of the Des Moines (Ia.) Electric Company to become connected, on May 1, 1910, with the Union Electric Company, Dubuque, Ia. Mr. Keiser has been in the employ of the Des Moines Electric Company since 1901. He was formerly with the General Electric Company, and at one time was engaged in central station work.

Mr. Charles Wright has resigned as general foreman of the Manchester shops of the Pittsburgh (Pa.) Railways to accept the position of general foreman with the Coney Island & Brooklyn Railroad, Brooklyn, N. Y. Mr. Wright is 31 years old. He has been with the Pittsburgh Railways 16 years, and for the last five years has acted as general foreman of the company. Mr. Wright will assume his duties with the Coney Island & Brooklyn Railroad on May 1, 1910.

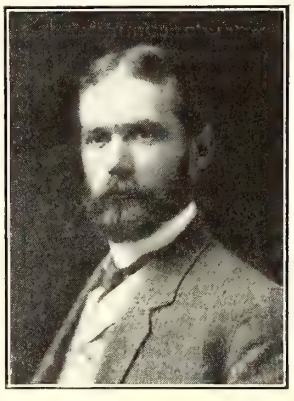
Mr. Philip D. Laird has been appointed to the place on the Public Utilities Commission of Maryland which was declined by Judge James A. Pearce, and has accepted the appointment. Mr. Laird was a member of the Maryland legislature in 1886, 1888 and 1890. Later Gov. Frank Brown named him as Land Commissioner. Mr. Laird is now president of the Farmers' Banking & Trust Company, Rockville, from which he has contemplated retiring for some time. He is a native of Cambridge, Md.

Mr. W. T. Corbusier, who was recently appointed superintendent of the Schuylkill & Dauphin Traction Company, Williamsport, Pa., to succeed Mr. S. S. Straub, was formerly general traffic manager of the Schuylkill & Dauphin Traction Company. He is a native of Elmira, N. Y., and studied electrical engineering at the Polytechnic Institute, Brooklyn, N. Y. He then served in various departments with the General Electric Company and later entered the shops of the Brooklyn Rapid Transit Company. For three years previous to his connection with the Schuylkill & Dauphin Traction Company Mr. Corbusier was in the manufacturing and roofing supply business.

Mr. Paul Shoup, formerly assistant general passenger agent of the Southern Pacific Company, has been appointed assistant general manager of the company in charge of the electric lines, including the Peninsular Railway, San José, and the Los Angeles-Pacific Company. Mr. Shoup entered the service of the Southern Pacific Company in 1891 as a clerk in the office at San Bernardino. When the narrow-gage road between Riverside and San Bernardino went into the hands of a receiver Mr. Shoup was practically in charge, and he is said to have been largely responsible for converting the road into a paying investment. Mr. Shoup next entered the passenger department of the Southern Pacific Company. Soon thereafter he was sent to San José as district freight and passenger agent of the company. He went to Portland, Ore., later and reorganized the freight department of the Southern Pacific Company in that city. Since December, 1908, Mr. Shoup has given his time to the interests of the late E. H. Harriman in California not directly related to the Southern Pacific Company.

Mr. W. S. Dimmock, whose resignation as manager of the Puget Sound Electric Railway, Pacific Traction Company and Tacoma Railway & Power Company, Tacoma, Wash., was announced in the Electric Railway Journal of March 26, 1910, will take up his work at Boston, Mass., with the Stone & Webster Management Association in a few weeks. At present Mr. Dimmock is enjoying his first extended vacation in five or six years. Mr. Dimmock was formerly connected with steam railroad work. He entered the electric railway field in 1892 as general manager of the Omaha & Council Bluffs Street Railway and the Omaha & Southern Railway, Omaha, Neb. In 1900 he resigned from these companies to become general manager of the Richmond, Va., Passenger & Power Company, operating in Richmond and between Richmond and Petersburg. In July, 1901, he entered the employ of Stone & Webster, Boston, Mass., and in August, 1909, was appointed manager of the Tacoma Railway & Power Company, Tacoma, Wash. In January, 1902, Mr. Dimmock was also made manager of the Seattle & Tacoma Interurban Railway, which had commenced operation in September, 1901. This road is now known as the Puget Sound Electric Railway. Mr. Dimmock's connection with Stone & Webster in Boston will have to do largely with the properties in Washington, with which he was connected as resident manager. Before leaving Tacoma Mr. Dimmock was presented a ruby pin surrounded with diamonds as a token of esteem from the employees of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company.

Mr. L. D. Mathes, who for several years has been secretary and treasurer of the Iowa Street & Interurban Railway Association, and who is manager and purchasing agent of the Union Electric Company, Dubuque, Ia., was elected president of the Iowa Street & Interurban Railway Association at the meeting of the association in Sioux City, Ia., on April 21, 22 and 23. Mr. Mathes has been actively interested in the Iowa Street & Interurban Railway Association for six years, or since his connection with the Union Electric Company, and he has been largely responsible for the success which has attended the meetings of the association. Mr. Mathes has been engaged in railway work for the last 15 years. His business connections have included the General Electric Company, the Westinghouse Electric & Manufacturing Company, the International Railway and the Norfolk & Portsmouth Traction Company. The property under his management at Dubuque includes 17.27 miles of electric railway and an electric light plant from which light and power are furnished for Dubuque and East Dubuque. In addition, the Union Electric Company owns two parks, one of 85 acres and the other of 73 acres.



L. D. Mathes

OBITUARY

Sumner A. Bemis, formerly general manager of the Bemis Car Truck Company, Springfield, Mass., died at his home in Springfield on April 4. Mr. Bemis was 75 years old at the time of his death. From 1884 to 1904 he was actively engaged in the manufacture of the Bemis patented trucks and journal boxes. For the past six years, however, Mr. Bemis took no active interest in the business.

A. L. Gardiner, assistant counsel of the Interborough Rapid Transit Company, New York, N. Y., is dead. Mr. Gardiner was born in Dundee, Canada, in 1858, and was graduated from Franklyn Academy, Malone, N. Y., in 1880, and from Hampton College in 1884. Soon after being admitted to the bar he became assistant counsel of the Manhattan (Elevated) Railway, New York, N. Y. When the Manhattan (Elevated) Railway was absorbed by the Interborough Rapid Transit Company Mr. Gardiner was appointed assistant counsel with that company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Elmhurst (Cal.) Street Railway.**—Incorporated in California to build an interurban railway between the present terminus of the Sacramento Electric, Gas & Railway Company and the junction of Manzanita Avenue and Helvetia Avenue, Elmhurst. Capital stock, $100,000. Incorporators: H. J. Goethe, H. A. McClelland, C. M. Goethe and T. P. Beere.

Third Avenue Railway, New York, N. Y.—Incorporated in New York in the interests of the bondholders of the Third Avenue Railroad, the property of which was recently sold under foreclosure to the bondholders and which it is proposed to have the Third Avenue Railway succeed. Capital stock, $16,590,000. Among the directors are: James N. Wallace, Adrian Iselin, W. E. Roosevelt, Albert W. Scholle, Edward A. Maher and Franklin L. Babock.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—Incorporated in South Carolina to succeed the Charleston Consolidated Railway, Gas & Electric Company. Capital stock, $2,000,000. Incorporators: P. H. Gadsden, Julian Mitchell and F. H. Horlbeck.

Clarksburg & Weston Traction Company, Clarksburg, W. Va.—Incorporated in West Virginia to build a 24-mile electric railway from Clarksburg to Weston. Preliminary surveys have been made and construction will begin as soon as the project can be financed. Capital stock, $500,000. Incorporators: James O. Watson, George T. Watson, A. B. Fleming, Walton Miller and J. E. Watson, Fairmont. [E. R. J., April 16, '10.]

FRANCHISES

Edgewood, Ala.—The Birmingham & Edgewood Electric Railway, Birmingham, has been granted a franchise by the Board of Revenue to build its tracks through the Red Mountain cut into Edgewood. G. F. Brazelton, Birmingham, secretary.

Pasadena, Cal.—The Pacific Electric Railway, Los Angeles, has been granted a franchise by the Council to double track several of its lines in Pasadena.

Rock Island, Ill.—The Tri-City Railway, Davenport, Ia., has been granted a 20-year extension of its franchises by the City Council. The new franchises provide for the construction of several new lines and doubletracking of existing lines.

Wilmington, Ill.—The Illinois Light & Traction Company, Streator, has been granted a 50-year franchise by the Council to build an electric railway in Wilmington, with the proviso that within 5 years the company construct and have in operation an interurban railway between Wilmington and Kankakee.

Waverly, Ia.—The Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., has been granted a franchise by the Council to build a line in Waverly. This line is to be extended from Denver Junction to Waverly, and from Waterloo to Belle Plaine.

Ludlow, Ky.—The Covington, Big Bone & Carrollton Railroad, Covington, has been granted a perpetual franchise by the Council to operate a single-track line in Ludlow. This is part of a plan to build a 22-mile railway between Covington and Big Bone. M. J. Crouch is interested. [E. R. J., March 25, '10.]

Ironwood, Mich.—F. Sullivan and associates have applied to the City Council for a franchise to build a railway in Ironwood and to extend it to Bessemer. [E. R. J., April 16, '10.]

Brooklyn, N. Y.—The Van Brunt Street & Erie Basin Railroad, has been granted an extension of its franchise to operate its line of single track from Erie Basin to Hamilton Ferry, Brooklyn.

***Hastings, Neb.**—Frank E. Scharff, Lincoln, has asked the City Council for a franchise for an electric railway in Hastings. This is part of plan to build a railway from Hastings to Omaha.

***Athens, Ohio.**—The Nelsonville, Athens & Glouster Traction Company has asked the Council for a franchise to build an electric railway in Athens.

Albany, Ore.—The Oregon Electric Railway, Portland, has applied to the Council for a 25-year franchise to build an extension through Albany. This company has just been granted a 25-year franchise to build an electric railway in McMinnville.

Chattanooga, Tenn.—The Chattanooga Railway & Light Company has been granted a 21-year franchise by the Council to double track some of its lines in Chattanooga.

TRACK AND ROADWAY

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala.—This company has begun work on the extension of its line from Gadsden to North Gadsden. C. J. Zell, Gadsden, superintendent.

Decatur, Moulton & Russellville Railway Company, New Decatur, Ala.—This company advises that the project of building a 60-mile railway to connect New Decatur, Decatur, Danville, Jesseton, Needmore, Moulton, Landersville, Mount Hope, Newburg and Russellville is still in a preliminary stage. W. J. Cottingham, New Decatur, is interested. [E. R. J., April 16, '10.]

San Joaquin Valley Electric Railway, Stockton, Cal.—This company announces that it has succeeded in financing its proposed 32-mile railway to connect Modesto, French Camp, Manteca, Ripon and Salida. Work is expected to begin at once. Morris L. Brackett is interested. [E. R. J., April 24, '09.]

Tri-City & Northeastern Interurban Railway, Port Bryon, Ill.—This company is having surveys made of two new routes for its projected line from Albany. One route will be from Hampton to Silvis and Moline and the other 1½ miles above Hampton to Silvis and Moline. J. W. Simonson, Port Bryon, president. [E. R. J., Dec. 25, '09.]

Tri-City Railway, Davenport, Ia.—This company has placed contracts for about 5 miles of track to be used on its lines in Davenport, Rock Island, Moline and East Moline. J. F. Porter, Davenport, president.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—The directors of this company have authorized $285,000 to be expended in improving its lines in Waterloo. The work will include the double-tracking of several lines in Waterloo and extensions may be built to Charles City, Mason City, New Hampton, Cedar Rapids and Marshalltown. Construction has begun on the new interurban railway to Waverly. T. E. Rust, purchasing agent.

Motor Grand Traction Company, Belleville, Kan.—This company, which is promoting a 150-mile railway between Belleville and Wichita, has recently opened offices in Canton and has started a preliminary survey from Canton to Roxbury and Goerrel. E. S. Alnutt, Belleville, president and general manager. [E. R. J., Feb. 20, '10.]

Cincinnati, Newport & Licking Valley Railway, Cynthiana, Ky.—This company, which proposes to build an electric railway between Cynthiana and Paris, has opened offices in Cynthiana and secured rights of way. W. S. Gray, Louisville, is acting as consulting engineer for the company. Wade Lail is interested. [E. R. J., Feb. 12, '10.]

Detroit United Railway Company, Detroit, Mich.—This company expects to build several new crosstown lines in Detroit. About 5 miles of track will be built. F. W. Brooks, general manager.

Elkton, Fair Hill & Oxford Electric Railway & Power Company, Elkton, Md.—This company advises that as yet no definite time has been set for starting work on its proposed 17-mile electric railway to connect Elkton, Cherry Hill and Fair Hill, Md., and Louisville and Oxford, Pa. It has obtained a charter in Maryland and will apply for one in Pennsylvania as soon as the Legislature meets. Capital stock, authorized, $60,000, and to be increased to $500,000. Power stations to be located at Elkton, Md., and Oxford, Pa. Incorporators: Heister Hess, George E. L. Hess, C. P. Canriet, John Lungren and H. E. Mackin. [E. R. J., April 2, '10.]

Portland, Gray & Lewiston Railroad, Lewiston, Maine.—This company has awarded to Fred T. Ley & Company,

Inc., Springfield, Mass., contracts for concrete work for eight bridges varying from 20 ft. to 100 ft. in length and abutments for two steel girder bridges and a number of culverts. [E. R. J., April 2, '10.]

Baltimore & Pennsylvania Railway & Power Company, Annapolis, Md.—This company has completed plans to construct an interurban railway between Hanover and Reisterstown, Md. [E. R. J., Sept. 19, '08.]

United Railways, St. Louis, Mo.—This company proposes to build a 2-mile extension to its Brentwood line.

Butte (Mont.) Electric Railway.—This company will build a 1½-mile extension of the Englewood line to the Butte County Club. J. R. Wharton, Butte, manager.

Public Service Railway, Newark, N. J.—The Assembly has passed a bill permitting this company to construct an extension from North Paterson to Ridgewood via Hawthorne Borough.

Columbus, Urbana & Western Electric Railway, Columbus, Ohio.—This company is securing right of way for a 5-mile extension of its railway from Fishinger's Bridge, 8½ miles north of Columbus, to Dublin. C. W. Van Gundy, Columbus, purchasing agent.

Portland, Eugene & Eastern Railway, Eugene, Ore.—It is reported that financial arrangements have been made by this company to build an extension through Eugene east to McKenzie Valley. It is expected that work will be started soon on the first section of the line to Junction City, between Eugene and Salem, 15 miles. L. N. Roney has the contract for building a bridge over the Williamette River at Springfield. Work is now under way.

Toronto & Eastern Railway, Toronto, Ont.—This company advises that construction will probably start this summer on its proposed 100-mile electric railway to connect Toronto, Whitby, Oshawa, Brownsville, Lindsay, Port Hope, Uxbridge and Peterboro. Capital stock, $1,000,000. L. L. Murton, Oshawa, solicitor. [E. R. J., April 16, '10.]

Oklahoma City & Suburban Railway, Oklahoma City, Okla.—This company is reported to have let contracts to John Alley and to M. Corrigan, Oklahoma City, to build lines in Oklahoma City; also from Britton north to Edmund, and from a point between Oklahoma City and Greeley south to Moore. W. A. Haller, Oklahoma City, is interested. [E. R. J., Aug. 21, '09.]

Phœnixville, Valley Forge & Strafford Street Railway, Phœnixville, Pa.—This company has awarded the contract for building its line 10 miles from Phœnixville to Strafford via Valley Forge to the Phœnixville Construction Company. A Philadelphia banking house will finance the proposition. Thomas E. O'Connell, West Chester, president. [E. R. J., March 5, '10.]

Lewisburg, Milton & Watsonville Passenger Railway, Milton, Pa.—This company reports it proposes to extend its railway for a distance of several miles. C. S. Johann is in charge of the new engineering work.

Pittsburgh, Butler, Slippery Rock & Grove City Railway, Butler, Pa.—This company announces that it is securing rights of way and active work will begin this summer on its proposed 20-mile railway between Butler, Slippery Rock, Prospect and West Liberty. J. A. Smith, Butler, secretary. [E. R. J., Feb. 12, '10.]

Quebec Railway, Light & Power Company, Quebec, Que.—This company will place contracts during the next few weeks for building 2½ miles of double track. C. E. A. Carr, Quebec, general manager.

Fort Worth, Mineral Wells & Western Railroad, Fort Worth, Tex.—This company announces that contracts will be let about May 15 for the construction of its proposed 60-mile railway to connect Fort Worth, North Fort Worth, Azle, Springtown, Agnes, Poolville, Adell, Authon, Blue Springs and Mineral Wells. Motive power to be both steam and electricity. J. S. Hanford, Beaumont, president.

Mill Mountain Incline, Inc., Roanoke, Va.—Press reports state that this company has awarded the contract for the construction of the 2000-ft. railway up Mill Mountain to C. Markley, Roanoke. Wingate & McGhee, Roanoke, are the engineers. Equipment will be furnished by the Lidgerwood Manufacturing Company, New York. [E. R. J., Jan. 8, '10.]

Union Utilities Company, Morgantown, W. Va.—It is stated that this company will extend the Sabraton Railway to Dellslow and the Morgantown & Pittsburgh Railway to Granville.

SHOPS AND BUILDINGS

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company is preparing plans for a new car house in West Washington Street. The new structure will be for the exclusive use of interurban cars and when it is completed the repair work of the whole system will be done at that point and not at the various small shops scattered over the various lines. The plans for the buildings are now in course of preparation.

Springfield (Mass.) Street Railway.—This company expects to place contracts during the next 4 weeks for the construction of a car house and repair shop in Springfield. George C. Towle, general manager.

Fonda, Johnstown & Gloversville Railroad Company, Gloversville, N. Y.—This company expects to build soon an addition to its car house in Gloversville. W. H. Collins, general manager.

Quebec Railway, Light, Heat & Power Company, Ltd., Quebec, Que.—This company expects to place contracts for building a new car house next to its present car house in St. Sauveur. It will have a storage capacity of 50 cars and will contain repair, paint and carpenter shops. C. E. A. Carr, general manager. [E. R. J., Oct. 30, '09.]

New York, Westchester & Boston Railway, New York, N. Y.—This company has purchased a site in upper New Rochelle, on which it proposes to erect a station. The structure is estimated to cost $50,000.

Grafton (W. Va.) Traction Company.—This company expects to build a new car house in Grafton during the summer. Geo. L. Hartley, general manager.

POWER HOUSES AND SUBSTATIONS

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company will build an extension to its power plant in Waterloo and will install additional equipment. The capacity of the plant will be increased from 1000 hp to 3000 hp.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company has placed contracts with the General Electric Company for one 14,000-kw Curtis turbine and accessories and two 1500-kw, six-phase rotary converters for its power house at Minneapolis.

Butte (Mont.) Electric Railway.—This company expects to build a small substation having a capacity of about 150 kw on its Columbia Gardens line. All material has been purchased. J. R. Wharton, Butte, manager.

Lewisburg, Milton & Watsontown Passenger Railway, Milton, Pa.—This company has awarded a contract to the Allis-Chalmers Company for two 200-kw normal rating, 2300-volt, three-phase, 60-cycle synchronous motor-generator sets to be installed in its new plant at Milton.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company has authorized $40,000 for the purchase of new equipment for its power plant at Waynesboro and substation at Pen Mar.

Northern Texas Traction Company, Fort Worth, Tex.—This company plans to enlarge its present power house by the installation of a 3000-kw, 25-cycle, 2300-volt, three-phase turbine. The plans for this are being prepared by the Stone & Webster Engineering Corporation, Boston.

Twin City Light & Traction Company, Centralia, Wash.—This company has purchased a site in Centralia for a new power station. The building is estimated to cost $75,000.

Nooksack Valley Traction Company, Bellingham, Wash.—This company is preparing to double the capacity of its power plant at Nooksack Falls and improve its steam auxiliary plant in Bellingham. It also plans to build a new substation on York Street. Contracts have been placed for the new equipment to be installed.

Wausau (Wis.) Street Railway.—This company has purchased a site at Mosinee for the construction of a power plant to have a capacity of 7000 hp.

Manufactures & Supplies

ROLLING STOCK

Dallas (Tex.) Consolidated Electric Street Railway is rebuilding 10 cars in its own shops at Dallas.

Chicago City Railway, Chicago, Ill., will place an order at once for 50 pay-as-you-enter cars, it is reported.

Illinois Traction System, Champaign, Ill., is reported to be contemplating the purchase of 10 interurban cars.

Metropolitan Street Railway, Kansas City, Mo., has purchased 25 pairs of trucks, type O-50, from the Standard Motor Truck Company, Pittsburgh, Pa.

Spokane & Inland Empire Railroad, Spokane, Wash., has placed an order for 10 cars with the St. Louis Car Company for use on the lines of the Spokane Traction Company.

Twin City Rapid Transit Company, Minneapolis, Minn., reported in the Electric Railway Journal of Nov. 27, 1909, as building in its own shops 100 new cars, has practically completed the closed passenger cars included in the order.

Galesburg Railway & Light Company, Galesburg, Ill., reported in the Electric Railway Journal of April 23, 1910, as being in the market for four cars, is drawing up the specifications for six pay-as-you-enter cars which will be ordered immediately.

Macon Railway & Light Company, Macon, Ga., reported in the Electric Railway Journal of April 2, 1910, to be in the market for cars, has decided to use pay-as-you-enter cars, and will purchase eight new cars of this type and remodel 33 cars.

Lehigh Valley Transit Company, Allentown, Pa., reported in the Electric Railway Journal of April 9, 1910, as having ordered 10 cars from The J. G. Brill Company, will have these cars built under license of the Pay-As-You-Enter Car Corporation, New York.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill., reported in the Electric Railway Journal of Feb. 19, 1910, as having ordered four interurban cars from the Danville Car Company, has contracted for only three combination passenger and baggage cars, which will have the following details:

Seating capacity	48	Bumpers	plate
Bolster centers	26 ft.	Curtain fix	Curtain S. Co.
Length over vestibule	45 ft.	Curtain material	pantasote
Width over sills	8 ft. 6 in.	Fenders	pilots
Width over posts at belt	8 ft. 5 in.	Heating system	Peter Smith
Height, rail to sills	36 in.	Motors	Allis-Chalmers
Body	wood	Sash fixtures	O. M. Edwards
Interior trim	bronze	Seats	Hale & Kilburn
Underframe	composite	Trolley retrievers,	Knutson No. 2
Bolsters, body	wrought steel	Trucks	Taylor, M.C.B.

Central California Traction Company, San Francisco, Cal., mentioned in the Electric Railway Journal of Feb. 5, 1910, as having ordered four combination interurban cars from the W. L. Holman Car Company, San Francisco, Cal., has drawn the following specifications for this equipment:

Seating capacity	50	Car trimmings	A. & W. Co.
Weight	15 tons	Control system,	General Electric
Length of body	41 ft. 8 in.	Couplers	Janney
Length over vestibule	50 ft.	Curtain fix	Curtain S. Co.
Width over sills	8 ft. 10 in.	Curtain material,	Curtain S. Co.
Width over posts at belt	9 ft.	Gears and pinions	G. E. Co.
Sill to trolley base	9 ft. 4 in.	Gongs	Adams & Westlake
Height, rail to trolley	12 ft. 11 in.	Hand brakes	Peacock
Body	wood	Journal boxes	Brill
Interior trim	mahogany	Sash fix	Adams & Westlake
Underframe	composite	Seats	Brill reversible
Air brakes	West. automatic	Seating	leather covered
		Trucks	Brill, M.C.B.

Portland Railway, Light & Power Company, Portland, Ore., reported in the Electric Railway Journal of March 26, 1910, to have purchased 40 cars from the American Car Company, has ordered 10 narrow-gage and 32 standard-gage, pay-as-you-enter cars. The cars differ only in the following details: The 10 cars will seat 36 passengers each, have 28-ft. 8 in. car bodies, will be 45 ft. long over all, and will be equipped with Westinghouse air brakes, while the 32 cars will seat 40, have 31-ft. 6-in. car bodies, will be 47 ft. 10 in. long over all, and will be equipped with National air brakes. Other specifications of both types follow:

Weight	36,500 lb.	Gears and pinions	G. E. Co.
Width over posts at belt	8 ft. 3 in.	Heating system	electric
Height, rail to sills	2 ft. 7 in.	Headlights	Crouse-Hinds
Body	wood	Motors	G. E.
Underframe	wood	Paint	Lowe Bros.
Couplers	Van Dorn No. 11½	Registers	Ohmer
Curtain fix	Curtain S. Co.	Sanders	De Witt
Curtain material	pantasote	Step treads	Universal
Destination signs	Hunter	Trolley poles	G. E.
Fare boxes	Brill	Trucks	Brill Special 22
		Varnish	Murphy

TRADE NOTES

American Brake Shoe & Foundry Company, Mahwah, N. J., will move its Chicago office on May 1 to the McCormick Building.

Burton W. Mudge & Company, Chicago, Ill., has moved its offices from 400 Commercial Bank Building to 1001 People's Gas Building.

Dressel Railway Lamp Works, New York, N. Y., will locate its Chicago office in Suite 1216, Peoples' Gas Building, 150 Michigan Avenue, after May 1.

Dorner Railway Equipment Company, Chicago, Ill., has removed its headquarters from the Manhattan Building to Room 1730, 193 Michigan Avenue.

Griffin Wheel Company, Chicago, Ill., expects to have a portion of its Denver plant, which was burned last month, in operation about the middle of May.

Chicago Bearing Metal Company, Chicago, Ill., has removed its office to 520 McCormick Building, at the corner of Michigan Avenue and Van Buren Street.

Sherwin-Williams Company, Cleveland, Ohio, on May 1 will move its Chicago city and railway offices from the Railway Exchange Building to 39 Jackson Boulevard.

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip the 50 all-steel cars being built for the Hudson & Manhattan Railroad with its ventilators.

Alberger Condenser Company and Alberger Pump Company, New York, N. Y., will remove their offices on May 1 from 95 Liberty Street to the West Street Building, 140 Cedar Street.

Hale & Kilburn Manufacturing Company, Philadelphia, Pa., on May 1 will remove its Chicago office from the fourteenth floor of the Fisher Building to room 817 in the same building.

Wisconsin Engine Company, Corliss, Wis., has appointed Benjamin K. Hough its Boston sales manager with offices in the Oliver Building to represent the company in the New England States.

C. A. Wood-Preserver Company, Austin, Tex., has sent a circular stating that, owing to the demand for its wood preserver, orders in quantities should be booked at once for June delivery.

American Steel & Wire Company, Chicago, Ill., announces the appointment of C. H. Rhodes as purchasing agent for the company at Chicago. Mr. Rhodes was formerly in the purchasing department of this company at Pittsburgh, Pa.

McKeen Motor Car Company, Omaha, Neb., recently received an order from the Chicago, Rock Island & Pacific Railroad for two more 70-ft. motor cars for delivery in September and October. With this rolling stock the railroad will have four McKeen cars.

Pressed Steel Car Company, Pittsburgh, Pa., is installing in its power plant at McKees Rocks three 500-kw Westinghouse low-pressure steam turbines to utilize the exhaust from its large complement of non-condensing air compressors and direct-acting hydraulic pumps.

C. Drucklieb, New York, N. Y., has sold the patent, manufacturing and sales rights of his injector sand blast apparatus to J. M. Dutton, of New York, who for the past five

years has managed this branch of the business and who will continue the manufacture and sale of this product.

Allis-Chalmers Company, Milwaukee, Wis., has been awarded the contract for a new 6400-kva, three-phase, 25-cycle, 4000-volt steam turbo-generator, which is to be installed by the Toledo Railways & Light Company, Toledo, Ohio. This unit will operate in parallel with four Allis-Chalmers engines and two Curtis turbines which comprise the present equipment of the plant. Ford, Bacon & Davis, New York, N. Y., are the engineers for the company.

Western Electric Company, New York, N. Y., reports that gross sales for March show an increase of approximately 40 per cent over March, 1909, and, with one or two exceptions, the month was the biggest March the company has experienced. To date the fiscal year ending in 1910 has shown a gain of about 45 per cent over the corresponding period a year ago. The gains are well distributed geographically, indicating a fundamentally prosperous condition of the country at large. At the present time the company has approximately 20,000 persons on its payrolls, which is an increase of about 2000 since the beginning of the current year.

Walpole Rubber Company, Walpole, Mass., has been incorporated with a capital stock of $3,000,000 to take over the business and assets of the Massachusetts Chemical Company, the Walpole Varnish Works, the Walpole Shoe Supply Works, the Valveless Inner Tube Company and the Walpole Rubber Company, of Granby, Que. The new company will be under the same management which has built up such a large business for the Massachusetts Chemical Company. All departments of the new company are now being operated at their full capacity to supply the demand for rubber goods, insulating tapes and varnishes. Work has been started on a new building at Walpole which will give the company nearly 100,000 sq. ft. of additional floor space.

Ray D. Lillibridge, Inc., New York, N. Y., is the title of a new company which has been incorporated by Mr. Lillibridge and William L. Rickard. The business of an advertising agency conducted by Mr. Lillibridge as an individual and subsequently as a partnership has proved very successful during the 10 years since it was established and this fact has led to the incorporation of the firm. Ray D. Lillibridge, Inc., has moved to 192 Broadway, New York, where the company now occupies four offices comprising the Tower Suite. The company will move its storeroom which has been at 79 Nassau Street for the last eight years. Some of the representative clients of the company are: Wagner Electric Manufacturing Company, Central Foundry Company, Trojan Powder Company, Dodge & Day, Mead-Morrison Manufacturing Company, Robins Conveying Belt Company, Mine & Smelter Supply Company, International Steam Pump Company, Power & Mining Machinery Company, Jeanesville Iron Works Company, Denver Rock Drill Company, Pressed Radiator Company of America.

Ohmer Fare Register Company, Dayton, Ohio, has recently brought to the attention of railway managers the vital part that the fare collecting and recording service plays in maintaining a proper bookkeeping system. The company quotes a manager as saying: "If there is any better system than the Ohmer system, I have failed to hear it." It says that this is why the Pacific Electric Railway has just given the company the third renewal contract for its entire system; why the Denver City Tramway adopted the Ohmer system in its entirety; the Detroit United Railway has adopted the Ohmer system; the Los Angeles-Pacific Company has used the Ohmer system for years, and the Oakland Traction Company has used the Ohmer system for years. The company also says that this is why the Syracuse Rapid Transit Railway and all other companies in Syracuse, N. Y., the Illinois Traction System, the Providence & Danielson Railway, the Pittsburgh Railways, the Northern Ohio Traction & Light Company and many other companies are using the Ohmer system. The company has closed, after a period of tests, a long-term contract with the Southern Pacific Company for equipping all roads owned and controlled by it with Ohmer registers.

ADVERTISING LITERATURE

Graphite Lubricating Company, Bound Brook, N. J., has issued a leaflet calling attention to its graphite and bronze bushings.

Sanitary Rag Company, Kalamazoo, Mich., has published a folder describing its sanitary wiper and pointing out its advantages, both in cost and service.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued its bulletin No. 102, in which an unusual large quantity of rails and equipment are offered for sale.

Consolidated Car-Heating Company, Albany, N. Y., has issued Bulletin No. 10, in which the various parts of the Consolidated buzzer system are described and illustrated.

Indianapolis Brass Company, Indianapolis, Ind., is mailing a card calling attention to the quality and construction of the complete line of trolley wire ears, splicers, crossings, switches, etc., which it manufactures.

Electric Service Supplies Company, Philadelphia, Pa., in the "Keystone Traveler" for April discusses the merits of its "Pay-Within" type of car. Many of the company's specialties are also described, among them Garton-Daniels lightning arrester, Protected bond, the automotoneer, Keystone compound, the St. Louis trolley pick-up and the Lyon reinforced steel gear case.

Gisholt Machine Company, Madison, Wis., has issued an attractive 40-page catalog entitled "Gisholt Boring Mills." It contains specifications and illustrations of the various sizes and types of boring and turning mills which the company manufactures, and illustrations of finishing a few different parts. Several views are presented of the company's plant at Madison. Attention is also called in the catalog to the company's turret lathes and tool grinders.

Western Electric Company, New York, N. Y., has issued Bulletin No. 1005, which is the third of a series of nine bulletins on telephone exchange apparatus which is to be issued. This bulletin is entitled "Branch Exchange Switchboards of Lamp Signal and Magnetic Signal Types." It describes the types of branch exchange equipments which have been designed for use in business establishments, factories, schools and places where a modern private telephone system is required.

National Electric Lamp Association, Cleveland, Ohio, has issued Bulletin No. 7A, which is devoted to the mazda lamps for street lighting. It contains an outline of the historical development of series incandescent lighting, data on the illuminating and electrical equipments for the mazda street series lamp and practical suggestions for the installation of such equipments. In addition there are printed considerable data on the mazda street series lamp and advice as to its various applications.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has published a booklet entitled "How to Build a Rural Telephone Line." The instructions are very complete, in that each part of the line is taken up and described and illustrated. Illustrations are also shown of the various tools used in constructing a rural line. A considerable amount of space of the booklet is devoted to descriptions of telephone batteries, lightning protection and the compact type magneto telephone. As the booklet is more in the nature of a treatise on the subject, the company is selling it at 10 cents per copy. The company has also issued Pamphlet No. 29, in which its various types of common battery telephones are described and illustrated.

Murphy Varnish Company, Newark, N. J., has issued a second edition of its publication entitled "Quality and Economy in Varnish and Varnishing." This publication contains 62 pages and bears the imprint of the American Bank Note Company, New York, N. Y. In a foreword the company says that there are two kinds of varnish trade: one based on popular ignorance of the goods, the other based on the value of the goods; one simply advertises, the other advertises by teaching. Among the many sub-titles of the work are: Varnish Definitions and Explanations, Three Enemies to Fine Varnish, Why the Finest is Cheapest, The Murphy Systems of Finishing, Varnishes for Manufacturers, Specification of Varnish, Natural Wood Stains, Artistic Stains, Enamels, Colors, How to Care for Varnished Things. There is a very complete index of the subjects treated in the handbook. Sections of the book which will appeal particularly to railway men are entitled Perfect Railway Body —The Varnish That Saves Big Money and Murphy's System of Finishing.

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The Columbus Strike

The wearisome story of a strike to enforce recognition of the union is repeated this week at Columbus. As in other cases several questions have been interjected as side issues, but the evidence at hand indicates that the demand already mentioned is the foundation of the trouble in Columbus. We cannot believe that any strike based on this issue was ever initiated with the heartfelt support of a majority or that of even a large proportion of the employees of a company. The direct beneficiaries of union recognition can be only the agitators who thereby wish to strengthen the power which they exercise over both company and employees, while the latter exchange liberty of action for the tyranny of an irresponsible outside dictator or set of dictators. The management at Columbus has been noteworthy for introducing profit sharing, pensions and other plans for the benefit of the employees, and the length and extent of the present strike will be a guide to other companies—at least in a sense—of the value placed upon schemes of this kind by the men.

A Forgotten Individual

During a recent street railway fare hearing in New York City, a speaker, who said that he represented the East Side, spoke scornfully of the plea of the railway company that its existing fares were too low and remarked that the prosperous appearance of the representatives of the company at the hearing did not harmonize with the claims made of the adverse financial condition of the company. The slur is unworthy of notice, except that it represents an idea in the minds of a great many people that because a railway company can and does pay to some of its employees salaries which are higher than those received by certain patrons of the line, the railway company can afford to carry passengers at lower fares. If those who object to these street railway expenses carried their investigations further, however, they would find that the loss occasioned by charging insufficient fare falls not on the operating officers, who must be paid for the services which they render, but on the unfortunate stockholders of the corporation. Talent in operating railway properties must be hired at its market price, whether the company is in receipt of a large net income or is in the hands of the receivers, and the fact that the recompense which certain individuals are paid, and which they earn, might be considered large on the East Side of New York is no indication that the company is not receiving full benefit for the money which it is expending. The stockholders in a solvent railway company, and the bondholders in one which is insolvent, are the persons who are affected by increases or reductions of fares, but in the minds of the public their existence is forgotten almost as completely as if they belonged to an extinct race like that which inhabited North America before the arrival of the red men.

Patent Rights

Electric railroading is so recent that many of the important features of the equipment are covered by patents and operating companies have to consider the patent situation to an extent not common in other industries. As they are rarely in a position to establish or disprove the validity of the claims made by different inventors they constantly run the danger of paying royalty directly or indirectly for the use of an absolutely worthless patent and of being caught between the upper and the nether mill-stone of the commercial rivalry of manufacturers for purchasing from one a device claimed to be covered by the patent of the other. Probably because the patent situation is as it is, some railway companies have adopted the plan of paying little attention to patent rights of any kind. The temptation is often strong in a person's own business to select the good features of one device, and combine them with those of another, on the theory that such a use of a patented principle without the permission of the patentee is quite different than when a device is manufactured for sale. But the legal status is the same and the user is just as liable for damages for infringement in either case. The prosperity of the country and its manufacturing preeminence have undoubtedly been due, in large part, to the encouragement afforded inventors under the patent law, and while there has been some criticism from inventors that recent legal decisions have tended to narrow patent claims, the courts have never refused to act promptly in any palpably evident violation of the law. Hence the necessity of carefulness in the shop and power station and on the line as regards the use without permission of patented principles is evident.

Revision of Interurban Rules

Perhaps no subject connected with electric railway operating methods has attracted greater attention from State authorities and associations during the past winter than that of standardizing the interurban rules. The matter has been considered in conferences between the Railroad Commissions of Ohio and Indiana and committees of railway managers in those States, and in Illinois the chairman of the Railroad Commission has been reported as considering the possibility of taking similar action. Several of the street railway associations have also had committee reports on the subject. That of the Iowa committee was presented at its last annual meeting and the Street Railway Association of the State of New York is to consider the adoption of a code next month. For these reasons special interest attaches to the meeting of the committee on interurban rules of the American Street & Interurban Railway Transportation & Traffic Association which will be held at Fort Wayne, Ind., on June 8, when possible changes to the code adopted at the Denver convention will be taken up. The committee is composed of earnest, conscientious managers whose aim is to compile the best possible set of interurban rules which will meet the approval of the majority of the members of the association. They realize many of the shortcomings of the present code and will welcome the opinions of other managers whose experience has been along different lines from their own. This meeting and those which the committee no doubt will hold later during the summer, afford an opportunity for all those who are not satisfied with the rules as adopted at Denver to suggest any modifications which in their opinion would be improvements. The discussions which have already been held are evidences of the importance which is attached to the subject and we trust that the meeting at Fort Wayne will be of the greatest profit to the industry.

TESTS OF ELECTRIC HEADLIGHTS

Considerable interest has been awakened in regard to the practical value of electric headlights for steam locomotives by a recent paper on this subject presented by Professor Benjamin, of Purdue University, before the Western Railway Club. Taken by themselves the tests, of which the author gave a description, bring out facts of a somewhat disquieting character. Electric headlights were given a trial on steam locomotives some 20 years ago, but in their original form they did not prove very successful. Since that time they have been improved with apparently much better results. As a substitute for the ordinary oil headlight the arc lamp gives, of course, a much more brilliant source and can be focused into a long concentrated beam capable of lighting up straight track for a very long distance ahead, but its utility has been under suspicion by railroad men, on account of the dazzling effect of the enormous brilliancy. An electric searchlight on the front of a locomotive, when directed along the track, must shine fairly in the eyes of the engineer upon a locomotive approaching it, and experience has shown that its blinding effect is considerable. It has not been altogether clear, however, that this is not in some measure compensated by ability to see distant signals and distant obstructions on the track.

The experiments of Prof. Benjamin show beyond a reasonable doubt that the great intensity of the beam from the electric headlight, so far from helping in the recognition of ordinary signals and obstructions, is actually harmful under some circumstances, and particularly in cases where there is an opposing headlight. Under such conditions the iris must of necessity contract to a comparatively small aperture, thus hindering the recognition of objects just outside the brilliant beam and in point of fact even hindering the recognition of objects within the beam on account of the glare. The general character of these results might have been predicted from previous experience, but one observation was systematically recorded which was hardly to be anticipated and has a serious bearing on the subject.

It was found that the brilliancy of the beam from the electric headlight was so great as to produce by reflected light false signals from lanterns which had been extinguished, and particularly false safety signals. There was apparently no interference of any appreciable extent with red danger lights by the beam, but an extinguished lantern having a green roundel permitted enough reflection of the headlight beam from the rear surface of the roundel to give the appearance of a green safety light, where no light existed. This singular effect appeared most strikingly at moderate distances. For example, in one test run in which a green light had been extinguished no light appeared up to a distance of 1,000 ft. At 600 ft. four of the eleven observers saw a green light in the extinguished lantern, which persisted for one observer up to 400 ft. This effect is due to the intensity of the beam and also to the large proportion of greenish and bluish light in the arc as compared with an oil lamp. The green lights suffered to an exceptional degree, but the red danger lights, fortu-

nately, were less seriously affected. No corresponding reflections were observed when an oil headlight was used.

This is a rather serious indictment of the electric headlight and for the conditions of the tests there is little defense to be made. The discussion, however, put the electric device in a better light, so to speak, or to use still another simile, which is not so apt, it is not so black as it was painted. Several railroad managers expressed the belief that while signals could not be read so easily with an electric headlight as with one which burned oil, the electrical device was far preferable for disclosing obstructions on the track. It was also noted that in the Southern and Southwestern States, where single tracks are the rule, and the speeds are low, electric headlights were extensively used, whereas, the contrary was the case on the trunk lines of the East and Middle West. On single track the immense range of visibility of an electric headlight turned along the line makes it also particularly valuable as a warning to other trains.

Broadly speaking, the conditions of the single-track, slow-speed line apply on electric lines with the addition of the factor of braking distance. For this and similar purposes, every moving vehicle may be considered as carrying ahead of it a dangerous space equal to the distance in which the vehicle can be stopped by an emergency application of the brakes. If this braking distance is 300 ft., and two cars or trains find themselves approaching on the same track at a distance within 600 ft. an accident is inevitable, or if a single car picks up an obstacle within 300 ft., or fails to see a danger signal until within this distance, an accident again is due. Now from the relatively small weight of an electric car, in spite of its sometimes high speed, the dangerous space is considerably less than with an ordinary steam train, and, in fact, most of the difficulties found with the electric headlights in Prof. Benjamin's tests pertain only to distances considerably greater than the dangerous space of any ordinary electric car. For instance, at and below 400 ft. the recognition of signals, with or without electric headlights, was, generally speaking, entirely satisfactory. The objections, therefore, do not apply with the same force as to the heavier and faster steam trains. On the other hand the gain from brilliant light along the track is greater in the case of the electric car, on account, again, of the shorter dangerous space. Finally, the value of the electric headlight for warning passers-by of the coming fast electric car is much greater than that of the oil headlight, owing to the more brilliant and conspicuous beam, and under the conditions of operation of electric cars this warning value is of considerable importance.

From the facts already outlined it seems to us, therefore, that the experiments conducted by Professor Benjamin, valuable as they are, cannot be considered at all conclusive against the use of electric headlights on suburban and interurban electric lines, although they should serve as a warning to look carefully into the subject with a view of applying remedial measures. If necessary it would be a very simple thing to change the color or intensity of an electric headlight so as greatly to modify the glare without sacrificing the usefulness of so convenient an illuminant. Certainly so far as illumination is concerned, we feel confident that interurban electric railway managers would be very loth to substitute an oil headlight for the electric arc lamp carried in the front of their interurban cars, for practical experience has shown that the arc headlight has prevented many an accident.

WHY FARES SHOULD NOT BE LOWERED

Papers were presented before the Iowa Street & Interurban Railway Association at its meeting in Sioux City, on April 21 to 23, giving summaries of the reasons why fares should not be lowered. L. D. Mathes, of Dubuque, submitted the point of view of the city system on this important subject and H. W. Garner, of Oskaloosa, that of the interurban line.

The advantage of dividing this subject so that the position of each type of railway should be discussed independently is obvious. The issues involved are different. On the city roads the uniform rate of fare prevailing is, in most cases, a heritage from the first company that secured a franchise in the community. The theory on which the uniform fare is still charged is comparable more nearly to the postage stamp unit of revenue demanded by the Government than to any other business method known. But with interurban lines the rates of fare are compiled usually on a systematic mileage basis. In brief, it may be stated that the gross rate of fare on city properties is ordinarily inflexible and inexorable except at remote periods of franchise renewal, while the interurban rate is susceptible of regulation except where it is limited by unusual franchise or legislative restrictions. The problem of the city rate of fare, therefore, is the more acute.

The summary of the reasons given by Mr. Mathes includes more than the usual arguments. It recognizes that the case of the railway companies which are suffering from fare limitations does not rest entirely on the disquieting changes in the purchasing power of the 5-cent piece. It calls attention to the two potent arguments comprised in the many exactions levied by municipalities and in the distress which short term franchises cause security holders.

Of these arguments iteration has made common to the public those which are rooted in the changes in the purchasing power of the street railway 5-cent piece. Sinister results may arise from constant agitation for a reduction from a 5-cent fare, and from the increases in cost of every class of labor and nearly all classes of materials, that promise greater, not less, operating expenses in the future. Whatever the results are in individual instances, it is probable that since most city companies have a fixed gross rate of fare, they will not be able to secure relief during existing franchises unless they can find some means to lessen municipal exactions. It should be remembered also that the burden of an "expansion of the free transfer system," which Mr. Mathes mentions, is one which the companies have increased by contributory negligence. The indulgent attitude of the railways on the subject of transfers in the past is now passing, however, and it is succeeded by more business-like methods designed to prevent abuse of the privilege so far as possible. Improvement in this direction should be attained by all companies if possible.

An argument against the short term franchise is a logical, though a very infrequent, accompaniment of a discussion on the subject of fares. If companies are prohibited by the terms of their grants from earning sufficient profits to amortize their capital investment the value of the property should be recognized and a renewal of franchise should be given. Either a definite provision should be made for the security of the capital investment or the rates of fare should be large enough to permit a reasonable interest and a return of the principal to investors in the property.

What is really desirable is a salutary object lesson, which

will impress the public more than either logic or argument. Such a lesson is fortunately afforded by the present widespread increases in the rates of steam railroads, which show that the burdens of necessary higher expenses must be overcome by larger revenues.

THE IMPORTANCE OF ENGINEERING DETAILS IN DAMAGE SUITS

Recent observation of the conduct of a number of electric railway damage suits in the lower courts suggest the importance of matters of engineering detail in many such cases. It is a great mistake to assume that because the average jury has little conception of volts and amperes any one of a company's engineers can safely be called into court to testify in an accident case without thorough study of the equipment conditions surrounding the situation. It is impossible to foresee the line of attack which cross questioning of company witnesses will take, and the only safe plan is for the company to put on the stand its most experienced technically trained men, whenever any fundamental principles of importance are liable to be brought into the case. To many engineers court work before an ordinary jury is a wearisome duty, but it is more and more coming to be clear that expert knowledge must be enlisted in order successfully to ward off the attacks of claimants served by lawyers having a somewhat acute knowledge of the physical systems of modern transportation companies.

In many accident cases the most exhaustive questioning centers about the possibilities of equipment performance under assumed conditions. An inexperienced man cannot handle such a situation intelligently and with satisfaction to the company. In a case where a passenger sues on account of the sudden starting of a car, for instance, the motorman and the conductor's testimony should not be permitted to include a discussion of hypothetical cases such as to what might have happened if the equipment had been in an assumed state or position. The testimony of such employees is valuable in so far as it exhibits the general and specific conditions of the equipment at the time of the accident, but it is the proper province of the company's shop foreman to testify as to the detailed condition of the rolling stock parts at a given time, and the duty of the master mechanic himself to discuss the broad principles of brake action under stated circumstances. If the assumption is made that a step on a rheostat burned out, the electrical engineer and not the car-service employee is the safest man to handle the possible phenomena before the jury. A station master may properly testify as to the character of the platform illumination at a given time, but should not be considered competent to discuss under cross-examination the results of voltage drop on feeders leading to the station-lighting circuits or the causes of such drop.

Under severe cross-examination it frequently becomes necessary to explain technical matters in very simple language for the benefit of the jury. While the abilities of different employees vary widely in this respect, as a rule it is better to rely upon the company's experts in facing most hypothetical questions and in stating in clear form, the fundamental principles at issue. The use of models of cars, elevated structures, stations and other physical features of the system come into valuable play here. Electrical systems are tied so closely together in operation that it is well for the company to offer testimony by employees familiar with the interaction of the different parts when the case is closely contested. It is also desirable to remember that most juries require that a company shall demonstrate its contentions to the limit of common sense; hence it pays to bring officials with expert knowledge into many cases in order to submit a complete and sound defense. It is needless to review the value of original shop and power house records under such circumstances. It is practically impossible for any company to maintain all the routine information that may be called for in a damage suit in connection with the minor details of the equipment, but experience shows that separate records of the history of large units of apparatus are often most valuable.

EMPLOYERS' LIABILITY

In connection with welfare work among employees, a subject that has engaged the serious attention of electric railway managements for several years, the problem of rendering adequate compensation to injured employees and their families has been given special study. Many solutions have been suggested and several have been tried, chiefly along the lines of mutual benefit associations supported jointly by contributions from the company and from its men. But while these various plans have in greater or less degree brought the needed relief in ordinary cases of sickness or death they have not altogether met situations arising when a company's responsibility and legal liability for injuries resulting from accidents have been brought into question.

In common with other large employers of labor, electric railway companies are coming to recognize that a very considerable portion of the money expended in compensating injured employees has missed the mark, because, instead of assisting to relieve suffering and necessity, it has been woefully wasted in legal and other unprofitable expenses. According to statistics recently published several important industrial concerns have discovered that scarcely 50 per cent of the total sum paid as compensation for damages to injured employees actually reaches the employees or their families.

There is general agreement that this whole matter of employees' damages and employers' liability must be readjusted and established on a more equitable and fundamentally correct basis. The object sought should be to insure to injured employees, irrespective of legal complications, prompt, definite and adequate relief; to protect employers against exorbitant and extravagant demands, and to relieve both employee and employer of the large and wholly unnecessary burden imposed by the legal and medical fraternities who come between the companies and their men at a time when the relations should be the most intimate and direct.

Special interest attaches therefore to the voluntary relief plans established by the United States Steel Corporation and the International Harvester Company. These plans went into effect May 1 of this year and under them injured employees and the families of those killed in the performance of their duties will receive wholly adequate compensation, without regard to the legal liability of the companies, based upon the earning capacity of the man and his tenure of office. In the case of the United States Steel Corporation a distinction is made between single and married men. Thus, single men who have been with the company for five years or less receive during temporary disability, or for 52 weeks, 35 per cent of their wages, with an additional 2 per cent for each year of service over five years, while married men receive more and are also

allowed 5 per cent additional for each child under 16 years. The Harvester Company makes no distinction between married or single men. It is not necessary here to give in detail all of the provisions of these relief plans, but they are significant as being the most ambitious attempts here to duplicate in industrial enterprises the chief features of the German, English and French pension schemes. Of these, the methods applied to German electric railways have been described in this paper.

ELECTRIC LOCOMOTIVE DESIGN

The two experimental electric freight locomotives of the New York, New Haven & Hartford Railroad, which are illustrated elsewhere in this issue, are of essentially different design mechanically and electrically, but both embody certain principles of construction which point to the possible future development of a distinctive type of heavy electric tractor which will be modified only slightly for different requirements of speed and hauling capacity. The geared locomotive is built with articulated trucks and a single cab while the side rod locomotive consists of two entirely separate short units coupled together. In both machines, however, the motors are entirely spring borne and are mounted well above the axles thus raising the center of gravity. The rigid wheelbase is short and guiding pony wheels are placed in front of the driving wheels at each end. These features of similarity in the two designs are to be found also in most of the recent electric locomotives built in Europe because they are essential to smooth and safe running. They are not new or revolutionary, but have been adopted from steam locomotive practice just as the side rod drive with quartered cranks has been employed. Motors and control apparatus have replaced the boiler on top of the locomotive frame. From an electrical standpoint, of course, the location of the motors above the axles facilitates ventilation, inspection and repairs and permits of better design unincumbered by limitations of space. This, however, is of secondary importance compared with the improvement in running obtained with a high center of gravity and by relieving the axles of all dead load.

The value of guiding trucks was fully demonstrated by the improvement in the running of the New Haven passenger locomotives which followed the addition of a pony axle and wheels, in front of the driving wheels. The New York Central locomotives which have a long wheelbase were also improved by the substitution of a swiveling four-wheel truck at each end for the radial pony truck first used. It is impossible to analyze completely all of the complex forces exerted by a locomotive running at high speed, but it is evident that the drawbar pull at the rear end produces severe nosing effects which are not found in a pivoted truck under a single car. This nosing effect is greater in a locomotive with a long rigid frame than in an articulated design and requires the use of a radial pony truck or swiveling four-wheel truck carrying a considerable vertical load to counteract it. The electric locomotive of the future must sacrifice a good proportion of available tractive weight to this end. This sacrifice, however, is more apparent than real. To build a frame and running gear strong enough to transmit the tractive effort developed by large motors, all of the parts must be made very heavy. On account of their uniform torque the driving wheels of an electric locomotive do not require as great an adhesive weight to develop a given tractive effort as do those of steam locomotives and the excess weight necessary for strength can be shifted to the guiding trucks, where it accomplishes a useful purpose.

Without having the designer's calculations at hand it would appear that the side rod locomotive has a higher center of gravity than the geared locomotive. The side rod motors are mounted with the center of their shafts 91 in. above the rails while the geared motors are only 63¾ in. above the rails, but owing to the larger diameter of wheels of the geared locomotive its frame and all of the auxiliary electrical apparatus are raised higher. The height of the center of gravity of both locomotives is probably nearly equal to that of an average steam locomotive; it is certainly greater than that of the New Haven passenger locomotives or the New York Central electric locomotives in which the motors surround the axles.

In Europe the side rod drive has been generally adopted in recent designs, but the ingenious double pinion drive of the New Haven geared locomotive is an entirely different solution of the problem of connecting motors mounted on top of the frames to the driving axles than any previously attempted. It has the advantage that it provides the necessary vertical play without the complication of a jack shaft and connecting rods, but its application is somewhat limited. The width of the motors is confined to the distance between the hubs of the wheels, less twice the width of the gears and the necessary clearances and they must be mounted directly over the driving axles. With side rod connections the motors can be raised to any practicable height, can be made as wide as the full distance between frames and can be located at any point on the frames with respect to the driving wheels. In Dr. Gleichmann's review of European progress in heavy electric traction, abstracted in the ELECTRIC RAILWAY JOURNAL of April 9, 1910, page 667, a number of side rod locomotives were illustrated in which the motors were mounted almost directly over the driving wheels between the driving wheels and also directly over the four-wheel guiding trucks at the extreme ends of the locomotive. Any desired distribution of weight on the frames can thus be obtained. The side and connecting rods can be perfectly counterbalanced and with quartered cranks uniform torque is transmitted from the motors to the wheels. The relative efficiency of geared and side rod drives depends on the condition of the gears and the rod bearings. With bearings of suitable size, well lubricated, the transmission loss due to friction is probably small in comparison with the energy output of the motors.

It speaks well for the builders of the electric equipment of the New Haven geared locomotive to say that the locomotive was put into service immediately upon its receipt by the railroad company and ran more than 2000 miles without developing a fault in the motors or the control. The experience gained in the operation of the electric passenger locomotives over a period of about two years was used to good advantage in avoiding the little mistakes which cause the most trouble. Stationary motors for both direct and alternating current are now being built in very large sizes, and with small restrictions as to space and weight the design of powerful locomotive motors to be mounted above the frames involves few new or difficult problems. They can be constructed to meet almost any conditions of speed and hauling capacity. The best method of converting the power of the motors into drawbar pull and the construction of a vehicle which can be run on rails at high speed with perfect safety are the future problems of electric locomotive design and these are within the province of the mechanical engineer, rather than of the electrical engineer.

SHOPS OF THE LONDON UNDERGROUND ELECTRIC RAILWAYS

The Underground Electric Railways Company, London, operates three tube railways and one subway line, each having its own shops which were in existence when the several companies were separately managed. Since the consolidation, however, Albert H. Stanley, general manager of the company, has found it feasible to have each shop do all the work of a certain character, thereby securing the advantages of specialization on the largest scale permitted by the conditions. Thus all the motor winding and air brake repairs for the three tube lines are done at the Golder's Green shops of the Charing Cross, Euston & Hampstead Railway, and the switch and contactor work is done at the Lillie Bridge shops of the Great Northern, Piccadilly & Brompton Railway. This practice is greatly assisted by the fact that the same equipments are used on all the tube roads and even the Metropolitan & District Railway employs the same motors and trucks.

FEATURES OF THE TUBE SHOPS

The Golder's Green shops are of brick construction with corrugated metal and glass roofs, built as four parallel bays. The buildings are 600 ft. long overall and contain 15 tracks. The first bay contains two concrete pits, and a section which embraces offices and club room at the front, storerooms in the center and a machine shop. Next comes the paint shop with three tracks without pits. The roof of the painting bay is entirely of glass to insure maximum lighting. Each of the two remaining sections has five tracks with inspection pits. The entrances to all bays are guarded by rolling steel shutters. No pit lamps are installed anywhere, as only extension lamps are found necessary although much night work is done. In common with the other shops, the conductor rails are cut off outside and the cars move about inside from overhead trolley carriages which are provided with flexible conductors and plug-ins. The buildings are heated by steam on the direct system. The paint and oil stores are kept in isolated brick buildings. The machine shop is conveniently arranged alongside the truck overhauling tracks. The latter are provided with two 10-ton Musker cranes which lift and replace car bodies by means of slings. The machine tool equipment is largely from American manufacturers, such as the Niles-Bement-Pond Company, Gould & Eberhardt and the American Mills Supplies Company. All tools and belts are carefully guarded by railing and wire screens wherever needful.

The Lillie Bridge shops of the Piccadilly line consist of a single six-track brick building with glass and metal roof as at Golder's Green. This structure is 78 ft. 6 in. wide and fully 1312 ft. long, pits being installed all the way. The machine tool equipment is at the rear of the tracks and in touch with two 12-ton Higginbottam & Mannock cranes which span part of the overhauling tracks at the rear. The offices and stores are in a nearby building. The shops of the Baker Street & Waterloo Railway, the smallest of the three tubes, are located at London Road and St. George Circus. They do not offer any special features.

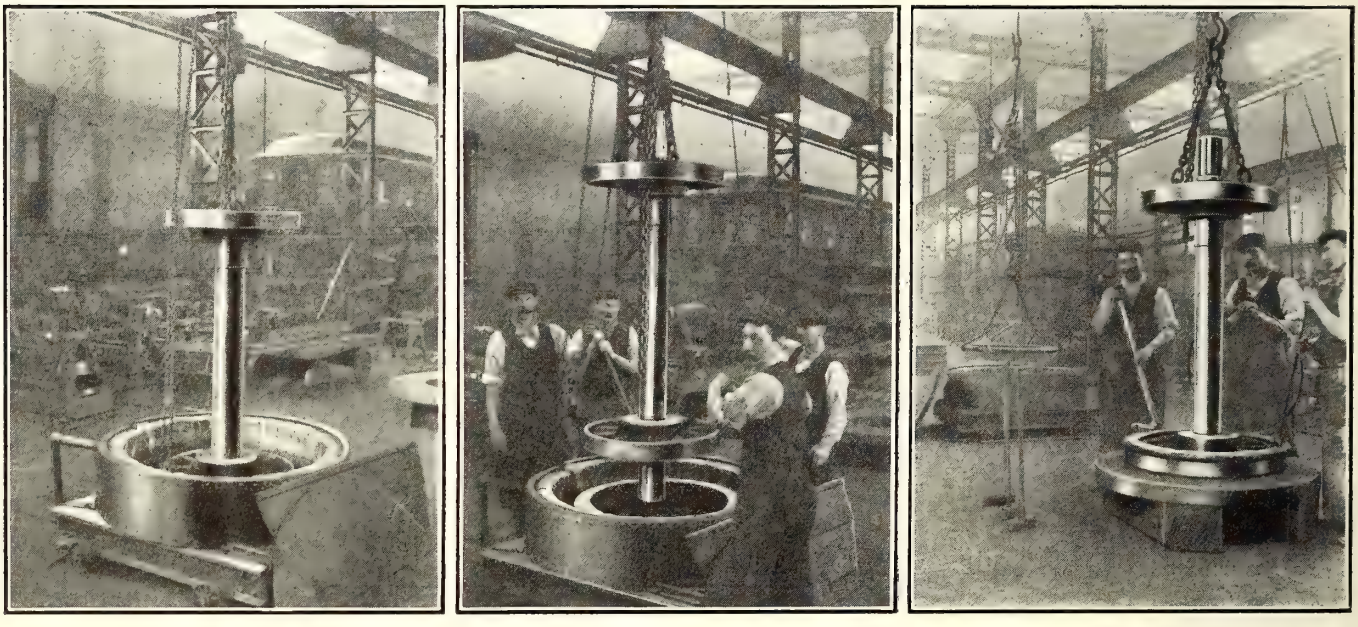
SOME MECHANICAL AND ELECTRICAL PRACTICES IN TUBE SHOPS

The tube cars are inspected nightly and overhauled about every 30,000 miles. The GE-69 motor is standard throughout. All wheels are steel-tired, the motor wheels being 36 in. in diameter and the trailers 31⅛ in. in diameter. The former wheels are applied with 60 tons pressure on 6⅛-in. axles and the latter with 30 tons pressure on 3⅞-in. axles. The gears and pinions are made of steel billets which are cut at the shops of the Metropolitan & District Railways, and are giving satisfactory results. The standard carbon brush is the National No. 15, the life of which varies from 4000 to 20,000 miles.

Lubrication is now carried on under a contract with the Galena Signal Oil Company. During the first six months of 1909, the cost per 1000 miles on each tube line was as follows: Bakerloo 6.42 cents, Piccadilly 4.98 cents and Charing Cross 5.88 cents. These very low costs include armature and journal bearings, motor suspensions, gear cases, compressors, draft rigging, side rubbing plates and center bearings. The oil drained from the armature and motor suspension bearings is filtered and used on other bearings. The armature and axle bearings are packed with oil-soaked wool. The journal boxes have hinged covers and wooden dust shields.

An unusual feature of the collector shoes is the use of leather instead of metal link hangers, so that only the rubbing piece and leads are alive. These links were made from old conveyor belting and have given good service for over two years. The holes in these hangers are provided with steel stiffening bushings to prevent the pinching of the belt pin.

Every motorman is provided with a device for short-circuiting the line in emergencies such as fires under the car. This consists of a wooden-handled iron beam which is provided at one end with a channel cap to fit over one rail and a contact piece at the other end to complete the circuit via the second rail. When the live and return (fourth) rails are thus spanned, the substation circuit breakers are blown and the affected section is dead.



London Underground Railways—Removing and Replacing Steel Tires on Car Wheels

METROPOLITAN DISTRICT SHOPS

The shops of the Metropolitan District Railway, at Ealing Common, comprise a three-bay brick structure 800 ft. long with combination glass and metal roofs. One bay contains the offices, storerooms, machine shop and overhauling section and the others are used for painting and inspection. Among the American tools installed is a commutator slotter of the Device Improvement Company. The original tool-steel slotting pieces have been replaced by hack-saw segments which give more satisfactory results.

The standard motor wheels on this line are 36 in. diameter and the trailer wheels 30 in. diameter. All wheels are steel-tired. The average mileage of the motor wheel tires is 150,000 miles and the estimated life of trailer wheel tires is 230,000 miles. The material for the motor truck tires is of the best quality of acid open-hearth steel, owing to the severe service on this railway with its many curves and heavy traffic. In purchasing motor truck tires one specimen is selected from each cast for the following tests under the railway's engineer, which must be made without reheating or other manipulation.

The tire must be placed in a running position with the tread resting on a block of metal of not less than 5 tons weight, supported on a rigid concrete or other solid foundation, and must withstand without fracture, blows from a falling weight of 2240 lb. The weight must be allowed to fall freely on to the tread from heights of 10 ft., 15 ft., 20 ft. and upward until the tire deflects to at least one-tenth of its internal diameter. In any case, where the required deflection has been very nearly reached, the height of the final blow may be reduced at the discretion of the railway's representative. A test piece machined cold from a tire subjected to the foregoing falling weight test must show a tensile breaking strength of not less than 50 tons per sq. in., with a minimum elongation of 13 per cent and not more than 55 tons per sq. in., with a minimum elongation of 11 per cent. Tires showing flaws of any kind after being delivered and machined must be replaced.

Wheel tires are considered unfit for service and sent to the shops for re-turning, under the following conditions, as indicated according to the numbered outlines in the accompanying illustration.

(1) When the inside of the flanges becomes approximately



London Underground Railways—Motorman's Short-Circuiting Beam

at right angles to the tread and forms a definite corner on the tire at the point marked "X."

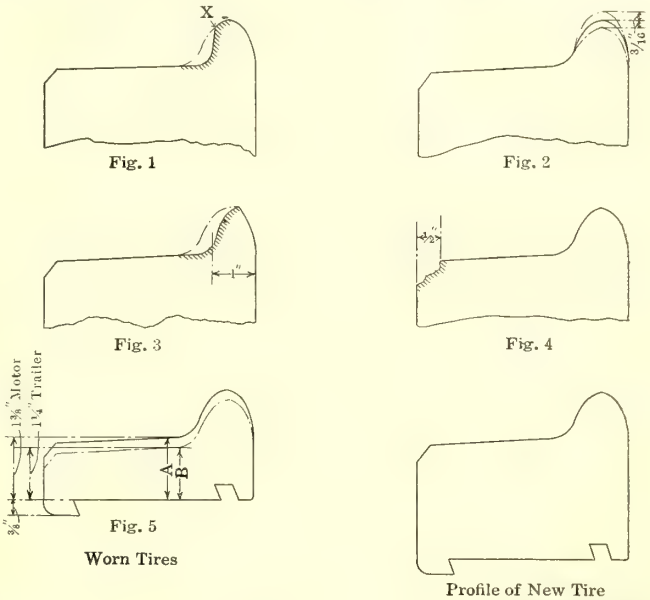
(2) When the flange becomes more than either 3/16 in. above or 3/16 in. below the standard gauge of new tire.

(3) When the flange at the base is less than an inch wide.

(4) When the outer edge of the tread is worn or broken away more than ½ in.

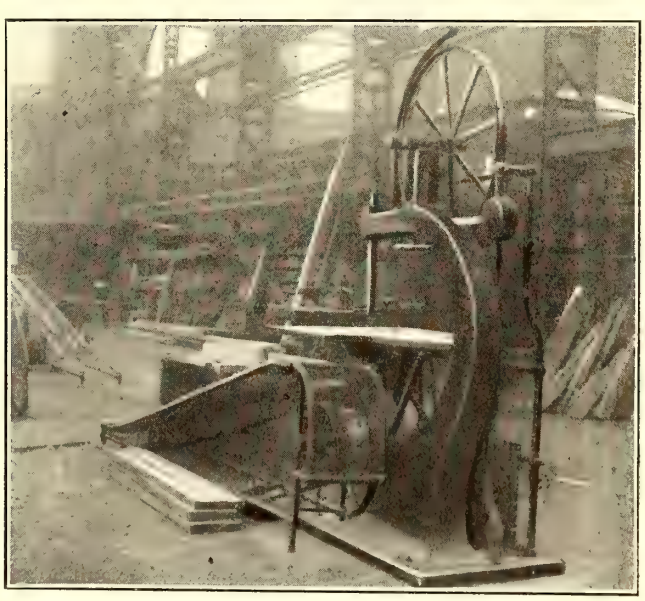
(5) When the thickness becomes (a) on motor tires less than 1⅜ in. on tread; (b) on trailer tires less than 1¼ in. on tread.

Wheels are re-turned at the rate of about 3½ pairs a day per lathe. This usually averages at the rate of about 19 pairs of wheels for every 23 shillings labor cost on the day system which prevails throughout these shops. The average cut never exceeds ½ in. The process of re-tiring a single wheel involves



London Underground Railways—Profiles on Shop Print Covering Allowable Wearing Limits

several steps, the times for which follow: Cutting the rings out, 75 minutes; taking old tires off, 30 minutes; heating new tire for shrinking and installing, 45 minutes; putting in new rings and riveting, 15 minutes; final truing up as for re-turned wheels. The two men required to take the tires off and the



London Underground Railways—Screen Over Machinery Belting to Avoid Accidents

three men required to put new ones on, each receive on the average 29 shillings, 4 pence, for about five and a half 9½-hour days, viz., 53 hours per week. The man who bores out the new tires and cuts the recess into which the ring fits is rated at 39 shillings a week. The tires are shrunk off and on in a brick-lined iron circular tub which is mounted on a truck for easy removal when not needed. The lower circumference

MECHANICAL ENGINEERING DEPARTMENT

EXAMINER'S REPORT

Depot..... *Date*.....

Car No.	Train No.	Defect	Action Taken	Time

London Underground Railways—Inspector's Report (10 in. High x 8 in. Wide)

.....RECORD DATE.....

No..... TYPE..... MAKERS.....

Date Sent In	Date Sent Out	Car No.	Memo. of Work Done	

London Underground Railways—Card Record (11 3/4 in. High x 8 1/4 in. Wide)

DAILY REPORT OF TRAIN-WORKING

TRAIN SERVICE SCHEDULE NO..... .....THE.....DAY OF.....19.....

Class of Failure, Etc.	Time Occurring	Place	No. of Car Lift or Signal	Delay in Minutes	Particulars of Failures and Delays
Rolling Stock					
Signals					
Lifts					
Current Supply					
Miscellaneous					
		Total Delay			

Other variations in Train Service Schedule and reasons therefor:—

No. of Cars in Service: No of Cars required by Schedule

Motors..... Motors.....

Trailers..... Trailers.....

Total..... Total.....

No. of Lifts in Service, Maximum.... Minimum.....

Accident Report		Time	Place	Particulars
Passengers	Name			
Staff				

.....*Superintendent*

N.B.—When full particulars cannot be given on this form, ordinary foolscap memoranda to be attached, and the form used as a summary only.

London Underground Railways—Daily Report of All Train Operation, Elevators, Etc. (13 in. High x 8 1/4 in Wide)

RECORD OF CAR OVERHAUL

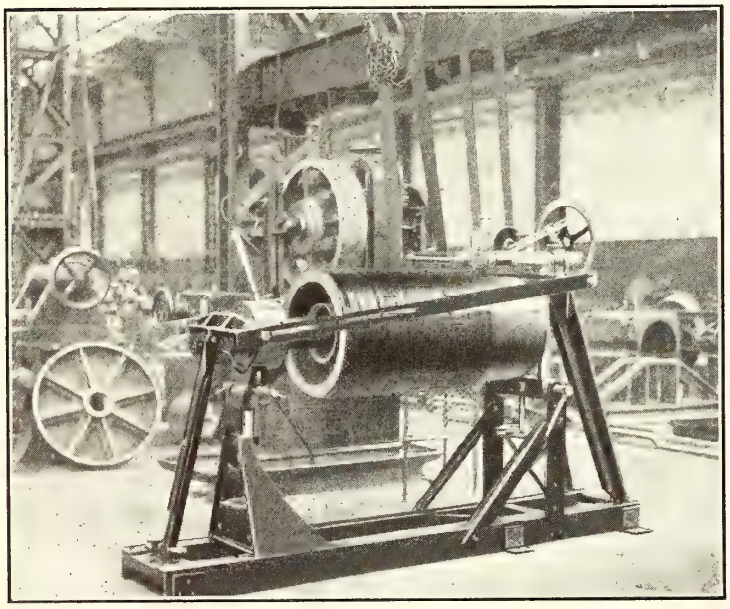
.....Depot. Car No.....Date in Shops.....19....Date out Shops.....19.....

DESCRIPTION OF WORK DONE			
Wheels	Nos.		
Axles	Nos.		
Trucks	Nos.		
Motors (No. 1)	No.		
Motors (No. 2)	No.		
Motors (Compressor)	No.		
Armatures	No.		
Draft and Buffing Gear.			
Underframes			
Bodies, Doors, Gates and Locks			
Shoe Gear			
Electrical Equipment			
Air Brakes (Including Compressors)			
Lighting			
Emergency Outfit			
General Remarks			

I hereby certify that the above Car has been thoroughly overhauled, and is now fit to run in Passenger Service.

Date.....19..... *Signed*.....*Shop Foreman*

London Underground Railways—Record Sheet for Car Overhaul (13 in. High x 8 in. Wide)



London Underground Railways—An American Commutator Slotter



London Underground Railways—Flexible Overhead Connection for Moving Cars in Shed

of the tub contains a pipe with burners for a mixture of illuminating gas and air at 70 lb. pressure. On the average about 200 cu. ft. of gas are required to take a tire off and about 300 cu. ft. to shrink it on. The gas costs 2 shillings 9 pence (42 cents) per 1000 cu. ft. and has 550 b.t.u. per cubic foot.

Thermit is used in the Ealing shops for many purposes, even for broken gears which are filled with the mixture and machined afterward. A mixture of 6 lb. of thermit and 3 oz. of ferromanganese is used now for lining up and strengthening motor nose-pieces. Formerly manganese steel pieces were dovetailed for this purpose but they would not stay in. For the ordinary welding of cast-steel frames, the welding mixture

DAILY REPORT OF TROUBLES ON CARS NOS.....

*Train No.....Depot..... Date.....*190.....

Apparatus	Trouble	Car No.	Reported by No.	Action Taken
Electrical				
Brakes				
Trucks				
Car Body				
Other Troubles				

MOTORMEN having no Car troubles to report must write their numbers below before leaving the train.

No..... No..... No..... No..... No..... No.....

INSTRUCTIONS—Motormen, Conductors, Terminal Men, etc., must, on discovering anything wrong with a Car, record same in "Trouble" column above, opposite the particular apparatus found out of order. Always give Car No. and your own No. Only report here troubles relating to the portion of the train composed of Cars numbered at the head of this Card, and report regarding the other portion of the train on card provided at that end. Write clearly and keep the Card clean.

London Underground Railways—Motormen's Daily Card Report (5 in. High x 8 in. Wide)

SENT TO SHOPS FOR

CAR NO. DATE SENT IN / DATE SENT OUT

SECTION	FOREMAN'S SIGNATURE (When O. K.)	REMARKS
Elec. Equip. on Car Body		
Motors and Armatures		
Trucks and Brakes		
Wood Working		
Doors		

London Underground Railways—Linen Tag (2 1/2 in. High x 5 1/4 in. Wide) on Car in for Some Kind of Heavy Repairs

MECHANICAL ENGINEERING DEPARTMENT A

RECORD OF WORK COMPLETED BY ELECTRICAL SECTION

Car No..... In Shops for.....

Date sent in..... Date sent out.....

[W. & S. Ltd.]

Motor taken out.....	No.....	No.....
Armature taken out.....	No.....	No.....
Motor put under.....	No.....	No.....
Armature put in.....	No.....	No.....
Compressor taken down	No.....	Compressor put up. No.....

Summary of Repairs completed to Motors and Armatures put under also Car Body Equipment.

Date ..... 19..... ..... *Foreman*

MECHANICAL ENGINEERING DEPARTMENT B

RECORD OF WORK COMPLETED BY TRUCKS SECTION

Car No..... In Shops for .....

Date sent in..... Date sent out .....

[W. & S., Ltd.]

PARTICULARS	EAST END		WEST END	
	Number	Number	Number	Number
Trucks taken out.....				
Trucks put under.....				
Axles taken out				
Axles put under.....				

Summary of Repairs completed to Trucks put under, and Repairs made on Car Body Equipment.

Date.....19..... *Foreman*

MECHANICAL ENGINEERING DEPARTMENT C

WHEEL AND TIRE CHANGING REPORT FOR WEEK ENDING.....190.....

Axle No.	Wheel Nos. Pressed Off	Reason	Wheel Nos. Pressed On	Tire Nos. Scrapped	Tire Nos. Put On

Date.....190..... *Foreman*

MECHANICAL ENGINEERING DEPARTMENT D

TIRE TURNERS' REPORT for Week ending.....190.....

Axle No.	Reason for Turning	MEASUREMENT		Tire Loss Calipered	Remarks
		Before Turning	After Turning		

Date.....190..... *Foreman*

MECHANICAL ENGINEERING DEPARTMENT E

RECORD OF WORK COMPLETED BY PAINT SECTION

Car No..... In Shops for.....

Date sent in..... Date sent out.....

Summary of Repairs completed:—

Date.....190..... *Foreman*

MECHANICAL ENGINEERING DEPARTMENT F

REPORT OF WORK DONE TO COMPRESSORS FOR WEEK ENDING..... 190.....

Compressor No.	SUMMARY OF REPAIRS COMPLETED TO	
	Compressor	Motor

Date.....190..... *Foreman*

London Underground Railways—Forms A, B, C, D, E and F, (each 8 in. High x 10 in. Wide) Covering Different Classes of Overhauling

consists of 28 lb. of thermit, 13 oz. of manganese steel and 8 lb. of scrap steel, such as old washers. In general, the company has found that thermit welding gives excellent results for all cast steel work, but is not so serviceable for Bessemer steel or cast iron.

INSPECTION AND OVERHAUL RECORDS

Every motorman, on taking a train out in the morning, is furnished with an 8-in. x 6 in. card to cover reports on such troubles as may arise during the service. Unless the defects set down are serious, the card remains on the train for the records of succeeding motormen until the cars are turned in at night by the last men in charge. It will be observed, however, that the motorman who reports a defect on this card must give his number so that the responsibility for trouble is not divided. These cards are examined by the night inspectors whose report on the defects corrected is made out on a separate blank for the local foreman. Cars in for inspection are designated by a linen tag on which there are provided spaces for individual signed records of the repairs on electrical equipment, trucks, doors and bodies. The reports on all cars inspected are assembled on the foreman's daily form, this record also including washing, lubrication, brake adjustments, lighting circuit inspection and car-body examination.

When a car is in for its regular overhaul or for heavy repairs, it is marked during its stay in the shops by a linen tag similar to that used in the inspection work. When the car has been made fit for service again, the record of everything done for that purpose is submitted by the shop foreman on the sheet reproduced. This report covers the work done or replacements made on the wheels, axles, trucks, motors, armatures, electrical equipment, air brakes, car underframe and the emergency outfit. This foreman's record is based on a series of shop detail forms numbered 306-A, B, C, D, E and F, and emanating from the foremen of the respective shop sections which handle the different classes of work indicated on the records as follows: "Form "A" includes all necessary changes or replacements on car and compressor motors; form "B" includes trucks and axles supplemented by forms "C" and "D" which cover wheel and tire changing and tire turning for weekly periods; form "E" includes painting touch-ups, and form "F" deals with compressors.

Ruled white cards 11¾ in. x 8¼ in. in size, of the design illustrated, are used to serve equally well for the permanent records of car body changes including the control, trucks, motors and armatures. The wheel, tire and axle records are kept partly on an 8 in. x 5 in. card and partly on the enclosing ruled envelope, as illustrated.

Wheel No ..... Tire No.....
Maker..... Maker.....
Class ..... Dia ..... Class.....
Date Received..... Scrapped .....

Into Service			Out of Service		Measurement		Tire Loss Caliper	Remarks
Car No.	Axle No.	Date	Date	Reason	Before Turning	After Turning		

London Underground Railways—Wheel Record Card (5 in. High x 8 in. Wide)

DOUBLE-GEARED MOTOR IN ENGLAND

In an article contributed to the April 7 issue of the *Tramway and Railway World* Albert A. Blackburn describes a rigid double-geared motor drive applied to a Brill 21-E truck. This truck was 16 ft. long, had a wheelbase of 6 ft. 6 in. and carried 30¾-in. steel-tire wheels on 4-in. axles. The motors were of the Westinghouse No. 200 35-hp type, and the motor armatures were fitted with pinions at both ends of the shaft. At the time of Mr. Blackburn's report the truck had been in service for two years and had run 74,800 miles. The first inspection was made after the car had been in service six months, and it was then found that all wheel flanges were wearing exactly alike, both in shape and thickness; the circumference of all the wheels was also the same. The teeth of the gears and pinions, wheels and bearings, were found to have worn evenly. The same consistency in wear has appeared in the later inspections. The life of the armature bearings has been increased because the wear at both ends is equal, thereby avoiding undue wear at the commutator end. It has been found that the brake shoes on this truck wear longer than on trucks with the usual single reduction gear. The test car does not take any more current than other cars of the same general type.

SHOP FOREMAN'S DAILY REPORT

The particulars given below are a correct record of all work done on Cars at.....Depot .....day .....day of.....19....

STATE BELOW THE CAR NUMBER AND NATURE OF REPAIR WORK DONE

Cleaning and Washing		Trucks	
Oiling and Greasing		Shoe Gear	
Brake Adjustments		Valves	
Brake Blocking		Lighting	
Gate and Door Adjustment		Electrical Equipment	
Motors		Advertisements	
Governors		Other Work Done	
Compressors			
Controllers			
Car Bodies			

Signed ..*Shop Foreman*

Date .....19.....

London Underground Railways—Shop Foreman's Daily Report (13 in. High x 16 in. Wide)

Axle No ... Class Diameter..... Maker. .. ..

Date Received Date into Service Date Scrapped Reason.....

Into Service			Out of Service			
Car No.	Truck No.	Date	Date	Reason	Wheel Nos.	Remark

London Underground Railways—Axle Record on Envelope (5 1/2 in. High x 8 1/2 in. Wide) Containing Wheel Record

Owing to the increasing popularity of the automatic ticket delivery machines which have been placed in tube and district stations, London, Eng., the management of the Bakerloo, Piccadilly and Hampstead lines has ordered 25 more, making 50 in all. Recently 76,000 tickets were issued by the machines in one week.

DEPARTMENT OF MAINTENANCE OF WAY AND BUILDINGS—METROPOLITAN STREET RAILWAY COMPANY

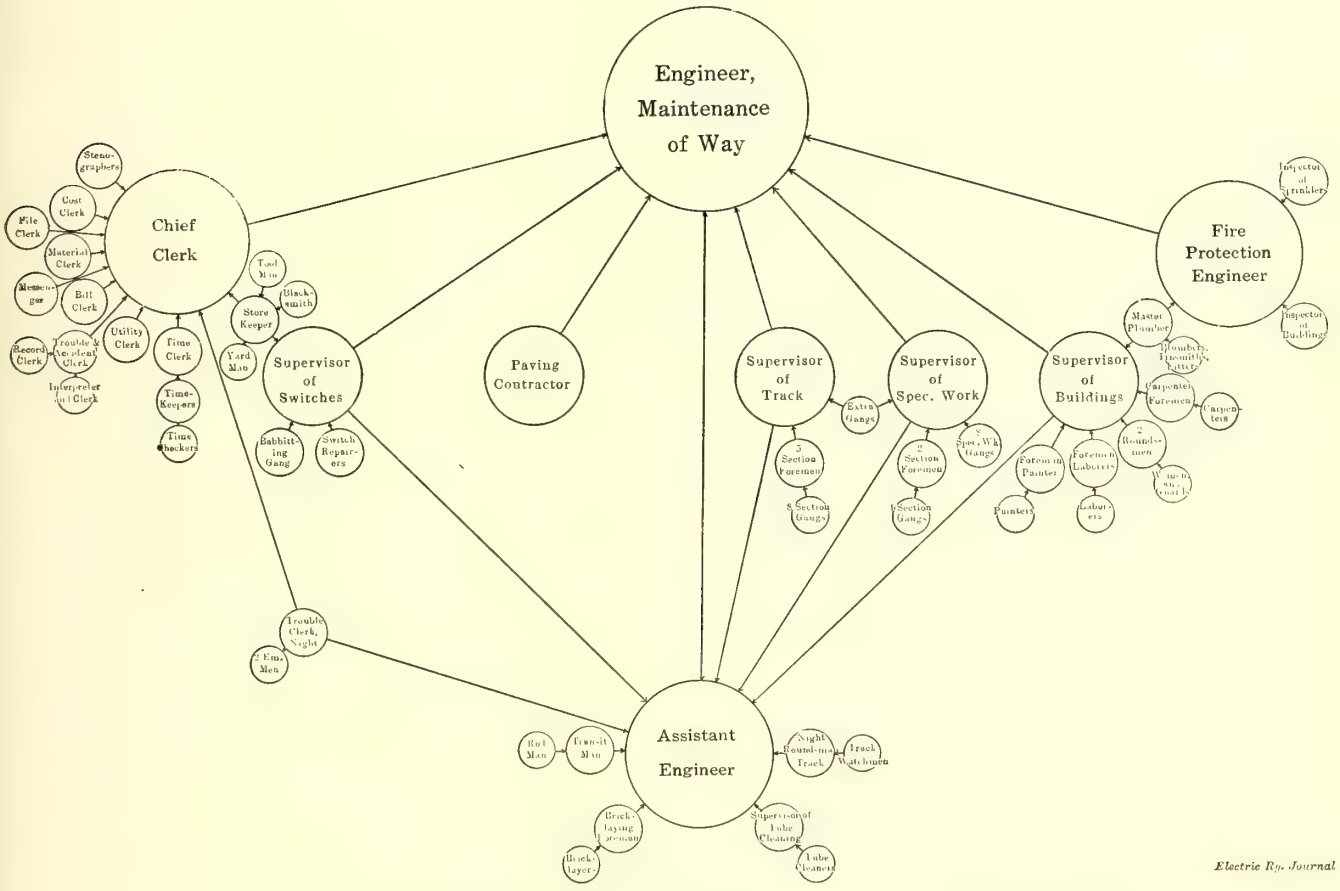
With the exception of the channel rails which form an essential part of the system of power transmission of the Metropolitan Street Railway system, the maintenance of the track structure and the adjacent pavement is supervised by the engineer of maintenance of way, who also has charge of the maintenance of all of the buildings used in operation.

SCOPE OF WAY DEPARTMENT

The jurisdiction of the department of maintenance of way includes all work of an ordinary maintenance character, such as repairing loose and broken rails and joints; repairing pavement in the railway area; cleaning the conduit on electric lines; cleaning and repairing switches on electric and horse lines; greasing curves; replacing broken insulators, manhole and special vault covers; cleaning all manholes, handholes and special pits; inspecting and guarding track structures in places where excavations are made under or adjacent to them in connection with subway construction, water and gas main installation, etc., and all such rail renewal, special work renewal, special work modification and rearrangement, additional feeder and conduit manhole construction, regrading and reconstruction as are found necessary or advisable from time to time. This department does no work on cables or power feeders, but installs the necessary ducts in which the electrical department carries its cables and feeders. It also makes repairs to these ducts and manholes and does other street work for the electrical department as required. A very important function of the department of maintenance of way is the removal of snow from the surface of the street and from the conduit. This particular subject was discussed at length in the article published in the ELECTRIC RAILWAY JOURNAL for April 23, 1910.

This department also has under its jurisdiction such ordinary maintenance work as carpentry, painting, plumbing, roofing, tinsmithing, sidewalk repairs, etc., and all matters affecting the subject of prevention of and protection against fire, maintenance of fire-fighting apparatus, cleanliness in housekeeping and the maintenance of watchman service. Upon the maintenance of way department, more than upon any other single department of the system, has devolved the task of eliminating structural fire hazards in the properties used in the operation of the road, and of reducing the so-called "moral hazard" through frequent inspections, thereby correcting practices among employees, which, if unchecked, would be likely to result in fires. The activities of the department in this connection were covered by the article on Fire Protection and Insurance which appeared in the issue of April 16, 1910, of the ELECTRIC RAILWAY JOURNAL. The department also attends to all new construction in the properties of the system.

An organization chart is presented illustrating the assignment of work to the various sub-departments. This chart is largely self-explanatory. A short statement might be made, however, in regard to the "trouble clerk," whose office is open during the entire 24 hours of the day. The duties of this clerk consist chiefly in receiving telephone messages relating to emergency conditions which require action on the part of the department of maintenance of way. The information comes from a number of sources, but very largely from the report clerk of the transportation department, to whom hurry calls are telephoned by transportation employees and officials who may be at the scene of trouble. The trouble clerk of the maintenance of way department communicates directly by telephone with the foreman who should handle the necessary inspection or repairs. The existence of any unusual condition which affects or may affect the track structure is thus brought promptly to the attention of the maintenance of way department. Some of the occurrences which the trouble clerk must act upon are the choking up of catch-basins and consequent threatened flood of the conduit; the digging of excavations in the vicinity of the tracks; the discovery of broken insulator



Metropolitan Track—Organization Diagram of the Maintenance of Way Department

covers and manhole covers; the existence of loose or broken tram or slot rails, defective pavement; closing up of the slot on the surface of the street due to extreme heat or cold, car derailments, switch troubles, water leaks, gas leaks, obstructions in conduit, etc.

OPENINGS TO CONDUITS, MANHOLES, ETC.

To afford access to the sub-surface structure of the conduit electric system there are openings in the surface of the street every few feet. These openings are protected by iron insulator covers and manhole covers, according to the character of the opening. It is by no means an infrequent occurrence for these covers to be broken by vehicular traffic. There are approximately 95,000 such covers in or adjacent to the Metropolitan tracks of which about 6,500 are broken annually, principally during cold weather. If an insulator cover is not properly installed it is apt to be tilted up by a passing truck, and even a comparatively slight displacement of a cover will cause it to project high enough to be struck by the next car, with disastrous consequences to the cover and often to the car equipment. These insulator covers are located on either side of the slot rail at 15-ft. intervals.

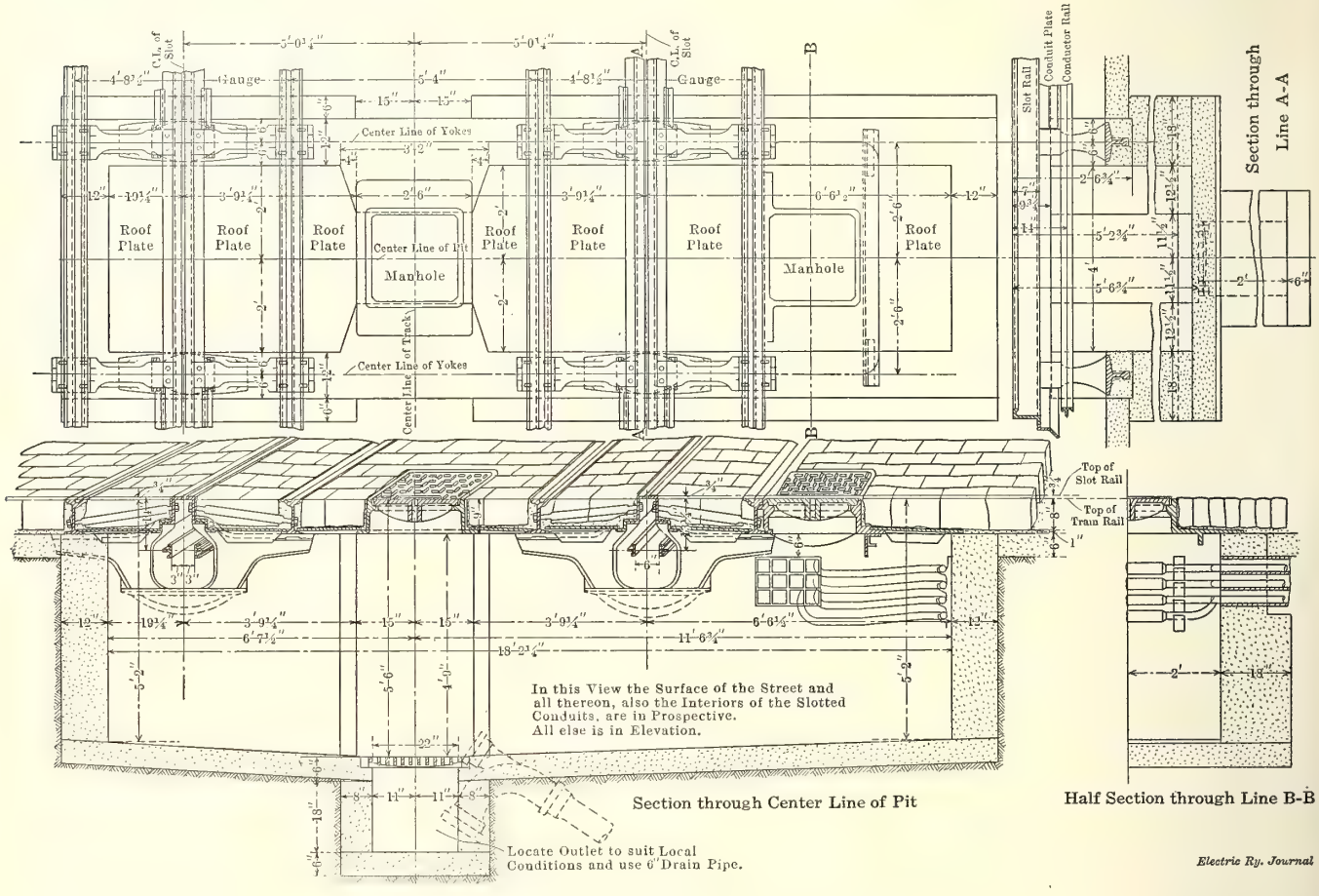
The construction of a typical feeder manhole is illustrated in the diagram on this page. These feeder manholes are constructed beneath the tracks and are spaced approximately 420 ft. apart. Between every two feeder manholes there are three cleaning manholes which are of substantially the same type of construction as the feeder manholes, although differing somewhat in dimensions. They are about 5 ft. deep, 4 ft. wide and 14 ft. long. These are inside measurements, the manholes being enclosed in a 12-in. concrete wall.

CONDUIT TRACK MAINTENANCE PROBLEMS

Track maintenance in New York is greatly complicated because the sub-surface of the thoroughfares on which the tracks are laid is honeycombed with an intricate network of gas mains, water mains, telephone ducts, Edison power and light ducts, mail tubes, steam heating pipes and sewers. The Interborough Rapid Transit Company's subway passes under many of the streets through which the Metropolitan Company's cars are operated. Whenever one of the various public service corporations or other interest using these subterranean structures has occasion to repair or extend them, the track structure, manholes and the ducts in which the Metropolitan's feeders are located are likely to be more or less affected. The difficulty of maintaining an uninterrupted car service with safety during such periods of excavation and chaos is often extremely great. The work performed by the municipality in the construction of the underground terminal at the Manhattan entrance to the Williamsburg Bridge and the construction of the subway connecting the Williamsburg Bridge and the Brooklyn Bridge presented certain peculiarly difficult problems of this nature.

One feature of the maintenance of a conduit electric system which demands constant watchfulness is the necessity of keeping the aperture between the slot rails not less than 5/8-in. wide nor more than 3/4-in. wide. Any greater width is almost certain to produce accidents through the catching of wheels of vehicles in the slot, resulting in personal injury, damage to property and blocking of the cars. On the other hand, if the slot is narrower than 5/8-in., the contact plows of cars are almost equally certain to become wedged and the force of the plow impact against the walls of the slot is so great at times as to wrench the plow from its fastenings, buckle the heavy plow bars and sometimes seriously disable the car trucks themselves.

The great changes in temperature which occur in New York City produce, of course, a corresponding expansion or contraction in the tie rods and thus widen or narrow the slot. During the winter especially one of the most frequent sources of trouble is the simultaneous occurrence of tight slots at many points of the system, requiring immediate attention to prevent serious consequences. The same complications ensue during



Metropolitan Track—Feeder Manhole Pit

excessively warm weather although they are more infrequent at such times than in the winter.

CONDUIT CLEANING

The work of conduit track maintenance on the Metropolitan system is aggravated because of the necessity of keeping the underground conduit free from the rubbish which falls through the slot in the surface of the street. This slot, as above stated, is about ¾-in. wide. The conduit itself is elliptical in form, the inside width being 16 in. and the height 24 in. This means

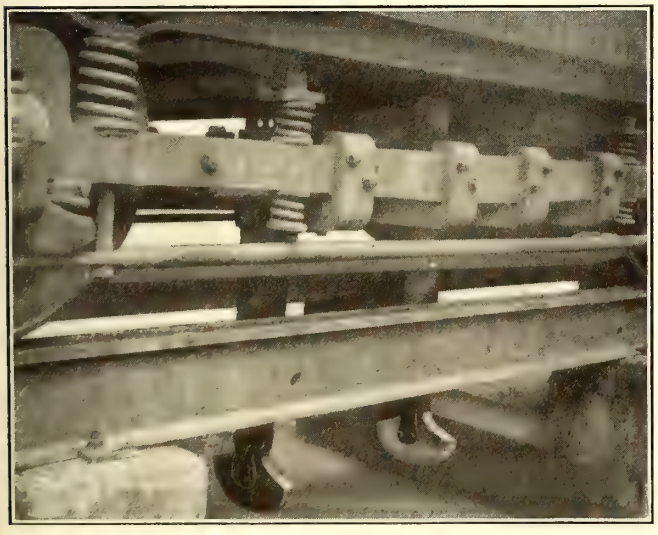


Metropolitan Track—Scraper Car

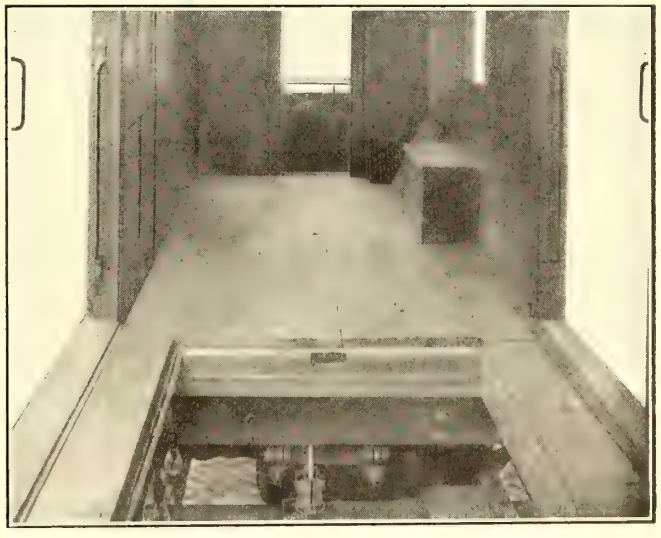
that an underground chamber of this cross section and equivalent in length to the distance between New York and Albany must be cleaned daily. As illustrating the magnitude of this work, it is interesting to state that in the course of a year there are removed from the conduit of the Metropolitan system about 400,000 cu. ft. of rubbish and dirt other than snow. This amount of rubbish would fill 373 ordinary dirt cars, which would make a train over 2¾ miles long.

SCRAPING CARS

For cleaning the conduit, the Metropolitan formerly used small trailer cars, each with a scraping device with a contour corresponding to the shape of the conduit. This small car was



Metropolitan Track—View of Scrapers



Metropolitan Track—Scraper Attachments Under Trap Door

either dragged over the road by horses or was attached to the rear of an ordinary passenger electric car. Because of its relatively light weight, the trailer was very unsatisfactory. It was frequently derailed, and when the dirt, ice, snow and other material accumulated in front of the scraping device in the conduit in too large a mass, as often happened, the cleaning device would be forced upward and would become jammed against the roof of the conduit, displacing the channel rails.

These trailer cars were superseded by the present power scraping cars, shown in the accompanying illustrations. Each car is equipped with two scrapers and two contact plows so that the cars may be operated very slowly over special work without danger of becoming stalled on "breakers," that is, those points at track intersections where there are breaks in the conductor rails. The dirt in the conduit is pushed by these scraping cars into the nearest cleaning manhole, from which it must be removed by tube-cleaning gangs. These manholes are 105 ft. apart. The improved scraping car affords more protection than the old form to the men in winter. At that time the operation of the old trailer scraper cars was attended with considerable difficulty and necessitated the employment of twice as many men for crews as the power scrapers because the work was arduous, the exposure was severe and the equipment was crude.

The use of these power scraper cars has resulted in a saving of from $5,000 to $10,000 per year, depending upon the severity of the winters. This means that the scraper-car equipment has very nearly paid for itself, since the power scrapers were introduced. Furthermore, since the power scrapers have been used, the Metropolitan lines have never been tied up by snowstorms, although this was experienced on several occasions in the past when the trailer scrapers were used.

PAVEMENT MAINTENANCE

Upon the Metropolitan Street Railway Company rests the obligation to maintain the pavement within, between and for 2 ft. outside of its tracks. The total expense of this item amounts to several hundred thousand dollars per year and the condition of affairs will readily be appreciated from the fact that so large a portion of the streets on Manhattan Island are paved with asphalt over which a heavy street traffic passes daily. Until quite recently practically all asphalt pavement laid by the city was installed under a maintenance guarantee contract, by the terms of which the paving company bound itself not only to lay the asphalt pavement but to maintain it for a stated period of years. The asphalt companies always contended that any repairs required on a street still under maintenance contract must be made by the company which originally laid the pavement and at the original contract price. In this contention they were always upheld by the city authorities, and the bureau of highways would not issue any permits for opening the street or making cuts in the asphalt pavement on any street until the Metropolitan Company first stipulated that the required restoration would be made by the company holding the maintenance contract for that street, at the original contract price. In practice it would frequently be necessary to disturb asphalt pavement, originally laid under a 15-year contract, the maintenance period on which had nearly expired, having but one or two years more to run. Yet, for such restoration, it was necessary to pay the original contract price, often as high as $3.50

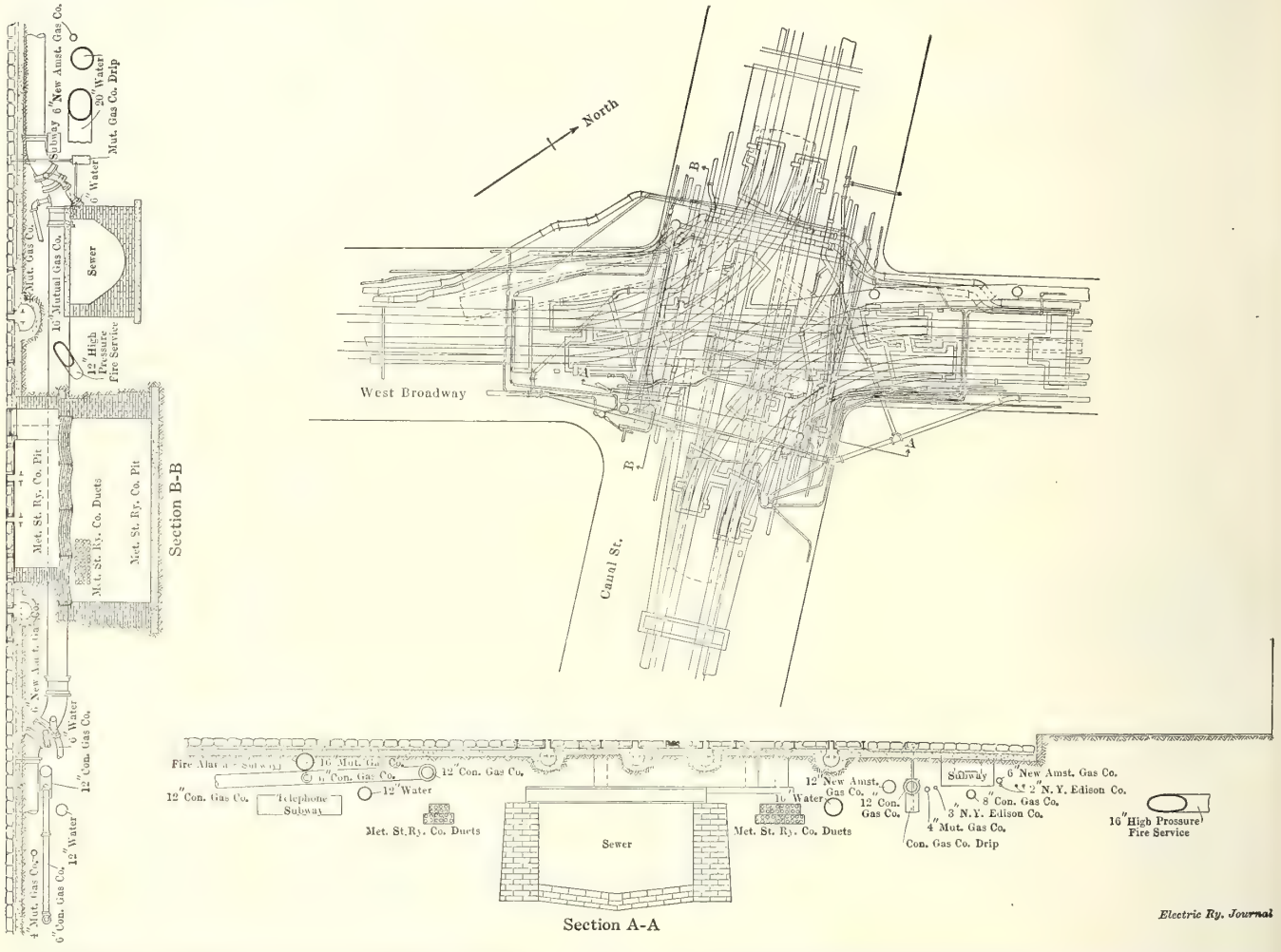
per square yard. This plan was manifestly unfair, but no success followed any attempts to get the asphalt pavement companies to quote a fairer and more reasonable price for such work until the matter was taken up by the present management. The policy was then adopted of having the necessary repairs made by the asphalt company which would do the work in the best and most workmanlike manner and for the lowest price regardless of what asphalt company might hold the maintenance contract for such pavement. As a result of this new policy the saving to the Metropolitan for the year ended Nov. 30, 1909, was approximately $25,000.

It was formerly the practice of the municipality, when repaving a street with asphalt or asphalt block pavement, to pave the entire roadway from curb line to curb line, including the space in and between the tracks, and to bill the Metropolitan Company later for the cost of the pavement laid within the railway area. This custom was decidedly objectionable, since instead of paying the regular contract price. This course resulted in a further saving of approximately $4,000 during the calendar year ended Nov. 30, 1909. Thus the total amount saved during the year mentioned was approximately $104,000.

The amounts of $75,000 and $4,000 refer merely to the saving in first cost. So far as maintenance is concerned, the economy effected by the retention of the granite block pavement, instead of substituting asphalt in the territory affected by the operations during the year ended November 30, 1909, will amount to approximately $8,000 annually. As this principle is followed out further, the resulting annual maintenance charge will, of course, be materially decreased, but in the absence of definite information as to the future plans of the city in repaving thoroughfares no exact figures can be given.

PAVEMENT

A careful study has been made of the relative merits of the various types of pavement, as viewed from the standpoint of



Metropolitan Track—Plan and Sections at West Broadway and Canal Street Showing the Maze of Subsurface Conduits and Transmissions

it increased the maintenance charges, because maintenance of track on asphalted streets costs more than on granite paved streets, and because granite block pavement has been found in New York superior to asphalt or asphalt blocks in and between tracks. An arrangement has recently been made, however, between the company and the city authorities by the terms of which the Metropolitan agreed, on condition that it be allowed to retain the granite block pavement in the railway area, that it would bear the expense of paving the 2-ft. strip on either side of the tracks with the same character of pavement as the city authorities might lay on the balance of the roadway. By this arrangement, during the calendar year ended Nov. 30, 1909, a saving of approximately $75,000 was effected. Furthermore, the Metropolitan provides the concrete paving base in restoring pavement which it has been necessary to remove, the railway company. The pavement in the railway area on Manhattan Island, to which reference has been made above, is usually one of three types, namely, sheet asphalt, wooden block and granite, the block and granite paving being laid with tar joints, and tar and gravel joints, respectively. The experience of the maintenance of way department on the relative costs of these different kinds of paving may be interesting.

If the assumption is made that all rails will be relaid twice in 20 years, the average cost per year per yard for a period of 20 years of the different pavements per square yard per year would be: Sheet asphalt, $.554; wooden block, $.4545; granite, $.2715.

The asphalt pavement, aside from being the most expensive, is distinctly the most undesirable pavement to place in the railway area because the vibration of the rails tends to loosen

the adjacent asphalt, and the wheels of passing vehicles accelerate the process of deterioration, by causing the pavement to crumble away. In winter, when the pavement becomes coated with ice, and during damp weather, when the atmospheric conditions are such as to make the asphalt extremely slippery, considerable delay is caused to the movement of cars by the falling of horses upon the tracks. The latter objection applies also to the wooden block pavement. Again, because of the better footing afforded by the granite block pavement, there is less tendency on the part of truck-drivers to drive their horses on the railway area, than when the adjacent roadway is paved with asphalt or wooden block. Efforts are made in New York by the Traffic Squad of the Police Department to prevent this use of the tracks, but it has not been entirely stopped.

The repairs to wooden-block or granite-block pavement may be made by the employees of the railway company, whereas asphalt repairs must be made by some asphalt company which has the necessary apparatus for performing this work; consequently, defects cannot be as promptly eliminated in the case of asphalt pavement as with wooden block or granite pavement.

The fact that asphalt can only be restored by an asphalt company materially delays the restoration of the street to its normal condition when repairs are being made to tracks because, with wooden-block or granite-block pavement, the whole operation can be performed by the railway employees, whereas, in the case of asphalt pavement, the holes must be left in the street until the asphalt company can replace the pavement.

The process of replacing broken rails is much easier when granite-block pavement is used than where wooden block or asphalt pavement is employed, one reason being that the base for block and asphalt pavements is of concrete which must be disturbed whenever a rail is taken out.

For these reasons, whenever the Metropolitan management renews rails on streets where the pavement in and between tracks was formerly asphalt, it substitutes granite blocks for the asphalt, with, of course, the consent of the city authorities in each case.

The area between tracks on Broadway between Canal Street and Chambers Street, is paved with track block, the dimensions of which are 7 in. x 3 in. to 4 in. x 5½ in. to 6 in. This pavement must be renewed every four years. On West Broadway, from Chambers Street to Canal Street, the area between tracks is paved with specification blocks, which are 12 in. x 3½ in. to 4½ in. x 7½ in. to 8½ in. It is necessary to renew this pavement every five years. The larger block is more expensive in first cost than the smaller but a workman can lay more yards of pavement in a given time with large block than with small block, and, for a given area, the large block obviously requires less tar and gravel for joints than does the small block.

For a period of five years the cost of maintaining pavement on West Broadway has amounted to $2.52 per square yard, or at the rate of $0.504 per year. On Broadway, the cost has been $2.98 for a period of four years, or $0.745 per year per square yard; in other words the small block pavement is approximately 50 per cent more expensive to maintain than is the larger block. It should be stated, in this connection, that the traffic on West Broadway is, if anything, more severe on the pavement than that on Broadway. These figures point to the desirability of using the larger block and this plan is being followed wherever 9-in. rails are laid.

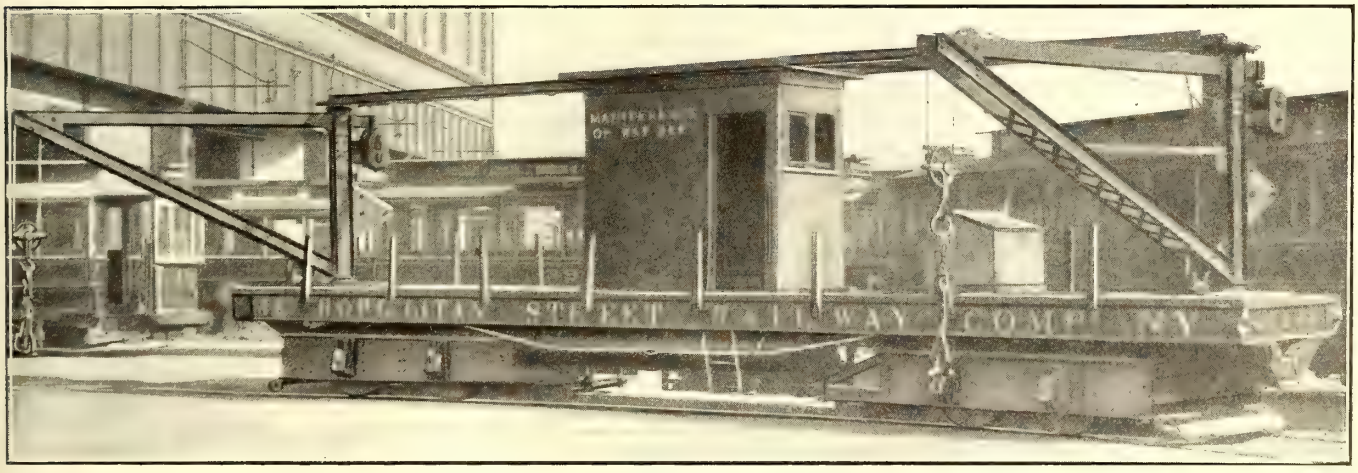
In the case of the 7-in. construction, arrangements are being made to increase the size of the block whenever it is necessary to repair the pavement.

Of course, the figures given for these two thoroughfares are very much higher than the average for granite block pavement on Manhattan Island, because of the very heavy traffic on the streets involved.

TRACK RENEWALS

During the last two years rail has been renewed on 28.20 miles of single electric track and 6.88 miles of single horse car track. During the same period nearly 90 pieces of special work have been modified or renewed. Several of these pieces of special work were altered to permit of the operation of pay-as-you-enter cars on the Fourth & Madison Avenue line and on the Broadway-Columbus & Lenox Avenue line and considerable difficulty was encountered in spreading the tracks because of the interference of various sub-surface structures. For instance, on Forty-second Street between Park and Vanderbilt Avenues, the roof of the subway station was only 30 in. below the surface of the street and extreme care was necessary to avoid damaging the waterproofing of the station. In other cases, the work of modification required the shifting of gas mains, ducts and other structures, all of which had to be done without any unreasonable delay to traffic. The special work layout scheme has now been changed so that where existing tracks are 10 ft. ½ in. or over centers it will not be necessary to spread them to permit of the operation of the pay-as-you-enter cars. This layout will not only cost less to install, but the cost of maintenance has also been materially decreased. Such revised layouts have been installed at Fourteenth Street and Avenue A, Twenty-third Street and Eleventh Avenue, Twenty-third Street and Lexington Avenue and Broadway and University Place.

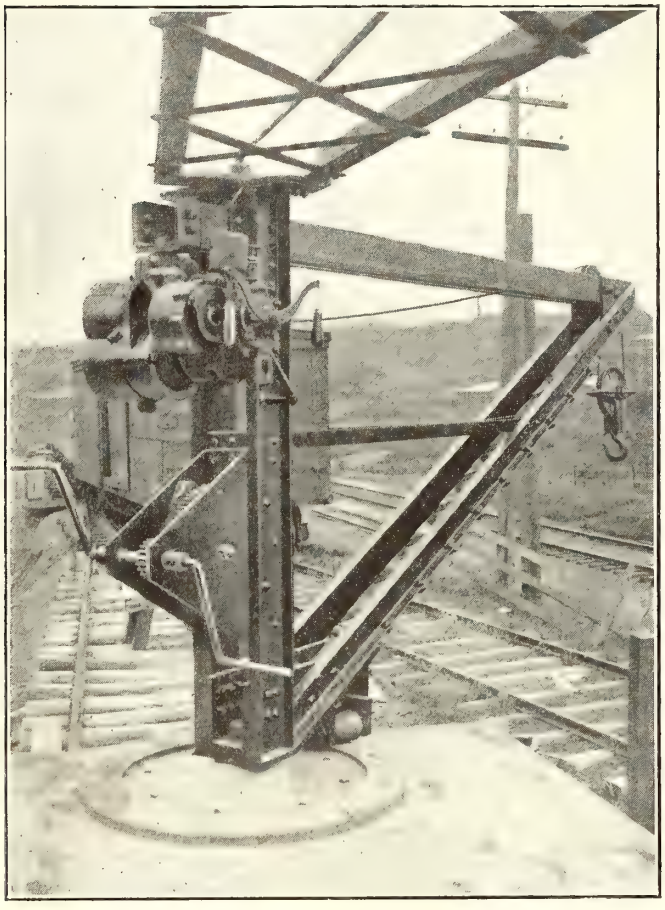
Where track has been relaid the construction has been standardized. Some of the track was originally constructed from 10 to 15 years ago and since that time the art of track construction has advanced materially. Certain of the track relaid formerly was used in connection with the operation of the roads by cable and embodied certain features not necessary or desirable in the conduit electric system. This is particularly true with reference to the tubing in the conduit as well as to



Metropolitan Track—Construction Car Equipped with Two Cranes

the type of slot rail used. In renewing rail on Broadway, wherever the old cable slot rail existed, it was replaced by the standard "Broadway" slot rail, Lorain Section No. 70/274, and the existing sheet iron conduit lining (cable construction), which was found to be badly rusted, was cut out. Further details of the track reconstruction will be found in the Electric Railway Journal for Dec. 26, 1908. During other track renewal work the company has also laid a line of ducts on Lexington Avenue between 116th and 131st Streets, about 1000 ft. of new ducts on Lenox Avenue and a line of ducts on Fifty-ninth Street, between First Avenue and Second Avenue. The management has also installed during the past two years a total of 60 new feeder manholes and 10 new cleaning manholes in various locations.

Work is now under way of relaying about 18 miles of single



Metropolitan Track—Crane on Construction Car

electric track and renewing the necessary special work involved. Three and one-half miles of horse-car track are also being relaid. At the completion of this work about 40 per cent of the total electric track of the Metropolitan system will have been relaid within three years.

The renewal and installation of special work has been very materially facilitated by using a special construction car which renders it possible to install the special track work more promptly and with less interference with car and other street traffic; at the same time the expense of labor incident to such installation is decreased by about 10 per cent.

CONSTRUCTION CAR

The halftones on this and the previous page show the form and construction of this car. It is approximately 41 ft. over the draw-heads, 8 ft. 9 in. wide overall, with a 4-ft. wheelbase and 26-ft. truck centers. The car is equipped with four motors and has two contact plows. The cranes at either end are operated by a 24-in. air hoist and each crane has a lifting capacity of five tons. This car has been very useful in the handling of equipment such as trucks, motors, etc., and bids fair to pay for itself in a comparatively short time.

SPECIAL WORK

An important improvement has been made in the design of special track work. It was the former practice to construct vaults beneath the special work, and from the roof plates suspend the insulators which support the channel rails. These vaults were approximately 15 ft square and 3 ft. 6 in. deep, although the dimensions varied somewhat according to local conditions. When repairs were made to the channel rails, it was necessary for the workmen to descend into these vaults and perform their task in very cramped quarters. The operation was more or less dangerous and unsatisfactory for many other reasons, because it was necessary not only to clean out the vaults constantly, but they had to have special sewer connections and the company had to provide for any other subterranean structures which were disturbed by the construction of the vaults.

All new special work is so constructed that the handholes are cast into the special work itself, so that there is easy access from above to the insulators supporting the channel rails. This plan does away with the necessity of any vault whatsoever, makes it practicable to maintain the special work in much more satisfactory condition, because of its greater rigidity, and lessens the noise caused by the passing of cars over the special work since the old vault construction formerly acted as a sounding-board. Briefly, the new type of special work lessens the initial outlay, requires less expense for maintenance and its life is from 20 to 40 per cent more than that of the old type of construction.

All of the special work on the Metropolitan system is now made with removable hard centers of manganese steel at all tram-rail intersections, but this construction is not considered necessary at the intersection of the slot rail with the tram rail. This feature of special work construction renders it possible for the Metropolitan to renew the hard centers when they become worn. This work is done by the Metropolitan's own employees, of whom there is a special gang organized for this particular work.

Improvements have been made in the design of switch mechanism and steel yokes. The switch has been materially improved in that the entire top is now of manganese steel and the tongue has an improved fastening with an adjustable check piece with which wear in the tongue pin is taken up. The slot switch boxes are now furnished with a removable top, allowing the renewal of slot leaves without disturbing any pavement. The value of the latter improvement in the design of these boxes was amply demonstrated recently, when a wearing plate from a car contact plow became wedged back of the crossover slot leaf, so that the next car which was sent back over the crossover badly bent this leaf. With the old style slot switch box it would have required at least half an hour to have removed this bent slide, but with the new style of box the defective slide was removed and a new one was installed in about five minutes.

The switch mechanism levers have been made somewhat heavier at bearing points, allowing the holes to be bushed when worn. In addition to this the fork ends of the levers, where the wear is very heavy, have been made renewable, the effect being to increase the life of the special work and switch mechanism. The top angles of steel yokes have been made ¾-in. thick, instead of ½-in. as formerly. As nearly as can be estimated, this change has increased the life of the yoke approximately 33 per cent.

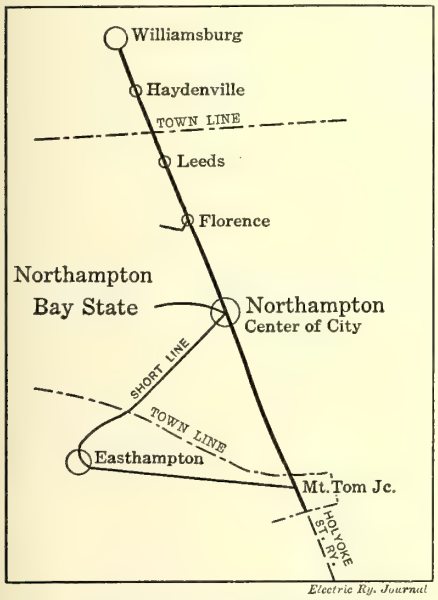
NEXT ARTICLE

In the next article on the Metropolitan system track standards and the general rules of the maintenance of way department will be discussed.

The freight and express committee of the American Street & Interurban Railway Transportation & Traffic Association did not meet in Cleveland, Ohio, on Monday, May 2, as was planned. It is expected, however, that the committee will hold a meeting in Cleveland within a few days.

HEARING BY MASSACHUSETTS RAILROAD COMMISSION UPON NORTHAMPTON FARES

The Massachusetts Railroad Commission gave a public hearing on April 21 upon the petition of the Northampton Street Railway Company for authority to place in effect a new schedule of fares. This is the latest of the requests for permission to increase fares in Massachusetts, and special interest attaches to the manner in which the case was presented, owing to the attention which this movement in Massachusetts has attracted in all parts of the country. Counsel Edward S. Shaw opened the case for the company, stating that the proposed change amounted in general to an increase in charges, but that it was purely a business question. The laws were based on a theory of a partnership between the company and the public. Improved and efficient facilities were required by the public. On the other hand, the company required a reasonable net revenue from the public in return for the service rendered. The present management of the road had made a careful study of the financial condition of the property, and had determined that an increase of income was absolutely necessary. The revenue could only be obtained in such a company by some raise in the rates of fare, since a conservative and careful management had done what it could to conduct the service along economical and yet efficient lines. The proposed schedule appealed to the management as fair and equitable.



Map Showing Northampton and Surrounding Towns

Henry M. Tyler, president of the company, reiterated the idea of a partnership existing between the road and its patrons. He said that it was a matter of public importance that a transportation company should be able to get a fair return upon the money invested in the property. The company had gradually been led to the present position that additional revenue was necessary to its prosperity. Year by year there had been a decided increase in the cost of material and other expenses, and consequently more and more difficulty in getting a fair return and giving the public the necessary service.

TABULATION OF PRESENT FARES.

	Mileage half-trip.	Length of ride obtainable with transfer, miles.	Fare.
Williamsburg through Leeds..	4.00	....	5 cents
Williamsburg to railroad station in Northampton.....	8.79	18.03	10 cents, with transfer; tickets, 12 for $1, without transfer
Haydenville to R. R. station, Northampton	6.89	16.13	10 cents, with transfer; tickets, 16 for $1, without transfer
Leeds to R. R. station, Northampton	5.36	14.60	5 cents
Florence to Mt. Tom Junct'n.	5.99	12.29	5 cents
Bay State to Bridge St.....	2.93	9.73	5 cents
Burt's Corner in Easthampton to Northampton.....	7.41	12.76	5 cents
Maloney's X'g to Northampton via Mt. Tom Junction.	9.24	14.60	5 cents

L. D. Pellissier, treasurer of the company, then presented detailed figures showing its operations from 1893 to 1909. They were printed and in two tables. The first gave statistics of the company's outstanding securities earnings, dividends, surplus and deficit, passengers carried, car miles run, miles of track owned, equipment, number of men employed, wages, rate of fare, etc. It showed a steady decrease in net earnings and net divisible income, with increase in traffic, car miles, wages paid and expenses. The second table gave the operating expenses in detail. Mr. Pellissier also submitted the accompanying tabulations of the present and proposed rates of fares.

Mr. Pellissier explained that the company desired to discontinue the sale of reduced rate tickets between Williamsburg and Northampton and between Northampton and Haydenville, in each direction. It also wished to establish a fare limit at Mt. Tom Junction, and to re-establish the old fare limit at the Easthampton-Northampton boundary line, near Meadow Park. He explained these proposed changes in detail.

Continuing, he said that the company began operating by electricity in 1893. At that time the capital stock was $150,000, and 4¼ miles of track were in operation, extending from Northampton to Florence, and a branch line to Bay State. In 1894 a line was extended from Florence to Williamsburg, about 6 miles; in 1895 a line was built from Northampton to Easthampton, 5 miles; and in 1898 the State Street and Bridge Street extensions were built. The rate to Williamsburg from Northampton was two 5-cent fares, a distance of nearly 9 miles; the rate from Northampton to Easthampton was two 5-cent fares, the distance being 5 miles. In October, 1899, the rate of fare on the Easthampton line was reduced from 10 to 5 cents. Up to 1900 16.5 miles of track were in operation and the investment reached $385,000. The capital stock was $300,000 and the floating debt and bonds amounted to $85,000. Mr. Pellissier stated that as the investment up to this time was small and the cost of operation low, the company earned good returns. During the years 1900 and 1901 a line was built from Northampton to Mt. Tom Junction and from Mt. Tom Junction to Easthampton Center, adding 8 miles of track. This construction, with requisite cars and power house equipment necessitated an additional investment of $275,000; and although the company gave the public better facilities and longer rides, the same rate of fare was charged as before. In 1902 the people of Williamsburg demanded a reduction of fare on that line, with the result that books of tickets were sold at the rate of 12 rides for $1, and also at the rate of 16 rides for $1 between Northampton and Haydenville, on the same line The effect of these concessions was emphasized in the statemer of operations, net earnings dropping off 22 per cent. in a sing year.

For the year ending Sept. 30, 1909, the gross receipts w $175,277, the greatest in the history of the road. The opera expenses were $160,720, which was usually large owing tc payment of $26,125 for damages. The fixed charges fo year were $29,022, making a total expenditure of $1(creating a deficit of $14,465. Assuming $6,125 to be

TABULATION OF PROPOSED FARES.

	Mileage half-trip.	Length of ride obtainable with transfer, miles.	
Williamsburg through Leeds..	4.00	....	5 cents
Williamsburg to R. R. station, Northampton	8.79	11.73	10 cents, no reduced tickets
Haydenville to R. R. station, Northampton	6.89	9.83	10 cents, no reduced tickets
Leeds to R. R. station, Northampton	5.36	8.30	5 cents
Florence to Mt. Tom Junct'n.	5.36	5.99	5 cents
Bay State to Bridge St.....	2.93	5.37	5 cents
Mt. Tom Junction via Easthampton, Burt's Cor., fare limit abolished.....	9.69	15.05	10 cents, with transfer; 4 tickets for 25 cents, without transfer
Northampton - Easthampton town line to Mt. Tom Junction via Easthampton.....	7.05		5 cents
Northampton - Easthampton town line to Northampton via Mt. Tom Junction.....	9.24	14.60	10 cents, with transfer; 4 tickets for 25 cents, without transfer

Fare limit at Maloney's crossing abolished.

yearly damage account, that being less than 3.5 per cent. of the gross receipts, which is less than the average in the State, the operating expenses would be reduced $20,000, making $140,720 a normal operating expense for the year, and a total expense for the year of $169,742, leaving the net divisible income $5,535. Had not the stockholders put in $110,000, thereby reducing the investment account by over $5,000, there would have been no return on the investment.

In conclusion Mr. Pellissier contended that most of the property had been in service 18 years, and incident to increase in age, replacements and renewals must be made in the immediate future. Five double truck cars were needed to replace those unfit for service; 5 miles of track must be renewed, and several boilers in the power station must be removed and new ones installed. This meant an expenditure of $70,000, most of which must be paid for out of earnings. With the reduction in the rates of fare on the Easthampton and Williamsburg divisions, the greater cost of operation and the increase in fixed charges, the margin of profit had become less from year to year, and now the company could barely pay expenses. In resuming the original rates of fare by withdrawing the sale of reduced rate tickets on the Williamsburg line, and re-establishing the old fare limit between Easthampton and Northampton, and making two 5-cent fare collections as formerly, and selling tickets, four rides for 25 cents, and in books of 25 for $1.50, without transfer privileges, the company expects to secure an additional revenue of about $9,000. The hearing was closed and the board took the case under advisement. It is expected that the board will render its decision at an early date.

POSSIBILITIES FOR ELECTRIC TRACTION IN JAPAN

In the opinion of an observant traveler who visited Japan recently, there is a large future in that country for electric railways as supplemental to the Government steam railroad system. This opinion is confirmed by interviews with a number of Japanese who are well informed on the situation. For a number of years, interrupted only by the exigencies of war, the national government has been taking over the steam railroads belonging to private corporations and has been building connecting links to complete the system. The Imperial Government railways now consist of 5248 miles of road. There are only 445 miles of road in the country under private ownership. These lines are widely scattered and have been built to serve private interests, such as mining propositions, rather than public needs. Ten years ago, Japan owned but 979 miles of the 3172 miles then in operation.

One reason for believing that the future roads will be largely electric is that Japan has many water-powers which are going to waste, and these powers could economically be used to operate electric feeders for the steam lines into districts which are not reached by them. These lines should be cheaply constructed for, apart from the rail, material is plenty and labor is cheap. Japan, for instance, is sending ties to both the United States and China. The Government now operates about 25 miles of trolley lines about Yokohama Bay and is extending these lines. The trolley cars use the same stations as the steam railroads in many places and connections are made between the two systems of transportation.

Another reason why electric roads are well suited to supply the needs in Japan is that the chief function of the steam railroads now is the transportation of passengers. According to the last report of the Imperial Government railways, the receipts from passengers were $18,786,865 and from freight were $14,651,808. The passenger business more than doubled during the year. There is provision for three classes of passengers, and an analysis of the earnings shows that the third-class passengers were carried at the rate of a little more than 0.7 cent per mile and that the average fare paid by each passenger of this class was about 15 cents. Certainly this is interurban traffic and the kind of business which can be best handled by electric lines.

THROUGH RUNNING AGREEMENTS IN ENGLAND

A very important factor in the development of British tramway undertakings, particularly in London and its environs, is the arrangements for leasing other lines and operating through routes over connecting lines. The value of through running as regards convenience to the public has become so well recognized that in recent years Parliament has approved the insertion in tramway bills of clauses authorizing through running facilities, and, failing agreement, a settlement by arbitration of all questions arising therefrom. As these agreements are similar to those made in the United States between city and interurban railways, it may be of interest to publish the following abstract of a schedule prepared for the Metropolitan (London) Association of Electric Tramway Managers by T. B. Goodyer, its honorary secretary, and also manager of the Croydon Corporation Tramways.

The Bexley District Council Tramways run over the London County Council Tramways from Wickham Lane Corner to Beresford Square, Woolwich, a distance of 1½ miles and pay 6d. (12 cents) per car-mile. This payment is subject to revision by arbitration at the end of two years. Bexley retains all fares collected in the London County Council area. The service began on July 25, 1908, and is to continue for about 15 years, when part of the Bexley system can be bought by the London County Council.

A similar agreement between the Croydon Corporation Tramways and the South Metropolitan Tramways Company provides that each authority shall receive its own local fares, and proportion of through and overlapping fares. All excess mileage is to be paid for at the rate of 3d. (6 cents) per car-mile. Each system uses about 2 miles of track belonging to the other. The Croydon corporation also has a system of through tickets with the London County Council, between Purley and London and intermediate points, on the basis that the amounts to be apportioned between the authorities shall be in accordance with the fare stages traversed in the area of such authority.

The East Ham Corporation Tramways has two agreements of this kind. In Barking, where 3450 ft. of track is used, East Ham retains the fares and pays Barking 2.25d (4.5 cents) per car-mile for the first 83,000 miles per annum, plus an amount of £641 ($3,118.40), being interest and sinking fund on capital expended. This latter sum is equivalent to 1.85 d. (3.7 cents) per car-mile. For all mileage over 83,000, a sum of 2.5 d. (5 cents) per car-mile only is paid. In Ilford 1640 ft. of track is used. Ilford receives from East Ham 6 d. (12 cents) per car-mile for all cars run over this section. Ilford supplies current and maintains the track and East Ham retains the fares. The 6 d. (12 cents) per car-mile is made up as follows:

	Pence.	Cents.
Power	1.90	3.8
Rates and taxes	.40	.8
Maintenance of track and overhead	.40	.8
Capital repayments on track and overhead	1.25	2.5
Contingencies	.25	.5
Estimated proportion of profits	1.80	3.6
	6.00	12.0

The West Ham Corporation Tramways operate in the East Ham area a distance of 4080 ft. West Ham pays to East Ham all receipts and receives back 4.937 d. (9.874 cents) for working expenses. At the close of the year, all receipts over 10 d. (20 cents) per car-mile, a figure representing the earnings on the section prior to through running, are divided, one-third going to West Ham and two-thirds to East Ham. East Ham cars are operated in the West Ham area from Green Street to Iron Bridge, a distance of 1 mile 4635 ft. Both authorities run through cars, and each receives all money paid for fares in its own area, and its proportion of through fares. Either authority running more than its share of mileage is paid for same at the rate of 1.15 d. (2.3 cents) per car-mile.

The West Ham, Leyton and Walthamstow tramways operate jointly a line in West Ham, 4257 ft.; in Leyton, 2 miles 1902 ft., and in Walthamstow, 3 miles 681 ft. At present the arrangement is only in the experimental stage and the cars run only on Saturday after 1 p. m. and all day on Sunday. The basis of

arrangement is that the receipts are pooled and divided according to the length of route in each district. So far the results obtained are of a most encouraging character. The three areas are considered as of equal revenue-earning capacity. Each party is responsible for accidents or damages caused by its own cars in whatever district they occur unless the accident is due to some defect in track or overhead equipment. No change is made in motormen or conductors.

A STREET CAR RIDE THE CHEAPEST SERVICE OR COMMODITY WE BUY

BY GEORGE H. DAVIS, OF FORD, BACON & DAVIS

A large part of the present antagonism against street car services of the United States is psychological. Cars are in the use of, sight of, hearing of or way of everybody every day. Consequently, nearly every one has a real or fancied grievance against the owners and their operators. There are services, however, where the value of a nickel is not given and punitive measures are fully justified; but, in view of the present costs of other services and things this is not a frequent occurrence.

All classes are patrons of car companies—the wealthiest family of the city and the poorest laborer working intermittently at $1.50 for ten hours. The wealthy can use their automobiles, the well-to-do hire taxicabs and the poor can walk. A good family automobile service, including the employment of an expert driver with maintenance of equipment, purchase of supplies, depreciation, taxes, insurance, damages, interest on the investment and other indirect items, costs not less than 50 cents per car mile—$15 per day for an average run of 30 miles, or $450 per month. If a man rides daily in his machine from his residence to his office or shop, a round distance of 10 miles, it has cost $5 carfare. If he makes the trip by taxicab his fare has cost 50 cents for the first mile and 40 cents for each additional mile.

The excessive amount of time consumed by carriage conveyance prohibits its use except by those whose time is unemployed or of very moderate market value. In the case of a day laborer working for 15 cents per hour and living 3 miles from his work, if he walks, consuming 40 minutes, his transportation has cost him 10 cents instead of 5 cents on a street car.

Another important item included in the 5 cents is accident insurance. If the company does not transport a passenger safely it has to pay all damages to him, while if he rides in his automobile or walks, he has to pay his own damages.

A street or steam car is the only conveyance in which a passenger can employ his time in reading business documents or other matter to practically as great advantage as in his office or home. This alone saves daily many high-priced men 200 times the insignificant carfare paid the street railway company and, as stated before, it saves even the unskilled laborer an amount equal to his car fare.

So much has been said in depreciation of street car service, both as to cost and quality, that many people actually believe that they are being grossly cheated every time they pay for a ride. Compare in a few points other than cost, the various available means of artificial city transportation; the automobile, carriage, omnibus and street car. The street car company furnishes with transportation electric light sufficient for reading. An automobile can be electrically lighted with storage battery if the cost is not a consideration. All city public conveyances such as taxicabs and carriages are without light. These conveyances are also without artificial heat. In regard to speed, with a given standard of safety to passengers, pedestrians and vehicles, street cars maintain a higher average rate than any city conveyance, private or public. This is possible because the cars are operated on a fixed trackage, the location of which other occupants of the street know and avoid.

There is the readiness-to-serve charge which is included in the nickel. In modern city operation, cars are at the constant disposal of patrons night and day. It would be expensive to maintain a carriage or automobile at a shop, office or residence for 18 to 24 hours and for 365 days. If the hours of a street car service could be reduced one-half, say from nine to 12 hours in the twenty-four, all the expenditures of the company except taxes, interest, depreciation and salaries of general officers could be correspondingly reduced. For a city of 100,000 population this would amount to at least $400,000 per annum; and for the entire country, $100,000,000. This is what the street railways pay to be ready to serve the people.

Steam railway passenger rates are extremely low comparing the service they render with that which is sold by merchants, manufacturers and others. The average receipts of all the steam roads of the United States reporting for the year 1907 was over 2 cents per passenger mile. Assuming that the average ride per passenger on street cars is 3 miles, this would give a fare rate to the street railway company of 6 cents,

AVERAGE DISTRIBUTION OF LIVING EXPENSES WITH INCOME OF $827.19, FROM BULLETIN NO. 71, BUREAU OF LABOR.

	1901		Per cent of Total
Fresh beef	$50.05	349.7 lbs.	
Salt "	5.26	48.6 "	
Fresh hog products	14.02	114.2 "	
Salt " "	13.89	110.5 "	
Other meat	9.78	77.7 "	
Poultry	9.49	67.7 "	
Fish	8.01	79.9 "	
Eggs	16.79	85.2 doz.	
Milk	21.32	354.5 qts.	
Butter	28.76	117.1 lbs.	
Cheese	2.62	16.0 "	
Lard	9.35	84.4 "	
Tea	5.30	10.6 "	
Coffee	10.74	46.8 "	
Sugar	15.76	268.5 "	
Molasses	1.69	3.6 gal.	
Flour and meal	16.76	680.8 lbs.	
Bread	12.44	252.7 loaves	
Rice	2.05	25.1 lbs.	
Potatoes	12.93	14.7 "	
Other vegetables	18.85		
Fruit	16.52		
Vinegar, pickles, etc.	4.12		
Other food	20.40		
Total food	$326.90		42.54
Rent	99.49		12.95
Mortgage:			
Principal	8.15		1.06
Interest	3.98		.52
Fuel	32.23		4.19
Lighting	8.15		1.06
Clothing:			
Husband	33.73		4.39
Wife	26.03		3.39
Children	48.08		6.26
Taxes	5.79		.75
Insurance:			
Property	1.53		.20
Life	19.44		2.53
Organizations:			
Labor	3.87		.50
Other	5.18		.67
Religious purposes	7.62		.99
Charity	2.39		.31
Furniture and utensils	26.31		3.42
Books and newspapers	8.35		1.09
Amusements and vacation	12.28		1.60
Intoxicating liquors	12.44		1.62
Tobacco	10.93		1.42
Sickness and death	20.54		2.67
Other purposes	45.13		5.87
	$768.54		100.00

while, as a matter of fact, including transfers and excluding interurban operation, it is less than 4 cents. In other words, the steam railways get 50 per cent more for their passenger service than the street railways, and their principal profits are realized in their freight service. This would mean, per year, to the street railways of the United States, based upon census returns of 1907, about $200,000,000 additional receipts applicable to dividends and surplus. This item is approximately four times all the dividends on all the stocks of all the street railways of the United States in 1907. The exact dividends amounted to $53,589,399.

Much is being said at present regarding the increased cost of living. In the time of Crœsus a fat ox sold for $1; a sheep for $0.20 and a bushel of wheat for $0.12. Various estimates on this subject have been made by political economists based upon the publications of the Department of Commerce and Labor and by economic and trade publications. According to tabulations in *Dun's Review*, for the period Jan. 1, 1897, to Jan. 1, 1907, the increase in the cost of commodi-

ties has been 42.6 per cent. On the other hand street car earnings per passenger have constantly decreased in the city service of the United States. In a typical city, for example Boston, earnings per passenger, including transfers, in 1898 were 4.27 cents and in 1908 3.15 cents, a reduction in 10 years of 1.12 cents, or 26.21 per cent. Operating costs per passenger including labor and material increased by nearly one-half in this period, while earnings per passenger have decreased by more than one-quarter. In other words, with only three-quarters of the earnings per unit the cost of the service is, in 1908, one and one-half times as much as in 1898.

What the public wants is not lower fares, but the maintenance of the present high standard of service, which will be impossible much longer even at present rates. Patrons not only have the right, but it is their duty, to specify through governmental channels the kind of service desired. They must, though, in fairness, pay for what they get. There is probably no electric railway company that would object to doubling the cars in the service or making them all Pullman coaches if it received full compensation with a profit of from 15 per cent to 30 per cent as is realized in other industries.

Based upon information furnished by 2567 workingmen's families having, in 1901, an average income of $827.19, as reported by the Bureau of Labor, Bulletin No. 71, the average costs per annum per family of 5.31 persons of the principal articles are as given in the table on page 825.

It is assumed that street car fares are included in the item of $45.13, expenditures for "Other purposes." Of this amount at least half must have been spent miscellaneously for things other than transportation thus leaving about 3 per cent of total expenditures, or $23.05 per annum, for car fares. That this assumption is in excess of actual expenditures for carfare is clearly indicated in a 1909 publication by the Charities Publication Committee by Robert Coit Chapin, "The Standard of Living Among Workingmen's Families in New York City." For example, Table No. 15, page 70, in general is as follows:

Income per annum (385 families)	Expenditures for car fare per annum Average	Per cent of total expenditures
$400 to $499	$11.94	2.6
500 " 599	9.80	1.8
600 " 699	11.31	1.7
700 " 799	10.53	1.5
800 " 899	15.86	2.0
900 " 999	13.79	1.5
1000 " 1099	18.46	1.8
1100 " 1199	20.74	1.9
1200 " 1299	27.61	2.2
1300 " 1399	14.72	1.1
1500 " 1599	18.27	1.2

The expenditure of $23.05 is approximately the same as spent for fruit, vinegar and pickles ($20.64); only one-fifth of that for meat and eggs ($119.28); about one-half that for beef ($55.31) and less than was spent for liquors and tobacco ($23.37).

As previously shown, based upon an average ride of 3 miles which, in a car, only requires 20 minutes as against 40 minutes on foot, the saving of time alone to the laborer getting $0.15 per hour is $0.05 per ride which is equal to his fare and transfer. If he employs his riding time in business reading he saves its value of $23.05 per year also. The expenditure of $768.54, as detailed, was for 1901 which, with an increase of approximately 38 per cent in costs in nine years would amount to $1,060.58, of which $23.05 for carfares would be less than 2.2 per cent. In the above, only the incomes and expenditures of 2567 workingmen have been considered. Street cars are, however, used by and operated for millionaires and persons of intermediate wealth and incomes to whom street car expenditures are so small in percentage of their total expenditures as to be almost negligible.

The Federal government has made no investigation to bring out the facts regarding the incomes of capitalists, nor how their incomes are derived. It is difficult, therefore, to estimate the annual income per capita of the urban population of the United States (to which this inquiry is directed), or of the general population which would be of interest in connection with other census facts and estimates.

Incomes are derived from two sources: (a) wages (including salaries, fees, retainers and all pay for services), and (b) interests and dividends (being rent paid for money and profits on capital invested).

There is no country in the world in which capital is worked so intensely as in the United States. In estimates made by the census office as reported in "Wealth, Debt and Taxation," Table No. 7, the capital or wealth of the country is assumed to be for 1900, $88,517,306,775; and for 1904, $107,104,192,410; classified as follows:

	1900	1904
Real property taxed	$46,324,839,234	$55,510,228,057
" " exempt	6,212,788,930	6,831,244,570
Live stock	3,306,473,278	4,073,791,736
Farm implements	749,775,970	844,989,863
Manufacturing machinery	2,541,046,639	3,297,754,180
Gold and silver coin and bullion	1,677,379,825	1,998,603,303
Railroads	9,035,732,000	11,244,752,000
Street railways	1,576,197,160	2,219,966,000
Telegraph systems	211,650,000	227,400,000
Telephone "	400,324,000	585,840,000
Pullman cars	98,836,600	123,000,000
Shipping and canals	537,849,478	846,489,804
Private water works	267,752,468	275,000,000
Private electric light plants	402,618,653	562,851,105
Agricultural products	1,455,069,323	1,899,379,652
Manufactured "	6,087,151,108	7,409,291,668
Imported merchandise	424,970,592	495,543,685
Mining products	326,851,517	408,066,787
Clothing and personal ornaments	2,000,000,000	2,500,000,000
Furniture, carriages, etc	4,880,000,000	5,750,000,000
Total	$88,517,306,775	$107,104,192,410

Based upon previous rates of increase the capital of the country now amounts to more than $144,000,000,000, or $1,600 per capita for a population of 90,000,000.

It has been previously estimated by Logan G. McPherson in his article, "The Farmer, the Manufacturer and the Railroad," published by the *North American Review*, that capital invested in agriculture earns about 9.8 per cent; in transportation 4.4 per cent; and in manufacturing 15.1 per cent. In this no account is taken of the profits derived from contracting, banking, mercantile, professional and miscellaneous businesses and capital thus engaged. At present, applying past rates of increase, there is probably an amount of capital exceeding $50,000,000,000 invested in real property other than agricultural lands, gold and silver coin and bullion, exceeding $3,000,000,000; street railways, light plants, telegraph and telephone systems, water works, canals, agricultural, mining and manufactured products, merchandise and miscellaneous, exceeding $24,000,000,000, a total of $77,000,000,000, upon which, at least, an average return of 6 per cent per annum is realized, which is only ordinary interest.

Based upon reports of the Interstate Commerce Commission Department of Agriculture and special census reports, and allowing for normal increases, the extent of capital invested in active farming at present is in excess of $35,000,000,000; in railroads, $15,000,000,000; and in manufacturing $17,000,000,000, a total of $67,000,000,000. The income derived from the entire capital or wealth of the country may be summarized as follows:

Agriculture	$35,000,000,000	@	9.8%	$3,430,000,000
Railroads	15,000,000,000	@	4.4%	660,000,000
Manufacturing	17,000,000,000	@	15.1%	2,567,000,000
Other capital	77,000,000,000	@	6.0%	4,620,000,000
Total	$144,000,000,000	@	7.83%	$11,277,000,000

Exclusive of salaries, wages and other sources of income and assuming the population of the country at present as above, this would be equivalent to an annual income per capita of $125.30, or $626.50 per family of five.

The average annual wages for all railroad employees were in 1907, about $640. Employees in manufacturing occupations, men, women and children, received in 1905, about $540. The wages for men alone, according to Census Bulletin No. 93, were $11.16 per week, or $580.32 per year.

Regarding wages in agricultural pursuits, there is no accurate information available. Agricultural wages are paid in cash, food products, fuel and housing. It is estimated that wages of men paid in cash would not be less than $20 per month, or $240 per year and in other items at least an equivalent amount, or a total of $480.

The Census Report of 1909 regarding occupations gives in

classified detail the number of persons then engaged in each, the main groups being as follows:

Agricultural pursuits	10,438,219
Professional service	1,264,737
Domestic and personal service	5,691,746
Trade and transportation	4,778,233
Manufacturing and mechanical pursuits	7,112,987
Total	29,285,922

Applying the same increase as to the general population, the present number is more than 35,000,000. In general, with the exception of those engaged in professional service (which group is comparatively small), and without taking into consideration incomes derived through ownership of property, the country's present wage income would appear to be in excess of $21,000,000,000 which, with an income on account of property ownership of $11,277,000,000, a total of $32,277,000,000, would give an annual income per capita of $358.63, or $1,793.15 per family of five persons, nearly $1,800, or $150 per month.

Owing to the constant change of values, persons possessing great fortunes can only estimate their extent or the net income derived from their investment. In "Consumption of Wealth, Individual and Collective" by Hitchcock, it is stated, based upon census figures of 1890, that 1 per cent of the families of the nation receive 25 per cent of the income. There is, no doubt, in the United States, a group of individuals each having an annual income of, or at least each becomes richer annually by, an amount in excess of $50,000,000. One per cent of the entire population is 900,000 and 25 per cent of the total annual income of $32,277,000,000 is $8,069,250,000. This is at the rate of $8,965.83 per capita and leaves for the remaining population of 89,100,000, an income of $24,207,750,000; $271.70 per capita, or $1,358.50 per family of five. If the wealthy were eliminated and the companies had to rely upon 99 per cent of the population with an expenditure of as much as $27.16 instead of $23.05 per family or 2 per cent of the average income as shown, this service would then not only be the cheapest thing we buy, but would be one of the smallest of our expenditures.

CONSTITUTIONALITY OF CORPORATION TAX LAW

An account was published in the ELECTRIC RAILWAY JOURNAL for Feb. 12, 1910, of the suit before the United States Supreme Court of Wyckoff Vanderhoef, a stockholder in the Coney Island & Brooklyn Railroad Company against the company asking that the company and its officers and directors be restrained from paying the Federal corporation tax. Mr. Vanderhoef claimed that the law was unconstitutional, and as he was the holder of 10 shares of stock in the company he would be injured if the payment was made. Mr. Vanderhoef's counsel are Messrs. Linderbury, Pierson and Cox, of Alexander & Green, of New York. The attorneys for the company are Messrs. Dykman and Goddard, of Dykman, Oeland & Kuhn, of Brooklyn. Briefs for the appellees, the company, and appellant, Mr. Vanderhoef, have been filed with the court. A short statement of the most important claims made in each is presented herewith.

BRIEF IN FAVOR OF THE TAX

The first point made by Messrs. Dykman and Goddard, counsel for the appellees, is that the tax in question does not involve an unconstitutional interference with the sovereign powers and functions of the States. The tax must be paid by joint stock companies and associations, as well as corporations, showing that it was not the intention of Congress to tax merely corporate franchises, that is, the rights derived by the corporation directly from the States, although even if the corporate franchises of a State corporation were taxed, the act would not be an interference with the sovereign powers and functions of the State as there is nothing in the Constitution of the United States to prevent Congress from laying a tax of that kind. All restrictions imposed by the Constitution, arising from the dual nature of the system of government in this country, are confined to matters which have to do with the strictly governmental powers and functions of the several States. Counsel refer to the tax on State bank notes, the oleomargarine tax and the inheritance tax as among those which cannot be distinguished in principle from the present case, so far as interference with the sovereign rights of the several States are concerned.

The second point made is that the tax in question, even if in some respects an income tax, is not a direct tax within the meaning of the Constitution. The claim is made that the tax is invalid because it is an income tax. But this is not sufficient. It should be shown to be an income tax similar in nature to the tax held unconstitutional in the Income Tax Cases, that is, a direct tax. The fact that the corporation holds real estate and derives part of its profit from these holdings does not make the tax a direct tax any more than an inheritance tax which the Supreme Court has held need not be apportioned among the several States, even where the inheritance is measured by the value of real estate. Again, corporations are entirely the creation of law, and their right to hold real and personal property is entirely unlike that of persons. The tax should therefore be considered an excise tax on the privilege of doing business by corporations and joint stock companies.

The third point made in the brief of the appellees is that the tax imposed by the act is "uniform" and does not deprive any corporation or association of its property without due process of the law. The only provision of the Federal Constitution, aside from the exception of exports, which limits the absolute right of Congress to lay and collect taxes, duties, imposts and excises for the purposes mentioned in Article 1, section A, of the Constitution is that the duties, imposts and excises shall be uniform throughout the United States. The tax is uniform as it applies with the same force and effect in every State in the Union. To argue that the tax is invalid, because it taxes property without due process of the law and that the want of due process is because the tax is invalid is to argue in a circle. If the tax is valid, there is no want of due process of law. If it is invalid, it must be for some defect in the tax as a tax, but the only possible defect would arise from want of geographical uniformity which is not claimed. Uniformity does not mean equality, because if the tax were equally distributed geographically it could not be uniformly distributed. Nor is it the province of the judiciary to inquire whether the excise is reasonable in amount, or in respect to the property to which it is applied. Those are matters in which the legislative determination is final.

The fourth point made in the brief is that a tax upon the franchises or business of State railroads or public service corporations is not an interference with governmental functions or instrumentalities of the States, and is valid. If there was any doubt upon this subject, it was settled by the decision of the United States Supreme Court that if a State choose, as some of the Southern States have done, to enter into the business of selling liquors, its agents and property employed in this business were subject to Federal taxation. And the Supreme Court at that time clearly drew the distinction between properly governmental functions of States and their quasi-private functions. In the same way, if a State should engage in other business, subject to taxation, such as that of importing foreign goods, the imports would be subject to the national law.

The final point made by the counsel for the Coney Island & Brooklyn Railroad was that even if the tax should be held unconstitutional in some respects, the main purpose of the Act, being clearly within the powers of Congress, should be upheld. In this respect, the case is entirely dissimilar from the Income Tax Cases where it was held that the income derived from real estate and invested personal property and State or municipal bonds was so vitally of the essence of the Act that the tax could not be sustained as an excise tax on income derived solely from business or occupation and therefore, that the whole must fall. But in the present act Congress had clearly in mind an excise tax upon the business

done by corporations and associations and even if the Supreme Court should hold that the method of measuring the tax by net income from all sources as unconstitutional, yet the income derived solely from actual business may properly be taxed under the present Act.

THE CASE OF THE APPELLANTS

In the brief for the appellants, the case of Mr. Vanderhoef against the Coney Island & Brooklyn Railroad Company was combined with that of a stockholder of the Home Life Insurance Company against that company and its officers to restrain them from paying the corporation tax. The counsel for the appellants in both cases are the same. The argument in the case against the Home Life Insurance Company et al. differs in some respects from that in the case against the Coney Island & Brooklyn Railroad Company et al., because, among other reasons, the greater part of the assets of the insurance company are invested in real estate, United States Government bonds, bonds of individual States and municipalities and in real estate bonds and mortgages. Some of the principal points made in the brief, so far as they relate to the railway case, follow:

The first point made is that the tax is not an excise tax upon business or occupation, but is either (a) a corporate franchise tax, or (b) an income tax.

In the body of the act the tax is described as "a special excise tax with respect to the carrying on or doing business" by corporations, joint stock companies and insurance companies on which it is imposed." These words, the counsel say, were taken verbatim from the opinion of the United States Supreme Court in the case of the Spreckels Sugar Refining Company, where a tax was imposed on corporations carrying on the business of refining sugar. But this latter tax should not be considered a precedent to the one under consideration, because (1) it applied to persons and firms as well as corporations and (2) it related to income obtained from a particular business and not that received from all sources. The proposed corporation tax does not vary reasonably with the value of the business and authorities are cited to prove that a tax on all persons irrespective of their calling, measured upon a percentage upon their income, is not an excise tax on business, but is essentially an income tax. This is also shown from the fact that the tax applies to profits derived from exporting, and from business done in various countries, neither of which can be taxed by Congress as a business.

The second point made is that if the tax is construed as a franchise tax, it constitutes, so far as State corporations are concerned, an interference with sovereign powers and functions of the States not surrendered to the general government and expressly reserved to the States by the Tenth Amendment.

Counsel for the appellant believe that if the tax is not an income tax, as suggested in the first point, it can only be a franchise tax on the privilege of doing business within the United States. Congress has the right to tax corporations organized under the Federal law, but not corporations chartered by the State which do only an intrastate business, because the power to tax involves the power to destroy and if Congress can impose a tax of 1 per cent it can impose a tax of 10 per cent or 50 per cent. The right of the States to grant charters of incorporation is unquestionable and inherent in the sovereignty of the States. The Federal inheritance tax is not a precedent to the interference with these internal rights of the State because the inheritance tax falls on the transmission or transfer of property and not on any privilege granted from the State. The inheritance laws of the States simply describe the channels in which the transmission of property shall flow. There was also no question of a franchise or privilege from the State involved in the South Carolina liquor case, as this tax was a tax upon the business of selling liquor. If the proposed tax is upheld, representatives from States where an anti-corporation feeling is high, if their views are supported by a majority in Congress, can interfere with the intrastate business of other States, a condition which the founders of the government sought carefully to avoid.

The third point in the brief is that if the tax is construed as an income tax it is unconstitutional (a) because imposed upon income from real estate and personal property and, therefore, a direct tax not apportioned among the States according to population, and (b) because imposed upon income from State and municipal securities and, therefore, a burden on the borrowing power of the States. As these are essential and inseparable parts of the taxing scheme, the tax must fall as a whole.

In elaborating this point the brief says that if the words "special excise" and "with respect to the carrying on or doing business by such corporation, joint stock company or association or insurance company" should be stricken from the law it would become entirely an income tax. But these words are simply descriptive and do not change the nature of the tax. The brief points out also that substantially all of the income of the Coney Island & Brooklyn Railroad is derived from the use of real and personal property and from the exercise of franchises which by the laws of the State of New York are defined to be real estate.

The fourth point made in the brief is that the tax ordained by the act in question is non-uniform, arbitrary and unequal, and if imposed and enforced would deprive the corporations and joint stock associations against which it is levied of their property without due process of law contrary to the provisions of the fifth amendment of the constitution.

Congress, the brief says, may impose an excise tax upon the carrying on a particular business when exacted from all persons, copartnerships and corporations engaged in the business because then no inequality is involved. But any classification for taxing purposes is most unreasonable, arbitrary and vicious which includes some members of a class engaged in a competitive business and excludes others of the same class. The present act exempts fraternal benefit societies or associations operating under the lodge system, and domestic and loan associations. The latter engage in business solely for the profit of their members, and fraternal benefit associations operating under the lodge system do not differ in principle from a mutual life insurance association. There are other exceptions provided for in the act which render it unequal.

The fifth and final point in the brief of Mr. Vanderhoef's counsel is that whatever view may be taken of the act in other aspects, it must be held unconstitutional, so far as it imposes a tax on the franchises or business of State railroads or other public-service corporations, because an interference with State agencies or instrumentalities.

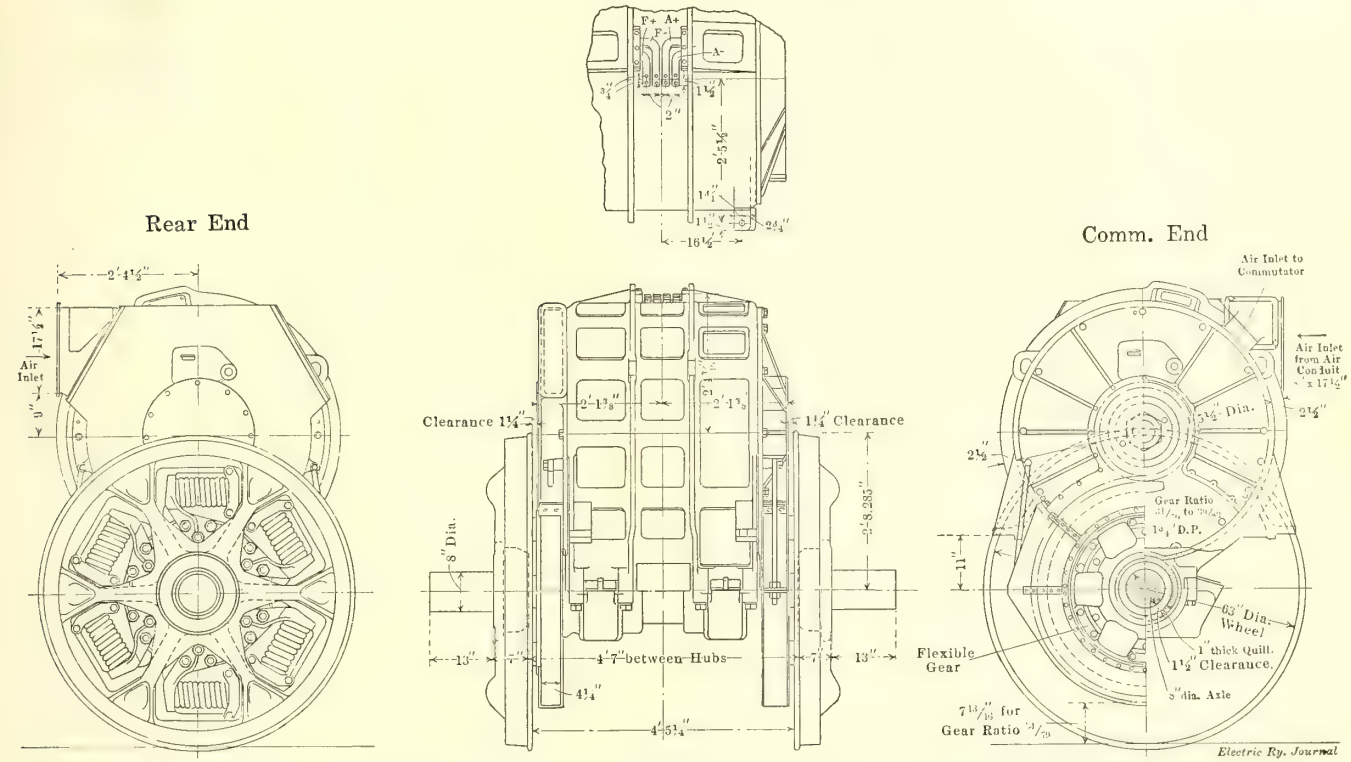
The franchises of intra-state railroad corporations like the Coney Island & Brooklyn Railroad Company are conferred by a State for public purposes. These corporations are formed, in part at least, for the purpose of aiding the State in the discharge of a governmental function; viz., to provide means of transit and intercommunication for its citizens and troops. Their business is of a public character, subject to regulation by the State in the public interest and not to be abandoned without the State's consent. They are controlled or are controllable in all their operations by the State, which has the right, not infrequently exercised, of fixing the rates they shall charge and prescribing in detail the service they shall render. In exercising the power of eminent domain, they exercise a power and perform a function of the State which charters them. The exercise of this power is part of their business. With some of them it doubtless constituted a part of the business transacted during the year ending Dec. 31, 1909, which is what the act purports to tax. Even if a person should concede the right of the general government to tax the property of these corporations as distinguished from their franchises or business, it is difficult to perceive how Congress can tax their franchises or business without violating the well-established principle that neither the general government nor a State can tax the agencies or instrumentalities of the other.

The London County Council Tramways report that the traffic receipts for the year ending March 31 were £1,845,444 from electric and £122,505 from horse tramways, making a total of £1,967,949, compared with £1,801,477 in the previous year.

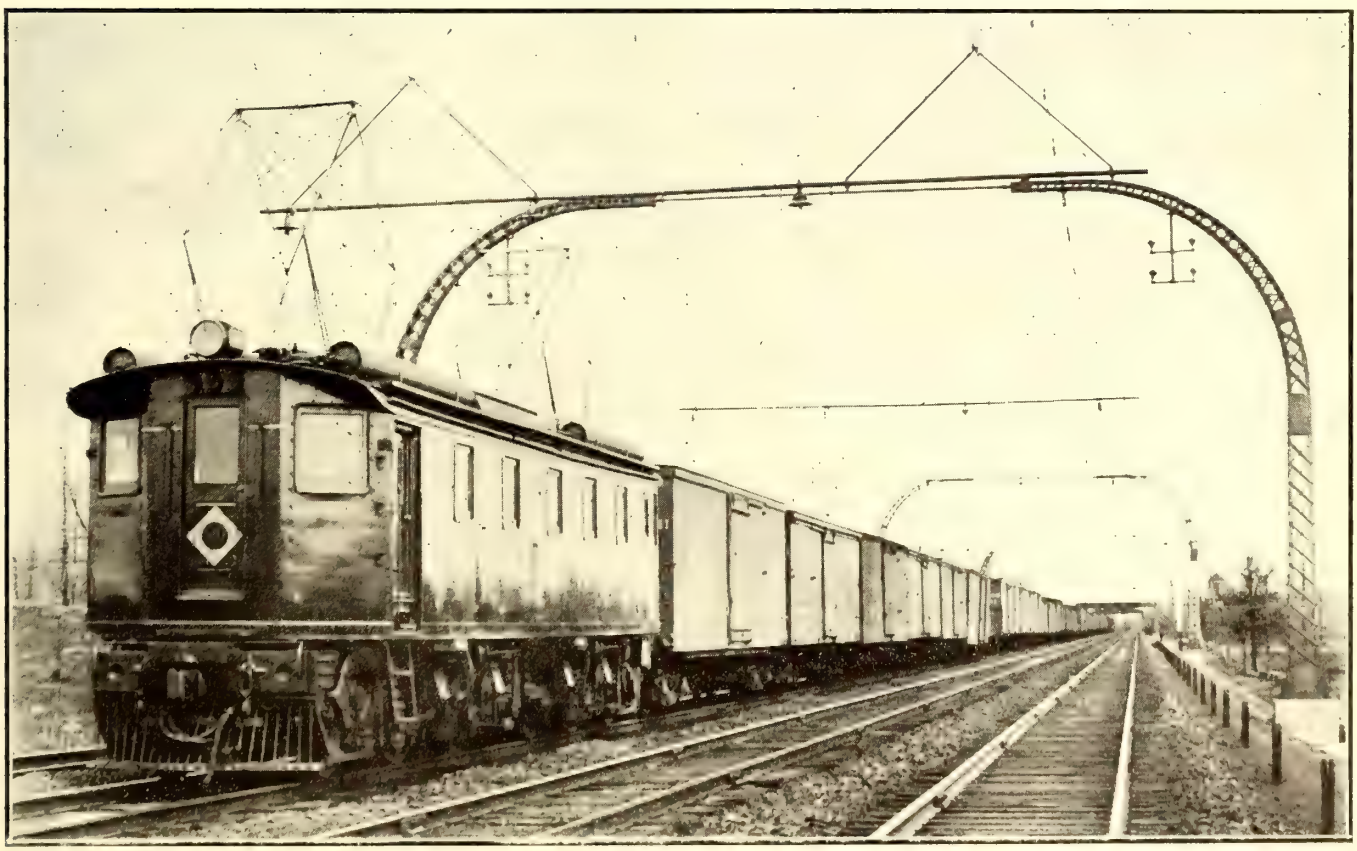
NEW HAVEN ELECTRIC LOCOMOTIVES

The New York, New Haven & Hartford Railroad on March 18 completed the first series of trial runs in freight service with electric locomotive No. 071. This locomotive which was described in the ELECTRIC RAILWAY JOURNAL of Sept. 25, 1909, is of the articulated truck type with four driving axles and a swiveling pony truck at each end. Each pair of driving wheels is geared to a 350-hp single-phase motor, mounted on top of the truck frames above the driving axle. The most novel feature of the locomotive is the method of mounting the driving gears on the wheel centers. The details of this mounting are shown in the accompanying engraving.

A pinion with 34 teeth is mounted on each end of the armature shaft and engages with a gear of 79 teeth. The gear is secured to the circumference of a spider casting, mounted on a hollow shaft or quill 13 in. in outside diameter, which surrounds the driving axle with 1½ in. clearance space between.



New Haven Freight Locomotives—Motors and Gearing of Geared Locomotive



New Haven Freight Locomotives—Geared Locomotive Hauling Long Freight Train East of Stamford, Conn.

This quill turns in bearings formed in the bottom of the motor frame. The driving wheel centers have six spokes suitably formed to serve as spring pockets for the six helical springs which are mounted on arms bolted to the outside face of the gear spider casting. The torque of the gear is transmitted through these springs to the driving wheel center. The springs are mounted so that three are in compression in either direction of rotation of the gear. This arrangement substitutes quill bearings on the motor frame for the usual axle bearings and relieves the axle of all bending stresses. This allows for vertical movements of the axle with respect to its motor. The manufacturer's and service tests of this experimental geared locomotive have proved this driving mechanism to be very rugged and otherwise satisfactory.

In designing this locomotive the aim was to build a unit which could haul freight trains up to 1600 tons weight at 35 m.p.h. and could also be used to haul heavy passenger trains of 800 tons weight at a speed of 45 m.p.h. For this reason it was equipped with both a.c. and d.c. collecting and control apparatus to enable it to be run over the New York Central third-rail tracks into the Grand Central station. There have been incorporated in its construction all of the improvements which have been made from time to time in the New Haven passenger locomotives and no serious mechanical or electrical troubles have developed since it was put in service. The ratio of continuous capacity of the motors to their hourly capacity which is very high in the passenger locomotives has been considerably exceeded in the freight locomotive owing to slight changes in the design and better ventilation.

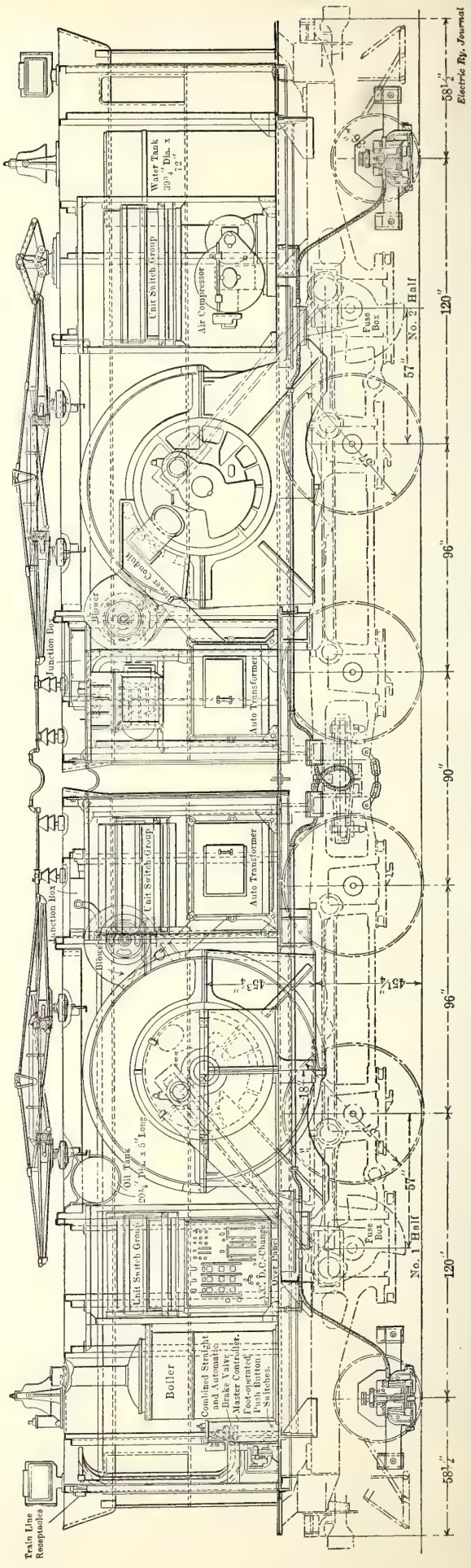
Before leaving the works of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., the locomotive was tested for tractive effort on both alternating current and direct current. It developed a maximum tractive effort at the rail of 51,000 lb. and started and accelerated a train of coal cars weighing 2100 tons on a 0.5 per cent grade. On Feb. 12, the locomotive began a service test of 2000 miles hauling regular freight trains between Stamford and New Rochelle, 17 miles. The electric locomotive was coupled in front of the steam locomotives which were allowed to drift. Regular trips were made every day; the daily runs were between 100 and 120 miles with no road failures. At no time was the capacity of the motors fully taxed and the speeds attained were limited only by the fears of the operating department. It is believed that the present running time of freight trains between Harlem River yards and Stamford can be reduced nearly 50 per cent when the Harlem River branch is electrified below New Rochelle. While rapid acceleration is not so important in freight service as in passenger service the results attained with this locomotive are interesting as an index of its reserve power. With a trailing load of 1600 tons the locomotive accelerates at the rate of 0.2 m.p.h.p.s., attaining a speed of 12 m.p.h. at the end of one minute. With an 800-ton train which is equivalent to 12 heavy passenger cars the rate of acceleration is 0.45 m.p.h.p.s.

This geared locomotive will also haul heavy passenger trains between Grand Central Station and Stamford, 33 miles. Further endurance runs will be conducted in this service which will test the d.c. control apparatus and the general performance of the locomotive at higher speeds.

SIDE ROD LOCOMOTIVE

A second experimental a.c. freight locomotive of the side-rod type is nearing completion at the Westinghouse works and will be delivered to the New York, New Haven & Hartford Railroad for test within a short time. The general arrangement of this machine is shown in the engraving on this page. The mechanical details were designed and built by the Baldwin Locomotive Works, Philadelphia.

The locomotive consists of two separate units each complete in itself, but designed to be operated in pairs. Each unit comprises two pairs of driving wheels and a leading pony truck mounted in a forged frame of the locomotive type. An a.c.-d.c. motor of 750 hp is mounted on top of the frame



New Haven Freight Locomotives—Side Elevation of Side Rod Locomotive

with its center line 18 in. in the rear of the forward driving axle. Forward of the front driver is a jack shaft extending across between side frames and carrying on each end a crank arm and counterweight casting. The motor shaft has a crank arm keyed to each end and connecting rods on each side extend down through the cab floor to the jack shaft crank arms. The two driving wheels on each side are coupled to the jack shaft crank pin by locomotive side rods of the ordinary type. The driving mechanism is almost exactly the same as that employed in the Pennsylvania Railroad Company's tunnel locomotives, described in the ELECTRIC RAILWAY JOURNAL of Nov. 6, 1909, page 982.

The auxiliary apparatus on the locomotive is distributed between the two halves of the cab but each unit is supplied with independent current collecting devices for both a.c. and d.c., ventilating blower, auto-transformer, unit switches, controller and change-over panel. Either motor may be operated without the other. A boiler for furnishing steam for the steam heating of passenger trains and an oil tank are mounted in No. 1 half, while the air compressor and a water tank are mounted in No. 2 half. The location of all of the principal apparatus is indicated on the drawing.

MEETING OF ARKANSAS PUBLIC UTILITY OPERATORS AT PINE BLUFF

The third annual convention of the Arkansas Association of Public Utility Operators opened at Pine Bluff, April 27, with about 50 members present, the majority of the properties represented being the central stations of the State. The membership includes, however, gas, water and street-railway companies as well. The president of the association, B. C. Fowles, in reviewing the events of the past year, mentioned an adverse decision of the State courts which requires central-station and other public-service corporations to continue furnishing service to customers who are delinquent in payment. A favorable court decree within the last year sustains the right of the electric companies to charge a minimum amount monthly for each meter connected. The speaker said that careful investigation by the public of the actual conditions under which the average utility is operated would result in a less critical and more tolerant attitude toward the public-service companies. The large place which the behavior of these companies occupy in the thoughts of the people is reflected in the recent reform platform elected in Milwaukee, where nine out of the 21 planks enunciated by the successful party relate to the regulation of public-service corporations. The benefits resulting from commission rule of these companies are often unequal to the expense involved upon the taxpayers, while the commissions themselves are too frequently given unlimited power and bear too close an association with politics.

Thursday morning's session opened with a paper on "The Effect of Natural Gas Upon Municipalities," by W. L. Wood. After discussing briefly the technics of natural-gas transmission and distribution, Mr. Wood referred especially to its effect as a competitor with other forms of light, heat and power.

D. A. Hegarty, general manager of the Little Rock Railway & Electric Company, next laid before the convention a paper outlining "A Law for the Prevention of Theft of Electricity, Gas and Water from Public-Service Corporations." The only present law bearing on this subject in Arkansas is one prosecuting wire-tapping, which is not effective in cases of theft of energy or tampering with meters. Theft is most prevalent in the case of electric supply on account of the ease of unauthorized connections. Loops around meters, taps ahead of the meters, tightened jewels and magnetic braking of meter elements are some of the common offenses. As protection against these methods it is now the local practice, so far as possible, to set meters directly at the service entries, to make careful inspections at intervals of from 60 to 90 days, and to scrutinize all bills carefully for unusual variations in consumption. Mr. Hegarty read, and suggested for local enactment with some amendments, the present law in force in the State of New York, which imposes one year's imprisonment or $500 fine, or both. To the terms of this ordinance, Mr. Hegarty proposed additions covering the wasting of electricity and tampering with the indications of meters. Under the proposed law anyone aiding, abetting or counseling the theft of energy is made equally guilty with the principal, while proof that the act was done on the customer's premises or that he received benefit therefrom is taken as *prima facie* evidence of guilt. To guard against theft of electricity W. L. Wood proposed to use metal-enclosed block terminals in all downtown installations. Mr. Hegarty told of the use of pole-mounted meters in suspected cases, and J. E. Cowles advocated the use of conduit enclosing all service wires up to the meter, which should be set in some standard place. It is planned to draw up an energy theft bill which the Arkansas Legislature will be urged to enact into a law when it meets next January.

At the afternoon session, Louis Friedman read a paper on "Modern Apparatus for Street Illumination," in which he discussed series tungsten and luminous-arc street lighting. J. D. A. Cross next read a paper on "The Extension of the Electric Heating and Cooking Device Business." Felix Borden presented a paper on "Illumination from a Contractor's Standpoint," which discussed the general and special lighting of buildings. Mr. Borden described the effects of various reflecting globes, and the walls and ceiling reflections from room interiors. In lieu of a paper by L. E. Sawyer, of Hot Springs, on 'Opinions of Various Cases in Various States," Secretary Cowles read a paper on "Public-Service Corporations." An interpretation of the recent court decision handed down in Arkansas which requires public-service companies to continue furnishing service after the customer has become in arrears in payment, included in the paper, was to the effect that this ruling does not apply after efforts have been made to collect the account by suit or otherwise. This paper also discussed the doctrines of the "fellow-servant" law and "assumed risk" as applied to public-service corporation affairs, and urged the appointment of a legislative committee to exercise its efforts for the passage of the best corporation laws. W. J. Thorp read a paper on "Customers' Accounts," in use by the Little Rock Railway & Electric Company, and which are based upon those of the Commonwealth Edison Company of Chicago and other Edison illuminating companies. The association passed a resolution approving the use of the T-rail as the standard for street railway track construction.

Following the close of the regular program the present officers of the association were re-elected by acclamation, and instructed to take steps looking toward the combination of the Arkansas association with the public-utility operators of Mississippi and Tennessee. Such a tri-state organization, if effected, will, it is believed, take a strong place among the similar associations of the country. L. G. Van Ness and V. A. Henderson, of the Merchants' Power Company, of Memphis, Tenn., who were present, gave the Arkansas operators a cordial invitation to join in making a single strong public-corporation association in the States above named. The officers and executive committee unanimously re-elected were: President, B. C. Fowles, Pine Bluff; treasurer, E. Hardin, Hot Springs; secretary, J. E. Cowles, Little Rock. Executive committee: D. A. Hegarty, Little Rock; W. J. Thorp, Little Rock, and W. C. Maguire, Arkadelphia. The legislation committee comprises D. A. Hegarty, E. Hardin and W. L. Wood, of Texarkana. The place and date of the next meeting will be announced later.

On Thursday evening, as the guests of the Citizens' Light & Transit Company, of Pine Bluff, the Pine Bluff Corporation and the Pine City Electric Company (a local contracting firm), the members of the association enjoyed a trolley ride out to Forest Park, where a Dutch lunch was served. Matters of entertainment were in charge of a committee consisting of B. C. Fowles, T. Y. Murphy and J. R. Bloom. During the convention the blue badges of the association were honored for transportation on the city street car lines and for admission to the local places of amusement.

MEETING OF THE COMMITTEE ON SHOP ACCOUNTING IN NEW YORK

A meeting of the committee on shop accounting of the American Street and Interurban Railway Engineering Association was held at the headquarters of the association in New York on Friday, April 29. Those present at the meeting were P. S. Young, comptroller of the Public Service Railway Company, Newark, N. J.; Charles Hewitt, superintendent of motive power, Philadelphia Rapid Transit Company; M. R. Boylan, auditor, Public Service Railway Company; Frank B. Lasher, traveling auditor of the New York State Railways; N. E. Stubbs, auditor of the United Railways & Electric Company, of Baltimore, and H. H. Adams, superintendent of rolling stock and shops, Metropolitan Street Railway Company. Mr. Young is chairman for the accountants. Messrs. Adams and Boylan are not members of the committee, but have kindly given their help.

The meeting opened with a discussion of the revised list of sub-accounts of rolling stock and shops sent in by John Lindall, superintendent of rolling stocks and shops of the Boston Elevated Railway Company. This report was discussed by Mr. Adams, who said that it was along the same general principle as his own system of job numbers. He did not believe that it would be possible to make a cast-iron schedule which would be followed by everybody, but it should be possible to develop a general method which could be used as a guide. Mr. Adams assumed the case of a typical car and said he would take various sub-divisions to cover different classes of work on the same. Thus, he would use job numbers 3201 to 3210 for painting, 3211 to 3220 for wood-working, and so on.

Mr. Hewitt said that the method of naming the sub-accounts was a matter that could easily be fixed. He had no objection, for instance, to using numbers along the lines proposed by Mr. Adams instead of letters like A, B, C, D, etc. Mr. Young said that what was wanted was not an extraordinary number of sub-accounts, but a method of getting the detailed costs in following up a given job like that of equipping a car. Mr. Adams thought that the recommendations for sub-accounts could be submitted to the classification committee for further action. Mr. Young said that in the meantime separate job order forms or authorization blanks might be devised for finding the costs of different classes of work. Messrs. Young and Boylan in this connection submitted the job order forms of the Public Service Railway Company.

It was agreed that the schedules of sub-accounts presented by Messrs. Lindall and Adams could be used as a suitable basis for working out a system of detailed cost accounts. Upon the suggestion of Mr. Young, a sub-committee consisting of Mr. Adams, Mr. Lasher and Mr. Boylan was appointed to work out a job number system, and to submit a set of forms in connection therewith for rolling stock and shop work. Mr. Stubbs was requested to make a special study of mileage records and forms for submission to the committee.

The committee found, in discussing the question of detailed costs in track work, that the standard classification is ample for that purpose, without any further sub-division. It was therefore decided to recommend the use of the standard classification divisions and titles for finding detailed track costs.

Mr. Hewitt then presented his sub-division of power house and sub-station accounting. He had made several changes from the schedule originally presented to bring it into conformity with the standard classification. Referring to account No. 51, covering fuels, such as coal, natural gas, crude oil, Mr. Young said he did not believe a comparison of accounts based on costs per kw.-hour was enough. There were so many other conditions which affected the result that if a company wanted to find what fuel was best for its purposes, it would have to make special experiments under fixed conditions. It was decided, however, that it would be advisable to sub-divide account 51 to cover different kinds of power generation. Mr. Hewitt was of the opinion that account No. 53, covering lubrication, was really too small to be a primary account. Speaking from the auditor's standpoint, however, Messrs. Young and Stubbs thought that this account was very desirable, even though small, because it was one that could very easily increase unless carefully watched. Mr. Hewitt admitted that through keeping a separate account of lubrication costs the Philadelphia Rapid Transit Company had been able to cut down this item to one-third of its former proportions.

There was some discussion between Mr. Hewitt and Mr. Young as to whether the sub-division proposed by the former really would lead to the obtaining of detailed costs. Mr. Hewitt explained that because rolling stock and shops covered such an immense field, a great number of job orders were required aside from the sub-accounts. This was not the case in power accounting because the items were comparatively few. The committee finally agreed that the sub-divisions presented by Mr. Hewitt were satisfactory, and it was decided to use his report as a basis for recommendations on power plant and sub-station accounting.

It is expected that the next meeting of this committee will be held some time in June, after the sub-committees have arranged their data on rolling stock and shop accounting.

MEETING OF COMMITTEE ON POWER DISTRIBUTION

On Wednesday, April 27, there was held at the headquarters of the American Street & Interurban Railway Association, in New York, a meeting of the committee on power distribution of the Engineering Association. The members of the committee present were James Heywood, chairman, superintendent of lines and cables, Philadelphia Rapid Transit Company; E. J. Dunne, superintendent of distribution, Public Service Railway Company, New Jersey; A. F. Hovey, cable engineer, Interborough Rapid Transit Company, New York. On invitation of the committee, there were also present at the afternoon session the following representatives of trolley wire manufacturers: Arthur G. Warren, of the American Steel & Wire Company; C. C. Baldwin, Standard Underground Cable Company, and H. J. Horn, of John A. Roebling's Sons Company.

Discussion was had on the revision of the present specifications on paper insulated cables, and it was decided to make these revisions after corresponding with the manufacturers of this material. It was decided to start the work of standardizing dimensions and quality of some lines of material used in overhead construction. At the afternoon session, the subject of specifications for hard-drawn copper wire was taken up with the representatives of manufacturers. The report of committee "W," of the American Society for Testing Materials, was discussed, and certain revisions, which are contemplated in this report, commented on. The subjects of conductivity, tensile strength, elastic limit and surface seams, brazes, and the necessary tests to determine these qualities were gone into. At the close of the meeting the manufacturers' representatives were extended the thanks of the committee for their presence and assistance.

CABLE BREAKDOWNS ON THE INTERBOROUGH SYSTEM

Through the courtesy of H. G. Stott, superintendent motive power, Interborough Rapid Transit Company, the following record of high-tension cable breakdowns on the 11,000-volt distribution system of that company from January, 1904, to January, 1910, is available.

Year	Miles of Cable	In Joint	In Bend	In Cable	External Causes	Total	Number Per Year Per Mile*
1904	330	1	0	1	1	3	.61
1905	351	0	0	1	0	1	.28
After Grounded Neutral Installations:							
1905	351	0	1	1	0	2	.57
1906	353	3	0	3	5	11	1.70
1907	353	1	0	0	5	6	.28
1908	368	1	0	0	4	5	.28
1909	371	3	0	1	5	9	1.08
Total		9	1	7	19	36	

* Excluding external causes.

Note:—External causes include mechanical injury, steam leaks and armor burns from other cables.

MUTUAL INSURANCE IN GERMANY AGAINST ACCIDENTS TO EMPLOYEES

The last report of the accident insurance association of the German street railway companies presents some interesting statistics on accidents to employees in that country. In accordance with the workmen's protection law of Germany, during the first 14 weeks of an employee's disability he is supported from a sick benefit fund to which the employees are the sole contributors. After that time the burden of his support falls upon the employer. Hence the employers in different trades have organized accident associations, of which one of the largest is that comprising the street and interurban railway companies.

This organization, known as the Strassen-und-Kleinbahn-Berufsgenossenschaft, had at the end of 1907 441 company members, divided into five classes according to their risk factors. As originally arranged these five classes were: Class A, city horse-car lines and mountain railways, danger factor 10; Class B, electric railways, danger factor 13; Class C, steam street railways and lumber roads, danger factor 20; Class D, steam branch lines, danger factor 30; Class E, suburban horse-car lines, danger factor, 35. The actual danger factors per 1000 employees for the years 1904 to 1907, inclusive, were as follows: Class A, 6.22; Class B, 6.82; Class C, 9.49; Class D, 22.87; Class E, 11.59. It is now proposed to revise the danger factors so that the electric lines in Class B will not have to carry an unfair proportion of the burden.

At the end of 1907 the number of employees for which the association was responsible was 97,989 earning $21,220,092 annually. Reduced to a "full-time" basis of 300 working days of 10 hours each the number was 69,465. The average annual payment was $2.30 per name enrolled, or $2.68 for every $250 in wages. The annual cost of accidents per name enrolled was $1.95 and $2.25 per $250 in wages. There were 5128 accidents in 1907, which would be equivalent to 73.82 injuries per 1000 "full-time" employees. In all, 5963 accident cases were recorded, and of these 4321 recovered before the fourteenth week, when the employers' organization begins to take charge of the patient. Damages were denied in 250 cases. All disputes as to payments are settled by arbitration and only 29 per cent of the disputes were decided in favor of the plaintiffs.

A feature of the system is that the association has a committee which inspects the different properties and has power to compel the adoption of safety devices when necessary. Recommendations of this kind were made in 422 instances in 1907. These visits were made at very short notice and the inspection was carried out in the presence of the manager and his foreman. After investigation the committee lists all defects in duplicate and allows a period within which the proper appliances should be installed. Up to this time it has not been necessary to impose any fines for neglect.

The committee stated in its last report that absolute accident prevention is practically impossible owing to the indifference of the employees. Workmen frequently removed the safety devices from machines because they considered them in the way. This was especially the case with the dangerous woodworking tools. About 31 per cent of all accidents were due to the disregard of the safety devices or printed warnings and only 3.3 per cent to the sole neglect of the employer. The committee recommended that more attention should be given to educating the employees in regard to accident prevention as 34.7 per cent of all accidents occurred to men employed not more than one year.

CONVENTION COMMITTEE GOES TO SARATOGA

A meeting of the committees of the American Street & Interurban Railway Association and of the Manufacturers' Association on location of the 1910 convention was held at Saratoga on April 26, 1910. Saratoga is being seriously considered as the place for the next convention, and the trip to that city was made to determine the facilities of the hotels. Those representing the committee who went to Saratoga were: James F. Shaw, Charles C. Peirce, H. C. Evans and George Keegan.

STRIKE AT COLUMBUS, OHIO

The conductors and motormen of the Columbus Railway & Light Company, Columbus, Ohio, went on strike on the morning of April 28, 1910, because the company, they claimed, had not restored to their former standing several employees whom it had been agreed between the men and the company should be reinstated. They also demanded recognition of the union of employees. E. K. Stewart, general manager of the company, ordered all cars to be returned to the car houses in the afternoon of April 28, and informed the police department that he would not attempt to operate cars until the men who had remained with the company were properly protected. Very few cars were operated on April 29 and 30, but on May 2 a few cars were started on their regular morning runs. Traffic was interfered with, however, and the company made no effort to increase the number of cars in service. Mayor Marshall refused at first to put patrolmen on the cars to protect the crews and passengers on the ground that the administration would be charged with favoring the company. Officers in automobiles were, however, detailed as escorts for the cars in some cases. On May 2 the mayor said that the cars should be operated at 2 o'clock that day and that he would furnish protection.

On May 2 Mr. Stewart made public a letter addressed to the mayor in which he referred to the disorder which followed immediately after the strike had been declared and expressed his willingness to resume service as soon as proper protection was guaranteed. He said that the reason the disorder of April 29 was not then in progress was "due to the fact that the company, to save bloodshed and loss of property, ceased to operate its cars." There could be no doubt about the question of whether the company was entitled to the fullest protection from mob violence. Mr. Stewart concluded his letter as follows:

"This company has always met its men and taken up fairly and dispassionately all questions of difference. A few weeks ago all matters of difference were so adjusted. The adjustment then made has been broken by some of the men who brought on a strike. Most of the men are at heart loyal to the company. Most of them at least want to resume work. Whether they shall be permitted to do so or shall be assaulted in the presence of police who refuse to interfere 'under orders' is not an open question, nor one that is for arbitration."

On the afternoon of May 2, R. E. Sheldon, president of the company, Mr. Stewart and L. G. White, general superintendent of the company, conferred with a committee from the men on strike. After the meeting Mr. Stewart said:

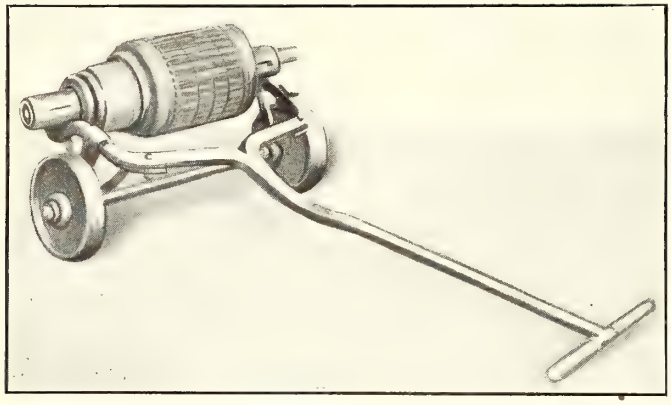
"The only thing which now stands before a settlement of this difficulty is recognition of the union. Mr. Sheldon assured the men that inspectors and foremen of the company would be instructed to refrain from trying to influence the men against joining the union or to influence members to withdraw.

"It was also agreed that the four men not reinstated before the strike would be put back to work in positions as good as those they occupied prior to their discharge. Mr. Sheldon made it plain to them, however, that he would not recognize the union under any circumstances and would not consider their original demands, which the men displayed at the conference."

The Department of State has delegated Dr. W. H. Tolman, director of the American Museum of Safety, to represent the United States at the ninth International Housing Congress, to be held in Vienna next month. Robert W. DeForest is the president of the American section of the International Housing Committee, of which Dr. Tolman is the executive secretary. T. Commerford Martin and Arthur Williams are the other members. This congress is one of the most important international gatherings, assembling the leaders in the movement of improving housings, which is attracting the earnest attention of governmental officials, statesmen, publicists, social economists and men of affairs. The reports from the United States will summarize the progress of the movement in this country.

A HANDY ARMATURE TRUCK

The armature shop of the Pittsburgh Railways Company is in a building separated by an alleyway from the truck repair shop. All armatures going to or from the shop have to be hauled 100 ft. or more across this alley, and a convenient form of truck has been devised for this purpose. It consists of a pair of iron wheels, 12 in. in diameter, turning loosely on an axle. Mounted

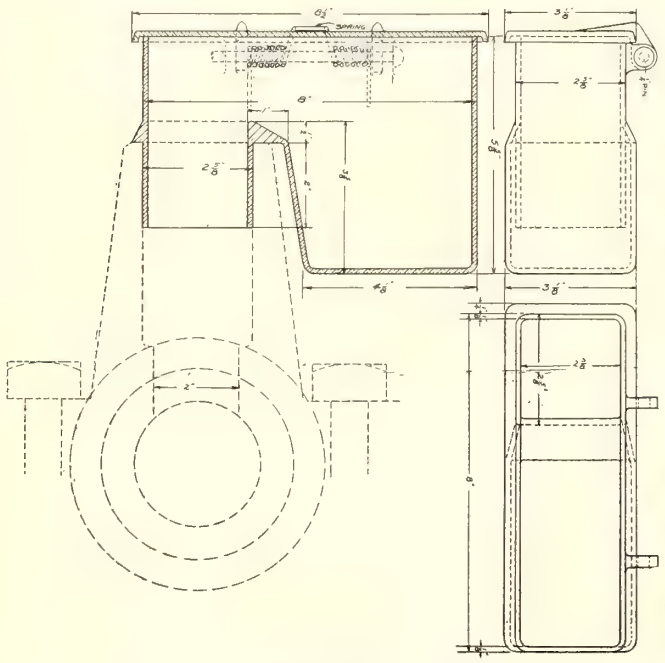


Handy Armature Truck

on this axle is a forked iron frame terminating in a long handle and cross-bar. The forked arms are curved downward to form a resting place for the armature shaft. By elevating the handle of the truck the forked arms can be lowered and pushed under the shaft of an armature lying on the floor. When the handle is lowered to about waist height the armature is lifted clear of the floor and the truck can be moved anywhere about the shop.

OIL CUP FOR GREASE-TYPE MOTORS

The Virginia Railway & Power Company, Richmond, Va., still operates a considerable number of GE-57 and GE-67 motors, which were designed originally for grease lubrication. It has been found possible, however, to use oil and wool waste packing with much greater satisfaction and economy by installing oil

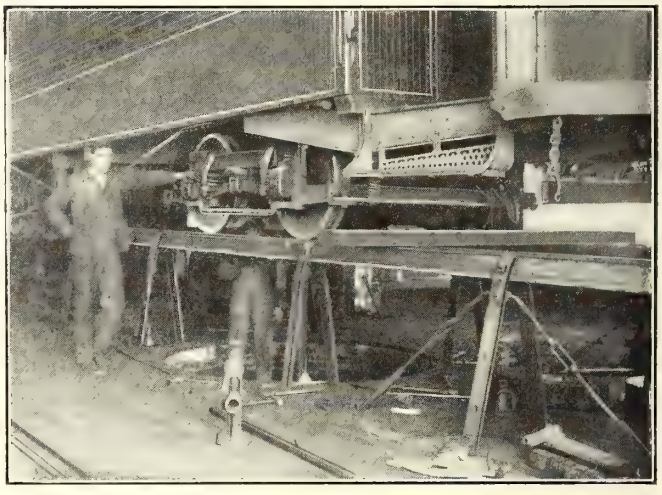


Oil Box for Grease Type of Motor

boxes of the design shown in the accompanying drawing. The box is riveted to the motor frame and has a spring cover which effectively excludes dust. Oil cups of this type are being applied to the armature bearings of all motors of the above types, resulting in substantial increase in the life of the bearings and fewer hot and melted bearings, due to the better lubrication obtained. Before putting these oil boxes on the GE-57 motors the company experienced a great deal of trouble with bearings on account of water getting into the armature boxes, and it was necessary to drain the oil wells after any considerable spell of wet weather. The application of these oil cups has entirely done away with this trouble. Lubricants are supplied on a mileage basis by the Galena Signal Oil Company.

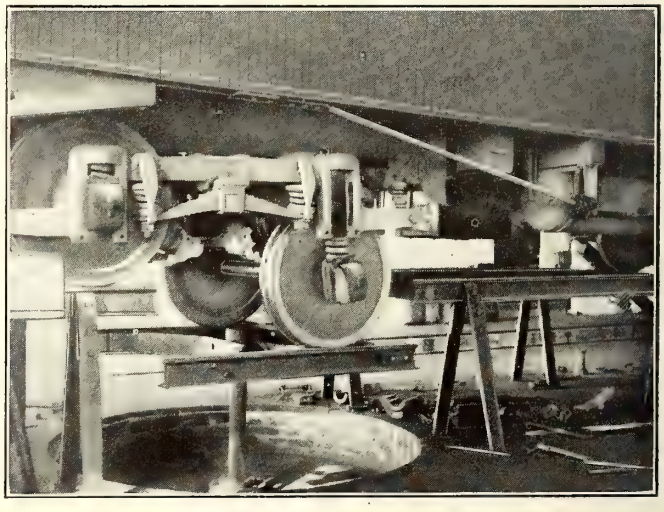
WHEEL CHANGING AT MOBILE

As shown in the accompanying illustration, S. M. Coffin, master mechanic of the Mobile (Ala.) Light & Railroad Company, dispenses with the usual pit or car-jacking methods of changing wheel pairs in trucks. A car requiring attention of this kind is run up an inclined track until the truck rests on a removable section which is kept in place by an air hoist. As soon as the wheel and axle set is unbolted, it is lowered to the floor by means of the hoist and taken to the machine shop. Vice versa, the replacing set is rolled into the removable section when the latter is flush with the floor and then raised into the side frames as shown. This method was very economical to



Truck Over Wheel-Changing Hoist

install as the trestle was built up of old rails, brakebeams, turnbuckles, etc., and the pit itself did not require much work as it had to be of little greater depth than the rails.



Raising Wheels Up to the Truck

Mr. Coffin states that with wheels fitted on the axles two men usually can change a pair of wheels in an hour but the record time for this work is 36 minutes. If it is desired to put the same axle back into the car when changing, three men can bore, fit and make the complete change in two and a half hours.

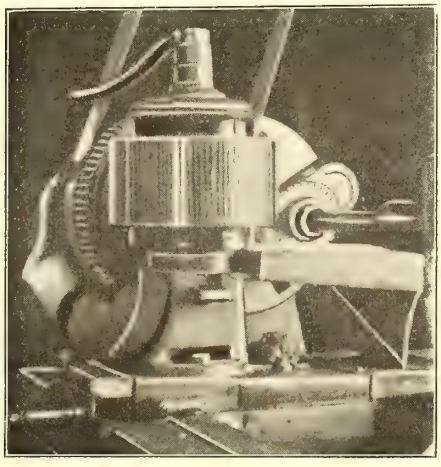
METHODS AND COSTS OF COMMUTATOR MANUFACTURE

The master mechanic of a railway company which is a long distance from the bases of electrical supplies has furnished the following illustrated particulars of the methods followed by him in the manufacture of commutators at home. The costs of the principal types used were also furnished and are given in the tables in the next column.

All commutators are made from Eureka drop forged bars, which are assembled in the four-piece clamping plate shown in the illustration on page 836. Upon inserting the mica, the bars

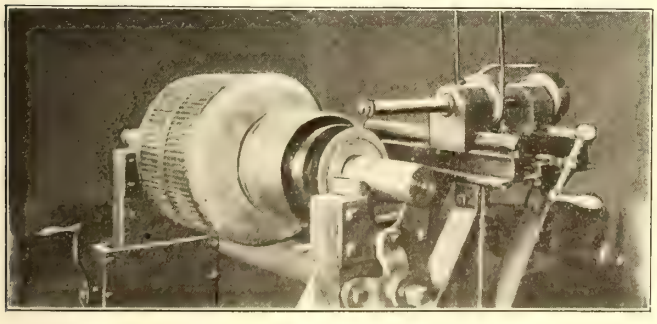


Vertical Commutator Repair



Milling a Commutator for Armature Leads

are squared and the clamps tightened, after which the assembled commutator is placed on a lathe chuck to bore out the bars. The latter are then tested for short-circuits. Next, the commutator bars are secured on the commutator core and a second short-circuiting test is made after the removal of the clamps. The commutator is then baked over gas to soften the mica, after which it is tightened again and allowed to cool. Then it is taken to a lathe to have the face turned and the bars slotted for the armature leads. Following this, a third short-circuiting test is made, and the commutator is shellacked at both ends. Finally, the commutator is pressed on the armature shaft at three to seven tons pressure. The hydraulic press used



Commutator Slotter with Side and Upward Adjustment

for this purpose also serves to remove the commutators. No trouble has ever been experienced from loose commutators. They are made with a taper of about 3/16 in. and are held by a jam nut between the oil deflector and the commutator end and by a collar shrunk on with a holding pin or dowel to prevent turning.

Instead of using a milling machine for cutting the bars for the armature leads, the shops have devised a special tool post, which is employed for this work in connection with a cutter wheel on the arbor of a lathe. The general arrangement is shown in an accompanying illustration. It will be observed that the commutator is set on the tool post, which, in turn, is set on the lathe carriage. The post is furnished with adjustable

COST OF COMPLETE COMMUTATORS.

WEST.—3 MOTOR.

Commutator bars, 47½ lb., at 27½ cts.	$13.06
Mica, 3¾ lb., at $1.75	6.78
Four mica circles, at 75 cts. each	3.00
One flat mica ring, at 70 cts. each	.70
One vulcabeston ring, at 65 cts. each	.65
Commutator shell (labor included)	3.00
Labor	1.65
	$28.84

WP.—50 MOTOR.

Commutator bars, 32 lb., at 27½ cts.	$8.80
Mica, 3¾ lb., at $1.40	5.42
Two mica circles, at 70 cts. each	1.40
Two mica circles, at 75 cts. each	1.50
Commutator shell (labor included)	3.00
Labor	1.65
	$21.77

G. E.—800 MOTOR.

Commutator bars, 39½ lb., at 27½ cts.	$10.66
Mica, 3¾ lb., at $1.40	5.43
Four mica circles, at 70 cts. each	2.80
One flange mica ring, at $1.35 each	1.35
One vulcabeston ring, at 85 cts each	.85
Commutator shell (labor included)	3.00
Labor	1.65
	$25.74

G. E.—1000 MOTOR.

Commutator bars, 49½ lb., at 27½ cts.	$13.61
Mica, 4 lb., at $1.75	7.00
Two mica circles, at 85 cts. each	1.70
Two mica circles, at 90 cts. each	1.80
Commutator shell (labor included)	3.00
Labor	1.65
	$28.76

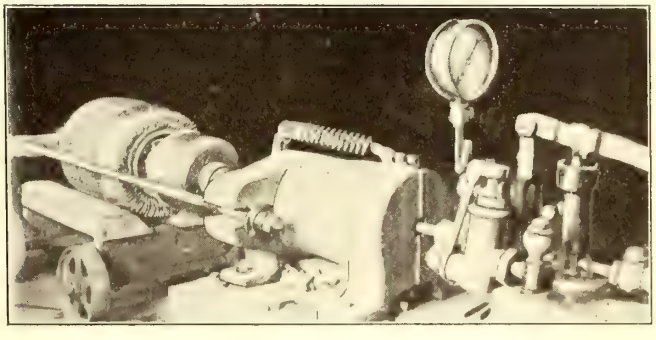
G. E.—67 MOTOR.

Commutator bars, 55½ lb., at 27½ cts.	$15.26
Mica, 4 lb., at $2	8.00
Two mica circles, at 90 cts. each	1.80
Two mica circles, at 95 cts. each	1.90
Commutator shell (labor included)	3.00
Labor	1.65
	$31.61

G. E.—80 MOTOR.

Commutator bars, 69½ lb., at 27½ cts.	$19.11
Mica, 4¼ lb., at $2.50	10.62
Two mica circles, at $1.15 each	2.30
Two mica circles, at $1.10 each	2.20
Commutator shell (labor included)	3.00
Labor	1.65
	$38.88

collars for different sizes of commutators. The teeth of the Brown & Sharpe bar-cutting wheel used in this operation, designed especially for milling copper, are alternately square and diamond-shaped. The latter teeth split the copper and the former sweep out the copper dust. These wheels are far superior

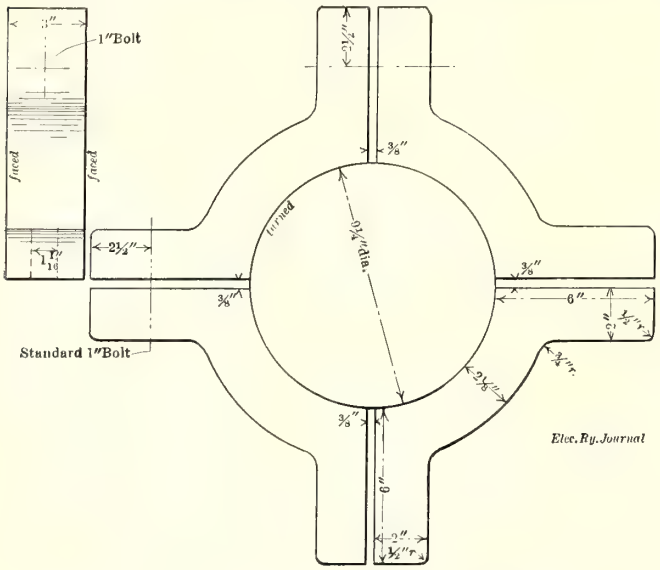


Hydraulic Press for Commutators

to the old cutters, which were made with all teeth square. They can mill 28 commutators without re-sharpening, whereas the square teeth could mill only 12 commutators without re-sharpening. The best record so far made was with two cutters which milled 64 GE-1000, GE-67 and GE-80 commutators, in all of which the arrangements for leads are alike. The cutter is not cooled by a drip, but is allowed to run in a pan of water, which arrangement is safer for the attendant. With this device a Westinghouse No. 3 commutator is slotted in 6 minutes and a GE-67 commutator in 15 to 20 minutes. The finishing touches are made with a hand file.

The commutator slotter, which is also illustrated, is suitable for cutting commutators of any size. Both ends of the support-

ing frame can be moved vertically, and by means of bevel gearing at one end the commutator can be moved sidewise to handle bars out of true without shaving the copper. Another feature is the quick reverse of the feeding mechanism, which is attained



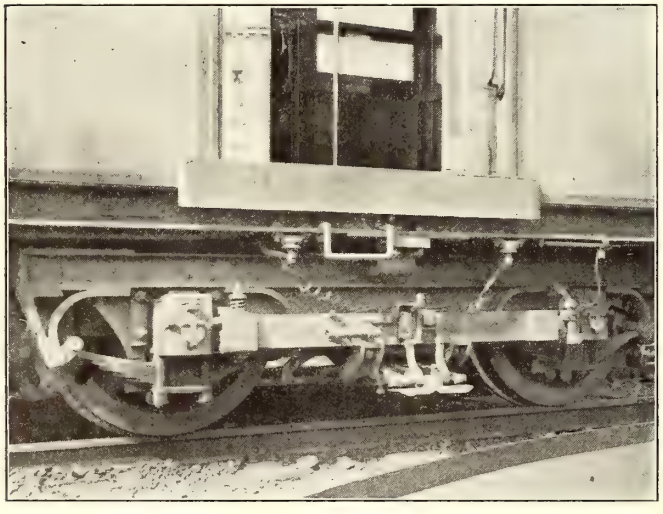
Clamp for Setting Up GE-800 Commutators

by releasing a spring thumb latch pressed against the feed thread and then drawing back the carriage.

A number of repairs to commutators are made with the commutator in a vertical position. After the bearings have been taken off and both the collar and oil deflector removed, the armature is set with the commutator end up in a floor casting containing an armature pinion. The jam nut is then unscrewed and the mica circle removed, after which the commutator may be readily examined for grounds and other troubles.

INTERESTING DETAILS OF BERLIN ELEVATED AND SUBWAY CARS

The motor cars of the Berlin elevated and subway system are furnished with a short-circuiting method whereby the conductor can immediately short-circuit third-rail sections between adjoining section insulators. The purpose of this device

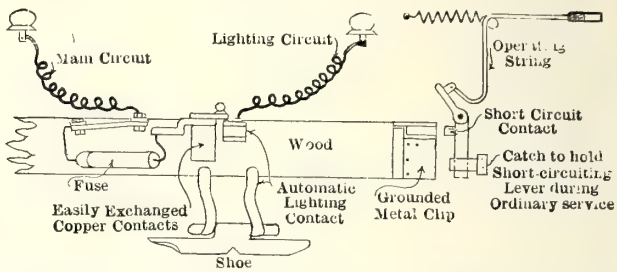


Motor, Automatic Lighting and Emergency Connections from Car to Shoe

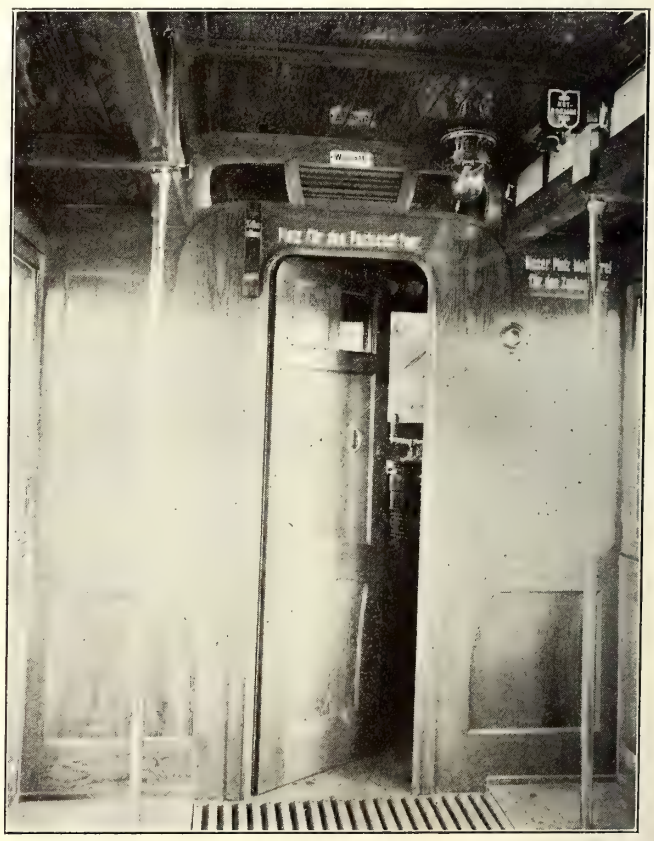
is to prevent injury to passengers from the third-rail should they be obliged to walk on portions of the structure. This short-circuiting device is operated by a handle carried in a sheet-iron, brass-trimmed box in a car corner opposite the emergency air-brake handle. The pulling of the handle causes a dead short which trips the proper feeder circuit breaker in the power house and makes the affected section dead. The connection to the short-circuiting contact is shown in the accompanying diagram and in the half-tone view of a motor truck..

In the subway the third-rail is a little higher than elsewhere. Therefore, when a car enters the tunnel the rising of the shoe closes the automatic lighting circuit. On the other hand, when the car leaves the subway the dropping of the shoe opens the lighting circuit, unless the regular lighting switch is closed. The lighting circuit of the subway is independent of the third-rail circuits, and is supplied with current from a storage. battery. There is also an emergency connection with the Berlin Electricity Works.

Each motor car is provided with two cabs, one for the motorman and one directly in the rear, which is used only by the conductor and the government mail carriers. The emergency devices can be operated from the conductor's cab, but are not subject to interference by passengers. In the Berlin cars it has been customary for the conductor to watch the motorman and the track signals from this rear cab through a small bull's-



Connections for Berlin Elevated Short-Circuiting Method



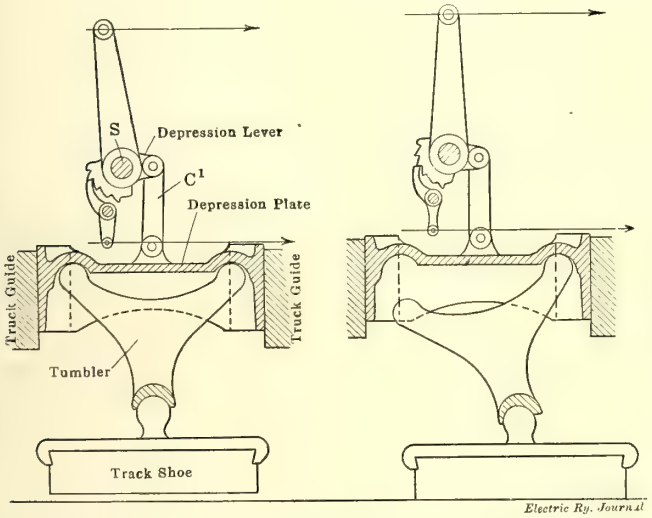
Compartment Behind Motorman's Cab, with Air and Electrical Emergency Devices

eye, but since the accident of Sept. 26, 1908, one of the former blind panels in the cab door has been glazed for this purpose. The third illustration shows the position of the emergency devices in the compartment behind the motorman's cab.

A SELF-TIGHTENING TUMBLER BRAKE USED IN ENGLAND

The Yorkshire (England) Electric Tramway Company has recently installed on 12 cars a novel track brake, known as the Freund self-tightening tumbler brake. This device was originally intended for the mechanical control of magnetic track brake shoes to avoid the failure of the latter in case of non-excitation. In practice, however, it is stated to have proved both an efficient hand brake and a powerful, self-tightening mechanical brake, adaptable to a wide variety of conditions. The motorman's work has been reduced to a minimum by the interposition of a "tumbler" between the depression links and the shoes of an ordinary track brake. The manipulation of this device requires the motorman's right hand only for an instant, enabling him to attend also to the wheel brake to secure the advantage of the combined operation of both brakes. The details of this contrivance are explained in the following paragraphs and the accompanying drawings:

The depression levers are keyed to the customary braking axle and are linked by connecting rods to depression plates which can be moved up and down between guides fixed on the truck. These depression plates contain cup-shaped housings for the shoulders of the tumblers, which rest with cups on spherical pivots over the brake shoes. To the shaft marked *S* in the drawing there are fixed operating levers which can be



Tumbler Type Track Brake Operated by the Yorkshire Electric Tramways

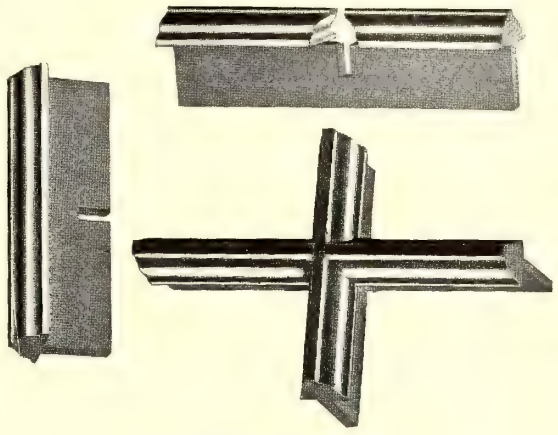
pulled by the usual gear from either car platform in the direction indicated by the upper arrow; the same shaft also has a toothed sector to engage a spring pawl as shown. When not in use the shoes are kept off the rails by pull-off springs, which are not shown in the drawing.

The brake is operated as follows: When the top lever is pulled from the platform in the direction indicated by the upper arrow, the depression plate descends and the pawl engages the lower teeth of the sector until the brake shoes touch the rail. If the car is moving to the left, the shoes will drag on the rails and thus shift to the right relatively to the car. In doing so the tumbler is tilted as shown on the right-hand drawing, thereby increasing the distance between the brake shoes and the depression plates. A toothed sector and drawbolt are used to regulate the amount of drag which, in turn, controls the brake pressure, because the greater the drag allowed, the greater the proportion of the car weight made available for braking.

The brake shoes can be instantaneously released by pulling the lever and the pawl lever in the direction indicated by the arrows. As soon as the pawl has been withdrawn from the sector in this way, the top lever is released, and there is nothing to prevent the release springs from returning all parts to their original positions.

STEEL SASH

The attention being given to fire protection of car houses emphasizes the importance of a new type of steel sash just brought out by the David Lupton's Sons Company, of Philadelphia. The sash is of rolled steel sections and the munnions are locked together as shown in the illustration by a method which holds



Samples of Steel Sash

them rigidly without impairing the strength of the members. The sash are glazed on the inside of the building after they are built in the walls. The steel construction described permits the use of a sash providing the maximum illumination and durability, with a low first cost and low maintenance.

AN ELECTRIC SHOVEL

Where electric power is available an electric shovel offers many advantages over a steam shovel, the chief of which is the elimination of the boiler. Furthermore, it uses power only when it is doing work. The shovel shown in the illustration is of the "Little Giant" type, mounted on cast-steel wheels. It carries a 1¼-cu. yd. dipper and weighs approximately 35 tons. It will make a cut 40 ft. wide in a 10-ft. bank and will clear a floor of 26 ft. The point of the crane stands 20 ft. above the ground. The dipper will dump 12 ft. 6 in. above the ground

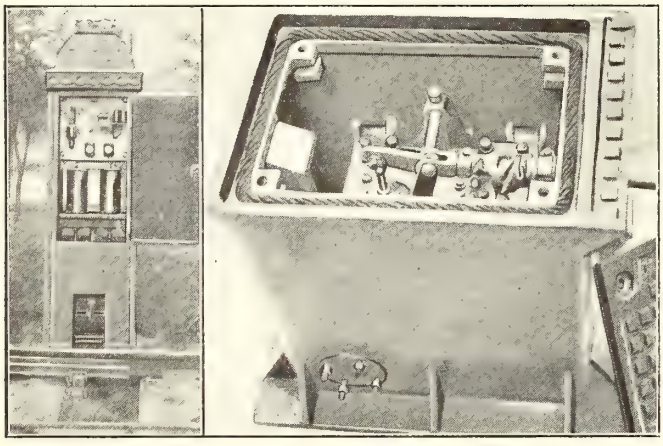


An Electrically Operated Shovel

and 21 ft. out either way from the center of the shovel. The car body is 23 ft. long and 7 ft. wide. The shovel is equipped with three Westinghouse motors, as follows: one 60-hp unit for hoisting the dipper, one 30-hp for swinging the crane, and one 30 hp on the crane for crowding the dipper into the bank. All the motors are for 60-cycle, two-phase, 220-volt alternating current. The shovel has a capacity of from 600 cu. yd. to 800 cu. yd. of blasted rock per 10-hour day. It was installed for the Kokomo Stone Company by the Vulcan Steam Shovel Company, Toledo, Ohio.

TWO GERMAN AUTOMATIC SWITCHES

The Siemens-Schuckert Works, Berlin, Germany, has been successfully installing throughout that country and elsewhere three types of automatic switches. The electric apparatus used in two of the designs is shown in the accompanying illustrations. The design, Fig. 1, was devised for situations where it is not objectionable to have the electrical apparatus set alongside the track or at the base of a pole. Naturally, this arrangement is the most convenient, both on account of its accessibility and its freedom from water troubles. The operating equipment consists essentially of two solenoids, the cores of which are joined to the double-arm lever which pulls or pushes the switch tongue; a cut-in switch, and a reversing switch which is so connected in the circuit that the second solenoid cannot pull the switch tongue back to its original position until the initial movement is complete.



Figs. 1 and 2.—Automatic Electric Track Switches

Fig. 2 shows the cast-iron box and equipment used when it is necessary to bury the solenoids. As in the other design, the cores are connected to a double-arm lever. The switches are placed in a small box on a pole. In this design special precautions are taken to keep water out of the solenoid box. The magnet coils are made of enamelled wire and the cores are copper plated to prevent rusting. It will be observed from the illustrations that the entrance of dirt and water by way of the top of the box is prevented by using a gasket of tarred hemp rope laid in a groove over which the lid is tightly screwed. The side opening for the rod between the solenoid core and switch lever is covered inside the case by an accordion-like leather bag which is connected to both the rod and the case, as shown. This minimizes the friction caused by the rod as it moves back and forth through the opening, and at the same time the bag prevents the rod from bringing water into the case. The box is also provided with a drain to the sewer system for carrying off interior condensation.

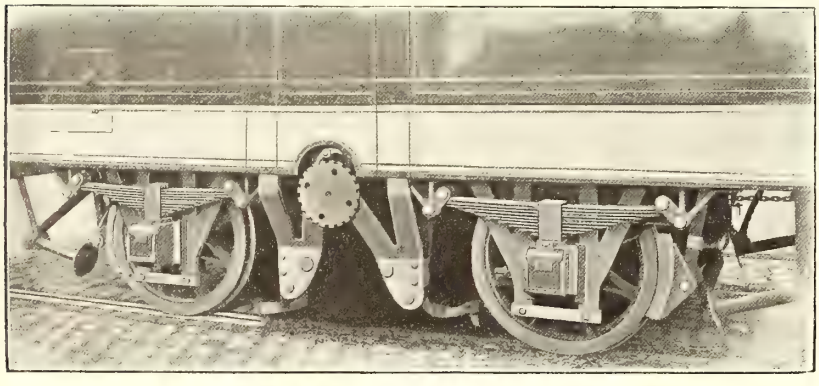
In both forms of switches described, overhead contact is made through wires which are suspended from insulators at a level slightly below that of the trolley wire. As is customary with automatic track switches, motormen who do not have to leave a straight run simply pass under the contact with their controllers in the "off" position. Lamp signals can be used in connection with these switches to show from a distance the position of the switch.

A SPECIAL CAR FOR RAIL CLEANING

The Vereinigte Isolatorenwerke Aktiengesellschaft, Berlin, Germany, has developed a car which is intended especially for the cleaning of the grooved rails generally used abroad and for the removal of the refuse from the side of the rail. In appearance the car does not differ materially from regular passenger cars, and it can be operated at any speed up to 15 m.p.h. The grooves are first cleaned with ordinary scrapers, but after this the refuse is drawn into a 4½-in. cu. yd. capacity tank through a pipe. The nozzle of the latter is the exact width of the rail groove to prevent the removal of loose soil outside the rails. Even pieces of brick and stone are drawn into the tank because of the great suction produced. The tank pipe is connected to a vacuum pump, which is driven by a motor using line current.

The four scrapers per car are operated under pneumatic pressure. They adapt themselves automatically to the direction in which the car is traveling, and have their bearings so arranged that they do not foul or lose their efficiency on switches, crossings and curves. The scrapers are the only parts of the equipment subject to appreciable wear. The rails are watered before the scrapers touch them to prevent the raising of dust. In the car illustrated the water is carried in two 800-gal. tanks piped together but placed at opposite ends of the body. The vacuum apparatus is carried in the upper part of the car with piping to the refuse tank in the center. This tank contains a cut-off arrangement to prevent dust from being drawn into the suction apparatus. Gages are provided to indicate the amount of water in the water tanks and the degree of vacuum in the refuse tank. An alarm indicates when the refuse tank is full, thus permitting the cleansing apparatus to be cut off and the car to proceed to the dumping grounds. As shown in one of the accompanying cuts, the car is run up a trestle and its load is discharged by gravity.

The car shown is provided with two 26-hp motors. It is 23 ft. long and has a truck wheel base of 6 ft. 6 in. The maximum width is 6 ft. 9 in., and the total height from rail to rail 11 ft. The truck wheels are 32 in. in diameter. The consumption of power when the car is operating at 10 m.p.h. averages 2.3 kw per car mile.



Rail-Cleaning Mechanism Under Car



Car Discharging Refuse

The Municipal Council of Paris is understood practically to have decided to accept the offer of the General Omnibus Company for the working of the street railway and omnibus services of that city, but the agreement has yet to be formally confirmed by the Council in full session. The company will have three years to carry out the reconstruction of its omnibuses.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES.

California.—Railroads—Right of Way—Conveyances.

If it be necessary to find consideration for right of way deeds executed and delivered pursuant to an agreement to make them without consideration, the enhancement of the value of property in the neighborhood by construction of the road is sufficient. (United Investment Co. vs. Los Angeles Interurban Ry. Co. et al., 101 Pac. Rep., 543.)

Connecticut.—Street Railroads—Construction of Railway or Extension—Effect of Approval of Plan—Condition Precedent to Location—Right to Make Location—Nature of Power—Extension of Line—Obligation to Complete—Conditions of Approval by City Authorities—Time for Completion of Work—Power of City Authorities—Obligation of Lessee—Partial Abandonment—State as Party Plaintiff—Effect of Amendment of Charter—Compelling Extension of Street Railroad—Laches—Proceedings Against Street Railroad Company—Writ in Name of City or State—Subjects of Relief—Construction and Operation of Street Railroads—Obligation Imposed by Law.

Gen. St. 1902, Sec. 3833, provides that, where a street railroad company constructs a railway or lays new tracks, it shall make a plan showing the highways in or through which it proposes to lay its tracks, their location as to grade, and the center line of the highways, and such changes, if any, as are proposed to be made in any highway, and such plan shall be presented to the Mayor and Common Council, who, after a hearing, may adopt it or modify it as they deem proper, and notify the company of their decision, but that no company shall construct a railway or lay additional tracks except in accordance with the plan approved by the city authorities, or, on appeal, by the railroad commissioners or superior court, as provided in sections 3832, 3834. Held that, where a plan presented was an entirety, the approval thereof was an approval of it in its entirety, and such approval either by the city authorities or on appeal was a condition precedent to the location of an extension.

The right to locate a railway or any part of it is a power of election, and, when once exercised, is exhausted in the absence of a statute to the contrary.

Where the location of an extension of a street railroad is made and approved as a whole, the company is not obliged to construct it, but if it enters on its construction it must not stop when it has constructed a part and proceed to operate cars thereon without completing it within a reasonable time.

One of the particulars of a plan of a street railroad extension which city authorities had power to modify under Gen. St., sec. 3833, as a condition of their approval, was the grade proposed for the tracks, and another was the change, if any, to be made in any highway, and their approval was conditioned on the company's bringing the street, in a part of the extension, throughout its full width, to a specified grade, and putting it, both within and outside of the tracks, in good condition for public travel, and another condition required this and certain other work to be completed, and the whole extension to be put in operation by a specified date. Held, that both these conditions were germane to the plan.

The right given a street railroad company by the State to locate its railroad in city streets within a certain period is a qualified right, subject to the approval and control of the city authorities pursuant to Gen. St. 1902, sec. 3833, and hence it does not prevent shortening of such period by the city in case of an extension, which, in the order of approval, was required in the public interest to be completed during the current season.

A lessee succeeding to the rights and franchises of a street railroad company takes the same burdened with the obligation of its lessor to complete the construction of an extension begun by it, and put the same in operation.

If the entire authorized extension of a street railway has been completed and put in operation, no part of it can afterwards be abandoned at the will of the company.

The fact that the lessee of a street railroad company was not a party to proceedings for proposed alterations and extensions was no objection to mandamus to require completion of an extension begun by the lessor, as the lessee thereafter succeeded to the rights, franchises and obligations of the lessor.

That a street railroad has not completed an extension by the time required by a city in the order approving of its plans therefor is no excuse for not subsequently doing so, and its lessee stands in its shoes in this respect.

An alternative writ of mandamus which is entitled "State of Connecticut ex rel.," a certain city against a specified railroad company, is a proceeding in which the State, as the party plaintiff, is seeking to enforce its laws, and is not open to the objection that the State and not the city named control the use by the public of the defendant's railway and the interest of the public in its operation.

The amendment to the charter of the Connecticut Railway & Lighting Company in 1905 14 Sp. Laws, p. 704), though validating and confirming the location and construction of the railway, as formerly located and constructed, did not prevent the State in mandamus on relation of a city from complaining that a part of a certain route had not been finished, as this assumed that what was done was lawful as far as it went, and simply insisted that a franchise to lay a railway on a certain route in part ex ecuted shall be wholly executed.

A delay of three years in bringing mandamus to compel a street railway company to complete the construction of an extension does not call for explanation, in the first instance, on the face of an alternative writ, when assigned as ground for motion to quash.

Gen. St. 1902, sec. 3824 (Pub. Acts 1907, p. 806, c. 219), provides that the mayor and common council of each city shall have in the first instance exclusive control over the placing of street railroad tracks, and of changes in grade of a railway, and, if any company shall fail to obey their orders in these respects, "may proceed by mandamus to compel such company, at its own expense, to carry out such orders." Held, that the procedure in such case may be in the name of the city, but that there was no reason why it may not be in the name of the State on relation of the city, or in the name of the State alone.

The State can always proceed by mandamus to enforce a legal duty created by the authority to which it has intrusted power to create it, and, when it invests a city with power to make orders with respect to the construction or operation of a street railroad, it charges those against whom such orders may be directed with the duty of obeying them, and their duty is therefore one of law. (State ex rel. City of Waterbury vs. New York, N. H. & H. R. Co., 71 Atl. Rep., 942.)

Indiana. — Railroads — Mechanics' Liens — Construction — Statutes.

Acts 1873, p. 187, c. 78, providing, in section 1, that all persons who by contract with any railroad corporation shall perform work or labor in the way of grading, building embankments, etc., for the track of any railroad, shall have a lien on such grading, etc., does not apply to a contractor who performs no manual labor himself, but who employs men and teams in the performance of his contract and derives his compensation from the profits realized. (Indianapolis Northern Traction Co. et al. vs. Brennan et al., 90 N. E. Rep., 65.)

LIABILITY FOR NEGLIGENCE

Alabama.—Damages—Exent of Injury—Burden of Proof.

In an action for injuries to a horse, buggy and harness, caused by collision of a street car, there can be no recovery for injury to the harness where the evidence shows that the harness was injured, but does not show to what extent in damage the harness was injured. (Birmingham Ry., Light & Power Co. vs. Camp, 49 Southern Rep., 846.)

Alabama.—Rules—Construction—"Standing."

An electric railroad rule provided that, when passing standing cars, the gong must be rung and the car brought to a stop with the front end opposite the rear end of the standing car. Held, that the word "standing" did not limit the application of the rule to the passing of cars absolutely at rest, but included cars that had stopped and had just started to continue their journey from which passengers might have alighted.

A requested charge that, if the motorman did all he

could to stop the car after he saw intestate, the jury should find for defendant, was properly refused, as eliminating the motorman's duty to warn intestate of her danger. (Birmingham Ry., Light & Power Co. vs. Morris, 50. S. Rep., 198.)

Alabama.—Street Railroads—Operation of Cars—Obligation of Motorman—Injuries to Pedestrians—Contributory Negligence—Proximate Cause.

While a motorman may assume that a pedestrian will turn out of the way of the car, he cannot rest on such assumption so long as to reach a point where it will be impossible for him to control the car or to give warning in time to prevent injury.

Where a motorman, after discovering that a pedestrian was unaware of the danger, failed to use reasonable care to avoid injuring him, the act of the pedestrian in placing himself in danger was the remote cause of the ensuing injury. (Randle vs. Birmingham Ry., Light & Power Co., 48 Southern Rep., 114.)

California.—Master and Servant—Safe Appliances—Duty to Furnish—Delegation of Duty—Danger Arising in Doing of Work—Acts of Fellow Servant.

A master is liable for a breach of duty to furnish safe appliances, resulting in injury to a servant.

The obligation of a master to furnish his servants with safe appliances and a safe place for work cannot be delegated, and the delegation of the duty to an employee who would for other purposes be regarded as a fellow servant of an employee injured through failure of the duty would not exonerate the master.

Where the place in which work is to be done and the appliances to be used by servants are as safe as can reasonably be expected, and danger arises necessarily in the doing of the work, the master has discharged his duty when he has furnished to the servants suitable means of obviating the danger.

The failure of a co-employee to use the means furnished to obviate the danger in the work is the act of a fellow servant, and, where a company operating an electric substation maintained highly charged wires, and furnished means whereby the current might be shut off, and authorized the foreman of a construction gang working on the roof to shut off the current, and decedent, one of the gang, was killed by coming into contact with a live wire, either because of the foreman's failure to turn off the current or his negligence in informing decedent that the line was clear, the company was not liable under Civ. Code, Sec. 1970, prior to the amendment of March 6, 1907 (St. 1907, p. 119, c. 97), providing that the master is not liable for injury to a servant from the negligence of a co-employee, unless the negligence was committed in the performance of a duty the master owes by law to a servant or the master has not used ordinary care in the selection of the culpable employee. Bridges et al. vs. Los Angeles Pac. Ry. (L. A. 2299), 105 Pac. Rep., 586.)

California. — Railroads — Crossing Accident — Contributory Negligence.

Decedent and his driver, riding behind a team of mules, approached an electric railroad crossing in the country at a slow trot. The road crossed the railroad at right angles, through a cut with banks about 8 ft. high. The driver listened for a car, but did not hear it. He did not stop to listen, though he admitted that, if he had stopped, he might have heard the noise of the car when there was no noise of the wagon to prevent it. Another witness, who was walking and listening proximately from the same position that decedent occupied, testified that, while no gong was sounded, he could hear the rumble of the car. Held, that decedent and the driver having failed to listen for a car which they knew might cross the road from behind the obstruction, decedent was negligent as a matter of law precluding a recovery for his death. (Heitman vs. Pacific Electric Ry. Co. (Civ. 616), 102 Pac. Rep., 15.)

Iowa.—Carriers—Injury to Passenger on Street Car—Facts Constituting Negligence—Alighting in Middle of Block—Negligence of Carrier.

Where it is found that a passenger on a street car gave a conductor the stop signal, and he recognized it and indicated a purpose to stop where requested, and, as the passenger with his knowledge is in the act of alighting, the speed is suddenly increased, causing him to fall and be dragged a considerable distance before the car was brought to a stop, the court ought not to disturb a conclusion of negligence drawn from such facts.

If a passenger indicates by word or gesture to a conductor a desire to leave a car, though it be in the middle of the block, and the conductor, understanding the request, indicates his assent, and the car stops or slows down, so that the passenger, acting as a reasonably prudent person, with the conductor's knowledge, attempts to alight, and while so doing is thrown off by a sudden increase in speed, it is negligence for which the company is liable. Cohen vs. Sioux City Traction Co., 119 N. W. Rep., 964.)

Kentucky.—Street Railroads—Collision with Vehicle—Negligence.

A motorman who sees a standing vehicle close to the track, and who knows that the only person in the vehicle is a boy not old enough to appreciate the danger, must stop the car until the vehicle is moved to a place of safety; and, where he attempts to pass, the street railroad company will not be relieved from liability for injuries to the boy because the horse attached to the vehicle by a slight movement throws the wagon in such a position that the rear of the car strikes it.

Where a standing vehicle is so close to the street car track that the slightest movement of the horse attached to it will bring it in contact with a car, and this fact is known or by ordinary care should be known to the motorman, that a part of the car passes in safety will not excuse the company if another part of the car strikes it, and causes injury to person or property. (Louisville Ry. Co. vs. Flannery, 121 S. W. Rep., 663.)

Massachusetts.—Damages—Reduction of Injury—Personal Injury—Exercise of Will—Instructions—Reduction of Effect of Personal Injury.

In a personal injury case, where the evidence showed that plaintiff could lessen the occurrence of certain fits by improving her general tone and resisting the impulse by her will, a charge that if plaintiff's fits were entirely under her own control, and if she need not have had one unless she wished, she could not recover therefor, was error, since it disregarded the right of recovery for such fits "as could have been prevented by the exercise of self-control"; there being a material difference between the two classes. Those which would occur only when the victim wished would be those to which the victim's active will would contribute, while the other class would be those where there was no active exercise of the will to prevent them.

Plaintiff's condition being likely to appeal to the sympathies of the jury, it was defendant's right to have plaintiff's duties in the situation defined with precision. (Dooley vs. Boston Elevated Ry. Co., 87 N. E. Rep., 586.)

Michigan.—Damages—Personal Injuries—Excessive Damages.

A street car passenger was injured while attempting to board a car. She was held down under the projecting step of the car, and could not be released until the car was backed. After her release she was in a dazed condition, suffering from the shock. She sustained bruises and injury to her back, confining her to her bed from 10 to 12 days. At the date of the trial, several months thereafter, she complained of recurring pains in the back. Held, that a verdict for $2,000, reduced by the trial court to $1,500, was not excessive. (Marshall vs. Saginaw Valley Traction Co., 122 N. W. Rep., 131.)

Washington. — Damages — Personal Injuries — Excessive Damages.

Plaintiff was 27 or 28 years old, a carpenter, with an earning capacity of $3.50 a day. By an accident in a planing mill he lost the entire little finger of his left hand, the middle finger above the knuckle, and the end of the index finger was cut off diagonally, without injuring the bone; the ring finger having been cut off in childhood. The injured fingers were very sensitive to touch and cold, and plaintiff could not take up material or tools with the injured hand, and is greatly hampered in climbing ladders, etc. Held, that a verdict for $3,008 was not excessive. (Rood vs. Seattle Electric Co., 104 Pac. Rep., 249.)

LONDON LETTER

(From Our Regular Correspondent.)

The fifteenth annual convention of the Incorporated Municipal Electrical Association will be held in Glasgow and Edinburgh on June 14, 15, 16 and 17. It will be opened by A. McInnes Shaw, Lord Provost of Glasgow. W. W. Lackie, chief electrical engineer of the corporation, will deliver the presidential address. A paper will then be presented on "Commercial Progress," by A. C. Cramb, Croydon, and H. Collings Bishop, Newport. The delegates will lunch at the City Chambers by invitation of the tramways and electricity committees and will visit the various electrical stations. In the evening there will be a reception and conversazione at the City Chambers tendered by the lord provost and magistrates. On June 15 the delegates will be received by the lord provost of Edinburgh, and the following papers will be read and discussed: "Mixed Pressure Turbines," "Exhaust Steam Turbines" and "Chemistry in the Boiler House." After luncheon the various electric departments will be visited. On June 16 the following subjects will be discussed in Glasgow: "Advantages of Continuous Records of Costs and of Steam Consumption" and "Cheapening of the Cost of Mains and Service." The annual dinner will be held on the evening of June 16. June 17 will be devoted entirely to pleasure.

The report of the Underground Electric Railways, London, for the second half of 1909 shows a distinct improvement. Reference was made recently in this letter to the various improvements which the Metropolitan District Railway contemplated making. Perhaps the most important of these was the construction of a link in the vicinity of Charing Cross between the Charing Cross and Hampstead line, the Bakerloo Railway and the District Railway. The Hotel Metropole, under which the line would have to be built, opposed the line and the improvement has been abandoned. The South Eastern Railway also opposed the line, as the tube would have had to be carried underneath the pillars of that company's bridge across the Thames.

The report of the London United Tramways, which are now under the management of the Underground Railways, is perhaps the most unsatisfactory that the company has ever presented. It shows a decrease of about £36,000 in net profits for the year. No dividend will therefore be available on the preferred stock, on which 3¾ per cent was distributed in 1908, all the surplus being allocated to the reserve account. With Mr. Stanley, who is general manager of the Metropolitan District Railway, acting as manager, however, there is no doubt that the fortunes of the company will be bettered. The reserve account will be utilized to improve the track. New rolling stock will also receive consideration, and the whole property will be put into better condition.

It has been decided by the special committee, which inquired into the construction of an electric railway from Wimbledon, in connection with the District & South Western Railway to Sutton, there joining the Brighton line, to allow the bill to proceed. The committee does not insist upon a junction between the new line and the South Western at Wimbledon, nor does it insist upon a junction with the Brighton line at Sutton. Arrangements must, however, be made for public access between the two stations.

Leeds has the distinction of being the first municipality to have its trackless trolley bill authorizing the use of the trackless trolley passed by a select committee of the House of Lords. J. B. Hamilton, general manager of the Leeds Corporation Tramways, described the various trackless trolley systems on the Continent. He estimated the cost per mile at from 4½d. to 5½d. and on the proposed line to Farnley, a distance of about 4½ miles, he estimated that there would be a net return of ⅝ of a penny per car mile. The bill which has been passed is particularly interesting as it endows the board of trade with power to approve the use of the trackless trolley on other routes in the city to which the corporation may wish to extend the system. This will save future Parliamentary expenses. The tramways at Leeds show a surplus for the year of about £47,000, and a very substantial amount will again be paid for the relief of rates. Probably the next municipality to secure permission for trackless trolleys will be Bradford.

It is interesting to note that returns from municipal tramways for the past year or half year are better than for the preceding year or two. Sheffield, Leeds, Bradford, Belfast and other large cities show increased returns, and even the Metropolitan Electric Tramways, which operates in the north of London and has not done particularly well since its inception, shows an increase in receipts. The number of passengers on this system was more than 62,000,000, an increase of nearly 5,000,000, while the total revenue increased and enabled the directors to pay the interest on the debentures and to increase the dividend on the common stock from 4½ per cent to 5 per cent.

Liverpool is well satisfied with the first-class cars in which a double fare is charged. When the experiment was begun the whole car was first-class, inside and outside. Afterwards the cars were made first-class inside only. It has now been decided to extend the experiment to the Croxteth Road route, the most fashionable in the city. The intention is to run a first-class service daily, except on Sundays, applicable only to the inside. The tramway committee has been criticized for catering to snobs, but the cars have increased the revenue and have proved a source of great satisfaction to people who prefer comfort at a little extra cost. Reserving the inside of the cars for first-class traffic has increased the earnings on the route on which the cars are operated from 5.26 of a penny to 10.92 of a penny per car-mile.

The London County Council electric tramway constructed on the conduit system up Highgate Hill, which replaces the cable tramway, has been opened with a 6-minutes' service. The cars are smaller than those on the other lines of the company. They are fitted with emergency brakes which work on the slot rail, which is extremely heavy for a rail of this kind. The new line connects at the Archway Tavern with the lines to the City, Holborn and Euston Road and with the Metropolitan Tramways line to Finchley and High Barnet.

It has been suggested to the London County Council that season tickets would be a distinct advantage, but it is not likely that the Council will accede to the request. A report by the highways committee sets forth the first agreement which it has been able to make regarding conditions of labor of tramway men under the new conciliation board scheme, referred to in this letter recently. It has been decided that Sunday labor shall be restricted to eight hours, to be completed within a period of 12 hours. Holidays to be taken any time during the year, instead of during the winter months only, as at present. The adoption of the alterations will increase the expenditure about £12,000 a year, but the highways committee recommends the Council to accept the agreement. A. C. S.

The Brooklyn Rapid Transit Company has explained more clearly to the Public Service Commission its proposal to operate cars through the Centre Street subway loop in Manhattan. The company states that 20 trains now operated over the Brooklyn Bridge could be diverted from the Lexington Avenue, Myrtle Avenue and Fulton Street lines in the eastern section of the city to the Williamsburg Bridge hourly during the rush hours, thus making it possible for the company to operate more trains on its Fifth Avenue division in South Brooklyn over the Brooklyn Bridge. The trains diverted to the Williamsburg Bridge would be operated through the Centre Street tunnel to the terminal of the Brooklyn Bridge in Manhattan and patrons would not be inconvenienced, as the route by way of the Williamsburg Bridge would be shorter. Concerning compensation, the company suggests that a five-year franchise should be granted with a charge for operation "at a fair rate per mile," with the understanding that the city reimburse the company for all money expended should the contract be broken by the city. The Board of Estimate has authorized Controller Prendergast to issue $150,000 worth of corporate stock, so that the Public Service Commission can pay for extra work on the contract for the construction of the Fourth Avenue subway in Brooklyn.

News of Electric Railways

Program of Meeting of Southwestern Electrical & Gas Association

In the Electric Railway Journal of April 23, 1910, brief mention was made of the preparations for the convention of the Southwestern Electric & Gas Association, to be held in Beaumont, Tex., on May 12, 13 and 14, 1910, and the tentative program of entertainments for the meeting was published. The program in detail has since been made available. The headquarters of the association will be at the Crosby Hotel. Meetings of the association, however, will be held at the Kyle Theater, which is a block from the hotel, on May 12, morning and afternoon; May 13, morning and afternoon, and on May 14, morning. As previously stated the storeroom and the lobby of the Kyle Theater will be used as an exhibit hall and members who desire space should communicate with D. G. Fisher, assistant secretary of the association, 300 Commerce Street, Dallas, Tex.

The registrar of the association will be located on the main floor of the lobby of the Crosby Hotel, and those in attendance at the convention are requested to register their names at once so as to secure their badges and programs. The executive committee has adopted a standard badge for the association, which it is hoped will remain a permanent one and be used at future conventions. The question box feature of the association will be retained and the question box and souvenir program will be bound together and distributed to the members on the first day of the convention. Special railroad arrangements have been made, which include a one-week excursion ticket, good for 21 days, to be on sale on May 10, 1910. The rates provide round-trip transportation for one fare plus $2. Delegates from the East are requested to confer with S. A. Hobson, St. Louis, Mo., or with Milton Mill, Olive Street, St. Louis, Mo., regarding transportation facilities or reservation of sleeping car accommodations. The program of entertainments follows:

MAY 12.

10 to 12 a. m.—Automobile ride for visiting ladies.

4 p. m.—Automobile ride for all visitors to oil field, Country Club, and other points of interest.

8 p. m.—Theater party.

MAY 13.

2 to 6 p. m.—Boat trip on Neches River; refreshments and music.

9 to 12 p. m.—Ladies entertained at Woman's Reading Club.

8 p. m.—Sons of Jove.

MAY 14.

3.30 p. m.—Street car tour of the city.

During the session of the convention the following papers will be presented: "The Watt-Hour Meter in Actual Operation," by O. Brasher; "Dry Gas Meters in Actual Operation," by P. E. Nichols; "Individual Factors in the Development of the Gas Business," by M. T. Walker; "Proper Operation of Water Gas Apparatus," by W. J. Dewey; "Suggestions for a Standard Rule Book for Operation of City Cars," by H. S. Cooper; "Condensers for Small Central Stations," by Harry Pennington; discussion, "The Internal Combustion Engine in the Small Central Station," by R. B. Stichter and others.

Cleveland Traction Situation

The Cleveland Railway, through a resolution introduced in the City Council on April 25, 1910, has asked that body to approve an expenditure of $250,000 for improvements. Among other things the resolution provides for the conversion of 230 cars into cars of the pay-as-you-enter type, at a cost of more than $190,000, and additions to the Cedar Avenue and viaduct power houses at a cost of more than $50,000.

G. M. Dahl, street railway commissioner, has reported to the Council that the surplus of the Cleveland Railway for March, 1910, should be $19,854.94, instead of $18,880.94, as given by the company. This difference, Mr. Dahl says, is due to charging interest on stock held in the treasury. The Tayler ordinance has been construed by the company to mean that 6 per cent. interest shall be allowed on all the stock.

The resolution introduced by Councilman Laferty, requesting the company to charge 5-cent fare to Collinwood and Euclid Beach, has been adopted. J. J. Stanley, president of the Cleveland Railway, states that the request cannot be considered until the directors meet. Until then the fares authorized by the ordinances under which the company operates will be charged.

Mr. Stanley has informed Mr. Dahl that no new cars will be ordered at present. Only a small proportion of the new issue of $1,500,000 of stock of the company has been subscribed by the old stockholders and obligations, which amount to about $1,000,000, inherited largely from the Municipal Traction Company, have been presented for payment. In addition, considerable track must be repaired, and Mr. Stanley feels that the need for completing this work is more imperative than supplying new cars. Under the Tayler ordinance the order in which improvements shall be made to the property is not fixed.

Experiments have been made with another fare register, with a view to its adoption if found satisfactory. The cost will be 12 cents a day for each register, whereas an outlay of 25 cents a day for each register would be entailed for the one tested some time ago.

A resolution has been prepared for introduction in the City Council to require the company to submit its rules for passengers to that body for approval. The rules promulgated by Mr. Dahl which prohibit passengers from riding on the rear platform and smoking on the cars resulted in this action. Both rules are opposed by several members of Council, and many riders, who feel that they should at least be allowed to ride where they please.

The *Cleveland News* counsels patience and a trial of the rules which the commissioner has made, but asserts that Mr. Dahl is seemingly, at least, endeavoring to conduct affairs so that the 3-cent rate will pay, instead of securing the very best service.

Railroad Commission of Pennsylvania to Inquire into Transit Affairs in Philadelphia

The Railroad Commission of Pennsylvania has announced that it proposes to conduct an inquiry into the transit situation in Philadelphia, now that conditions in that city are again practically normal. It will be recalled that the commission refused to conduct such an inquiry during the recent strike because conditions were unsettled and it was likely that the purpose of its observations might be misconstrued. The commission says:

"It has for some time been the intention of the commission to prosecute an inquiry of the transit situation in the city of Philadelphia, and this has been delayed only by reason of the abnormal conditions which have existed there for the past three months, awaiting the termination of which action on the part of the commission has been postponed. So soon now, however, as a reliable and competent party can be secured for the purpose such inquiry and investigation will be inaugurated."

Concerning the complaints filed with it, the commission states:

"Upon consideration of the complaints filed against the Philadelphia Rapid Transit Company, it has developed that many of the charges contained therein are so general in character as to furnish us no sufficient guide in any investigation we may prosecute.

"For instance, it is alleged that 'portions of the city which should have good service are not accommodated,' but those portions of the city are not named; also, that 'portions of the city which need new car lines and ask for them have been neglected, while outlying sections that do not offer a proper return in fares have been catered to,' without specify-

ing those portions of the city and those outlying sections; and, also, that 'the transfer system is unjust to many sections of the city and inadequate,' without stating what sections these are. With respect to these items the complaints should be more specific, and it is suggested that the petitioners may by way of amendment supply the particular data necessary to furnish the required information to the commission.

"In other respects, there are items in the complaint which transcend the powers of the commission; for instance, that 'new elevated and subway lines are needed to furnish rapid transit to outlying sections,' and 'the transit system is grossly over-capitalized.'

"The capitalization of the company has already been determined, and the commission has no authority to reduce it; and the construction of new elevated and subway lines is a matter about which the company and the city authorities will have to deal, and with the latter, particularly, the commission can exercise no authority.

"It will readily be understood that this will require some time, and if definite action by the commission seems to be somewhat delayed it must be attributed to the necessity and the difficulty of obtaining definite and accurate information upon which to base such action, and the time required therefor."

Association Meetings

Oklahoma Public Utilities Association.—Sapulpa, Okla., May 10.

Southwestern Electrical & Gas Association.—Beaumont, Tex., May 12, 13 and 14.

Central Electric Traffic Association.—Fort Wayne, Ind., May 14.

Pacific Claim Agents' Association.—San Francisco, Cal., May 20 and 21.

Central Electric Railway Association.—Toledo, Ohio, May 26 and 27.

Master Car Builders' Association.—Atlantic City, N. J., June 15, 16 and 17.

American Railway Master Mechanics' Association.—Atlantic City, N. J., June 20, 21 and 22.

Central Electric Accounting Conference.—Toledo, Ohio, June 25.

Street Railway Association of the State of New York.—Cooperstown, N. Y., June 27 and 28.

Colorado Electric Light, Power & Railway Association.—Glenwood Springs, Col., Sept. 21, 22 and 23.

Proposed Electrification of London & Port Stanley Railway.—J. H. A. Beattie, Mayor of London, Ont., who is a member of the special committee appointed to report on the advisability of electrifying the London & Port Stanley, states that the lease of the property does not expire until Jan. 1, 1914, and that no action has been taken toward the electrification of the road.

Date Set for Hearing on Brakes Before the Commission of Canada.—The Board of Railway Commissioners of Canada set May 3, 1910, as the date for the hearing before the board at Ottawa regarding air-brake equipments on the Hamilton & Brantford Electric Railway and the Hamilton Radial Electric Railway and the proposed order requiring all electric railways subject to the jurisdiction of the board to equip their cars with automatic air brakes.

Two-Day Session of the Central Electric Railway Association.—It has been decided by the executive committee of the Central Electric Railway Association to make the May meeting of the association at Toledo, Ohio, a two-day session, and the association will therefore meet on May 26 and 27, 1910. This will make it possible to dispose of all the work in hand before the summer, as the May meeting is the last until September. The change to a session covering two days will also afford the railway men a better opportunity to inspect carefully the apparatus of manufacturers who exhibit at the meeting.

Maryland Commission Appointments.—There have been several conferences between Governor Crothers and Chairman James M. Ambler and Philip D. Laird of the Maryland Public Utility Commission regarding the selection of the chief attorney to the commission. William L. Marbury declined to accept the position, as he has among his clients a number of public service corporations and persons interested in such corporations. The salary is $4,800 a year. It is believed that William P. White, Jr., will be appointed assistant counsel. The Governor and the members of the commission have not yet discussed the election of a secretary.

Charter Granted for Elevated Railway in Philadelphia.—The Philadelphia & Suburban Elevated Railway was chartered at Harrisburg, Pa., on April 28, 1910, by S. S. Neff, president of the Interstate Engineering Supply Company, Philadelphia; Russell Thayer, Robert K. Cassatt, S. Coates Coleman, C. W. Haines and J. H. Hawkins. As stated in the ELECTRIC RAILWAY JOURNAL when the proposal of the company was first mentioned in Philadelphia several months ago, the company has in contemplation the construction of an elevated railway from a terminal station at Broad Street and Filbert Street to the northwestern section of the city, North Philadelphia, Frankford and the northeastern section of the city. It was proposed to apply to the Councils of Philadelphia on May 5, 1910, for a franchise.

Answer to Swensson Report on Pittsburgh.—At a conference held in Harrisburg on April 29, 1910, between Mayor William A. Magee of Pittsburgh, J. B. Callery, president of the Pittsburgh Railways, and the members of the Railroad Commission of Pennsylvania, it was decided to have Mr. Magee and Mr. Callery each file an answer to the report made recently on street railways in Pittsburgh by Emil Swensson. Mr. Callery told the commission that to follow out all the suggestions made by Mr. Swensson would require an expenditure of at least $5,000,000 for cars and power station equipment. Mr. Swensson will be asked by the commission whether the operation of the loops which he suggests would be feasible under existing conditions and whether, in his opinion, the additional cars which he recommends should be put in operation before the proposed widening of certain streets. Mr. Magee and Mr. Callery will file their answer with the commission not later than May 10, 1910.

Detroit Situation.—Efforts have been made to induce Frederick T. Barcroft, who made the appraisal of the property of the Detroit United Railway for the committee of fifty, to reconsider his decision not to appear before the board of arbitration. In an interview published in the Detroit *News*, Mr. Barcroft made the following statement in relation to the efforts of Mayor Breitmeyer to persuade him to appear before the board: "It is incomprehensible that the Mayor cannot seem to understand my position and that financial remuneration cannot change it. I will appear before any board of arbitration that is given official standing, with a definite purpose fixed in advance, that has police power and power to subpœna witnesses and that has the sanction of the city and the company to the extent that both will be bound by the result. In such a body I must have an opportunity to aid in preparation of my own case. I must have funds for such purpose and I must have sympathetic legal assistance. These are only necessary contingencies. I must repeat that my position cannot change."

Public Service Commission in South Carolina.—The General Assembly of South Carolina has passed a bill which establishes a public service commission to fix rates and charges for water, gas and electricity in the cities of that State. The commission is to consist of three members, to be appointed by the Governor with the consent of the Senate, to act on complaint of 20 or more citizens, with power to summon before them the representatives of the company about which complaint is made. Appeal from the finding of the board may be made to the Circuit Court of the county in which is located the city in which the complaint is brought. Upon conviction of an over-charge the commission may impose a fine of from $25 to $50. Each member of the commission is to receive $10 a day and traveling expenses, while actually employed, to be paid by the party against whom the complaint is made if the rates charged are found to be unjust, or by the city if the complaint is not borne out by the fact. The first members of the commission are to serve two, four and six years, respectively. Every two years thereafter the Governor is to appoint one member of the commission to serve six years

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The General Court has received several additional petitions to allow the New York, New Haven & Hartford Railroad to acquire street railways west of the Connecticut River. They have been referred to the committees on railroads and street railways sitting jointly. The bill to provide for the transportation of pupils of normal schools at half fares by street railways has been ordered to a third reading in the House, and the resolve to provide for an investigation by the Boston Transit Commission of the cost of building a subway from Park Street to the South Station has been passed by the House to be engrossed. An attempt to reconsider the bill to require street railways to equip their cars with lifting jacks has been defeated in the House. Governor Draper has signed a bill which permits a street railway incorporated in Massachusetts to purchase from any such company incorporated under the laws of another State so much of the railway, franchise and property of the other company as is located in Massachusetts, when the second company connects with, intersects or forms a continuous line with the first road. The act provides that the facilities for travel are not to be diminished or the rates of fare increased, and the terms of the purchase are subject to the approval of the Railroad Commission. The committee on banks and banking has reported leave to withdraw the bill introduced on petition of the Massachusetts Street Railway Association for legislation to define more clearly the cases in which savings banks may invest in the bonds of street railways which are leased. The bill provided that dividends paid by way of rental to the stockholders of a street railway which is leased shall be deemed to have been earned and paid by the company within the meaning of the statute providing for the investment of savings banks in bonds of companies which have paid 5 per cent dividends for five years. The bill to permit the Shelburne Falls & Colraine Street Railway to refund its funded debts and fund its floating debt has been read a third time in the Senate. The bill to permit the Railroad Commission to grant temporary locations to street railways to prevent the interruption of traffic has been read a third time in the House.

New York.—Both houses of the Legislature on May 2, 1910, passed the bill outlining the procedure to be followed in eliminating subways and dock bonds from the computation of New York City's debt limit, in accordance with the constitutional amendment adopted by the voters at the election in November, 1909. Under the provisions of the bill the Controller is required when requested by the board of estimate to submit a statement of the city's indebtedness growing out of any rapid transit or dock investment prior to Jan. 1, 1910. Details in connection with the issue of the bonds and the revenue derived by the city from the investment are to be given in connection with the statement. The board of estimate, acting for the city, may then apply to the appellate division for a determination of the amount of debt to be excluded. The bill was amended before passage so as to permit any parties in interest to intervene in the proceedings before the appellate division. The determination of the appellate division is to be final and conclusive. A hearing was held before the committee of the Assembly on internal affairs on the bill to repeal the Burns law of 1896, which reserves the Albany Post Road to vehicular traffic and prohibits the granting of franchises to street railway companies.

Ohio.—The Woods Utility Bill was defeated in the Senate on April 28, 1910, by a vote of 10 to 22. The bill was reported out by the House in March and was passed by that body by a vote of 96 to 13. Senator Patterson opened the argument against the bill. He said that the measure had been amended so often that it bore only a slight resemblance to the act as originally drawn, and that he was not quite certain of its provisions even as redrafted. The few compensating features of the original bill had been so emasculated as to make them negative. Senator Mather said that he considered the measure a futile bill, as the companies which would come under its jurisdiction had contracts with the municipalities in which they operated which were binding, and that the Legislature was without authority to confer power to adjust differences between utilities and municipalities upon a commission.

At a hearing before the committee on commercial corporations of the Senate on April 12, 1910, S. P. Bush, president of the Buckeye Steel Castings Company, Columbus, and A. M. Kittredge, president of the Barney & Smith Car Company, Dayton, protested against the passage of the measure in behalf of a deputation of Ohio manufacturers constituting the Ohio business committee of the Railway Business Association. Mr. Bush said that the injury which would be inflicted to the railroads by the proposed measure would seriously affect in all its ramifications the manufacturing interests identified with railroads. The group of interests whose product goes into railway uses was the greatest interest in the country except agriculture. In Ohio there were 800 railway establishments employing between 100,000 and 150,000 men. It was to the public interest to foster and not to assail railway development. The plan proposed of making the government a partner in the management of the railroads with powers much greater than heretofore deemed wise or necessary was a new and untried one calculated to suppress the initiative which has characterized railway and other development. While there might be a demand for railway regulation, there was also a demand, equally proper, for conservatism.

Mr. Kittredge said that the attitude of the delegation before the committee was final and that those in attendance had visited Columbus because they felt that the Legislature was in danger of making an error which might prove disastrous to many industries. One of the greatest temptations was to legislate too much. The attempt was being made to do too much in too short a time, without the opportunity to digest the underlying facts properly. The very men before the committee had their differences with the railroads, sometimes even sharp and acrimonious; they were present to say that before the proposed law, drastic in its provisions, radical in its changes of business method, costly to the State and the railroads to enforce, was enacted, every member of the Assembly should be sure that he knew what he was doing and why he was doing it and that the consensus of public opinion demanded it. There was no theorizing about the matter so far as Mr. Kittredge was concerned, as the Barney & Smith Company paid freight bills of at least $60,000 a year during times of normal business. Ninety-six prominent business houses in Dayton alone had signed a petition filed with the chairman of the committee urging conservatism in dealing with the Woods bill. There was no grievance properly coming within the purview of the Railroad Commission as now constituted that that body had not taken cognizance of and possessed power to deal with.

So far as the interests which Mr. Kittredge represented had learned, the Railroad Commission did not feel itself improperly equipped to regulate the railroads adequately in the interest of the public. If the railroads followed unjust methods in their business, the facts could easily be ascertained through investigation by a special committee or commission and proper action could be taken with all the facts and with the knowledge that Ohio wants such legislation. The members of the Ohio business committee of the Railway Business Association, at the invitation of the chairman of the committee on commercial corporations of the Senate, supplemented the speeches made by Mr. Bush and Mr. Kittredge with a written communication further protesting against the bill largely on the ground that there was no need for the proposed measure. In transmitting this letter, the association said that it asked only reasonable proof that the measure proposed would correct definite evils without producing new ones.

The House of Representatives has acted favorably upon the bill to require all electric cars to be equipped with air brakes. At least 50 per cent of the cars of each company in the State must be equipped by January, 1911; 75 per cent by January, 1912, and all by January, 1913. The Senate concurred in this bill. The Assembly voted to recess Saturday evening, but will meet on May 10, when action will be taken upon those bills about which disagreement still exists. The Langdon bill, creating a tax commission to take the place of the small tax boards, awaits the signature of the Governor. It makes the Nichols law applicable to public utility corporations. The bill which gives interurban railways authority to condemn land on which to build tracks has been passed by both houses.

Financial and Corporate

New York Stock and Money Market

May 3, 1910.

The stock market was irregular in price and weaker in tone last week. Prices declined several points during the week and trading was light. The downward movement was started a fortnight ago, when the severe storms in the West occasioned general alarm. This occurred at a period when confidence in the future was already at low ebb and when the majority of conservative traders believed it advisable to stay out of the market. Interborough-Metropolitan shares continued to be quite active, although lower in price. There is little interest in the securities of either the Metropolitan Street Railway or the Third Avenue Railroad.

The money market was considerably tighter during the week and rates were more irregular. Quotations to-day were: Call, 4 to 5½ per cent; 90 days, 4¼ to 4½ per cent.

Other Markets

Philadelphia Rapid Transit and Union Traction are weaker in tone and lower than during the strike.

Massachusetts Electric and Boston Elevated have each eased off a trifle in price. A few blocks of West End have been sold at former prices.

There has been little trading in tractions in the Chicago market during the week. Metropolitan Elevated has been offered in small blocks, but there is no significance to these sales and prices are unchanged.

In Baltimore, both the stock and the bonds of the United Railways Company have been moderately active. Prices are practically unchanged.

Quotations of various traction securities as compared with last week follow:

	April 26.	May 3.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a126	126
Boston & Suburban Electric Companies	a16	*16
Boston & Suburban Electric Companies (preferred)	73	*73
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a45	a44
Brooklyn Rapid Transit Company	a77⅝	74⅝
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	83⅞	82¼
Capital Traction Company, Washington	a132	a132
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3½	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a100	a100
Chicago Railways, ptcptg., ctf. 2	a29	a29
Chicago Railways, ptcptg., ctf. 3	a13	a13
Chicago Railways, ptcptg., ctf. 4s	a7¼	a7¼
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104½
Detroit United Railway	*61	59½
General Electric Company	148¾	146
Georgia Railway & Electric Company (common)	111	a115
Georgia Railway & Electric Company (preferred)	a87	a87
Interborough-Metropolitan Company (common)	21¼	19⅜
Interborough-Metropolitan Company (preferred)	55⅜	51
Interborough-Metropolitan Company (4½s)	80¾	79⅝
Kansas City Railway & Light Company (common)	*31	*31
Kansas City Railway & Light Company (preferred)	*77⅝	*77⅝
Manhattan Railway	136	132
Massachusetts Electric Companies (common)	a18	16⅞
Massachusetts Electric Companies (preferred)	a88	a88
Metropolitan West Side, Chicago (common)	*16	a16½
Metropolitan West Side, Chicago (preferred)	*53	a56
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	72¾	70⅛
Northwestern Elevated Railroad (common)	a17	a18
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a50¼	a49½
Philadelphia Company, Pittsburg (preferred)	a44½	a43½
Philadelphia Rapid Transit Company	a19⅝	a16½
Philadelphia Traction Company	a86	a85
Public Service Corporation, 5 per cent col. notes	a96½	*96½
Public Service Corporation, ctfs.	a104½	a103½
Seattle Electric Company (common)	a115	*115
Seattle Electric Company (preferred)	104½	103
South Side Elevated Railroad (Chicago)	*53½	*53½
Third Avenue Railroad, New York	6½	6
Toledo Railways & Light Company	*10¼	9
Twin City Rapid Transit, Minneapolis (common)	113	112½
Union Traction Company, Philadelphia	a48	a44
United Rys. & Electric Company, Baltimore	*12¼	*12¼
United Rys. Inv. Co. (common)	37	*37
United Rys. Inv. Co. (preferred)	65	*65
Washington Ry. & Electric Company (common)	a39	a37
Washington Ry. Electric Company (preferred)	a92	a91
West End Street Railway, Boston (common)	a88	a87½
West End Street Railway, Boston (preferred)	a102	a101½
Westinghouse Elec. & Mfg. Company	62½	62
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Report of the General Electric Company

The General Electric Company made public last week its report for 1909. The fiscal year of the company has been changed so as to end on Dec. 31 to comply with the corporation tax law, so that the present report is for the 11 months ended Dec. 31, 1909. It shows profits for the period, after allowance for depreciation, etc., of $6,493,670. The orders received during the 11 months amounted in value to $54,360,562, compared with $42,186,917 during the 12 months ended Jan. 31, 1909, and $59,301,040 during the 12 months ended Jan. 31, 1908. Orders received were at the yearly rate of $49,769,000 and for the last five months were at the yearly rate of $69,670,000.

The report refers to the continued success of the company's 1200-volt direct-current railway system and says that "more than 66,000 hp of 1200-volt railway motors are in operation and on order." Fourteen companies are mentioned as having adopted the system. Curtis turbines are now installed in 650 central distributing stations and power plants throughout the world, having a total capacity in excess of 1,750,000 hp. The aggregate floor space at the company's shops in Schenectady, Lynn, Pittsfield and Newark at the end of the fiscal year was 7,180,000 sq. ft. and the number of employees was 30,000.

In referring to engineering, the report refers to the improvements of high-tension transmission devices by means of which potentials of 100,000 volts and over can be used, to the development of a new electrolytic lighting arrester and to the development of turbo-generators of 20,000 kw. The 14,000 high-pressure turbines in use in New York and Chicago are giving good satisfaction. The company has $3,048,604 invested in copper mining and milling properties in California and New Mexico.

The balance sheet follows:

ASSETS.

Patents, Franchises and Good Will		$ 1.00
Cash		17,623,466.72
Stocks and Bonds	$22,329,663.71	
Real Estate (other than Factory Plants)	118,063.34	
Notes and Accounts Receivable	19,377,972.37	
Work in Progress	462,223.41	
	$42,287,922.83	
Merchandise Inventories:		
At Factories	$21,610,283.91	
At General and Local Offices	3,321,870.94	
Consignments	217,880.98	
	25,150,035.83	
		67,437,958.66
Factory Plants (including all lands, buildings and machinery)	$14,330,958.12	
Copper Mining Investment	3,048,604.41	
		17,379,562.53
		$102,440,988.91

LIABILITIES.

5 % Gold Coupon Debentures of 1892	$ 40,000.00
3½% Gold Coupon Debentures of 1902	2,047,000.00
5 % Gold Coupon Debentures of 1907	12,875,000.00
Accrued Interest on Debentures	83,664.58
Accounts Payable	2,753,617.30
Advance Payments on Contracts	777,133.34
Dividend Payable Jan. 15, 1910	1,303,592.00
	$19,880,007.22
Capital Stock Issued	65,179,600.00
Surplus	17,381,381.69
	$102,440,988.91

Proposal for Consolidation of the Elevated Railways in Chicago

The proposal to consolidate the elevated railways in Chicago has again been brought forward. Henry A. Blair, in the interest of the National City Bank, New York, N. Y., and N. W. Harris & Company, New York and Chicago, has made a proposal to the representatives of the elevated railways of cash in exchange for the preferred and common stock of the companies at a price hereafter to be agreed upon, the cash offer for the preferred stock to be distinct from the cash offer for the common stock. As an alternative, Mr. Blair proposes that the preferred and the common stock be deposited under an agreement which shall provide for a plan under the terms of which the depositors of the preferred stock will receive in exchange new securities sufficient in amount, at par, to represent the par value of the preferred stock which has been deposited, and the depositors of the common stock shall receive in exchange new securities commensurate with the cash offer made for the

common stock. Mr. Blair concluded his communication setting forth the proposal as follows:

"It is understood that a formal agreement is to be drawn up, setting forth the terms and conditions under which the exchange of securities, either for cash or for the new securities, to be offered by the bankers' syndicate, will be made.

"The said formal, written agreement will fix the price agreed to be paid in exchange for the preferred and common stock, and will provide that the syndicate shall have the right to call for the deposit of the preferred and common stock in exchange for the new securities of the syndicate, upon the basis set forth in the agreement and shall provide that Henry A. Blair, representing the bankers' syndicate, shall have the power to make an examination of the condition of the properties, to verify figures and estimates, to draw up a plan, and declare the plan operative, when possible to do so after the deposit of an amount of the stock sufficient to make it operative; and shall provide that, in case at the end of a stipulated period, the plan is not declared operative, then the depositors of the preferred and common stock shall have the right to withdraw their securities free from any obligations whatsoever.

"It is further understood that, in case the plan is declared operative by Henry A. Blair, representing the bankers' syndicate, within a time stipulated, then the depositors of the preferred and common stock shall have the right either to accept the cash offer made in the agreement already referred to, or in the alternative, to come in under the plan and receive in exchange for the preferred and common stock deposited thereunder the new securities of the syndicate, upon the basis agreed upon in the agreement."

Organization of Public Securities Company

The organization of the Public Securities Company with an authorized capital stock of $20,000,000 was announced in Chicago on April 27, 1910, by Homer W. McCoy, of McCoy & Company, Chicago, Ill., who has been elected president of the company. The purpose of the company is to occupy a position in Chicago to correspond to some extent to that of the private banking houses in the East in financing railroad, electric railway, gas, electric, hydroelectric and timber properties. The stock of the company is to be divided into 100,000 shares of 7 per cent cumulative first preferred stock of a par value of $10,000,000, 20,000 shares of second preferred stock of a par value of $2,000,000 and 80,000 shares of common stock of a par value of $8,000,000. The dividends on the first preferred stock are to be payable semi-annually or quarterly and the stock is to be redeemable 3 years after the date of issue at $110 per share plus any accumulated and unpaid dividends. The officers and directors of the Public Securities Company follow: Homer W. McCoy, president; Charles H. Deppe, vice-president; Walter A. Graff, vice-president; Joseph H. Roy, secretary and treasurer; Horace G. Burt, formerly president Union Pacific Railway; Samuel Insull, president Commonwealth Edison Company, Chicago; B. E. Sunny, president Chicago Telephone Company; Edward G. Cowdrey, vice-president People's Gas, Light & Coke Company, Chicago; Thomas E. Mitten, president Chicago City Railway; H. M. Byllesby, H. M. Byllesby & Company, Chicago; Clark L. Poole, Chicago; Walter Barker, Peoria; John W. Blodgett, Grand Rapids; Frank H. Buhl, Sharon, Pa.; James E. Danaher, Detroit; M. D. Thatcher, Pueblo, Col.; H. H. Picking, East Orange, N. J.

Following the announcement of the organization of the company, Homer W. McCoy made public a statement in which he said:

"The need for an investment banking institution in Chicago with a large capital to conduct a security underwriting and a wholesale bond business in the Middle West has long been recognized by bankers and business men. We have determined to take the initiative in this field and with the aid of local bankers and a coterie of prominent men experienced in the operation and conduct of lines of business which originate securities this company has been organized. Although the public offering has not been made $3,000,000 of the capital already has been subscribed. The public offering will be made at once. The company will not receive deposits nor will it interfere in any manner with the business now undertaken by local banks and trust companies, but rather facilitate through their co-operation and good will the underwriting or financing of securities not adapted to their requirements as carriers of commercial or savings deposits. The company has acquired the business and good will of McCoy & Company, which, however, will continue in the bond business as heretofore as a separate organization. It is not the present intention to engage in the business of retailing or distributing securities, but stockholders will be given the opportunity from time to time to join in underwritings on a profit-sharing basis."

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—The stockholders of the Charleston Consolidated Railway, Gas & Electric Company will meet on May 21, 1910, to vote to increase the capital stock of the company from $1,500,000 to $2,000,000 by creating an issue of $500,000 of 6 per cent preferred stock in $50 shares, which will be taken by the Charleston Consolidated Railway & Lighting Company, the organization of which was noted in the Electric Railway Journal of April 30, 1910.

Chicago City & Connecting Railways, Chicago, Ill.—The syndicate which controlled the stock of the Chicago City Railway has called upon the underwriters of the $22,000,000 issue of bonds of the Chicago City & Connecting Railways for a second cash payment. On April 1, 1910, a 60 per cent payment was made.

Joplin & Pittsburg Railway, Pittsburg, Kan.—The $2,800,000 of first mortgage 5 per cent gold bonds of the Joplin & Pittsburg Railway outstanding, which are dated June 10, 1907, and are due on July 1, 1927, have been called for payment on July 1, 1910, at 105 and interest at the office of the Germantown Trust Company, Philadelphia, Pa.

Lake Shore Electric Railway, Cleveland, Ohio.—E. W. Moore, president of the Lake Shore Electric Railway, says that 22,000 of the 30,000 shares of the preferred stock of the Lake Shore Electric Railway which are outstanding have been deposited under the plan for the readjustment of the preferred stock and that the holders of an additional 4000 shares have signified their intention to deposit their holdings. The terms of the proposed readjustment were published in the Electric Railway Journal of March 19, 1910, page 465.

Northampton Traction Company, Easton Pa.—The Northampton Traction Company and the Easton & Washington Traction Company, controlled largely by Thomas A. H. Hay and William O. Hay, Easton, Pa., have been consolidated as the Pennsylvania-Jersey Traction Company. It is proposed to build a connection between the lines of the Pennsylvania-Jersey Traction Company and the Morris County Traction Company so as to afford a route for travel by electric railway from New York via Newark to Easton.

Public Service Corporation, Newark, N. J.—The first annual report, covering the year ended Dec. 31, 1909, has been made public. Gross earnings of leased and controlled companies were $25,103,019. Miscellaneous income of the Public Service Corporation was $1,457,432, making a total of $26,560,451. Operating expenses and taxes were $13,331,228, leaving a balance of $13,229,223. Bond interest and rentals of leased and controlled companies amounted to $10,111,404, leaving a balance of $3,117,819. The fixed charges of the Public Service Corporation aggregated $1,689,372 and the surplus was $1,428,447. Of the total gross earnings reported by the corporation $12,114,412 were contributed by the Public Service Railway Company. The number of revenue passengers carried in 1909 was 238,171,257 and of transfers and passes redeemed 81,548,978, making a total of 319,720,235. The passenger receipts per car-mile were 29.08 cents and per car-hour $2.50.

Sioux City (Ia.) Service Company.—The Sioux City Service Company has made a first and refunding mortgage to secure not more than $2,500,000 of bonds dated May 1, 1910, and due May 1, 1928, but redeemable at $105 and interest on any interest payment date. Of these bonds $1,000,000 have been issued and sold to N. W. Halsey & Company, Chicago, Ill., who will offer them for public subscription.

Winona Interurban Railway, Warsaw, Ind.—Charles H. Worden has been elected a director of the Winona Interurban Railway to succeed C. O. Johnson, deceased.

Traffic and Transportation

Ticket Sales in the New York Subway

According to the Public Service Commission of the First District of New York, the Interborough Rapid Transit Company sold in 1909 35,777,769 more subway tickets than in 1908. The total was 256,768,961, as against 220,991,212, an increase of 16.19 per cent. The largest increase is noticed at the Brooklyn stations, where a total of 30,221,985 were sold, against 21,611,295 the year before. At the Brooklyn Bridge station 16,980,474 tickets were sold. On the Lenox branch travel was the heaviest during the last three months of the year, and the same condition prevailed on the Broadway branch. The statement by months for principal stations follows:

	Lenox Branch.	Broadway Branch.	Brooklyn Bridge.	Brooklyn Stations.	Total Entire System.
January	3,909,252	2,418,098	1,435,745	2,468,932	22,371,396
February	3,676,893	2,309,001	1,324,647	2,304,463	20,769,591
March	4,116,860	2,564,675	1,500,997	2,631,599	23,316,473
April	4,024,535	2,557,260	1,445,696	2,589,154	22,564,008
May	4,082,154	2,672,717	1,449,763	2,583,707	22,077,744
June	3,515,334	2,291,650	1,356,127	2,336,727	18,996,084
July	3,156,554	2,057,878	1,312,499	2,160,055	16,818,051
August	3,168,060	2,022,735	1,306,497	2,170,617	16,975,864
September	3,720,216	2,690,528	1,462,226	2,521,216	20,796,207
October	4,249,680	2,898,417	1,479,436	2,757,266	23,489,467
November	4,224,514	2,752,545	1,400,106	2,731,967	23,193,014
December	4,451,357	2,917,184	1,506,735	2,966,282	25,401,082
1909	46,295,409	30,152,688	16,980,474	30,221,985	256,768,961
1908	39,877,715	24,877,110	16,909,244	21,611,295	220,991,212
Increase	6,417,694	5,275,578	71,230	8,610,690	35,777,769
Increase in per cent.	16.09	21.21	0.42	39.84	16.19

The number of tickets sold on other portions of the subway (included in total figures shown in table above) follow:

	Ninety-sixth Street to Fiftieth Street.	Times Square.	Grand Central.	Thirty-third Street to Worth Street.	Fulton Street to South Ferry.
January	2,669,002	1,052,253	1,199,332	4,971,134	2,219,574
February	2,453,552	970,098	1,072,126	4,637,134	2,008,139
March	2,706,655	1,028,866	1,200,067	5,245,070	2,305,422
April	2,588,747	957,221	1,190,475	4,975,797	2,217,986
May	2,472,079	879,481	1,123,572	4,669,358	2,121,519
June	1,883,351	684,966	994,039	3,957,241	1,980,659
July	1,489,110	600,956	862,948	3,351,288	1,803,259
August	1,473,981	655,712	871,846	3,459,440	1,836,907
September	2,142,352	848,106	1,140,603	4,175,752	2,072,480
October	2,601,966	984,534	1,224,807	5,015,620	2,263,129
November	2,633,987	1,011,362	1,208,981	4,965,861	2,252,232
December	2,859,517	1,102,974	1,322,157	5,665,024	2,596,090
Total	27,974,299	10,776,529	13,390,953	55,088,719	25,677,396
Total, 1908	24,970,133	9,638,382	11,752,264	48,791,307	22,354,124
Increase	3,004,166	1,138,147	1,638,689	6,297,412	3,323,272
Increase in per cent.	12.03	11.81	13.94	12.91	14.87

Through Elevated Routes and Transfers in Chicago

Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, conferred on April 26, 1910, with a subcommittee of the engineers representing the Chicago elevated railways in reference to the problems of through routing and transfers. Another meeting, at which Mr. Arnold and the presidents and engineers of the companies were present was held on April 28, 1910. Out of 38 tentative plans for through routing only five were deemed to be feasible and were submitted to the companies for consideration. A summary of these plans follows:

"1. Through routing all trains on the Northwestern Elevated Railroad and South Side Elevated Railroad, looping the lines of the Metropolitan West Side Elevated Railway as at present. This plan would give a capacity of 205 five-car trains.

"2. Through routing of trains of the Northwestern Elevated Railroad and the South Side Elevated Railroad, and running some of the Humboldt Park and Logan Square trains of the Metropolitan West Side Elevated Railway over Lake Street from Paulina Street, entering the loop at Lake Street and Fifth Avenue. This plan would give a capacity of 237 trains an hour.

"3. Through routing of trains of the Northwestern Elevated Railroad and the South Side Elevated Railroad and of the Metropolitan West Side Elevated Railway and the Chicago & Oak Park Elevated Railroad. To facilitate this operation connections would have to be made between the Metropolitan West Side Elevated Railway and the Chicago & Oak Park Elevated Railroad at Paulina or Market Street, or both. The capacity under this plan would be 365 trains an hour.

"4. Loop operation of all roads with a separation of the grades at Lake Street and Fifth Avenue. This plan would give a capacity of 222 trains an hour.

"5. Through routing of Northwestern Elevated Railroad and South Side Elevated Railroad over a new structure in State Street from Chicago Avenue to Twelfth Street, or over the present structure in Fifth Avenue, looping the Chicago & Oak Park Elevated Railroad and the Metropolitan West Side Elevated Railway as at present. The capacity under this plan with a new structure in State Street would be 444 trains an hour."

Conference Probable in Illinois on Interurban Rules

Orville F. Berry, chairman of the Railroad & Warehouse Commission of Illinois, is considering the subject of the rules which govern the operation of electric railways in Illinois, and it is probable that he will request a conference with the managers of electric railways in the State with a view to the adoption of rules that shall be more nearly uniform. Mr. Berry was recently reported to have made the following statement regarding the operation of electric railways:

"I have found by inquiring into the mode of operation of the electric railways that their rules and regulations all bear the imprint of haste. The development of the electric railway has been so fast that the management has not been able fairly and carefully to organize the operating systems.

"There seems to be no definite plan or arrangement for controlling the operation of these roads. There seems to be no uniform schedules for operating. The responsibility of the movement of the cars seems to be divided in many instances between the motorman and the conductor. This divided responsibility is bad on the service.

"The commission contemplates calling together at an early date the officials of the interurban railways for the purpose of taking up with them the publishing by the commission of rules and regulations for the operating in a general way of these roads. This matter has been submitted to a number of the managers and has met with favor. The motormen on electric railways should be very carefully selected and be well versed in electricity and the manner of its handling. The commission feels that this is a very important subject and it will be dealt with at an early date. A set of rules should be adopted fixing absolutely the responsibility for the movement of cars."

Fare Complaint in New York.—Patrons of the Syracuse, Lake Shore & Southern Railroad, Syracuse, N. Y., have filed with the Public Service Commission of the Second District of New York a complaint about the fare of 10 cents charged by the company between stop 26 and Fulton, N. Y., a distance of 3.82 miles. They claim that the present rate between stop 26 and Fulton constitutes unjust discrimination in favor of passengers who ride within other 5-cent zones of the company.

Rochester, Syracuse & Eastern Railroad Ordered to Maintain Passenger Station.—The Public Service Commission of the Second District of New York has ordered the Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., to provide a station on its line at Savannah, Wayne County, on or before Oct. 1, 1910, and to submit plans for the station on or before May 30, 1910. The company is given an option of renting space for a passenger station in any building in which suitable accommodations for the public are offered.

Booklet Issued by the Terre Haute, Indianapolis & Eastern Traction Company.—John H. Crall, general passenger agent of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has issued a booklet, "A Trip to Nature's Beauty Spots," devoted entirely to the Martinsville division of the company illustrated with half-tones reproduced from photographs taken along the company's lines. The cover of the booklet contains the legend "Dedicated to all lovers of nature by the passenger department

of the Terre Haute, Indianapolis & Eastern Traction Company.

Application to Abandon Line Disapproved.—The Public Service Commission of the Second District of New York has denied the application of the Bennington & North Adams Street Railway, Hoosick Falls, N. Y., to abandon a part of its route in Hoosick Falls and construct this route on a part of High Street, Hoosick Falls, not now occupied by it. The portion of the route proposed to be abandoned now constitutes a loop and the company desired to abandon this and run the line through High Street, making a direct route. At the hearing it was objected that the portion of High Street, which it was proposed to occupy, was narrow and that a large school was located along the route. It was also contended that the steep grade on the street would endanger the lives of children.

Lehigh Valley Transit to Operate Into Philadelphia Over Philadelphia & Western Railway.—E. B. Smith, of E. B. Smith & Company, Philadelphia, Pa., who purchased the Philadelphia & Western Railway, as announced in the Electric Railway Journal of April 9, 1910, page 667, stated on April 30 that it was proposed to connect the Philadelphia & Western Railway with the line of the Lehigh Valley Transit Company, so as to afford an entrance to Philadelphia for the cars of the latter company which are operated from Allentown. At present the Lehigh Valley Transit Company operates only to Chestnut Hill, in the suburbs of Philadelphia. The Philadelphia & Western Railway is operated to Sixty-ninth and Market Streets, Philadelphia, where passengers transfer over the Market Street elevated line of the Philadelphia Rapid Transit Company for down-town Philadelphia. The connection between the two systems will reduce the time for the trip from Allentown to Philadelphia about 45 minutes. Stone & Webster, Boston, Mass., have been retained to determine how the plans for a physical connection between the Philadelphia & Western Railway and the line of the Lehigh Valley Transit Company can best be carried out.

Traffic Capacity of Boston Elevated Terminal Discussed.—J. Henry Neal, general auditor of the Boston (Mass.) Elevated Railway, in a recent lecture before the Roxbury Improvement Association, discussed the traffic capacity of the Dudley Street terminal station for elevated lines, and pointed out the efforts the company had made to handle the service at this point in the face of changing conditions. The Dudley Street terminal was the southern end of the original elevated system built in Boston in 1901. During the early years of elevated service it fulfilled its mission admirably and afforded the public additional transfer facilities without the interchange of checks. On account of the growth of business and the construction of the Forest Hills elevated extension it became necessary to change the design of the terminal, as described in the Electric Railway Journal. Perhaps the most notable improvements were the added platform facilities and the separation of inward from outward foot passenger movements to prevent congestion. The completion of all the changes at the terminal will give the station a capacity of 1420 cars per hour, whereas in the South Station at Boston, one of the largest stations in the world, 817 trains per day were handled, or a total of 4902 cars. From 8 to 23 platform men were on duty constantly. The volume of daily passenger traffic was larger at the Dudley Street Station than at the North and South railroad stations together at Boston.

An ordinance has been introduced in the upper house of the Council of Kansas City, Mo., to create a new public utilities commission in that city to consist of three members instead of seven as at present, each member to receive a salary of $1,000 a year. The commission is to be nonpartisan, the majority of the members to come from the dominant political party. Appointments are to be made by the Mayor, and members of the commission must be citizens of Missouri. The ordinance has been referred to the finance committee. Under the present laws of Missouri public utility commissions appointed by cities are only empowered to recommend to the Council changes in the operation of public utilities which their study of a case may seem to deem proper.

Personal Mention

Mr. W. J. Goldthwait has resigned as superintendent of the Manchester Traction, Light & Power Company and the Manchester Street Railway, Manchester, N. H.

Mr. Henry A. Everett, of the Everett-Moore Syndicate, Cleveland, Ohio, has sailed from San Francisco on a tour of the world for the benefit of his health. Mr. Everett spent the winter in California. He is accompanied by Dr. T. N. Moore, Willoughby, Ohio.

Mr. J. V. H. Torner has recently been appointed shop foreman of the Beloit division of the Rockford & Interurban Railway. Mr. Torner was formerly car house foreman of the Calumet & South Chicago Railway, Chicago, and has had several years' experience with the Chicago City Railway.

Mr. L. E. Lynde has been appointed superintendent of the Manchester Traction, Light & Power Company and the Manchester Street Railway, Manchester, N. H., to succeed Mr. W. J. Goldthwait. Mr. Lynde has recently been superintendent of the Eastern Massachusetts and the Eastern New Hampshire divisions of the New Hampshire Electric Railways, Haverhill, Mass.

Mr. John F. Collins, who recently resigned as general manager of the Saginaw-Bay City Railway and the Saginaw Valley Traction Company, Saginaw, Mich., to become assistant general manager of the Toledo Railways & Light Company, Toledo, Ohio, was tendered a banquet at the Boody House, Toledo, by his friends as an indication of their appreciation at his return to Toledo.

Mr. C. F. Franklin, who resigned recently as president and general manager of the Toledo & Western Railroad, Toledo, Ohio, has been appointed general superintendent of the Winona Interurban Railway, Warsaw, Ind. Mr. Franklin was formerly general superintendent of the Toledo, St. Louis & Kansas City Railroad, and has had 20 years' experience with steam railroads. He has been connected with interurban electric railways for the last 10 years.

Mr. Bertram H. Harrigan has been appointed superintendent of the Eastern Massachusetts and Eastern New Hampshire divisions of the New Hampshire Electric Railways, Haverhill, Mass., to succeed Mr. L. E. Lynde, who has been appointed superintendent of the Manchester Traction, Light & Power Company and the Manchester Street Railway, Manchester, N. H. Mr. Harrigan up to a short time ago was a conductor on the Eastern division of the New Hampshire Electric Railways, a position which he held for more than five years.

Mr. W. A. Satterlee has been appointed general manager of the Joplin & Pittsburg Railway, Pittsburg, Kan. Mr. Satterlee was formerly assistant general manager of the Metropolitan Street Railway, Kansas City, Mo., with which he was connected for 20 years. During this time he served as purchasing agent, auditor, cashier, assistant superintendent, superintendent and assistant general manager. Prior to 1902 he was superintendent in charge of the operation of all the lines of the Metropolitan Street Railway, and from 1902 until August, 1908, he gave his entire attention as assistant general manager to damages and claims. He took up the work with the operating department again in 1908 when Mr. J. W. Carter resigned as superintendent. Mr. Satterlee resigned from the Metropolitan Street Railway in September, 1909.

Mr. B. T. Longino, of the transportation department of the Seattle (Wash.) Electric Company, has been appointed assistant to Mr. F. A. Boutelle, superintendent of transportation of the Tacoma Railway & Power Company, Tacoma, Wash. Mr. Longino is a graduate of the technical department of the Georgia School of Technology, class of 1907. After finishing his course he entered the offices of Stone & Webster, in Boston, Mass., and was afterwards transferred to the Seattle Electric Company, where he has occupied different positions for the past year and a half. When he first entered the employ of the Seattle Electric Company Mr. Longino was connected with the engineering section of the master mechanic's department, from which he entered the offices of Mr. A. L. Kempster, superintendent of transportation of the company.

Mr. F. T. Hepburn, whose appointment as general manager of the Saginaw Valley Traction Company, Saginaw, Mich., was noted in the ELECTRIC RAILWAY JOURNAL of April 30, 1910, will also act as general manager of the Saginaw-Bay City Railway, the Saginaw City Gas Company, the Bay City Power Company and the Bay City Gas Company, which comprise the gas, electric light, power and street railway companies in Saginaw and Bay City and the interurban electric railway between these cities. Mr. Hepburn was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1893, and for 13 years was connected with the construction, maintenance and operating department of the Pennsylvania Railroad. In 1906 he was appointed general manager of the Lima & Toledo Traction Company and the Indianapolis, Columbus & Eastern Traction Company, Lima, Ohio, which operated 250 miles of interurban electric railway in Ohio, and now comprise what is known as the Northern District of the Ohio Electric Railway. Mr. Hepburn has already entered upon his duties with the companies in Saginaw and Bay City.

Mr. W. R. W. Griffin, general superintendent of the Rochester lines of the New York State Railways, has been appointed general manager of the East Liverpool Traction & Light Company, East Liverpool, Ohio, and will assume his duties with that company on May 10, 1910. Mr. Griffin was connected with the Toledo, Fremont & Norwalk Railroad from 1900 until 1901, and with the Lake Shore Electric Railway after the consolidation of the Toledo, Fremont & Norwalk Railroad and other properties by the Everett-Moore Syndicate as the Lake Shore Electric Railway. On May 15, 1902, he was appointed superintendent of construction of the Rochester & Eastern Rapid Railway for the Comstock-Haigh-Walker Company. He became operating superintendent of the Rochester & Eastern Rapid Railway on Nov. 19, 1903, and remained in this position until Dec. 1, 1907, when he was appointed general superintendent of the Rochester Railway, which subsequently was merged into the New York State Railways. Mr. Griffin is a member of the American Society of Civil Engineers and an associate member of the American Institute of Electrical Engineers.



W. R. W. Griffin

Mr. A. W. McLimont has resigned as general manager of the Chicago & Milwaukee Electric Railroad, Chicago, Ill., to become vice-president and general manager of the Michigan United Railways, Lansing, Mich. He will assume his duties with the Michigan United Railways as soon as his successor with the Chicago & Milwaukee Electric Railroad is appointed. Mr. McLimont has been general manager of the Chicago & Milwaukee Electric Railroad since March, 1909, and was formerly electrical and operating engineer of the Public Service Commission of the First District of New York. He was connected with the Public Service Commission from the time it organized, and in the position which he held with the commission there devolved upon him the task of making recommendations regarding the physical properties of companies operating 7000 electric cars, 24 car houses and several very large power houses and of making a number of original investigations for the commission, the most important of which was undoubtedly the series of fender tests conducted at Schenectady and Pittsburgh. Mr. McLimont is a Canadian by birth. After entering business with the New England Telegraph & Telephone Company and subsequently installing railway plants in Dallas, Houston, St. Joseph, Nashville, Chicago, and other cities for the Thomson-Houston Electric Company, he became general manager and resident engineer of the Dubuque (Ia.) Electric Company. Later he joined the foreign department of the General Electric Company and for a number of years installed electric light and power plants in South America. He returned to the United States for a short while, but later he built and operated a number of electric light plants in Mexico. Entering the employ of W. R. Grace & Company, Mr. McLimont designed, built and operated 40 miles of city and interurban railway at Lima, Peru.

OBITUARY

Townsend Wolcott, electrical engineer at New York of the United States Signal Corps, died of pneumonia on April 29, 1910, after an illness of only a few days. Mr. Wolcott joined the American Institute of Electrical Engineers in 1888, and became a full member of the institute in 1890. For more than 10 years he was a member of the membership committee and was always an active participant in the discussion of papers before the institute. He was also a frequent contributor to the technical press on various subjects.

William A. Snow, formerly chairman of the board of directors of the American Brake Shoe & Foundry Company, Mahwah, N. J., died at his home in Hillburn, N. Y., on April 26, 1910. Mr. Snow was 81 years old. At the time of his death he was also chairman of the board of directors of the Metal Plated Car & Lumber Company, vice-president of the Ramapo Iron Works, president of the Standard Equipment Company, treasurer of the Rockland Electric Company and treasurer of the Mountain Spring Water Company.

George F. Porter, former secretary of the National Electric Light Association, died of apoplexy on April 29, 1910, at his home in Montclair, N. J. Mr. Porter's long official connection with the National Electric Light Association brought him a wide acquaintance, both in central station and electrical manufacturing circles. Mr. Porter was born on March 12, 1855, in Pittsburgh, Pa. In 1875 he turned his attention to the electrical field, commencing as a telegraph operator. Until 1877 he was connected with the Pullman Palace Car Company in its Philadelphia office. Later he went into the carbon business, and subsequently held a position with the Westinghouse Electric & Manufacturing Company in Philadelphia. In 1892 he was appointed secretary of the National Electric Light Association, which office he held continuously until 1902. In 1904 he became master of transportation of the association, and just prior to his death was busily engaged in making transportation arrangements for the convention of the National Electric Light Association in St. Louis.

George W. Williams and George T. Bishop, receivers of the Washington, Baltimore & Annapolis Electric Railway, Washington, D. C., have issued a statement which shows the earnings of the company for March, 1910, and March, 1909, and for the nine months ended March 31, 1910. The gross earnings for March, 1910, were $54,426, as compared with $50,949 for March, 1909; the net earnings for March, 1910, were $26,445, as compared with $14,169 for March, 1909; the percentage of operating expenses to gross earnings in March, 1910, was 51.2 per cent as compared with 72 per cent in March, 1909. The gross earnings for the nine months ended March 31, 1910, were $459,067 and the net earnings were $183,090. The percentage of operating expenses to gross earnings for this period was 60 per cent. In a letter addressed to the stockholders of the company, which accompanied the statement of earnings, Mr. Bishop said:

"On March 1, 1910, the receivers commenced to operate the new cars, equipped with 1200-volt direct-current motors, to the United States Treasury Building, Washington. This terminus is within 500 ft. of the White House. On the same date rates of fare were increased, the most important advance being in the rates between Baltimore and Washington. All these changes have now been in effect for the full month of March and the first half of April, and it is evident that not only will the earnings be increased, but the operating expenses will show a material decrease. Since these changes were made, the receivers have increased the limited train service between Washington and Baltimore and have added a two-hourly through service between Washington and Annapolis, thereby increasing the car mileage 600 miles a day. Notwithstanding the reduction in operating expenses, the receivers have provided better service to the extent of 18,000 miles a month."

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Caldwell-Roswell Interurban Railway, Caldwell, Ida.**—Incorporated in Idaho to build an electric railway between Caldwell and Roswell. Capital stock $250,000. H. W. Dorman is interested.

Noccalula Railway, Light & Power Company, Gadsden, Ala.—Application for a charter has been made by this company in Alabama to build a railway from Gadsden to the Falls in Black Creek on Lookout Mountain. Capital stock, $300,000. H. A. Rogers is interested. [E. R. J., April 23, '10.]

Muskogee (Okla.) Transit Company.—Incorporated in Oklahoma to build a 225-mile electric railway to connect Wagoner, Corretta, Coweta, Broken Arrow, Tulsa, Sapulpa, Haskell, Boynton, Okmulgee, Checotah, Warner, Webber's Falls, Illinois Station, Bragg, Fort Gibson, Henryetta and Muskogee. Capital stock, $100,000. Headquarters, Muskogee. Incorporators: E. W. Mangson, and Oliver Borwick, St. Louis; O. D. Revell, Asheville, N. C., and Tams Bixby, Chas. Bliss, Thos. Smith, M. F. Hancock and Geo. A. Murphy, Muskogee. [E. R. J., April 23, '10.]

Philadelphia & Suburban Elevated Railroad, Philadelphia, Pa.—Chartered in Pennsylvania to construct elevated railroads on Twelfth and Thirteenth Streets, also for a subway under North Broad Street from Filbert Street to York Street with three elevated spurs running to Frankford, Wayne Junction and Strawberry Mansion. Among the directors are: Russell Thayer and Robert K. Cassatt. S. S. Neff president. [E. R. J., Dec. 4, '08.]

***Maryhill & Goldendale Railway Company, Olympia, Wash.**—Incorporated in Washington to build a railway between Maryhill and Goldendale. Capital stock, $10,000. Incorporators: Samuel Hill, A. E. Hanford, H. C. Richardson and N. D. Miller.

***Olympic Power & Development Company, Port Townsend, Wash.**—Application for a charter has been made by this company in Washington to build an interurban railway to connect Port Townsend, Irondale and Hadlock. Capital stock, $250,000. Directors: W. B. Martin, James H. Causten and James A. Calyert, Seattle; E. A. Sims, Port Townsend, and Eric Molander, Everett.

FRANCHISES

Gadsden, Ala.—H. A. Rogers, representing the Noccalula Railway, Light & Power Company, has been granted a franchise to build a railway in Gadsden. It will connect Gadsden, Alabama City, Attalla and Lookout Mountain top. [E. R. J., April 23, '10.]

Glendale, Cal.—The Glendale & Eagle Rock Railway, Glendale, has applied to the Trustees for a franchise to build an extension to the northern city limits of Glendale. E. D. Goode, president.

Eldorado, Ill.—The Egyptian Traction Company has been granted a 50-year franchise by the Councils of Harrisburg, Eldorado and Carrier Mills, and it is now negotiating with the Councils of Marion, Carbondale and New Haven for similar franchises. G. E. K. Hixon, general manager, announces that the company plans to begin work about June 1 on the section of the line between Eldorado and Carrier Mills. [E. R. J., April 16, '10.]

Bristol, Ind.—The St. Joseph Valley Traction Company, Elkhart, has been granted a franchise by the Board of Trustees to build a railway in Bristol. The plan is to extend this railway to Pioneer, Ohio, where it will connect with an electric railway into Toledo. [E. R. J., Apr. 9, '10.]

***Cedar Rapids, Ia.**—William Dows and Isaac Smith have asked the Council for a franchise to build a railway in Cedar Rapids.

Charles City, Ia.—The Charles City & Western Railway has been granted a franchise by the Council to build an electric railway in Charles City. It is planned to extend it to Marble Rock. [E. R. J., Apr. 23, '10.]

Davenport, Ia.—The Tri-City Railway, Davenport, has been granted a 25-year extension of its franchise to build extensions of its railway in Davenport. It is expected to extend the line to Muscatine.

Covington, Ky.—The Covington, Big Bone & Carrollton Railroad, Covington, has been granted a 50-year franchise by the Aldermen and Council to build a railway in Covington. M. J. Crouch is interested. [E. R. J., Apr. 30, '10.]

Ironwood, Mich.—Messrs. Sullivan and Appleyard have been granted an electric railway and light franchise in Ironwood. [E. R. J., Apr. 30, '10.]

Englewood, N. J.—The New Jersey & Hudson River Railway & Ferry Company have been granted a 5-year franchise to extend its railway in Englewood.

Welland, Ont.—The Niagara Falls, Dunnville & Welland Electric Railway, Welland, will ask the City Council soon for a franchise to build an electric railway through Welland. [E. R. J., Mar. 26, '10.]

Albany, Ore.—The Oregon Electric Railway, Portland, has been granted a franchise by the City Council to enter Albany.

Cold Spring Park, Pa.—The Huntingdon, Lewiston & Juniata Valley Traction Company, Huntingdon, has been granted a franchise to build a railway in Cold Spring Park.

Lykens, Pa.—The Schuylkill & Dauphin Traction Company, Harrisburg, has asked the Council for a franchise to build an extension to its lines to connect with the Pennsylvania Railroad in Lykens. W. E. Harrington, general manager.

Beaumont, Tex.—I. D. Polk, Beaumont, has applied for a 50-year franchise to build a railway in Beaumont. This is part of a plan to connect Beaumont and Port Arthur. [E. R. J., June 12, '09.]

***Houston, Tex.**—A. Foster Irwin, representing the Houston & Bay Shore Traction Company, has asked the County Commissioners for a franchise to build an interurban railway over county roads from Houston to Morgans Point, via Harrisburg and La Porte.

Provo, Utah.—A. J. Evans and S. L. Chipman has applied to the County Commissioners for a franchise to build an interurban railway through Utah County, similar to the one granted to Jesse Knight, which he declined to accept. Application has also been made to the Council for a local franchise. [E. R. J., Feb. 19, '10.]

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company has just laid 2¼ miles of double track with 80-lb. rails between Ensley and Corey. A. H. Ford, general manager.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company has awarded the contract for building its 5-mile extension to Chilliwack to J. W. Pike, Vancouver.

Nelson Electric Tramway Company, Ltd., Nelson, B. C.—This company has awarded a contract to L. G. Brandt, Nelson, for the construction of 5 miles of new track. J. McPhee, Nelson, superintendent.

Pacific Electric Railway, Los Angeles, Cal.—This company has finished the grading work around the west basin in Los Angeles Harbor. The double-track railway intersects the main line of the Pacific Electric Company's San Pedro-Los Angeles line at First Street, Wilmington. It intersects the Los Angeles Interurban line at the extreme end of the west basin. The line from Wilmington to Long Beach is practically completed.

Oakland & Antioch Railway, Oakland, Cal.—This company has secured right of way and grading work has been started at Walnut Creek. This proposed railway will connect Oakland, Bay Point, Concord, Walnut Creek, Lafayette and Martinez. Fred Brooks, engineer. [E. R. J., Jan. 22, '10.]

***San Rafael, Cal.**—Frederick Butterfield and associates of Marin County are perfecting plans for the construction of a street railway from Corte Madera through Ross Valley towns and San Rafael to McNear Point. The plan is said to be backed by San Francisco capital.

Southern Pacific Company, San Francisco, Cal.—This company has started grading for the extension of its tracks

from the present terminus in Melrose to Stonehourst, where a junction will be made with track already laid, thereby completing a loop suburban system which will extend almost completely around the newly annexed districts of Oakland. It is probable that the loop will be extended to San Leandro.

Valdosta (Ga.) Street Railway.—This company has decided to extend its line through a number of streets in Valdosta, so as to form a belt line. W. S. West, general manager.

Bloomington, Pontiac & Joliet Electric Railway, Bloomington, Ill.—This company is reported to be laying tracks on its extension between Pontiac and Chenoa. F. E. Parks, Joliet, manager.

Taylorville (Ill.) Railway, Light, Heat & Power Company.—This company is planning a 4½-mile extension which will eventually extend to Jayne Park. Contracts are new being awarded for material. W. B. Adams, Taylorville, manager. [E. R. J., Oct. 24, '08.]

Evansville (Ind.) Railway.—This company has announced plans for the extension of its line from Boonville through Lynnville and the Pike County oil fields to Oakland City, Ind. F. M. Durbin, Evansville, general manager.

Iowa City, Ottumwa & Southwestern Electric Railway, Iowa City, Ia.—This company has let contracts for the construction of its 74-mile electric railway to August Steffin and Charles Kindt, Davenport, and R. C. Campbell, New York. The line will connect Iowa City and Ottumwa via Sharon Center, Trytown, Amish, Wellman, Keota and Ollie.

Central Kentucky Traction Company, Frankfort, Ky.—This company announces that it will build an extension from Frankfort to Owenton, provided rights of way can be secured from property owners.

Louisville, Lincoln Farm & Mammoth Cave Traction Company, Glasgow, Ky.—Organization of this company with a capital stock of $1,000,000 has been perfected and these officers elected: J. M. Richardson, president; J. A. McDaniels, vice-president; J. Wood, secretary and treasurer, and J. Lewis Williams, general counsel. Immediate action will be taken to secure rights of way to Mammoth Cave and the head of navigation on Green River. The line will be built on steam road lines as to gage and electric power equipment to enable the interchange of traffic with connecting steam roads. [E. R. J., April 23, '10.]

Baltimore & Pennsylvania Railway & Power Company, Annapolis, Md.—This company, which proposes to build a railway to connect Baltimore, Hanover and Reisterstown, has perfected its organization by the election of the following officers: J. Pierce Burns, president; Jacob H. Sherman, vice-president. Headquarters, 1209 Calvert Building, Baltimore. [E. R. J., April 30, '10.]

Easton & Washington Traction Company, Washington, N. J.—This company is preparing plans to build an extension of its line to Belvidere, Oxford, Buttsville and Bridgeville as soon as Belvidere will furnish $75,000 capital. W. O. Hay, Easton, purchasing agent.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—This company is considering plans for extending its railway from North Syracuse to Cicero, Central Square and Brewerton, a distance of 10 miles. H. C. Beatty, general manager.

Grand Forks (N. D.) Street Railway.—This company will place contracts during the next few weeks for building three miles of track. Thomas D. Campbell, general manager.

Cherokee Belt & Interurban Railway, Collinsville, Okla.—Surveys have been completed for this company by Archer & Rolins, Kansas City, and construction will begin within 90 days on its proposed 45-mile electric railway from Pryor to Skiatook. Motor cars will be used for the passenger service and steam locomotives to handle freight traffic. Dr. E. Pleas, Collinsville, president and general manager. [E. R. J., May 16, '08.]

***Fossil, Ore.**—James Stewart and associates are planning to build a 20-mile railway from Condon via Marysville to Fossil.

Lane County Asset Company, Eugene, Ore.—This company advises that surveys are being made for the proposed 130-mile electric railway which is to connect Eugene, Florence and Coos Bay. Work is scheduled to begin on the line about July 1. The Lane County Asset Company has been organized for preliminary purposes only, and later it is proposed to organize a permanent company to build and operate the line. Capital stock authorized, $235,000; issued, $47,250. Officers: M. Svarverud, president; Alton Hampton, vice-president; John Baird, secretary and treasurer; H. D. Forner, chief engineer, all of Eugene. [E. R. J., June 5, '09.]

Huntingdon, Lewiston & Juniata Valley Traction Company, Huntingdon, Pa.—This company is reported to have awarded contracts to the Pennsylvania Excavating Company for the general grading, and to the Huntingdon Construction Company for the construction of the line. Preliminary arrangements are being made. J. M. Stare, Huntingdon, secretary and treasurer. [E. R. J., April 9, '10.]

Southern Cambria Railway, Johnstown, Pa.—This company has decided to proceed with the construction of its 1½-mile extension from Conashaugh to Woodvale Heights. F. R. Newman, Johnstown, general manager.

South Carolina Western Railway, Hartsville, S. C.—This company, recently incorporated to build a 40-mile railway from McBee to Florence, advises that it plans to operate the line by steam. W. R. Bonsal, Hamlet, N. C., president. [E. R. J., April 16, '10.]

***Cleburne, Tex.**—Daniel Hewett and associates are considering plans for building a street railway in Cleburne. As soon as the citizens subscribe for $30,000 work on the new line will be started.

Texas Traction Company, Dallas, Tex.—This company has decided to extend its railway to Waco. J. F. Strickland, president.

***Houston-Bay Shore Traction Company, Houston, Tex.**—This company, recently organized by Detroit and Cedar Rapids capitalists, has completed arrangements for building a 24-mile interurban railway between Houston and La Porte. A. Foster Irwin, Detroit, president.

***Salt Lake City, Utah.**—George H. Lawrence has succeeded in financing a proposed electric railway to connect Idaho Falls and Hizer's Hot Springs. Rights of way have been secured and work will be started July 1.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—This company plans to double-track its line from Ocean View to Willoughby Spit. E. C. Hathaway, general manager. [E. R. J., March 26, '10.]

Virginia Railway & Power Company, Richmond, Va.—This company is negotiating with the citizens of Chesterfield County to extend its lines from Cockade City to Matoaca. C. B. Buchanan, Richmond, superintendent.

Blue Ridge Light, Power & Railway Company, Staunton, Va.—J. M. Spotts, president, is reported to have completed arrangements for financing improvements and extensions of this railway.

Everett-Tacoma Railway, Snohomish, Wash.—This company will soon begin construction of its proposed 110-mile railway to connect Everett, Snohomish, Monroe, Holt, Issaquah, Renton, Kent, Auburn, Sumner, Puyallup, Seattle and Tacoma. It has recently filed with the county auditor a first mortgage to secure an issue of $5,000,000 in bonds. C. A. Barron, Snohomish, general manager. [E. R. J., May 1, '09.]

SHOPS AND BUILDINGS

Chicago (Ill.) City Railway.—This company has just purchased a site on Langley Avenue and Thirty-eighth Street, 60 ft. x 112 ft., for $18,000 on which it will build a new car house.

United Railways & Electric Company, Baltimore, Md.—This company will build additions to its Pratt Street power house. They will be two one-story fire-proof structures, 6 ft. x 43 ft., built of concrete with slag roofs. The estimated cost is $5,500. The contract has been awarded to John Cowan.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company states it has begun the building of a new

car house and storage yards to have a capacity of 300 cars in Minneapolis. [E. R. J., Nov. 27, '09.]

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—This company will build two extensive additions to its car houses in Buffalo this summer. The last extension will be a car storage house and the west addition will be 120 ft. x 50 ft. This will also be for storage purposes.

Scioto Valley Traction Company, Columbus, O.—This company contemplates the erection of a new station at Chillicothe. The estimated cost is $25,000.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company has acquired additional property at Pen Mar for its new substation and additional terminal tracks. It will also build a small car house and repair shop.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—This company has prepared plans for the erection of an additional car house adjoining the present one on Elm Street and Main Street. The structure will be half basement and one-story high, 60 ft. x 300 ft. E. T. Moore, Dallas, general manager.

Wheeling (W. Va.) Traction Company.—This company has under consideration the installation of new generating equipment which will increase the present capacity of its plant by 50 per cent. The company also plans to build a power house and the installation of equipment thereby centralizing the power for its various divisions. George O. Nagle, general manager.

POWER HOUSES AND SUBSTATIONS

Northern Electric Railway, Chico, Cal.—This company expects to erect a station at Lake Winola to cost $30,000. A. D. Schindler, San Francisco, general manager.

Los Angeles (Cal.) Railway.—This company proposes to remove its old power house at the southeast corner of East First Street and Chicago Street in Los Angeles.

Rome Railway & Light Company, Rome, Ga.—This company has placed an order with the General Electric Company for a 500-kw turbine, a 300-kw rotary converter and other small station equipment.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company plans to build a large power plant in West Tenth Street, Indianapolis. The new plant will furnish power only for the interurban divisions of the company and will be in addition to the present power plants along the lines. It is estimated to cost about $1,000,000 complete.

Louisville, Lincoln Farm & Mammouth Cave Traction Company, Glasgow, Ky.—This company will install a hydraulic water power plant where this proposed railway crosses at Green River, near Linwood, Ky., of sufficient capacity to operate the entire line and supply light and power to all towns adjacent to and along the line.

Rockland, Thomaston & Camden Street Railway, Rockland, Me.—This company will improve its line between Camden and Rockland by the installation of 51,000 lb. of new copper feed wire.

Boston (Mass.) Elevated Railroad.—This company announces that it will build a new power station at Green Street, Jamaica Plain, between Forest Hills and Egleston Square.

Milford & Uxbridge Street Railway, Milford, Mass.—This company proposes to install a new boiler in its power house in Milford.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has placed an order with the Allis-Chalmers Company for a 3750-kva, 25-cycle, 13,200-volt, three-phase, 1500 r.p.m. steam turbo-generator, to be installed in its power house in Omaha. G. W. Wattles, president.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company has added a 1500-hp engine to its power plant at Akron.

Cleveland (Ohio) Railway.—Press report states that this company plans to expend $65,727 for four new boilers. They are to have a capacity of 500 hp. Three will be installed in the Cedar Avenue power plant and one in the power plant at the viaduct.

Manufactures & Supplies

ROLLING STOCK

Meridian Light & Railway Company, Meridian, Miss., has ordered six open trail cars from the Southern Car Company.

Atlanta Northern Railway, Atlanta, Ga., has ordered two 30-ft. 8-in. closed trail cars from The J. G. Brill Company. They are to be mounted on Brill No. 27-FE1 trucks.

Los Angeles (Cal.) Railway, which was noted in the Electric Railway Journal of March 26, 1910, as planning to purchase 90 cars, has placed the order with the St. Louis Car Company.

Grand Forks (N. D.) Street Railway, expects to purchase two new or second-hand double-truck trailers, also three second-hand two-motor equipments. Thomas D. Campbell, manager.

Pawcatuck Valley Street Railway, Pawtucket, R. I., has ordered four 15-bench open cars and two 28-ft. semi-convertible cars from the John Stephenson Company. These cars will be mounted on Brill No. 27-GE1 trucks.

Birmingham Railway, Light & Power Company, Birmingham, Ala., reported in the Electric Railway Journal of April 2, 1910, as being in the market for nine cars, has ordered them from the St. Louis Car Company.

Ogden (Utah) Rapid Transit Company, which was noted in the Electric Railway Journal of March 26, 1910, as being in the market for six trailer cars, has ordered three 37-ft. trailer cars, mounted on Brill No. 420 trailer trucks, from the American Car Company.

Utica & Mohawk Valley Railway, Utica, N. Y., is in the market for four interurban cars of the same type as those now being operated on the Rome-Little Falls division. These cars will be equipped with multiple unit control for train operation. The company also proposes to purchase four double-truck cars having a larger seating capacity than the present double-truck cars.

Lynchburg Traction & Light Company, Lynchburg, Va., mentioned in the Electric Railway Journal of March 26, 1910, as having ordered four semi-convertible cars of the pay-as-you-enter type from The J. G. Brill Company, has drawn the following specifications for this equipment:

Length of body...30 ft. 8 in.	Gears and pinions..G. E. Co.
Over vestibule....42 ft. 8 in.	Gongs.....Brill Dedenda
Width over sills.7 ft. 10½ in.	Hand brakes.....Sterling
Over posts at belt..8 ft. 2 in.	Heaters ..... Consolidated
Interior trim ..... ash	Headlights.....A. & W. Co.
Air brakes.... Westinghouse	Motors.....GE-80; 4 per car
Brakeshoes....A. S. I. R. A. standard.	Push buttons.. Consolidated
	Registers ..... International
Bumpers....Brill angle iron	Seats ..... Brill Winner
Center bearings...Symington	Seating material..... rattan
Control system...GE K-28B	Springs ..... Brill
Curtain fix....Curtain S. Co.	Trucks.....Brill No. 27 GE1
Curtain material.. Pantasote	Special device..Wallace sliding door fixtures.
Destination signs.... Hunter	

TRADE NOTES

McCord & Company, Chicago, Ill., moved their offices on May 1 to larger quarters in the People's Gas Building.

Heany Fireproof Wire Company, New York, N. Y., has moved its office from 25 Broad Street to 1733 Broadway.

D. F. Holman Railway Tracklayer Company, Oak Park, Ill., has moved its offices from 1534 Masonic Temple, Chicago, to 102 Wesley Avenue, Oak Park.

Ackley Brake Company, New York, N. Y., announces that the Imperial Railways of Japan have decided, after numerous tests, to equip all cars with Ackley brakes.

A. W. Erickson Advertising Agency, New York, N. Y., has moved its offices from 127 Duane Street to the Fourth Avenue Building at Fourth Avenue, corner of Twenty-seventh Street.

Massachusetts Chemical Company, Walpole, Mass., has moved its New York agency from the Hudson Terminal Building, 30 Church Street, to 1964 Broadway. H. E. Cozzens is the New York representative.

Everstick Anchor Company, St. Louis, Mo., is building a new factory at 1622-24 North Eighth Street, St. Louis. The

factory will be equipped with machinery to manufacture Everstick anchors and Blackburn's telescoping auger handles exclusively. The company reports a large increase in its business.

Wonham, Sanger & Bates, New York, N. Y., have received an order for 4032 H. B. wheelguards from the Brooklyn Rapid Transit Company. This probably is the largest single order ever placed for fenders or wheelguards. Another order calls for 68 sets of H. B. wheelguards for the Northern Texas Traction Company, Fort Worth, Tex.

George O. Baker has resigned as chief engineer of the New England Engineering Company, Waterbury, Conn., to take up general engineering, with offices at 35 Wall Street, New York, N. Y. Mr. Baker was connected with the New England Engineering Company for nine years, and prior to 1901 was with the engineering department of the General Electric Company.

Moss & Satterlee Electric Railway Supply Company, Kansas City, Mo., in addition to its supply business operates the Autogenous Welding Devices Company and has installed a complete Davis-Bournonville oxy-acetylene welding equipment and an oxygen generating plant. It is doing a general repair business, and is welding broken motor cases, truck frames, machinery parts, etc., and refilling oxygen drums for the local operators of oxy-acetylene apparatus.

J. Milton Hagy Waste Works, Philadelphia, Pa., report an excellent demand for their packing waste. This company was the first manufacturer to introduce an especially spun yarn for journal packing, and its success was practically instantaneous. This packing contains a percentage of hair fiber which produces resiliency and forces the waste well up against the bearing. It is a convenient form of packing, because of its long strands, and as the ingredients are well proportioned in the spinning, even lubrication is insured. This product is being marketed under the name of S.R. motor packing. The principal ingredients used in the other packings of the Hagy company's manufacture are carpet yarns, shredded carpets and a composition wool and cotton thread, which acts as a binder and gives length of fiber. The company's "Fidelity" packing is guaranteed an all-wool carpet mixture. This grade is used by several roads for high-speed equipment, while the company's "foreign" and "domestic" packings, which contain small percentages of cotton threads, are specified for local and freight service. The company carries at all times a complete stock, from which prompt shipments can be made.

Lord Manufacturing Company, New York, N. Y., in reviewing the progress of its business says that when the manufacturing department of the Lord Electric Company was started the output was limited to rail bonds and lightning arresters. The success of these specialties, however, encouraged the company to investigate and take up the manufacture of other articles. During the last six years the policy of the management has been to confine itself to street railway lines, particularly safety and economizing devices which include those for lightning and power requirements. No specialty has been manufactured without the most severe service test and investigation. As a result trolley retrievers, trolley catchers and an intermediate device which semi-retrieves, choke coils, hydrogrounds and lightning arrester accessories, controller regulators, the Bradshaw car skid for bringing in broken-down cars under their own power, and a line of arc lamps have been added to the original line of lightning arresters and rail bonds manufactured by the company. Finally the progress of the Lord Electric Company made it advisable to incorporate the Lord Manufacturing Company, which is intimately associated with the Lord Electric Company and the Lord Construction Company, and contracts, agreements and orders with the manufacturing department of the Lord Electric Company will be assumed and carried out by the Lord Manufacturing Company. The Lord Manufacturing Company is incorporated under the laws of New York, with a capital of $100,000. The officers follow: F. W. Lord, president; W. R. Garton, vice-president and general manager; G. Lehmann, secretary and treasurer; John D. Clay, superintendent. The officers and F. W. Erickson form the board of directors.

ADVERTISING LITERATURE

Arthur S. Partridge, St. Louis, Mo., has issued List 33 of second-hand electrical and steam equipment for May.

Automatic Trolley Guard Company, Buffalo, N. Y., is mailing a folder in which it calls attention to the merits of its automatic trolley guard.

Everstick Anchor Company, St. Louis, Mo., has issued a folder entitled "A Moving Picture of the Time it Takes," which shows the quick method of installing Everstick anchors.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 4730 in which is described the single-truck type of gas-electric motor car. It contains illustrations and detailed descriptions of the car, motor and engine, also a table of schedule speeds for this car. Another bulletin No. 4729 issued by the company describes and illustrates the various designs of Mazda economy diffusers.

Manufacturers of American Ingot Iron Corrugated Culverts have just issued the April number of the *Highway Improvement News.* The exhibit of these culverts at the recent annual meeting of the American Railway Engineering and Maintenance of Way Association at Chicago is described. The first installment of a history of this culvert is also given, as well as several interesting articles bearing on the culvert problem.

Joyce-Cridland Company, Dayton, Ohio, has issued an attractive 100-page catalog entitled "Lifting Jacks." Besides listing its complete line of jacks for all purposes, the catalog also contains a description of the construction and recent improvements in this line of jacks. It also points out the relative merits of various types of jacks for different classes of service and contains complete information concerning the dimensions, weight, price, etc., of the various jacks listed.

David Lupton's Sons Company, Philadelphia, Pa., has issued an illustrated 52-page catalog on Lupton specialties. A new type of steel sash is described and illustrated by a photograph which shows two sections of No. 103 steel sash loaded horizontally. The sashes are supported at the ends only and sustain the combined weight of 26 men, distributed over an area of 109 sq. ft. Among the other products of the company which are described are rolled-steel skylights, Pond continuous sash hollow metal windows and the Pond operating device for pivoted sash and louvers. The catalog is profusely illustrated with half-tones showing the installation of Lupton products in various parts of the country.

J. G. Brill Company, Philadelphia, Pa., in *Brill's Magazine* for April publishes the fourth of a series of biographical sketches of prominent street railway officials in the United State. The subject in the April issue is John J. Stanley, president of the Cleveland (Ohio) Railway. The sketch is accompanied with an excellent portrait of Mr. Stanley. The publication also contains the sixteenth of a series of articles on the type of car adopted for use in large cities of the world. In the present issue conditions are described in Moscow. Other articles which appear are: "One Man Pay-As-You-Enter Cars for Muskogee, Okla.," "Truck Brake Rigging Accessibility," "Large City Cars for Cleveland," "Special Equipment for Chicago City Railway," "Straight Side Closed Cars for New England," "Cars for Fresno Traction Company" and " More Wason Equipment for Guatemala Railroad."

United States Graphite Company, Saginaw, Mich., has issued an attractive 24-page booklet entitled "Graphite Mining in Mexico." The opening paragraphs describe graphite and the various uses to which it may be put. The remainder of the booklet is devoted to excerpts quoted from the report of Frank L. Hess, a geologist in the service of the United States Geological Survey, who visited the company's mines in Mexico in March, 1909. Several maps showing the location of these mines and illustrations accompany the article. The company has also issued a general 40-page catalog, No. 20, which is descriptive of its graphite products. It contains information regarding graphite lubrication, and describes briefly the various kinds of lubricants and graphite compounds for special purposes. Attention is also called to several devices for introducing lubricating graphite into steam cylinders.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table sh be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various fina years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Mar. '10	173,425	*99,159	74,266	43,292	30,974
	1 " " '09	150,684	*86,720	63,964	43,803	20,161
	3 " " '10	484,575	*286,173	198,403	129,875	68,528
	3 " " '09	435,084	*251,971	183,112	131,486	51,626
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Feb. '10	32,816	21,249	11,567	9,325	2,243
	1 " " '09	30,745	19,235	11,510	8,790	2,721
	12 " " '10	411,792	233,099	178,693	100,471	78,222
	12 " " '09	366,238	212,880	153,358	101,381	51,977
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Feb. '10	25,485	14,953	10,532	8,890	1,642
	1 " " '09	24,061	13,220	10,841	9,411	1,430
	2 " " '10	52,665	31,677	20,988	17,811	3,177
	2 " " '09	50,354	27,635	22,719	18,315	4,404
BIRMINGHAM, ALA. Birmingham Ry. Lt. & Pwr. Co.	1m., Mar. '10	214,799	113,913	100,886	.....	.....
	1 " " '09	181,571	101,313	80,258	.....	.....
	3 " " '10	636,292	344,321	291,971	.....	.....
	3 " " '09	550,847	304,148	246,699	.....	.....
CHAMPAIGN, ILL. Illinois Traction System.	1m., Feb. '10	394,373	*239,071	155,302	3,906	151,396
	1 " " '09	349,505	*201,873	147,633	5,626	142,007
	2 " " '10	828,871	*492,712	336,158	8,885	327,273
	2 " " '09	735,294	*424,673	310,621	5,626	304,995
CHARLESTON, S. C. Charleston Con.Ry., Gas & Elec. Co.	1m., Mar. '10	67,314	43,724	23,590	13,990	9,600
	1 " " '09	60,394	39,636	20,758	13,917	6,841
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., Feb. '10	103,399	63,267	40,133	32,153	7,979
	1 " " '09	94,335	58,218	36,167	28,261	7,856
	12 " " '10	1,063,190	586,167	477,023	241,692	235,331
	12 " " '09	975,017	528,908	446,110	222,928	223,182
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Mar. '10	25,070	*12,503	12,567	8,621	3,947
	1 " " '09	20,345	*10,729	9,616	8,311	1,305
	3 " " '10	64,856	*35,180	29,676	25,989	3,686
	3 " " '09	55,813	*31,839	23,974	24,557	†583
Lake Shore El. Ry.	1m., Mar. '10	85,984	*49,142	36,842	34,803	2,039
	1 " " '09	76,680	*47,236	29,444	34,325	†4,881
	3 " " '10	235,854	*144,957	90,898	103,921	†13,023
	3 " " '09	210,742	*136,830	73,912	103,237	†29,324
DALLAS, TEX. Dallas Electric Corporation.	1m., Feb. '10	105,200	71,959	33,240	26,422	6,819
	1 " " '09	94,588	57,953	36,636	28,772	7,863
	12 " " '10	1,347,203	850,451	496,751	333,029	163,723
	12 " " '09	1,193,557	785,464	408,093	346,490	61,603
DAVENPORT, IA. Union Ry. Gas & Elec. Co.	1m., Feb. '10	242,593	139,083	103,510	65,050	38,460
	1 " " '09	231,161	114,181	116,980	64,521	52,459
	2 " " '10	506,468	295,740	210,728	130,160	80,568
	2 " " '09	480,337	237,688	242,649	127,591	115,058
DETROIT, MICH. Detroit United Ry.	1m., Mar. '10	737,306	470,406	266,900	161,871	105,029
	1 " " '09	601,275	360,743	240,532	152,090	88,442
	3 " " '10	2,029,040	1,294,590	734,450	479,669	254,781
	3 " " '09	1,702,597	1,064,151	638,446	460,249	178,197
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Mar. '10	200,254	101,547	98,708	50,297	48,411
	1 " " '09	158,537	91,982	66,555	50,526	16,029
	3 " " '10	563,681	294,628	269,053	149,774	119,279
	3 " " '09	460,909	267,873	193,036	148,821	44,215
EL PASO, TEX. El Paso Elec. Co.	1m., Feb. '10	53,839	27,753	26,086	8,486	17,600
	1 " " '09	45,373	27,864	17,509	7,911	9,598
	12 " " '10	615,870	359,199	256,671	99,530	157,141
	12 " " '09	540,443	381,217	159,226	88,357	70,870
FAIRMONT, W. VA. Fairmont & Clarksburg Trac. Co.	1m., Mar. '10	44,188	16,989	27,199	12,609	14,590
	1 " " '09	33,085	13,189	19,896	12,309	7,587
	3 " " '10	120,111	46,819	73,292	36,715	36,577
	3 " " '09	93,153	37,934	55,219	36,945	18,274
FT WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Feb. '10	111,184	60,921	50,262	44,255	6,008
	1 " " '09	99,236	58,290	40,945	40,914	31
	2 " " '10	234,439	129,784	104,654	88,013	16,641
	2 " " '09	208,909	122,563	86,346	82,063	4,283
FORT WORTH, TEX. Northern Texas Elec. Co.	1m. Feb. '10	93,082	52,315	40,767	18,252	22,515
	1 " " '09	82,661	48,090	34,570	17,190	17,381
	12 " " '10	1,286,884	703,551	583,333	206,208	377,125
	12 " " '09	1,106,663	645,103	461,560	195,406	266,154
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Feb. '10	85,411	61,977	23,434	23,179	255
	1 " " '09	82,552	53,388	29,164	21,561	7,603
	2 " " '10	182,042	129,592	52,450	43,571	8,879
	2 " " '09	173,987	112,387	61,600	40,451	21,149
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Mar. '10	86,211	42,520	43,691	19,659	24,032
	1 " " '09	76,136	38,847	37,289	18,923	18,366
	3 " " '10	251,031	127,076	123,955	60,142	63,812
	3 " " '09	225,177	112,924	112,253	56,806	55,446
HARRISBURG, PA. Central Penn. Trac. Co.	1m , Mar '10	63,884	47,214	16,667	.....	.....
	1 " " '09	57,186	44,434	12,702	.....	.....
	3 " " '10	184,117	141,633	42,484	.....	.....
	3 " " '09	167,332	130,446	36,886	.....	.....
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Feb. '10	22,165	13,545	8,620	6,341	2
	1 " " '09	21,869	15,346	6,523	5,297	1
	12 " " '10	322,041	170,170	151,872	75,413	76
	12 " " '09	274,992	153,664	121,328	60,628	60
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Feb. '10	43,690	22,802	20,888	9,132	11
	1 " " '09	36,793	23,076	13,718	9,382	4
	12 " " '10	502,619	271,677	230,942	112,439	118
	12 " " '09	441,329	257,647	183,683	111,781	71
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., Feb. '10	553,543	286,728	266,815	150,583	116
	1 " " '09	519,720	294,858	224,862	153,141	71
	9 " " '10	5,339,159	3,007,383	2,331,775	1,415,514	916
	9 " " '09	4,938,293	2,815,049	2,123,245	1,415,276	707
MILWAUKEE, WIS. Milwaukee Elec.Ry. & Lt. Co.	1m., Mar. '10	377,004	270,641	106,362	47,126	59
	1 " " '09	337,801	233,439	104,362	47,235	57
	3 " " '10	1,117,684	805,004	312,680	138,562	174
	3 " " '09	1,001,469	689,850	311,619	139,522	172
Milwaukee Lt., Ht. & Traction Co.	1m., Mar. '10	117,000	47,276	69,724	55,036	14
	1 " " '09	103,539	39,887	63,652	50,150	13
	3 " " '10	339,664	138,079	201,586	166,355	35
	3 " " '09	307,001	117,927	189,074	151,166	37
MONTREAL, CAN. Montreal St. Ry.	1m., Mar. '10	336,197	220,790	115,407	43,068	72
	1 " " '09	298,728	203,832	94,896	38,901	55
	6 " " '10	1,992,236	1,216,984	775,252	214,978	560
	6 " " '09	1,813,343	1,149,584	663,759	198,043	465
NASHVILLE, TENN. Nashville Ry. & Lt. Co.	1m., Mar. '10	149,276	87,719	61,557	.....	.....
	1 " " '09	134,132	82,287	51,845	.....	.....
	3 " " '10	434,314	248,297	186,017	.....	.....
	3 " " '09	404,415	242,387	162,028	.....	.....
PADUCAH, KY. Paducah Traction & Light Co.	1m., Feb. '10	18,771	11,777	6,994	7,055	
	1 " " '09	17,807	11,069	6,739	7,034	
	12 " " '10	232,001	138,683	93,318	81,692	11
	12 " " '09	225,099	131,797	93,301	82,574	10
PENSACOLA, FLA. Pensacola Electric Co.	1m., Feb. '10	19,812	11,725	8,086	4,825	
	1 " " '09	19,081	10,124	8,958	4,366	
	12 " " '10	248,219	143,507	104,712	53,467	51
	12 " " '09	214,515	140,448	74,067	51,634	22
PHILADELPHIA, PA. American Rys. Co.	1m., Mar. '10	304,222	.....	.....	.....	.....
	1 " " '09	264,348	.....	.....	.....	.....
	9 " " '10	2,423,417	.....	.....	.....	.....
	9 " " '09	2,260,983	.....	.....	.....	.....
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Feb. '10	6,597	6,231	366	1,785	†1
	1 " " '09	6,730	5,241	1,489	2,088	
	12 " " '10	130,442	94,725	35,717	21,008	14
	12 " " '09	123,154	86,013	37,141	26,327	10
PORTLAND, ORE. Portland Ry., Lt. & Power Co.	1m., Mar. '10	435,652	192,393	243,259	133,726	109
	1 " " '09	370,730	175,721	195,009	123,708	71
	3 " " '10	1,259,739	545,054	714,685	393,499	321
	3 " " '09	1,064,958	528,974	535,984	360,523	17
POTTSVILLE, PA. Eastern Penn'a Ry.	1m., Mar. '10	50,427	28,905	21,522	.....	.....
	1 " " '09	41,601	26,425	15,176	.....	.....
	3 " " '10	146,594	86,867	59,727	.....	.....
	3 " " '09	124,691	79,255	45,436	.....	.....
ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Power Co.	1m., Mar. '10	82,459	46,100	36,359	22,242	14
	1 " " '09	75,511	40,364	35,147	20,938	14
	3 " " '10	251,038	136,425	114,613	66,326	48
	3 " " '09	228,197	120,867	107,330	62,514	44
SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Feb '10	570,983	343,879	227,104	.....	.....
	1 " " '09	543,638	334,466	209,172	.....	.....
	2 " " '10	1,198,649	707,630	491,019	.....	.....
	2 " " '09	1,110,011	682,681	427,330	.....	.....
SAVANNAH, GA. Savannah Elec. Co.	1m., Feb. '10	45,130	27,365	17,765	17,752	
	1 " " '09	45,855	28,234	17,621	17,414	
	12 " " '10	602,000	390,293	211,707	210,341	
	12 " " '09	601,621	375,126	226,495	207,361	19
SYDNEY, N. S. Cape Breton Elec. Co. Ltd.	1m., Feb. '10	18,454	11,258	7,197	5,034	
	1 " " '09	15,892	11,559	4,332	4,955	
	12 " " '10	246,865	143,307	103,558	60,616	4
	12 " " '09	242,880	141,639	101,241	59,479	4
TACOMA, WASH. Puget Sound Electric Ry.	1m., Feb. '10	131,219	96,883	34,337	50,220	†1
	1 " " '09	125,418	91,065	34,353	44,313	†9
	12 " " '10	1,896,408	1,263,789	632,620	582,137	50
	12 " " '09	1,653,125	1,073,113	580,012	519,675	60
TAMPA, FLA. Tampa Elec. Co.	1m., Feb. '10	56,284	27,256	29,028	4,566	2
	1 " " '09	53,460	29,838	23,622	4,643	1
	12 " " '10	601,509	343,867	257,643	55,949	20
	12 " " '09	563,151	367,233	195,918	44,706	15
TORONTO, ONT. Toronto Ry. Co.	1m., Feb. '10	305,557	166,497	139,060	.....	.....
	1 " " '09	275,245	148,860	126,385	.....	.....
	2 " " '10	632,265	342,100	290,165	.....	.....
	2 " " '09	563,626	301,001	262,625	.....	.....

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Standardizing the Employee

Street railway companies have issued printed rules for their car-operating forces since the early days of horse railroading, but during the last few years special efforts have also been made to standardize the duties of all employees engaged in specific work on railway properties. Such a policy should not tend toward a reduction of intelligent service any more than such a result would follow the use of a manual of tactics in the army. The preparation of codes of rules for different kinds of employees has been carried to a greater extent perhaps on the lines of the Metropolitan Street Railway of New York than in any other city. Abstracts of several of these have been published in these columns and this week we print the rules for the guidance of the employees of the maintenance of way department. The company has found it advisable to print the rules in Italian as well as in English. The use of standards of this kind must benefit the service and the company.

Owl-Cars and Double Fares

A helpful hint for impoverished electric railways is contained in a cable dispatch from Paris saying that the municipal council of that city has decided to operate a tramcar service after midnight, charging a double fare. In this country the owl-car service takes its place among the public benefits which the grateful companies bestow upon the communities. It ranks with the long-abused free transfer, the sprinkling of streets, the frequent paving and repaving of highways and other costly public advantages. As one of the concessions which sweeten the franchises it is notoriously a promoter of a deficit. While the railways are endeavoring to overcome the effect of higher costs for labor and materials by lessening the illegal use of transfers, restricting various municipal exactions and raising fares where possible, they should consider the reformative idea upon which the canny members of the French municipal council have acted.

Committee on Heavy Electric Traction

The appointment by the Engineering Association of a committee on heavy electric traction broadens the field of usefulness of the association and should invite active co-operation in the affairs of the association by all steam roads which are operating or contemplate operating electric divisions. The American Railway Association and the American Railway Engineering & Maintenance of Way Association both have appointed committees on heavy electric traction within the last two years. These committees have confined their investigations to date to the subject of clearances for overhead and third-rail conductors which has also been assigned for consideration to the new committee of the Engineering Association. The three committees working together should in time bring about stand-

ardization of this important detail of electrical equipment, since they represent the three departments of a railroad which are most vitally interested. The Engineering Association committee also has had assigned to it the subject of general maintenance of heavy electrical equipment. No committee of any association has before undertaken the study of this broad question. The maintenance of heavy interurban equipment with multiple-unit control and of motor-car subway or suburban trains demands different patterns and methods from those required in the maintenance of the lighter apparatus used on street cars. Electric locomotives also involve many other new problems in the solution of which the experience gained in the operation and maintenance of heavy car equipments should be helpful. This asscciation is to be congratulated on the personnel of the new committee, of which Mr. Doyle, of the Interborough, is chairman.

The Street Railway and the Cost of Living

An exhaustive study of the causes of increased cost of living has just been completed by a special legislative commission in Massachusetts, whose findings will make a pamphlet of nearly 1000 pages when published. It is interesting to note that public utilities are conspicuously absent from the list of contributory causes of the rising price of labor and materials, manufactured products and professional service which has given birth to so much discussion in the past decade. As a matter of fact an inquiry was sent by the Cost of Living Commission to the Board of Gas & Electric Light Commissioners of Massachusetts, asking to what extent increases in the charges made for artificial illumination had been responsible for the growth of the family budget. To this inquiry the board sent a complete tabulation of the maximum net price charged for gas and electricity in all the cities of the commonwealth in 1890 and 1910, and in practically every case the most sweeping reductions appeared. In general, the cost of each service per thousand feet or per kw-hour has fallen off 50 per cent. It is well known that telephone rates have also decreased by large amounts in the same period. With the street railway, the same condition prevails. With practically a stationary fare in urban service, extensions of the transfer system, improved standards of equipment and service, and lengthened mileage have decreased enormously the cost of transportation to the public. We believe it would be an excellent plan if a legislative commission, or other competent public body would make an authoritative report on the increased cost of living to the railways so as to make clear the plain facts of the constantly decreasing margin between receipts and expenditures which exists in many cities. Such action would seem to be well within the purview of the State public utility bodies.

Over-Refinement in Power Calculations

One of the best hall-marks of the expert in any branch of engineering applications is the sense of proportion which governs his reasoning and conclusions when illustrated or expressed in figures. The inexperienced man fears to cut off his decimal points until his results tend to become absurd. The specialist unconsciously broadens a discussion of a familiar topic and leaves off all but round numbers in a large portion of his commercial reports. In considering the cost of production per kw-hour the tenth of a cent and perhaps the hundredth in extreme cases means something; but beyond the latter it is not worth while to spend much time, even though a saving of a thousandth of a cent per unit means an appreciable economy at the bus bar. A plant generating 5,000,000 kw-hours at a cost of 1 cent each throughout a yearly period spends nearly $1,000 a week on its production. A saving of one-hundredth of a cent per unit means $500 in the year, and is well worth seeking, but to carry out the figures to another place is largely a waste of effort. A railway plant recently sold 183,000 kw-hours to a distributing organization at a cost of $4,140, or 2.26 cents per kw-hour. The latter company reported that the unit cost was $0.0226163. On a sale of 183,000 kw-hours a difference of one-hundredth of a cent means only $18.30 more or less in the total—an amount large enough to be taken into account, but trifling from the engineering standpoint. The use of the seventh decimal place in this instance was simply ridiculous, since a change of one unit there changed the total by less than 2 cents. Tabulations of power cost, coal consumption, etc., should be pruned of all such over-refinements by engineers who are anxious to have their figures receive the consideration which they ought to deserve. The habit of carrying out such calculations to the limits of one's pencil point only invites distrust by those who possess the ability to examine results from a common-sense point of view.

PLATFORM ACCIDENTS AND TYPES OF PREPAYMENT CARS

On the continent of Europe the man who boards a moving car is likely to be arrested, taken before a magistrate and fined for his recklessness. In the United States, however, the practice of boarding a car before it has stopped or after it has started has almost become one of the most cherished privileges of citizenship. Until recently no American street railway company, with the exception of the Twin City Rapid Transit Company, had been able to introduce any method of seriously reducing this dangerous practice. The use of the Minneapolis gate did not seem generally feasible because the public had been accustomed for so long to absolutely free exits and entrances. It was not until the successful advent of the prepayment car that street railway companies found they had been too diffident of their ability to alter the riding habits of their patrons. It is fortunate that the radical principle of fare prepayment should have been associated with such striking betterments in the cars themselves that the public quickly learned to appreciate the merits of the new method.

Contrary to the expectations of many, the value of the prepayment car does not lie wholly, or even principally, in its ability to increase the number of fares collected. Experience has shown that it is far more valuable because of its safety. Whether a few fares are missed per trip is of less importance, both financially and in other ways, than the liability of frequent, though minor, platform accidents. Although many designs of the prepayment car are in service, all are superior to their predecessors in this problem of accident prevention. However, when the different styles are compared it will be found that they vary considerably in platform, door, vestibule and step arrangements. It is most interesting to find that, taken on the whole, the later prepayment cars have been simplified and are therefore less costly than the pioneer patterns.

It will be recalled that platform length was one of the great questions when prepayment cars first were proposed. It was

thought that the platform should be large enough to hold 20 or more people, and the first cars were built with 9-ft. platforms carried on extra heavy framing to prevent sagging. There were many cities, of course, where a 9-ft. overhang was out of the question, but the success of the prepayment idea was so striking that some bold spirits ventured to try a platform 7 ft. 6 in. long. By enforcing a rule against passengers remaining on the rear platform, other companies have since found it perfectly feasible to operate prepayment cars with 6-ft. platforms. No standard length can be ordained for all conditions, but the fact remains that a long platform is not essential to the successful operation of prepayment cars. The one important difference developed in this connection is that on the longer platforms, where passengers are allowed to stand and smoke, a person who boards the car and suddenly loses his balance by a quick start, will be thrown against the bodies of others, but as the latter are braced against the vestibule no harm is done. On the short platform car, however, the passenger is thrown directly against the vestibule framing, controller or brake shaft. This trouble can be overcome if the conductor exercise care in giving the starting signal and the passenger grasps the dividing rail, if necessary.

Some of the first prepayment cars were provided with a swinging entrance door and an exit door sliding into a center bulkhead. The entrance door proved rather annoying in summer when the motorman's open vestibule sash allowed drafts of air to swing the door. In later designs the end body doors were of the double sliding type and practically no difficulty was experienced in getting passengers to use the proper entrances and exits, as indicated by a bulkhead post or even merely by a platform railing. In still another design, body end doors were omitted because the vestibule doors are open only when the car is receiving or discharging passengers.

The design of vestibule doors and platform step has a most important influence on boarding and alighting accidents. On some cars, the vestibule doors on the conductor's platform remain open with the step always horizontal. On such cars there is little to prevent a reckless person from jumping on or off the car while it is in motion. Such practice is even more dangerous if the step and grab-handles are left exposed when the doors are closed. A better plan is to place the grab-handles inside the vestibule and so to interconnect both door and step that no one can secure a hold when the car is in motion. Even when the steps are arranged to disappear when the door is closed, it is necessary to provide for certain contingencies. Thus, if the step slides under the car or folds against the riser, there is a chance that someone will try to board the car at the very instant that the position of the step is being changed. Accidents resulting from this practice can be made impossible only by delaying the movement of the door until that of the step is completed and by delaying that of the step until no passengers are standing on it.

In still another pattern of prepayment car, the vestibule doors are replaced by gates which are controlled directly by the conductor. When these gates are closed they rest against the riser, thereby leaving the greater part of the step width available for a footing while the wire netting of the gates gives a good purchase for the fingers. Even as they are now these gates have helped to minimize platform troubles, but they would probably be more effective if they were flush with the edge of the step when closed.

THE BURDEN PASSES TO THE COMMUTER

Large increases in the commutation rates of railroads serving the suburbs of New York City, which have either been announced definitely or are in prospect, hold a significant lesson for electric railways. They touch the pocketbooks of the passengers who, riding daily between their homes and places of business, constitute a class of traffic which corresponds most nearly to the traffic of electric railways. The advances are, of course, the direct results of the higher wages paid to railroad employees. The import of the steam railroad wage advance and the need of resultant changes in rates can be read in the estimate that the total increase in wages in 1910 will be at the rate of $100,000,000 per annum for the entire country. This estimate does not take into account the large advances by electric railways.

The first of the companies to announce its new rates, the New York, New Haven & Hartford Railroad, has other reasonable grounds, if it cares to advance them, for asking higher rates. Its use of the Grand Central Terminal, owned by the New York Central & Hudson River Railroad, for many years has imposed a charge which reduces sharply the revenue from its commuter traffic. This fact, however, is no new basis for argument such as that which lies in the enormous outlay of capital required in electrification of the line between New York City and Stamford, Conn., an improvement that added greatly to the capital cost of the property in the commuter's zone. The electric service has not been in operation so long that passengers forget the inferior steam facilities, with the smoky and dangerous Park Avenue tunnel, which it succeeded. But the rapidity with which the announcement of increase in wages is followed by that of increase in rates places this cause and effect in such juxtaposition that the two must be remembered together.

Other companies have not yet announced their detail plans for increases in rates. The New York Central & Hudson River Railroad will raise commutation rates and the Long Island Railroad will add a flat price when it begins to operate its trains into the new Pennsylvania terminal on Manhattan Island.

For comparative purposes and as an illustration of the rates which are to be effective between New York and one community about 13½ miles distant on the New York, New Haven & Hartford Railroad, it may be stated that, beginning on June 1, the new tickets will average as follows: Monthly tickets, 11¼ cents a ride, or 0.8 cent a mile; 50-trip family ticket, 25 cents a ride, or 1.8 cents a mile; single fare, 35 cents, or 2.6 cents a mile. The fare between New York City and this suburb for a passenger traveling by the subway and the surface car is 10 cents, but the time required is much longer. The increases in commutation fares on the New Haven road range from about 20 to 40 per cent, but the average is said to be about 20 per cent.

It is idle to pretend that the railways can meet all manner of increases in costs of labor and material and continue to subsist without recouping from some source sufficient revenue to restore the margin between income and outgo. The burden of increased costs, unless lightened by freedom from heavy taxation or other governmental exactions, will necessarily fall upon the traffic, through the medium of higher rates or, if these are impossible, of more economical service.

SPECIAL APPLIANCES AT THE CHELSEA SHOPS OF THE BOSTON & NORTHERN STREET RAILWAY COMPANY

One of the principal centers of rolling stock maintenance on the system of the Boston & Northern Street Railway Company is the Washington Avenue shop at Chelsea, Mass. For many years car repairs have been carried on at this point, and, in general design the shop illustrates little of unusual interest, having developed gradually to its present extent and not according to a predetermined plan of expansion. The working facilities of the shop, however, include a number of labor-saving devices and special equipments which have added much to the efficiency of the installation.

On a system as large as the Boston & Northern, which embraces the care of about 1300 cars, the ordering of materials and supplies from different car houses is an important consideration. It is desirable to keep stocks of material at local points down as much as is consistent with reliable service. Correct ordering of parts and supplies needed is an important part of such work. To facilitate the accurate ordering of material, the company supplies each car-house foreman with a book of photographs of all standard material and equipment details, a page of which is shown in Fig. 1. Each piece of apparatus or important supply part is numbered, and the book contains an index of the numbers by which the parts may be ordered. Thus, in Fig. 1, piece "BN-10" represents a half-elliptic spring hanger, and "P-18" a journal box. The car-house foreman, in ordering, may simply specify these numbers. On the combined Boston & Northern and Old Colony systems some 75 of these books are in service. In order to obtain photographs of parts without shadows, a special arrangement of the camera is made, as shown in Fig. 2, at the Chelsea shop. The parts to be photographed are placed upon a white canvas-covered board 6 ft. long by 4 ft. wide, and the camera is mounted upon a frame with its lens about 10 ft. above the dis-

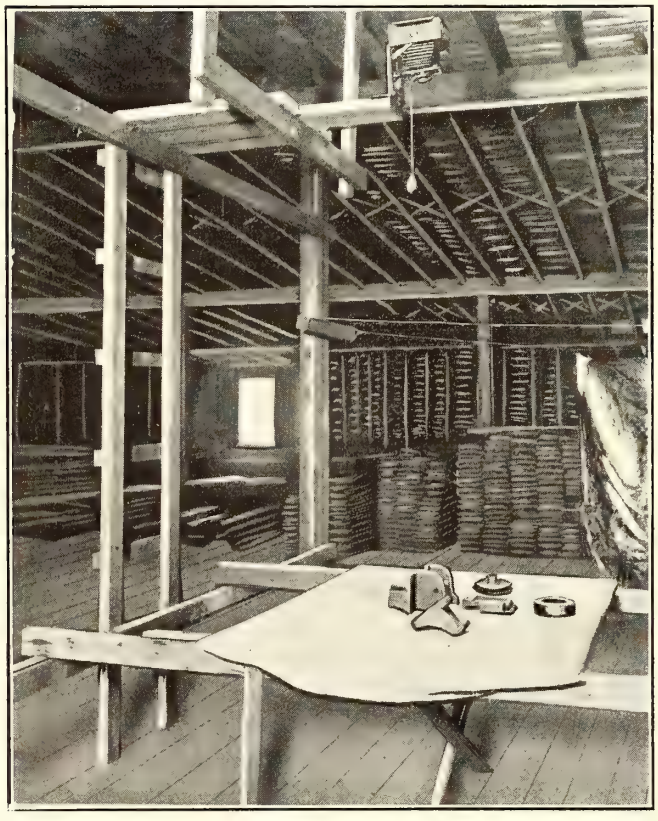


Fig. 2—Boston & Northern Shops—Method of Photographing Equipment Parts

play board. The object to be photographed being placed on a horizontal plane, no shadow is cast, and behind and above the camera a skylight affords ample illumination. The frame holding the camera consists of 2-in. x 4-in. stock, with a ladder and platform for the use of the photographer. The camera is attached to the frame by a ¼-in. screw fastened to a horse-shoe standard, and adjustments for focussing are easily made.

At the Chelsea shop the company has had in operation for

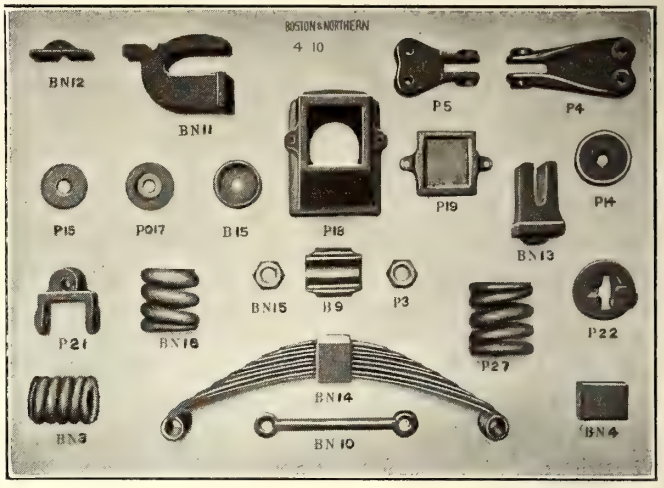


Fig. 1—Boston & Northern Shops—Equipment Parts

about two years a plant for the impregnation of motor field coils, supplied by the J. P. Devine Company, Buffalo, N. Y. It can treat about 35 field coils in 24 hours. The company uses No. 2 impregnating compound, from the Standard Varnish

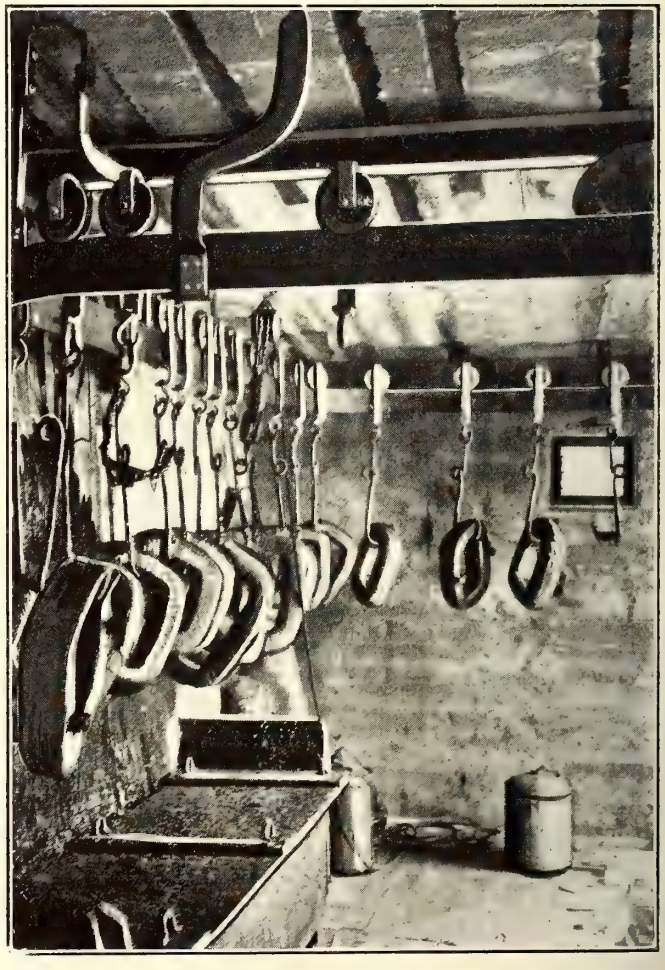


Fig. 3—Boston & Northern Shops—Dipping Room for Field Coils

Works. The plant consists of a 250-gal. vacuum chamber and a melting tank of the same size, with piping, steam boiler, vacuum pump and a driving motor. In the process of impregnation the fields are first put into the vacuum chamber and

heated for 16 hours; the compound is then liquefied in the melting tank, and a vacuum of 27 in. applied to draw it over into the vacuum chamber. Air is then applied at a pressure of 80 lb. per square inch for three hours, after which the compound is driven back into the melting tank. The coils are allowed to drip for three-quarters of an hour, and then are removed from the chamber. The stripping tape is taken off the coils, cleaning the coil surface, while one of two layers of tape are left on. The boiler supplying the steam pressure necessary is connected with the vacuum chamber, in which are coils for steam heating. The vacuum pump is operated by an electric motor, together with a paddle in the melting tank. When the plant is in operation one man handles the boiler and two strip the coils after treatment. The exhaustion of the air in the chamber and the introduction of the hot impregnating compound under subsequent pressure provide a treatment for the coils which other companies than the Boston & Northern have adopted. The Chelsea plant has handled a large amount of work for foreign street railways with successful results. The cost of impregnation is found to be approximately $1 per coil.

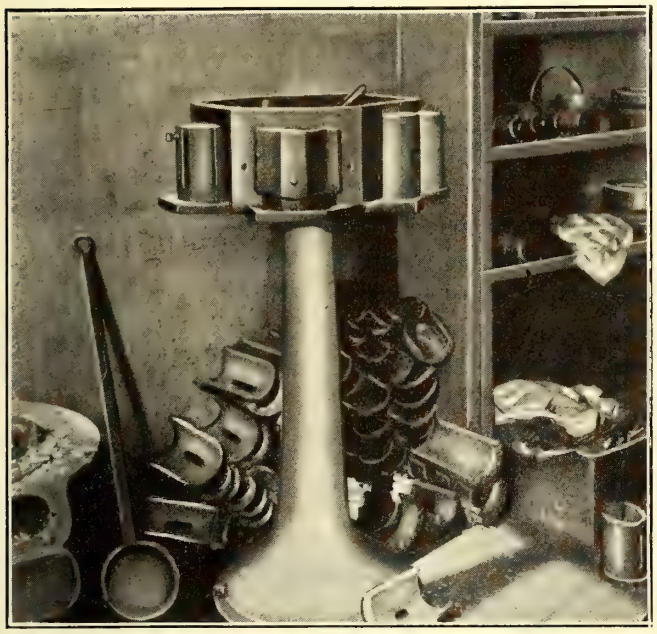


Fig. 5—Boston & Northern Shops—Babbitting Device for Three Pairs of Sleeves

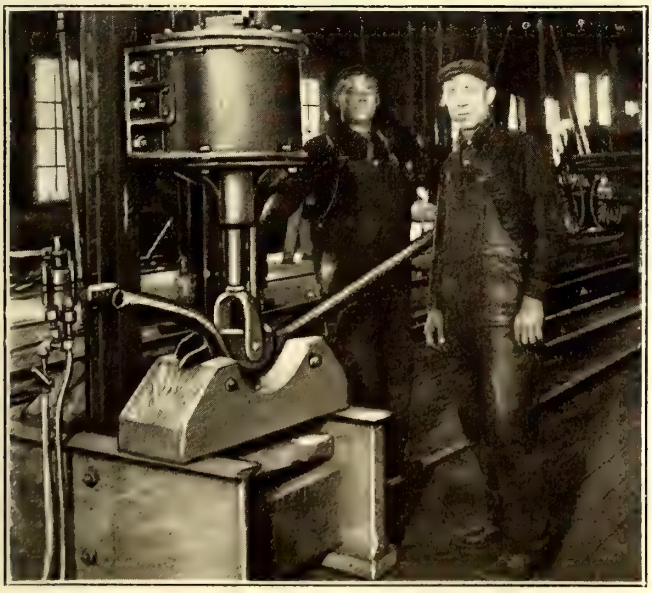


Fig. 7—Boston & Northern Shops—Pipe Bender

Fig. 3 illustrates a dipping room for field coils at Chelsea. It is constructed of concrete, reinforced by gas pipe in the walls, the roof being reinforced with old T-rails. The dipping room is about 14 ft. square, and is equipped with a 60-gal. compound tank and a trolley runway for the handling and temporary storage of coils. The compound used is the Massachusetts Chemical Company's No. 50 insulating compound. The room is lighted by five 16-cp incandescent lamps wired in conduit, and is ventilated by wall outlets of the register type. The trolley runway is 4-in. high by ½-in. thick, and the wheel carriers for the coils are each 4 in. in diameter and 1 in. wide. Angle irons attached to the wheels are provided with hooks in their lower ends, to which are hung looped angles for the carrying of the individual coils. Each hanger is provided with a middle eye by which the coil can be raised and lowered from the dipping tanks by means of a small block and tackle traveling horizontally across the top of the tank. The wheels and hangers are of ¼-in. galvanized iron. About 75 coils per hour can be dipped and dried in the room.

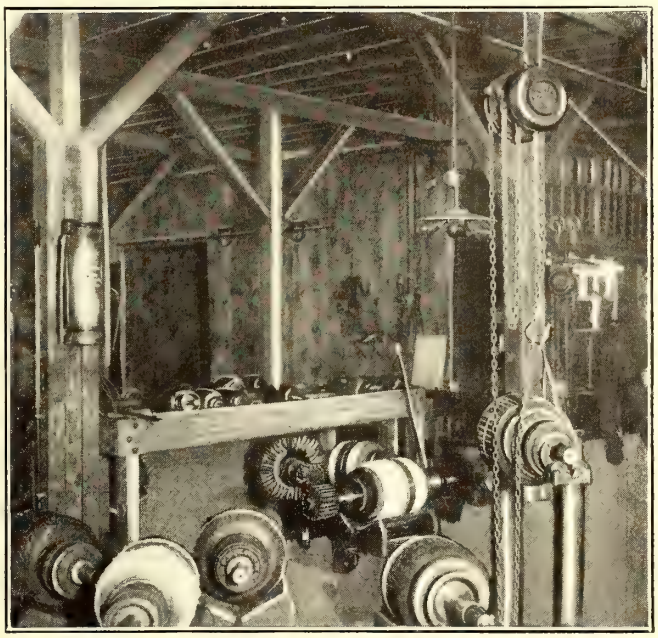


Fig. 6—Boston & Northern Shops—Automatic Truck Standards and Hoisting Equipment

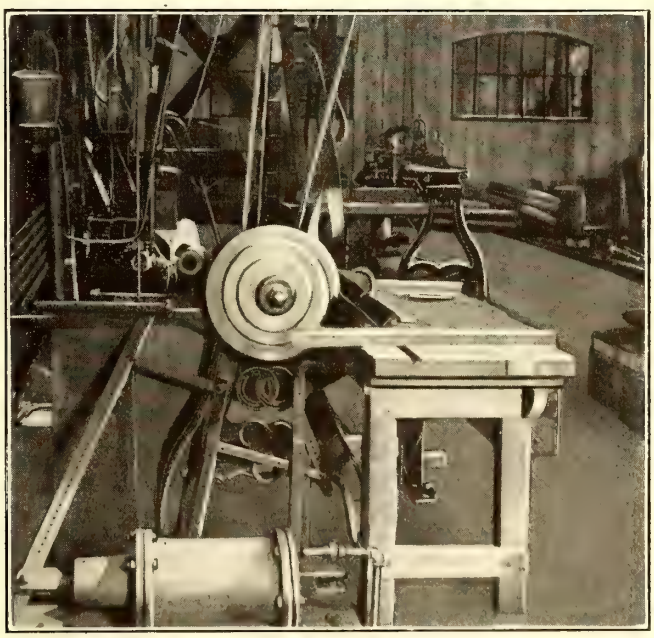


Fig. 8—Boston & Northern Shops—Conduit Cutter

The drawing Fig. 4 presents details of an oven and dipping room in service at Chelsea in connection with the field and armature coil heating and dipping. The field section, which is typical, is a room about 13 ft. long by 16 ft. wide, is built with reinforced concrete walls. The interesting feature is the floor and heating construction, the floor being made of sectional iron grating with steam pipes beneath for providing the requisite drying service. In the field-coil oven are over 400 ft. of 1¼-in. steam piping. The floor grating is installed 12 in. above the bottom of the room in 15 sections. The grating is laid on old rails cemented into the walls. Four ventilators are installed in the walls of the oven. A similar oven, about 6 ft. wide and 16 ft. long, is installed for armature service. A feature of the construction of these ovens is the ability to control the heat by the sectionalizing of the steam coils, which are provided with valves below the floor level. The location of the coils below the floor gives a maximum area for coil storage and permits easy cleaning and alteration.

The babbitting device illustrated in Fig. 5 has proved to be a great convenience in these shops. It consists of a hexagonal

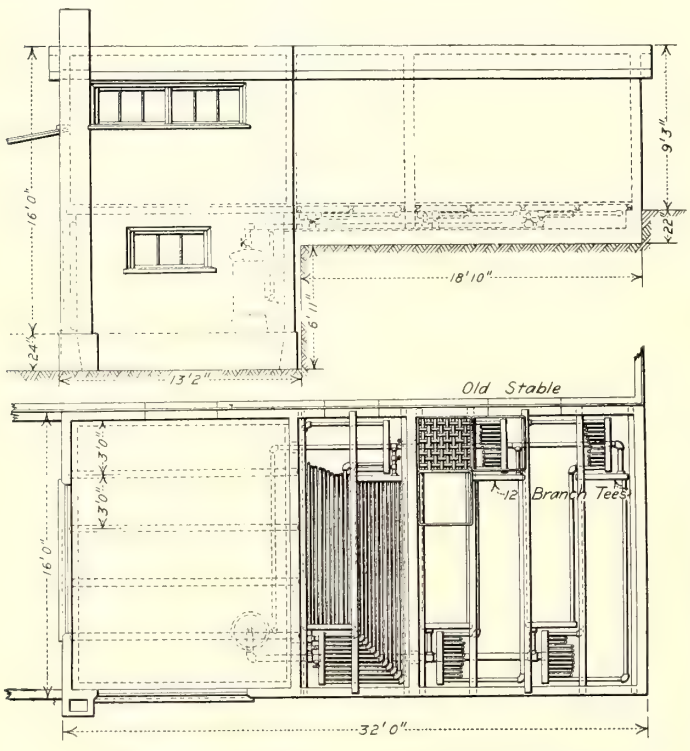


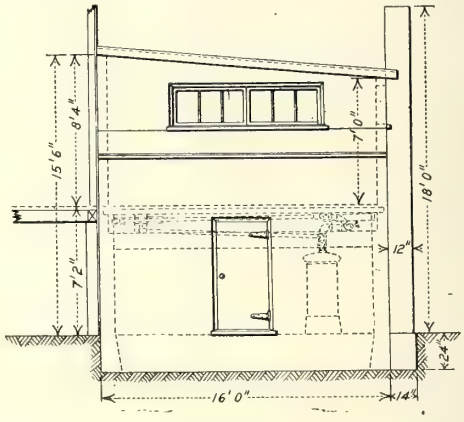
Fig. 4—Boston & Northern Shops—Oven and Dipping Room

box mounted on a heavy cast-iron standard, with faces and shelves on the outside by which two pair of axle sleeves and one set of armature sleeves can be poured at once. The shelves are 10 in. long and 3½ in. wide. In using the device a core is attached to a face, and on the outside of this a cap or mold is placed, leaving a space between which is filled with babbitt from a ladle heated in a stove close by. A typical core, sleeve and mold are shown in the illustration. The device is compact, easily operated and economical on account of its capacity. The height of the shelf is 7 in.

These shops are liberally provided with telpher equipment for the rapid handling of armatures, and Fig. 6 shows an armature standard, telpher and wheeled armature truck as used on the premises. The distances from one portion of these shops to the other are considerable on account of their lengthwise development. Special care has been taken, therefore, to avoid muscular labor in transportation, other than the comparatively easy work of handling armatures for short distances on wheeled trucks.

In the erection of certain cars at Chelsea the bending of pipe conduit assumed formidable proportions until the device shown in Fig. 7 was constructed. This consists of a large brake cylinder operated at a pressure of about 90 lb. per square inch, and fitted at its end with a yoke carrying a wooden block. The latter is forced against the conduit, driving it into a form block or mold of oak below. The pressure applied is about 8 tons, and pipes which are bent are filled with sand on bends of 45 deg. or over. The air supply reaches the cylinder through a 1-in. hose. The control of the pressure is effected by a brake valve at the side of the steel columns which carry the cylinder. The cylinder is adjustable for height on the columns by bolts passing through the web. The receiving block rests on two 18-in. girders. On each side of the steel columns shown in the illustration is a bending outfit, the controlling valve for the second equipment being shown in the foreground. The block which carries the conduit is provided with two ½-in. bolts to prevent splitting under pressure. Conduit 1½ in. in diameter can easily be handled by these devices. Two men usually are required for the most rapid work.

Fig. 8 shows a cutting-off machine for use in conduit work. It is motor-driven and consists essentially of a table carrying



a trough in which the conduit is laid, an emery wheel and an old saw with the teeth worn off, and a finger which throws the conduit against the disk when the machine is operated, the movement being effected by an air-brake cylinder and appropriate levers. The table top is forced toward the disk by the levers in connection with the application of air to the brake cylinder. Conduit up to 1 in. in diameter can be cut off in a few seconds by this device.

All conduit is filled with sand for the larger bends by means of a hopper elevated above the floor, under which the pipe can be set and easily controlled by a hand lever. This method superseded filling by hand.

RAILROAD CROSSING SIGNS RECOMMENDED BY THE INDIANA RAILROAD COMMISSION

The Railroad Commission of Indiana recently sent to all the railway companies operating in the State a circular letter regarding the erection of warning signs at the intersection of tracks with highways. The text of this circular letter was printed in the April 2 issue of this paper, page 642. Accompanying each letter was a drawing showing the types of signs recommended by the commission. One of the three designs shown on this drawing is reproduced herewith. This design, which is intended for use at points where a highway crosses two parallel lines of tracks close together, has the words, "2 Crossings" painted on a horizontal board below the crossed boards. The single crossing sign is similar to the one illustrated, but with the horizontal board omitted.



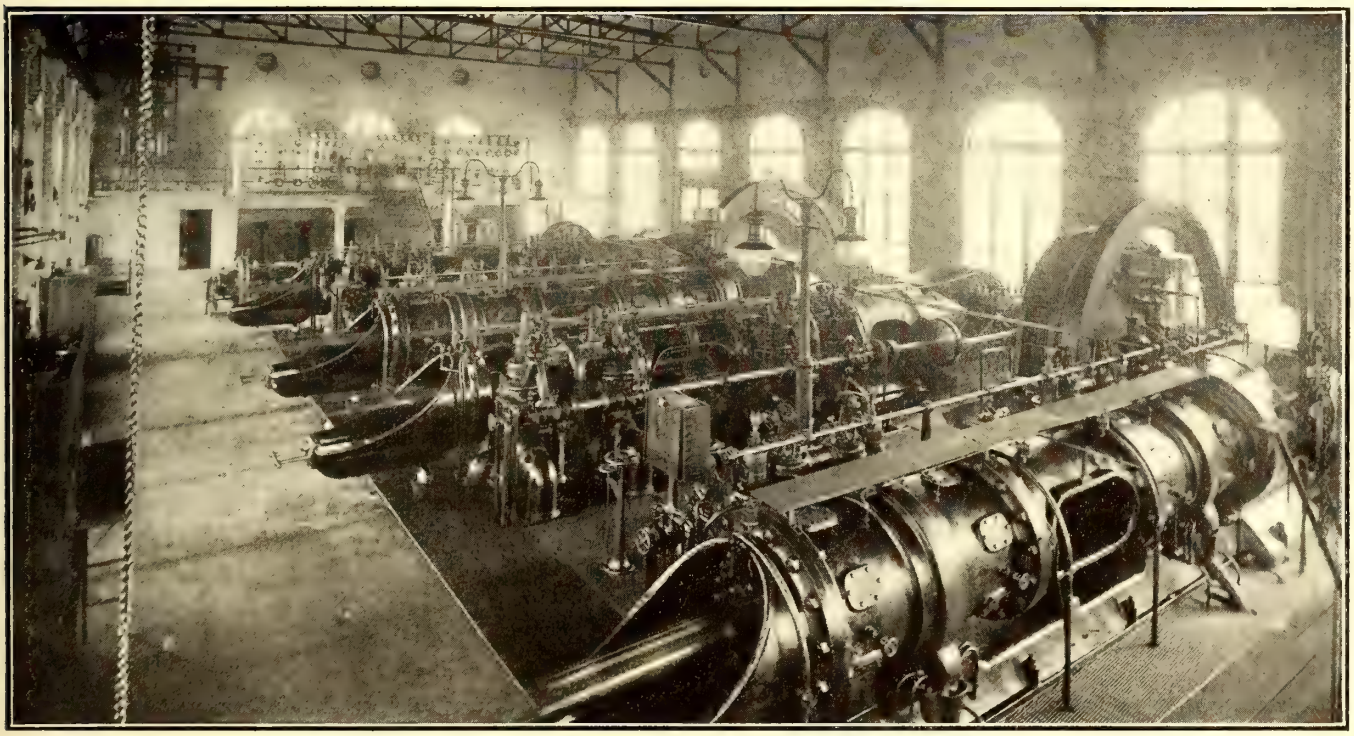
Crossing Sign

GAS ENGINES IN CHARLOTTE, N. C.

Through the kindness of E. D. Latta, Jr., general manager of the Charlotte (N. C.) Electric Railway, Light & Power Company, the following illustrated particulars are available on this company's gas-engine installation. The excellent results secured with the latter were mentioned in an editorial entitled "The Gas Engine in Railway and Lighting Service" and printed in the ELECTRIC RAILWAY JOURNAL of April 9.

The engine house is a brick structure designed for three 810-hp gas engines, but the present equipment consists of two Snow units of the horizontal twin-tandem, double-acting, four-stroke cycle type, each being direct and rigidly connected to a 540-kw, three-phase, 60-cycle, 2300-volt alternator. The exciter equipment consists of a 60-hp single tandem gas engine direct-connected to a 40-kw d.c. generator. In addition to this apparatus there is an induction motor-driven exciter set of the same capacity as the gas-engine exciter set; a 300-kw and a 500-kw rotary converter, and the usual switchboard equipment.

The Loomis-Pettibone producer apparatus consists of two 1000-hp twin generator down-draft producers, having a continuous overload capacity of 50 per cent. Each unit consists of two 9-ft. generators, 16 ft. high, connected at the bottom by openings containing water-cooled gate valves to an economizer or vertical boiler of 100-hp rating. From the top of the boilers a 16-in. pipe leads to the bottom of the wet scrubber and from the top of the wet scrubber to the exhauster, or through a by-pass around the exhauster to the dry scrubber. A 60,000-cu. ft. holder receives the gas from the producers and delivers it to the engines.



General View of the Gas Engine Station in Charlotte, N. C.

DETAILS OF THE GAS ENGINES

The gas-engine cylinders are 24 in. bore by 36 in. stroke; the flywheels are 16 ft. in diameter and weigh 34,000 lb. The entire engine occupies a floor space of 18 ft. x 44 ft., and together with the alternator weighs 500,000 lb. All parts of the engine that come in contact with the hot gases are water-jacketed. The jacket water empties from the separate pipes into open funnels to enable the operator to determine the temperature of the engine parts.

The ignition is low-tension make-and-break, with two igniters to each end of each cylinder. The ignition current requires about 10 volts. The poppet valves are actuated by bell-cranks which are lifted by cams on the camshafts, which are geared to the crankshaft and run at half speed. Intake and exhaust valves are located on the top and bottom, respectively, of a compartment bolted to the side of the cylinder which acts as a mixing chamber at one time and explosion chamber at another part of the cycle.

The governors are of the Jahns type, in which the centrifugal force of the weights revolving in a horizontal plane is resisted by the direct pressure of coiled springs, the weights turning on rollers in a constant oil bath. The governing is done with a uniform mixture, and the amount admitted to each cylinder is controlled by the governor through the cut-off valve gear. Each cylinder has its own mixing chamber and mixing valve to regulate the proportion of gas and air, so a disturbance, such as a back-fire, does not foul the gas going to other cylinders. This feature is a great advantage when close regulation is desired. A plunger in the face of the flywheel works in and out and radially against a coiled spring. In case of excessive speed of the flywheel, centrifugal force drives the plunger out beyond its normal position and opens a switch in the igniter circuit, thus shutting down the engine and preventing racing in case the governor belt breaks or the governor otherwise loses control of the engine.

The problem of piston packing has been solved in a fairly satisfactory manner by the use of metallic packing in cases. The packing cases each contain five rings of special cast iron made in segments, with overlapping joints, the segments being held against the piston rod by a garter spring drawn around the circumference. The packing case is bolted to the cylinder head by a flange, between which and the cylinder head is a ground joint. About once a month each packing case is removed and supplied with clean packing. The packing removed is cleaned and put aside for re-use.

The main bearings are lubricated by an oil-flushing system operated by turbine pumps, attached to the engine, which carries the oil from the engine through a filter to an elevated tank from whence it returns by gravity. The cylinders are lubricated by multiple pumps positively driven from the camshaft, the plungers of these pumps being so timed as to inject oil on the piston at the end of each power stroke. Two air tanks, each 5 ft. in diameter and 10 ft. long, in the basement, are kept charged with air at 150 lb. pressure for starting the engine. Air is admitted to each cylinder at the beginning of its power stroke.

During the summer months about 15 gal. of water, at an in-

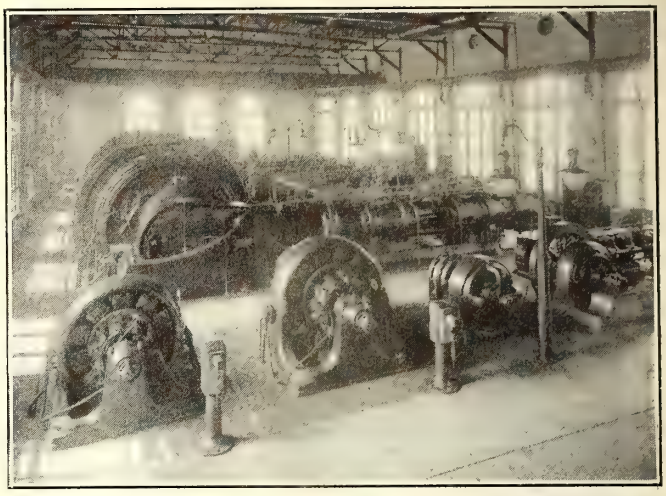
itial temperature of 80 deg. Fahr., are required per hp-hour for cooling, the temperature of the discharge being about 120 deg. During the winter months 10 gal. of water per hp-hour at 60 deg. are enough, and the water is discharged at about 100 deg. The difference in the amount of water required in summer and winter seems due to the fact that the heat lost by radiation is much greater in winter. The discharge jacket water flows by gravity to a hot well of the cooling system, from which it is drawn by an electrically driven centrifugal pump of 50,000-gal per hour capacity, against 15-lb. pressure, and forced through sprays into a basin which has a cold well in the middle. From the cold well the water is taken by a two-stage turbine pump of 15,000-gal. per hour capacity against 30-lb. pressure, and returned to the engine. These pumps are driven by the same motor. As the capacity of the single-stage or hot-well pump is three times as great as that of the cold-well pump, an excess of water is sprayed into the basin over that taken out of the cold well; this excess water overflows and returns to the hot well, where it is again pumped through the sprays. In this way all the water passes through the sprays three times to each time it is used in the engine. Ample cooling is obtained as the water in the cold well is reduced to a temperature slightly below that of the atmosphere. The loss in water by evaporation to attain this cooling is about 10 per cent.

The engines, which are rated at 810 b.h.p., have frequently carried a load of 700 kw, which is equal to 1010 b.h.p. or nearly 25 per cent overload for a considerable length of time, and a momentary load of 800 kw, or 42 per cent overload, without reducing the speed to a point that caused trouble. The load of 700 kw, although it does not reduce the speed materially, gradually heats up the engine so that after a few hours' operation pre-ignitions occur. The high pressure in the cylinder also strains the packing and causes gas to flow through.

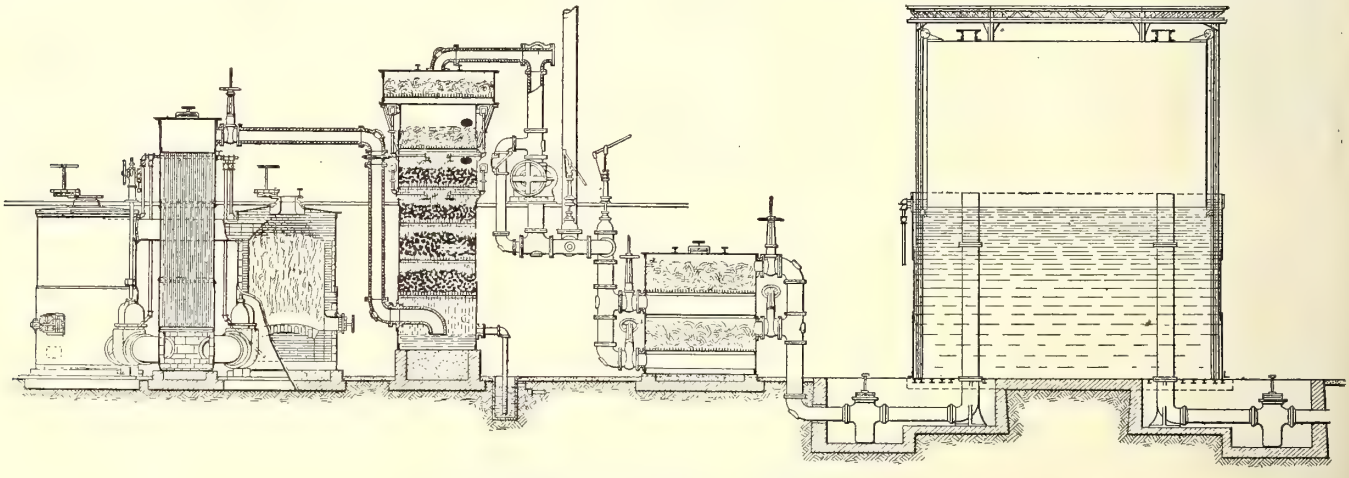
PRODUCER OPERATION

In starting a producer the generators are charged to a depth of 5 ft. with 72-hour coke, requiring about 6000 lb. to each generator, or a total of 12,000 lb. The exhauster is then started and the coke ignited. The gas made during the first 40 minutes is too inferior to be used, and it is, therefore, blown out through the purge stack and wasted. As the coke in the generators burns and becomes hot, coal is charged at the top in small quantities and at frequent intervals. When the fuel bed has attained a sufficiently high temperature, the purge stack is closed and the gas admitted to the holder. Steam is introduced at the top of the charging doors and, together with the air, is drawn in by the exhauster and passes down through the generator to form a mixed gas. The carbon of the incandescent fuel combines with atmospheric oxygen and steam, forming carbonic oxide gas and free hydrogen, the principal valuable constituents of producer gas.

The hot gas leaves the generators at a temperature of about 1200 deg. C. and passes out through a brick-lined nozzle and water-cooled gate valve into the lower brick-lined compartment of the vertical economizer. A large part of the sensible heat of the gas is given off there and serves to make steam, which is used in the generators and for running the exhauster. From the top of the economizer the gas passes, at a reduced temperature, to the bottom of the wet scrubber, where it is water sealed. Passing up through the wet scrubber, the gas works its way through several layers of water-sprayed coke. During the passage of the gas through the coke and water most of its dust and lampblack is removed and its temperature is reduced to that of the atmosphere. In the top of the wet scrubber a thick layer of excelsior removes part of the moisture and most of the remaining lampblack. From the wet scrubber, the gas goes through the exhauster, then to the dry scrubber, where two more layers of excelsior dry it thoroughly, thence it passes as a clean, dry, cool gas to the holder. The use of a large holder (60,000 cu. ft.) is of great value in operation, because it takes up the variations in load and allows the producer to be operated evenly; also, if the gas varies in quality over short intervals, which is unavoidable, the gases above and below the mean value are thoroughly mixed and a gas of uniform quality is supplied to the engines.



Rotaries and Exciter Sets in the Charlotte Station



Cross Section of Charlotte Gas Producer

Ford, Bacon & Davis, of New York, consulting engineers for the United Railroads of San Francisco, announce that a successful trial of the 150-mile, 100,000-volt transmission from the Stanislaus power station to San Francisco was made during the past week. In about a month regular service to the substations of the United Railroads of San Francisco will be instituted. The substations of the United Railroads of San Francisco were formerly equipped with 25-cycle rotary converters, but these have now been exchanged for 60-cycle motor-generators, on account of the change from 25-cycle distribution from steam stations to a combined 60-cycle steam and water-power supply.

TRACK STANDARDS AND GENERAL RULES—DEPARTMENT OF MAINTENANCE OF WAY—METROPOLITAN STREET RAILWAY COMPANY

An account was published last week outlining the general organization of the maintenance of way department of the Metropolitan Street Railway Company of New York and describing some of the work carried on by that department. During the last two and one-half years the company has done a great deal in the way of standardizing the equipment and methods used in the department of maintenance of way and some of the results secured are described below.

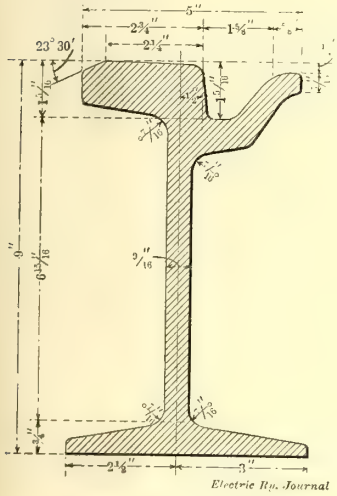
STANDARDIZATION OF RAILS

The breakage of many rails on the Metropolitan system during 1906 and 1907 demonstrated the necessity of making a change in the chemical composition of the rails, with the object of securing a rail which would stand the wear and tear better and, at the same time, be less brittle. The chief trouble encountered was that the web at the end of the rail would split for a distance varying from 2 in. to 10 ft. In approximately half the instances of this trouble, a piece was broken out from the end of the rail, varying from 2 in. to 12 in. in length.

The chemical composition formerly prescribed for Metropolitan rails was as follows:

Carbon, not less than 0.45 or more than 0.55 per cent.
Phosphorus, not over 0.10 and to average below 0.09 per cent.
Sulphur, not to exceed 0.07 per cent.
Silicon, to be 0.10 per cent.

The remainder of the composition was left to the judgment of the maker.



Standard 9-in. Rail

The new specifications for rail provide for an increase of carbon, a decrease of phosphorus and call for not less than 0.8 or more than 1.1 per cent manganese.

The weight of the rail has also been gradually increased. The standard Metropolitan rail is 9 in. high and its weight was changed, first, from 107 lb. to 115 lb. per yd. and finally, to 123 lb. per yd. On those lines where the cars were formerly operated by cable, a 7-in. rail was originally installed and as the yokes were designed for this height of rail it has been used when the track has been relaid, but its chemical composition is the same as for the standard 9-in. rail.

The following are the Metropolitan tram-rail specifications:

SPECIFICATIONS FOR 9-IN. OPEN-HEARTH STEEL GIRDER RAILS

Chemical Composition:

Test borings selected by the inspector from rail rolled from each heat to conform to the following chemical analyses:

Element.	Lower Limit.	Desired.	Upper Limit.
Carbon	.65	.75	.80
Manganese	.80	.90	1.10
Silicon	...	...	.20
Phosphorus	...	...	.04
Sulphur	...	...	.08

Process of Manufacture:

1. Ingots shall be kept in a vertical position until ready to be rolled or until metal in the interior has solidified.

2. No "bled" ingots shall be used.

3. There shall be sheared from the end of the bloom formed from the top of the ingot sufficient discard to insure sound rails.

All metal from the top of the ingot, whether cut from bloom or rail, shall be considered as top discard.

4. In reheating, care shall be taken to avoid burning the steel and under no circumstances shall a cinder heat be used.

A cinder heat shall be considered as one in which the scale on the sides of the ingot becomes fluid.

5. The initial temperature, number of passes and speed of train shall be so regulated that, on leaving the rolls at the final pass, the temperature of the rail shall not exceed 1900 deg. Fahrenheit.

Bars shall not be held for the purpose of reducing their temperature, nor shall any artificial means of cooling them be used between the leading and finishing passes, nor after they leave the finishing pass.

Mechanical Requirements:

1. The name of the maker, the weight and type of the rail and the month and year of manufacture shall be rolled in raised letters and figures on the side of the web, and the number of the heat shall be plainly stamped on each rail where it will not be subsequently covered by the splice bar. A letter shall be stamped on the web to indicate the portion of the ingot from which the rail was rolled.

2. The section of the rail shall conform to templates prepared by the manufacturer in accordance with the Metropolitan Street Railway Company Drawing No. 21375. There shall be no variation from template on the splice-bar fit. A variation from the template in height of 1-32 in. over or 1-64 in. under will be allowed.

The bottom of the base shall be flat and perpendicular to the axis of the web. A variation in the width of the base of not to exceed ⅛ in. over or under the dimensions given on the drawing will be allowed. The dimensions of the head of the rail shall agree with those shown on the drawing.

The width of the tram shall not vary more than ⅛ in. above or below the dimensions given on the drawing.

3. The weight of the rails shall be maintained as nearly as possible to 123 lb. per yd. A variation of one-half of one per cent, as applied to the entire order, will be allowed.

4. The standard length of rails shall be 59 ft. 11⅞ in. at 60 deg. Fahrenheit. Ten per cent of the entire order may be of less lengths in multiples of 15 ft. No rail, however, shall be shorter than 29 ft. 11⅞ in. Lengths shorter than 59 ft. 11⅞ in. shall be shipped in pairs. A variation from the above specified length of ⅛ in. shall be allowed.

Rails must be sawed smooth and true squared. All burrs removed. A variation from true square sawing not to exceed 1-22 in. will be allowed.

5. Rails must be free from all injurious mechanical defects and flaws.

6. Rail shall be smooth on head, straight in line and surface and without any twists, waves or kinks, particular attention being given to having the ends free from kinks or drop.

Hot straightening shall be carefully done so that gagging in the cold presses will be reduced to a minimum. Any rail coming to the straightening presses showing any sharp kinks or greater camber than that indicated by a middle ordinate of 4 in. in 33 ft. will be at once marked as No. 2 rail and only accepted as such. The distance between the supports of rails in the straightening presses shall be not less than 40 in. Cold straightening shall not be sufficient to leave distinct marks of gagging on head.

7. Splice bar holes shall be drilled accurately in accordance with Metropolitan Street Railway Company's Drawing No. 21375.

Tie rod holes shall be punched in accordance with Metropolitan Street Railway Company's Drawing No. 21375.

Drop Test:

One drop test shall be made on a piece of rail from each heat, such piece to be not less than 4 ft. and not more than 6 ft. long. This piece shall be cut from the rail bar next to either end of the top rail, as selected by the inspector. This test piece shall be placed head upwards on solid supports, 5 in. radius, 3 ft. between centers, and subjected to an impact test from a weight of 2000 lb., falling freely 18 ft. The striking face of this weight shall have a radius of 5 in. The testing machine used in making this test shall conform to the standard of the American Society for Testing Materials.

The temperature of test pieces when tested shall not be less than 60 deg. Fahrenheit nor greater than 120 deg. Fahrenheit.

Any piece which under the impact of the first blow either breaks or shows a deflection in excess of that indicated by a middle ordinate of 1¾ in. in 3 ft. shall be considered as having failed to pass for No. 1 rail. After the first blow test pieces shall be tested to destruction.

If, upon receiving the first blow, a test piece breaks, the rail from which it was cut shall be rejected and two more pieces selected by the inspector from the same heat shall be tested. If neither of these pieces breaks, all rails of the heat will be accepted as No. 1 or No. 2, according as the deflection after the first blow is less or more, respectively, than the prescribed limit. If either of these two additional test pieces fails, all rails from that heat will be rejected.

If, however, the first test piece shows a physical defect, the top rail from each ingot of that heat will be rejected and a second test shall then be made of a test piece selected by the inspector from the top end of any second rail of the same heat. If this second test piece break, the remainder of the rails of that heat shall also be rejected. If this second test piece does not break, the remainder of the rails of that heat will be accepted as either No. 1 or No. 2, according as deflection is less or more, respectively, than the prescribed limit.

Inspection:

1. Rails which by reason of surface imperfections are not classed as No. 1 rails may be accepted by the Inspector as No. 2, if in his judgment the imperfections are of such a character as not to impair the strength or usefulness of the rails.

2. Rails improperly drilled or straightened or from which the burrs have not been properly removed, shall be rejected, but may be accepted after being properly finished.

3. No. 2 rails to the extent of not to exceed 10 per cent of the entire order will be accepted. All rails accepted as No. 2 rails must have the ends painted white. All classes of rails must be kept separate from each other in the pile, and, in shipping, each class must be kept by itself.

4. Rails will be accepted and billed according to actual weight, subject to the limitation of Clause No. 5, under Mechanical Requirements.

5. All rails must be loaded in the presence of the Inspector.

6. Makers shall furnish the Inspectors with complete chemical analysis for each melt and with samples for checking each analysis.

The Inspectors representing The Metropolitan Street Railway Company shall have free entry to the works of the manufacturer at all times while the contract is being filled.

The manufacturer shall supply to the Inspectors all reasonable and requisite facilities for inspection and tests without charge.

The Inspector may reject unsatisfactory material at any time before shipment.

All tests excepting check analyses shall be made at the place of manufacture prior to shipment at the expense of the Manufacturer.

In the event of a dispute arising between the Inspector and the Manufacturer as to the interpretation of these specifications, or the character or quality of the rails to be supplied thereunder, the matter shall be submitted to the Engineer of the Receivers of the Metropolitan Street Railway Company, whose decision shall be conclusive and binding upon the parties.

All proposals shall be made on the basis of rates per gross ton delivered f. o. b., within free lighterage limits, New York City.

Approved by Standardization Committee, July 28, 1909.

STANDARD RAIL SECTION

The modified design calls for an increase in the thickness of the flange and in the web, which is now 9/16-in. thick. At the same time the groove of the rail was deepened by 3/16 in. By these modifications it is believed that the rail will be materially strengthened and its life considerably increased, particularly as there will be an opportunity for longer wear on the surface of the rail before the wheel flanges will ride upon the bottom of the groove. The accompanying drawing shows a section of the new rail in question. The length of rail life is particularly important in New York because of the great expense of rail renewal due to the large amount of asphalt which must be disturbed in renewing rails and the frequent interruptions to work from passing cars and the congestion of vehicles and pedestrians. Moreover there is always the possibility of an accident with resulting damage payment and interruptions to the service. Consequently the desirable ratio between the first cost and length of life of rails differs in New York from that in many other cities.

RAIL JOINTS

The question of rail joints on the Metropolitan system has been an important one and the company has conducted an extended series of experiments for the purpose of determining the character of joint best suited to the local conditions existing on the system. In 1905 375 joints, other than electric weld, were welded on a line where the motive power was being changed from horse traction to the conduit electric system. An observation of these joints, extending over a period of 2½ years, indicated that during the first year 3½ per cent of the joints broke and that afterwards 2.1 per cent additional joints were fractured, making a total breakage of 5.6 per cent during 2½ years. These joints were welded while the road was being reconstructed and while no car operation was taking place over the track.

On Lexington Avenue a total of 1216 joints were welded at various times from November, 1906, to August, 1908. During the welding process cars were operated over the track on a 20-minute headway. The total number of breakages during the first year was 141, or 11.6 per cent of the total number of joints welded. After the first year the percentage of breakage was about 8.3 per cent, making a total of 19.9 per cent breakage during the period of observation, which averaged about 2 years, 9 months per joint.

This experience seems to point to the fact that, when it is practicable to suspend car operation during the welding process, the life of the joint is substantially lengthened. The travel on the line which was reconstructed is very much heavier than that on the line where the welding was done while car operation was uninterrupted. In the latter case the rail was the 7-in. type, weighing 110 lb. per yard, whereas, in the former case, the rail was 9-in. type, weighing 109 lb. per yard.

On the assumption that car operation is to be continued during the process of rail renewal and that the breakages on the welded joints will average during the life of the rail about 20 per cent, the following figures show the relative estimated cost of maintenance per joint per annum on streets paved with asphalt as compared with streets paved with granite, on supposition that the rail is renewed once in 10 years.

ESTIMATED COST OF MAINTENANCE PER JOINT PER ANNUM.

	Seven-inch rail.	Nine-inch rail.
Street Paved with Asphalt:		
Welded joints	$1.18	$1.32
Continuous joints	.76	.88
Angle-bar joints	1.14	1.32
Street Paved with Granite Block:		
Welded joints	.74	.88
Continuous joints	.36	.48
Angle-bar joints	.54	.72

When track was relaid on Amsterdam Avenue last year, 125 pairs of Atlas truss joints were installed for the purpose of subjecting this joint to a thorough test and ascertaining its relative merits as compared with other joints, but it is too early as yet to give any definite figures in this connection.

The study which was made of the joint situation embraced a comprehensive investigation of the types of joints used, the method of procedure followed and the local conditions prevailing in a number of other large cities. The result of this investigation, taken in connection with a knowledge of the requirements which obtain on Manhattan Island, appears to point conclusively to the superiority of the Continuous joint over the welded joint used, taking all features of the subject into consideration.

On account of the comparatively heavy initial cost involved in the use of electrically welded joints or, as an alternative, the suspension of car operation for a longer period than is practicable in New York City, that system was not employed.

ALLOYS

An experiment is now being made with approximately 40 tons of rail treated with ferro-titanium alloy, partly to secure freedom from slag and blowholes, and partly, also, to harden the rail and increase its life. The rail so treated was laid last fall and, consequently, the time which has elapsed has been too short to obtain any conclusive data as to the advantages of the use of this alloy.

CAST MANGANESE STEEL

An outer rail of this character was installed on three curves on Broadway. These rails were of necessity cast; consequently they were not of absolutely perfect section and did not fit the yokes upon which they were placed as well as would have been the case had the rails been rolled. Observations made from time to time indicated that the manganese rail was showing less wear than was the case with either Bessemer or open hearth rails which were being subjected to test under the same conditions. While this experiment demonstrated the wearing qualities of the manganese rail to be unquestionably superior to either Bessemer or open-hearth rail the difficulties introduced into the situation by the fact that the manganese rail must be cast instead of rolled appears to render it less desirable than the open-hearth rail, taking into consideration the very great difference in cost between the two types of rails.

OFFICE PROCEDURE

A reorganization of the clerical force has been effected and the work classified in a manner to produce more satisfactory results than had previously obtained. A cost system has been placed in effect whereby it is possible to tell the cost of work performed on any given job to date, and maintenance records are being compiled with regard to the life of special work, track, etc.

Approved methods have been adopted in connection with the files, and regulations for the guidance of the employees of the maintenance of way department have been compiled and printed in book form and a copy is given to each employee who signs a receipt for it. There is an Italian edition of this book which is given to employees of that nationality, of whom there are a great many in this department. The rules are reproduced in the following paragraphs:

GENERAL RULES OF THE MAINTENANCE OF WAY DEPARTMENT

1. Knowledge of Rules.—Employees are required to be familiar with the rules and with every special order issued. The bulletin board to be examined daily by the supervisors for special orders, such orders to be transmitted by the supervisors to employees under them. Employment by the company binds the employee to comply with the rules and regulations, and ignorance thereof will not be accepted as an excuse for negligence or omission of duty. If in doubt as to the exact meaning of any rule or special order, application must be made to the proper authority for information and instruction.

In addition to these rules, special orders will be issued from time to time; such orders, when issued by proper authority, whether in conflict with these rules or not, must be obeyed while in force.

2. Report for Duty.—Regular employees must report for duty five minutes before starting time; if not, they will not be allowed to start work for one hour after starting time.

3. Sick Reports.—Every employee reporting sick or excused must report for work within one week thereafter, or send to the engineer maintenance of way a sufficient reason for longer absence; otherwise his place will be filled.

4. Habits and Personal Conduct.—The following acts are prohibited:

Drinking intoxicating liquors of any kind while on duty.

Entering any place where the same is sold as a beverage while on duty, except in case of necessity.

Constant frequenting of drinking places.

Carrying intoxicating drinks about the person while on duty.

Carrying intoxicating drinks on the company's premises at any time.

Indulging to excess in intoxicating liquors at any time.

Gambling in any form, including the laying of bets and playing raffles, while upon the premises of the company.

Smoking tobacco while on duty.

Smoking tobacco while off duty in any part of the company's buildings, except in the conductors' or motormens' room.

Reading books or newspapers while on duty.

5. Talking to Motorman.—Employees, while riding on the front platforms of cars, must not talk to motorman.

6. Reporting Defects.—Supervisors and foremen will report to the office of the engineer maintenance of way immediately by telephone any defects in track which require immediate attention.

7. Reports to Be Full and Complete.—A full report of every accident, no matter how trivial, to which any employee may be a witness, or which may be brought to his attention, must be made by such employee to the office of the engineer maintenance of way.

8. Give Information to Proper Persons.—No employee shall, under any circumstances, give any information whatever concerning any accident, delay, blockade or mishap of any kind to any person except to a properly authorized representative of the company.

9. Responsibility for Damages.—Employees will be held responsible for any damages caused by their neglect or carelessness or by disobedience of rules.

10. Hearing by Engineer Maintenance of Way.—A hearing will be given by the engineer maintenance of way to every employee who desires to complain. Reports or suggestions for the betterment of the service will always receive consideration.

11. Persons Allowed to Ride on Front Platforms.—Employees of engineering departments with badges displayed and wearing soiled clothing may ride on front platform of closed cars, but no more than two will be permitted to so ride at one time, unless cars are on long headway.

12. Leaves of Absence.—Leaves of absence will be granted only on account of illness, or for rest or recreation. No employee will be excused from duty to engage in other occupation or business, nor will his position be held open while so engaged.

13. Assignment of Wages.—Employees are forbidden to give an order on the company, or assign their wages. They will be paid on the regular pay day, except in cases of dismissal. Those who wish to remain in the service of the company must pay their lawful debts.

14. Lost Articles.—Employees must turn into the office of the engineer maintenance of way any articles which they may find while on duty, with a full report in the matter.

15. Transportation of Employees.—Employees with badge displayed, or wearing working clothing (if not soiled) with badge in sight, will be allowed to ride free to and from work upon any of the cars of this company. Such employees must ride inside of the cars when there is room, but must not occupy a seat while other passengers stand, nor must they converse with men in charge of the car. Not more than two such employees will be allowed to ride on any one car, except during the early morning or late at night when cars are on long headway, and in such event not enough employees to crowd the car will be allowed to board same. Employees of the engineering departments wearing soiled clothing will not be allowed on the rear platform or inside of closed cars, but may ride on the front platform thereof, as provided by Rule 11. On open cars such employees may ride only upon the rear platform.

16. Employees must not touch the channel rail or cables, or attach leads to the channel rail for lighting purposes, unless they have on proper rubber gloves.

17. Do not clean handholes with iron-handled shovels, unless the handles are insulated.

18. Do not clean out feeder manholes with iron shovels.

19. In cleaning out feeder manholes, use great care not to injure the cables, as injury to a cable is likely to cause not only damage to the cable but injury to employee.

20. Never stand between tracks on a curve when cars are passing each other.

21. Employees, when working on track, must be very careful to keep watch for approaching cars; in stepping out of the way of a car, look closely to see that it is not followed closely by a second car, and when stepping from one track to another, in order to get out of the way of a car, be sure that there is not a car coming on the other track.

22. Do not lift a handhole cover when an approaching car is within 50 ft. of the same.

23. In carrying rails, pieces of special work or heavy timber, where several men have hold of the same piece, do not let go of the same until instructed so to do by the foreman in charge.

24. In working underneath the track, be careful to keep out of the way of plows of cars. Never work with your back toward approaching cars.

25. When using striking hammers, especially at crossings, see that pedestrians or other employees are not in the way of the hammer, so as to be struck upon return from blow.

26. Employees will personally examine all tools of all descriptions used to see that they are in proper condition for use and do not use a tool that is defective. When using picks or hammers, be sure that the hammer or pick handle is properly fastened.

27. Foremen must not allow the loading of rails or long pieces of timber or iron upon carts or short trucks.

28. No employees, except motormen or carhouse men, must, under any circumstances, handle the electrical apparatus on cars, either in carhouses or on the road. Neither must they handle the electrical apparatus on transfer tables in carhouses.

29. Under no circumstances must employees leave a cut or manhole open anywhere, without properly guarding or protecting it.

30. When working on the street, employees must get up out of the cut to allow each car to pass, unless in a place which they know to be safe.

31. Do not use bull points within 6 in. of any duct, cable or channel rail.

32. When working in buildings, employees must not drop tools from one floor to another; either pass them down, lower them down with a rope or carry them down.

33. When handling, piling or storing away material, employees must perform the work in a neat, careful and proper manner. When piling material, build the pile up carefully so that there will be no danger of its falling and injuring yourselves or others.

34. When working in a carhouse, employees must see that all rubbish, refuse, etc., is removed each night before quitting work.

35. When working on a scaffold, employees must personally see that the scaffold is safe before going on it, and under no circumstances must they perform work on a scaffold unless they feel that it is perfectly safe.

36. Employees must exercise great care in the use of oils, paints, gasoline, varnishes and other explosive and inflammable liquids, and in order that neither yourselves nor others may be injured, you must see that these liquids are kept in oil house provided for the purpose, when not actually in use.

37. All tools, when not actually in use, must be kept in the tool box provided for the purpose, but employees must not keep any old clothes, caps, overalls, etc., in any tool box.

38. The above rules are not to be considered as necessarily final in their scope, as they will be changed from time to time as circumstances may demand, and employees must keep themselves posted regarding new rules or changes in the above rules as mentioned in paragraph 1.

39. Employees who are engaged in the performance of duties in and about the buildings of the company must be familiar with the regulations contained in the pamphlet entitled: "Description of Certain Precautions Against Fires." These regulations must at all times be obeyed.

NEXT ARTICLE

In the next article on the Metropolitan system an account will be given of the electrical engineering department of the company.

REBUILDING INTERURBAN CARS AT INDIANAPOLIS

Six 53-ft. interurban passenger cars of the Terre Haute, Indianapolis & Eastern Traction Company, are now being rebuilt and lengthened to 61 ft. 6 in. in the Indianapolis Traction & Terminal Company's repair shops. This reconstruction work also includes the standardization of the principal parts of the cars with a view to making the rebuilt equipments conform to the construction standards of the present type of large interurban car used on this company's interurban lines. An entirely new underframe largely composed of steel is being constructed for each car and the old underframes are being discarded.

When a car is made ready for reconstruction the body is lifted from the underframe and supported on horses while the new underframe is being built and placed below the car body. The underframes for the rebuilt cars include as main members four I-beam center and intermediate sills and two channel-section side sills. All the details of the underframing, including the conduit layout, were carefully prepared in advance of this work and presented on blueprints so that the detail parts of the work on the different cars all will be standard. The use of the standard design permits all the holes to be bored for the conduit before the sills and blocking are assembled. This work is done when the pieces are mortised because then considerable expense can be saved by boring with power-driven machines.

A standard layout for the electrical conduit and other pipe used under the cars has been made. The various classes of piping work are segregated in the open sections between the sills. All motor and control conduits are confined to the middle section between the two center sills. All the air pipes are placed in the two sections on one side of the center. On the other side of the center the intermediate section is used for the miscellaneous pipes and conduit. This classification and arrangement of the piping leaves one outside section of the underframe free for the reception of a row of turnbuckles, one of which is placed in the truss rod under each cross sill. The underframing is floored over with two thicknesses, the lower boards being laid crosswise of the car.

After the completion of one of the underframes as here outlined the body, which in the meantime has been held on horses, is lowered onto it and the new body extension is built at the front end where a baggage compartment about 13 ft. long is provided.

Each of the rebuilt cars will be mounted on two Standard Motor Truck Company's C-80 trucks. Four Westinghouse 121-A 90-hp motors will be used under each car. These will be controlled by Westinghouse unit-switch apparatus with master controllers at both ends of the cars. Westinghouse AMM schedule airbrakes are being installed. The braking equipment also will include Peacock hand brakes and two slack adjusters on each car. One of these will be the Price automatic adjuster, which has done good service on this road for a year. The other adjuster will be of the American type and this is being installed so that an adjuster always will be available even if at any time the Standard trucks are transferred when making repairs or changing wheels. The adjusters are set so that only one operates normally.

In reinstalling the hot water heating equipment in these car bodies the four lines of pipe on each side of the car are being replaced with three lines of larger pipe. The use of the larger pipe offers two advantages; better radiation is had with less retardation of the flow of water, and a space of about 3 in. is gained under the lower pipe so that the floor may easily be kept clean.

A TRAFFIC STUDY IN THE CHICAGO BUSINESS DISTRICT

A supplemental report on transportation subways for the business district of Chicago has just been released to the public. The report contains valuable data on the traffic of the elevated and surface lines of Chicago as well as suggestions for subway structures to accommodate underground operation of the cars of the street and elevated railways. The first subway report prepared by the Bureau of Engineering of the Department of Public Works was abstracted in the ELECTRIC RAILWAY JOURNAL of March 27, 1909, page 562, and an announcement of the completion of the collection of data for the supplemental report from which the following abstract is made was noted in the paper for June 19, 1909, page 1138. The supplemental report has not been published for lack of funds. In the letter from the city engineer transmitting the present supplementary report to the Commissioner of Public Works, credit for its preparation is given to R. C. St. John, assistant engineer, under whose immediate direction data were collected and compiled. Extracts of this report which are thought to be of interest to students of city passenger transportation follow.

STREET TRAFFIC CONGESTION

It is apparent to even the casual observer that there is a steady and rapid increase in the vehicular traffic within the business district which, even under the most admirable surveillance, must retard the movement of surface cars. With the increase in vehicular traffic there is also an increase in the number of people who must use the surface cars. These two increases are from the same cause—an increase in business due principally to increase in population. The result is that the greater the number of surface cars that are required to carry the increasing number of people the greater the obstruction and delay to their movement. If the vehicular and car traffic all moved in one general direction the delays would not be serious; but when at street intersections it moves in all ways it becomes a serious problem.

To illustrate the amount of vehicular and car traffic that passes across State Street, diagrams were prepared and tables presented in the report showing the traffic in 12 hours for each cross street intersection from Washington Street to Harrison Street. The summary for State and Madison Streets is shown in Table I and shows the direction and class of vehicle and car movement from 7 a. m. to 7 p. m., as counted on April 15, 1909.

TABLE I—SUMMARY OF VEHICLE TRAFFIC AT STATE AND MADISON STREETS FOR APRIL 15, 1909, 7 A. M. to 7 P. M.

Direction of traffic.	Street cars.	Number of pass. vehicles.	Goods vehicles.	Totals.
North	980	535	1,570	3,085
South	969	592	1,678	3,239
East	0	159	412	571
West	0	179	380	559
North to East	0	77	114	191
North to West	925	94	315	1,334
South to East	2	69	228	299
South to West	0	77	184	261
East to North	0	144	251	395
East to South	0	86	198	284
West to North	0	47	162	209
West to South	0	59	94	153

No surface cars pass across State Street in the congested district, therefore the maximum obstruction to surface car movements, which is occasioned by other traffic, does not appear. The report presents a diagram showing the length of flow of traffic in alternate directions at an important intersection indicating the east and west traffic across State Street, which necessarily interrupts the progress of street cars, to be greater than the north and south traffic accompanying the movement of street cars.

An engraving shows the congestion occasioned by a 5-minute obstruction to traffic at the intersection of Randolph and Dearborn Streets in the loop district and at the intersection of two double-track street-car lines. Delays to surface traffic by reason of the river bridges being opened are serious. To illustrate the difference between the movement of surface cars within the congested district and the movement outside of that district, three curves are presented, one showing the rate of speed within the subway zone, 9.21 ft. per second, another for the first mile outside (11.48 ft. per second), and another for the second mile outside of the subway zone (16.24 ft. per second).

The conclusions regarding congestion of traffic are as follows:

(1) The density of traffic congestion is constantly increasing and extending over longer periods both morning and evening. The result is that the time required to go to and from work is increasing, so that the working day is lengthened.

(2) Not only is the rapid growth of the city leading to this undesirable result, but as the congestion in the streets in the business district increases the interruption to surface traffic is leading to a smaller capacity for carrying passengers on surface lines. The present actual maximum traffic per hour on surface lines entering the business district is but 62 per cent of what it was estimated to be seven years ago, notwithstanding that extensive improvements have since been made, and that the total annual surface-line traffic has increased 30 per cent.

(3) The capacity of the elevated lines as it relates to traffic into and out of the business district is limited to the capacity of the elevated loop. The capacity of the elevated loop has been reached and can be only slightly increased by physical changes and revised methods of operation. Stub terminals, while adding to the capacity of the elevated lines, serve only those patrons whose destinations are nearby.

(4) The existing main lines of transportation have reached their ultimate practicable capacity for carrying passengers.

(5) The increase of 100 per cent in the carrying capacity of existing local transportation facilities would still leave a period of congestion in the morning and evening traffic.

PROVISION FOR FUTURE TRAFFIC

The interests of future transportation requirements, therefore, demand that any scheme projected for subways should conserve the use of every possible outlet from the South Side, north of Twelfth Street, and further contemplate that those streets on the north and west divisions in which subways originating on the south side do not pass should be conserved for terminals to be established in these localities in the future.

The first subway, therefore, to be constructed for the present and near future should not needlessly sacrifice any of the limited number of possible outlets. It would seem that a general arrangement of subways utilizing all outlets and all streets and avenues on the South Side, north of Twelfth Street, should be designed. The arrangement, however, should be one that will provide the greatest capacity for traffic that can be obtained and should at the same time be so designed that it may be constructed in parts or sections as the traffic needs would warrant. The section first to be constructed would, of course, be that which would meet the present traffic demands and give the greatest convenience at the least possible cost.

UNDERGROUND FACILITIES

The question as to whether or not the subway structure should include space for the accommodation of subsurface utilities is one of several other momentous questions that must be decided in the near future.

CONTRIBUTORY POPULATION

Increased transportation facilities have in a great measure assisted in the rapid increase in population outside the first and second mile zones. It will be possible after a thorough study has been made of the past drifts and settlements of population to estimate the future population of each mile zone and this study would be of value in determining the location of further transportation lines.

TRAFFIC DATA

The supplemental report includes a set of curves showing a comparison of the annual traffic, surface, elevated and subway, of the cities of Chicago and New York during periods of equal population and also showing the rides per capita and rides per annum for the different years. The essential data

to be obtained from these curves have been interpolated and put in Table II:

TABLE II—ESTIMATED POPULATION, RIDES PER ANNUM AND RIDES PER CAPITA OF CHICAGO AND NEW YORK.

Year.	Population.	Number of rides per annum.	Rides per capita.
1910:			
Chicago	2,500,000	607,671,000	243
New York	4,600,000	1,425,000,000	307
1915:			
Chicago	3,000,000	803,454,000	267
New York	5,200,000	1,750,000,000	337
1920:			
Chicago	3,425,000	1,024,991,000	299
New York	5,800,000	2,090,000,000	362
1925:			
Chicago	3,900,000	1,272,257,000	327
New York	6,400,000	2,475,000,000	387
1930:			
Chicago	4,400,000	1,530,353,000	348
New York	7,000,000	2,900,000,000	414
1935:			
Chicago	4,900,000	1,866,216,000	381
New York	7,600,000	3,360,000,000	443
1940:			
Chicago	5,450,000	2,210,208,000	406
New York	8,200,000	3,880,000,000	474

It will be noted that Chicago traffic is considerably greater for the same population than that of New York, which should be the case as local transportation 20 years ago when the population of New York City was approximately the same as that of Chicago to-day was far less efficient than at present.

ELEVATED LINES TRAFFIC

To simplify the study of the elevated lines traffic the city can preferably be divided into four divisions as follows: North division bounded by the lake, the north city limits, north branch of the Chicago River and the subway zone; northwest division, bounded by the north branch of the Chicago River, city limits, Madison Street and the subway zone; southwest division, bounded by the subway zone, Madison Street, city limits and the south branch of the Chicago River; the south division is all that section of the city south of the subway zone and the south branch of the Chicago River.

It cannot be claimed that the principal elevated line of each division handles only the traffic for its own division; the northwestern Elevated Railway alone serves the north division and a small part of the northwest division; the Oak Park Elevated and the Metropolitan Elevated serve the northwest division; the Metropolitan Elevated alone serves the southwest division, and the South Side Elevated alone serves the south division. On Feb. 18, 1909, observations during 24 hours were made of the elevated lines traffic in and out of the business zone or district bounded by Twelfth Street, Halsted Street and Chicago Avenue. The total traffic during the 24 hours of the elevated lines is shown in Table III. Table IV shows the maximum traffic on the same day for different intervals.

TABLE III—NUMBER OF PASSENGERS ON ELEVATED LINES IN AND OUT OF BUSINESS CENTER, FEB. 18, 1909.

	Inbound.	Outbound.
Metropolitan	61,986	57,415
Northwestern	54,247	50,606
South Side	51,478	47,207
Oak Park	20,421	19,662
Total	188,042	174,890

TABLE IV—MAXIMUM NUMBER OF PASSENGERS ON ELEVATED LINES, FEB. 18, 1909.

	Inbound—Maximum periods of		Outbound—Maximum periods of	
	¼ hour.	1 hour.	¼ hour.	1 hour.
Metropolitan	7,739	25,667	8,062	23,056
Northwestern	5,486	17,090	5,245	17,270
South Side	3,961	12,657	4,685	15,137
Oak Park	2,280	6,663	2,546	7,312
Total	19,466	62,077	20,538	62,784

TRAFFIC PEAKS

The inbound period of heavy traffic was from 6:30 a. m. until 9:45 a. m., and the maximum quarter-hour traffic was between 7:45 a. m. and 8:00 a. m. The inbound traffic from 9:45 a. m. until 8:00 p. m. was about constant, except between 6:00 p. m. and 7:30 p. m., during which time it fell, to increase again at 7:30 p. m. by reason of the inbound theater patrons.



Chicago Street Traffic—A Five-Minute Interruption to Surface Traffic at Dearborn and Randolph Streets

The outbound period of heavy traffic was from 4:00 p. m. until 7:00 p. m., and the maximum quarter-hour was between 5:45 p. m. and 6:00 p. m. The outbound traffic from 7:00 a. m. until 4:00 p. m. continued light in comparison with the inbound traffic for the same period but was fairly constant. The outbound traffic after 7:00 p. m. was steady and of fair average volume with a temporary increase after the theaters were closed.

The problem of the elevated traffic, as it relates to subways, is the handling of the maximum periods of heavy traffic.

TRAIN MOVEMENT

The observations also included train movement, and the number of passengers standing and seated, as shown in Tables V, VI and VII.

Table VII illustrates the inconvenience that the traveling public has to endure. Although it may not be practicable to provide all passengers with seats, yet the number of passengers who must either stand or wait an unreasonable time for a train that can furnish seats is excessive.

Economical operation will in future probably divert the traffic of the Metropolitan in the northwest division over the Oak Park line by means of a connection between the two lines in the vicinity of Lake Street and Ashland Boulevard.

TABLE V—NUMBER OF ELEVATED TRAINS IN 24 HOURS, FEB. 18, 1909.

Lines.	Inbound.	Outbound.
Northwestern	552	562
Oak Park	238	239
Metropolitan	823	822
South Side	574	578
Total	2,187	2,201

TABLE VI—NUMBER OF ELEVATED TRAINS DURING THE MAXIMUM HOUR, FEB. 18, 1909.

Lines.	Inbound.	Outbound.
Northwestern	48	41
Oak Park	30	29
Metropolitan	92	77
South Side	56	49
Entire City	215	194

TABLE VII—NUMBER OF PASSENGERS NOT SEATED, FEB. 18, 1909.

	Standing in 24 hours, both directions.	Maximum standing during one hour.
Metropolitan	15,225	6,258
Northwestern	19,706	7,551
South Side	9,480	3,960
Oak Park	3,960	1,895
Total	48,371	19,664

THE SURFACE LINES TRAFFIC

To simplify the study of the surface lines traffic the city should be divided into four grand divisions, similar to those for the elevated traffic study.

On March 18, 1909, observations of the surface lines traffic were taken for 24 hours at the boundaries of the subway zone, namely, Twelfth Street, Halsted Street and Chicago Avenue. The surface lines traffic is shown in Tables VIII and IX.

TABLE VIII—NUMBER OF PASSENGERS ON SURFACE LINES WITHIN SUBWAY ZONE, MARCH 18, 1909.

	Inbound.	Outbound.
North division	54,401	58,014
Northwest division	60,177	71,087
Southwest division	37,236	48,235
South division	92,387	103,458
Total all divisions	244,201	280,794

TABLE IX—MAXIMUM NUMBER OF PASSENGERS ON SURFACE LINES, MARCH 18, 1909.

	Inbound—Maximum periods of ¼ hour.	Inbound—Maximum periods of 1 hour.	Outbound—Maximum periods of ¼ hour.	Outbound—Maximum periods of 1 hour.
North division	2,989	10,390	4,026	15,215
Northwest division	4,150	12,893	5,468	18,834
Southwest division	2,533	8,831	3,958	14,018
South division	5,359	17,410	6,689	23,644
Entire city	14,870	50,074	19,443	69,919

The inbound period of heavy traffic was from 7:00 a. m. until 9:00 a. m., and the maximum quarter-hour traffic between 7:45 a. m. and 8:00 a. m. The inbound traffic from 9:00 a. m. until 9:00 p. m. was almost constant, except between 5:30 p. m. and 7:00 p. m., during which time it fell, to increase again at 7:45 p. m. by reason of inbound theater patrons. The outbound period of heavy traffic was from 5:00 p. m. until 6:30 p. m., and the maximum quarter-hour from 5:45 p. m. until 6:00 p. m. The outbound traffic from 8:00 a. m. until 5:00 p. m. continued light in comparison with the inbound traffic for the same period, but was fairly constant. The outbound traffic after 6:30 p. m. was steady and of fair average volume, with the natural temporary increases after the theaters closed.

The problem of the surface lines traffic, like the elevated lines traffic, as it relates to subways, is the handling of the maximum periods of heavy traffic.

SURFACE CAR MOVEMENT

The observations also included car movement during 24 hours, during the maximum hour inbound and outbound, and also the number of passengers standing and seated, as given in Tables X, XI and XII.

Table XII shows the inconvenience to which the surface lines passengers have to submit, and, although it may not be practicable to provide all passengers with seats, yet the number of passengers who must either stand or wait an unreasonable time for seats is excessive.

CHECK ON OBSERVATIONS

Feb. 18 and March 18, when the elevated and surface lines traffic observations were taken, were normal days and the accuracy of the observations was as near perfect as could be de-

TABLE X—NUMBER OF SURFACE CARS IN 24 HOURS, MARCH 18, 1909.

	Inbound.	Outbound.
North division	2,987	3,026
Northwest division	2,848	2,855
Southwest division	2,506	2,577
South division	3,674	3,694
Total	12,015	12,152

TABLE XI—NUMBER OF SURFACE CARS DURING THE MAXIMUM HOUR, MARCH 18, 1909.

	Inbound.	Outbound.
North division	184	197
Northwest division	203	216
Southwest division	188	204
South division	334	342
Total	909	959

TABLE XII—NUMBER OF PASSENGERS NOT SEATED, MARCH 18, 1909.

	Number standing in 24 hours, both directions.	Maximum number standing during one hour.
North division	20,192	8,256
Northwest division	27,070	10,483
Southwest division	13,859	7,060
South division	27,369	9,727
Total	88,490	35,526

sired. The total actual elevated lines traffic outbound on Feb. 18 of the four different lines from the loop stations and other stations within the business district was obtained from the elevated companies and checked surprisingly close with the figures of the observations. It is not possible to obtain traffic figures from the surface lines of such value as the outbound traffic on the elevated lines for the purposes of checking the observations. The figures obtained, however, indicate accuracy. The observations should at least equal in accuracy that of the elevated lines, as the task was less difficult.

It may perhaps be observed that the total outbound traffic of the elevated lines does not balance that of the inbound traffic during 24 hours. A similar difference will be found in the traffic of the surface lines. Weather conditions and the habit of many to ride one way and walk the other will naturally tend to disturb the balance of traffic in opposite directions.

OPERATION DATA

A further study of the movement of the elevated and surface lines traffic shows that the method of operation is to dispatch into the business district or subway zone as many trains and cars as possible during the rush periods, regardless of their movement when within the district or zone.

The average headways of the surface cars passing the subway zone boundaries on several of the lines during maximum traffic periods on March 18 are shown in Table XIII

TABLE XIII—AVERAGE HEADWAYS OF SURFACE CARS WHEN CROSSING SUBWAY ZONE BOUNDARIES.

	Inbound—Maximum periods of ¼ hour.	Inbound—Maximum periods of 1 hour.	Outbound—Maximum periods of ¼ hour.	Outbound—Maximum periods of 1 hour.
Madison	50 sec.	54 sec.	43 sec.	48 sec.
North Clark	69 "	62 "	28 "	37 "
Wabash	28 "	29 "	30 "	26 "
State	26 "	28 "	31 "	30 "
Clark	35 "	39 "	33 "	38 "

The average headways of trains of the four elevated lines passing the subway zone boundaries during maximum traffic periods of Feb. 18 are shown in Table XIV.

TABLE XIV—AVERAGE HEADWAYS OF ELEVATED TRAINS WHEN CROSSING SUBWAY ZONE BOUNDARIES.

	Inbound—Maximum periods of ¼ hour.	Inbound—Maximum periods of 1 hour.	Outbound—Maximum periods of ¼ hour.	Outbound—Maximum periods of 1 hour.
Metropolitan	82 sec.	78 sec.	78 sec.	93 sec.
Oak Park	99 "	120 "	100 "	124 "
Northwestern	69 "	75 "	90 "	88 "
South Side	60 "	64 "	69 "	73 "

The surface congestion within the subway zone and the incapacity of the elevated loop so retard the movement of the surface cars and elevated trains that no matter how large may be the number of cars and trains the traffic cannot be handled

expeditiously. In fact, if fewer cars were placed in service by the surface lines, or at least if the headway of the cars on the main surface lines was increased, particularly the headway of cars entering the subway zone or business district to handle the outbound maximum traffic, better results would be obtained.

TRAFFIC TO BE HANDLED BY SUBWAYS

Subways in Chicago will be required to handle expeditiously the elevated and surface lines traffic that flows into and out of the business or subway zone. There may be other traffic to be handled, but it will be of such small magnitude in comparison with the main traffic that it may be neglected.

With information in regard to the traffic of each elevated line in the past, it is not difficult to establish a relation between the traffic entering the subway zone of each line and its total traffic. This relation, when applied to the total traffic of all elevated lines and the percentages of the total traffic that each line handles, will give an estimate of the annual future traffic of each line in and out of the subway zone.

As the traffic moving into the subway zone or district is not the same as that moving out of the district, the maximum daily traffic (into or out of) in one direction may be obtained. With the relation of the maximum hourly traffic to the total traffic in the same direction, the future maximum hourly traffic should be as shown in Table XV.

TABLE XV—PROBABLE FUTURE HOURLY ELEVATED RAILWAY TRAFFIC.

	Metropolitan.	Oak Park.	South Side.	Northwestern.
1910	35,787	11,128	23,240	23,757
1920	71,473	24,241	46,422	47,545
1930	119,767	40,720	77,775	78,469
1940	182,842	62,012	118,736	121,374

The maximum hourly traffic or the maximum actual traffic for one hour is less than the traffic for one hour at the rate of the maximum traffic of a 15-minute period. As the capacity of subways should be such as would sustain the maximum traffic of a 15-minute period for one hour or more, the maximum hourly traffic of both the elevated and surface lines determined for the future is based on the maximum traffic for a 15-minute period.

SURFACE LINES TRAFFIC

Similarly to the elevated lines traffic the relation beween an average daily traffic in 1908 and the total traffic for each division may be obtained, and applying this relation to the future annual traffic, spread over the divisions in the same proportions as in 1908, there is found an average daily haul for future years. The relation between the outbound traffic of March 18 and the total traffic of the same day will, when applied to the average daily haul of the future, give an average daily outbound subway haul. The relation between the outbound traffic and the maximum hour of March 18, applied to these figures, will give a maximum hour for the future. (See Table XVI.)

TABLE XVI—PROBABLE FUTURE HOURLY SURFACE RAILWAY TRAFFIC.

	North.	Northwest.	Southwest.	South.
1910	14,574	31,313	15,245	25,966
1920	22,679	33,167	25,724	40,407
1930	32,305	47,245	33,793	57,559
1940	43,982	64,321	46,008	78,362

We have found the volume of traffic—elevated and surface—that flows over the subway zone boundaries and the sums of these traffic show the capacity of the subways that will be required in the future to handle all the surface and elevated traffic that will pass into and out of the business or subway zone, except that part of the elevated traffic that will pass through the stub terminals.

TRANSPORTATION PROBLEM

The problems to be considered to provide efficient transportation facilities for the present and for a reasonable future period are, transportation, operation and location.

The traffic of the rush periods is the serious problem of all surface, elevated and subway lines and it is to this traffic particularly that attention must be given. A system of subways with proper equipment and operated efficiently that can handle the traffic during the rush periods, can without question handle the traffic during the balance of the 24 hours.

The proportion of traffic handled during the rush periods in Chicago varies. In most cities it has been found that the traffic of the heaviest hour is generally one-sixth of the total traffic of one day in that direction, or 16 per cent. The congestion in this city is much greater. It is found for the elevated roads, that the percentage of the heaviest hourly traffic inbound to the total outbound traffic for 24 hours is 33 per cent and for the outbound traffic 36 per cent. For the surface lines traffic it is found that the percentage of the heaviest hourly traffic inbound to the total inbound traffic for 24 hours is 20 per cent and for the outbound traffic is 25 per cent. The high percentage of the heavy traffic hours of Chicago for both the elevated and surface lines, in comparison with that of other cities, emphasizes the greater magnitude of the transportation problem.

The only solution of the transportation problem is to provide means for handling this immense traffic. The congestion would be less if the business hours could be arranged so that some classes of business would open and close earlier and other classes would open and close later than at present. This acute congestion would in this way be considerably relieved and the problem simplified. Such an arrangement can hardly be expected, however, and as already stated, means for handling the traffic during the rush periods must be provided.

OPERATION

It is believed that subways should first be constructed entirely within the subway zone with a total capacity sufficient to handle all the elevated and surface lines traffic that will flow over the subway zone borders for several years in the future, and that when the volume of traffic has reached the capacity of these subways, then additional subways should be constructed within the subway zone, but extending beyond its present assumed borders to points to be then determined; and when these additional subways operated in connection with the first ones have reached their capacity, then to construct more subways within the present assumed subway zone, and to points beyond those previously constructed.

It is believed that subway terminals should be located at or near the subway zone boundaries; that there should be one for each of the traffic divisions, and that besides being at first perhaps only outlets for the elevated and surface lines they should finally or as traffic would warrant, be terminals for the storage of the extra equipment that handles the traffic of the morning inbound rush period until it is required to handle the outbound traffic of the evening rush period. The saving of empty car mileage would warrant the construction of these terminals the cost of which, in comparison to the cost of the subways, should not deter their construction.

COMMITTEE ON HEAVY ELECTRIC TRACTION OF THE ENGINEERING ASSOCIATION

The committee on heavy electric traction of the American Street & Interurban Railway Engineering Association, of which J. S. Doyle, superintendent of equipment of the Interborough Rapid Transit Company is chairman, is now complete with the following membership: Chairman, W. S. Murray, electrical engineer, New York, New Haven & Hartford Railroad Company, New Haven, Conn.; Edwin B. Katté, chief engineer of electric traction, New York Central & Hudson River Railroad Company, New York; E. R. Hill, assistant to chief engineer, Pennsylvania Tunnel & Terminal Railway Company, New York; J. H. Davis, electrical engineer, Baltimore & Ohio Railroad Company, Baltimore, Md.

At a meeting of the committee, held Friday, April 29, it was agreed that this committee would deal with the question of standardizing clearances for overhead and surface conductors in addition to the work which had already been allotted to this committee by the executive committee of the association, viz.: Specifications for heat-treated steel axles, and general maintenance of heavy electrical equipment.

RATE OF RETURN ON ELECTRIC RAILWAYS*

BY C. N. DUFFY, COMPTROLLER, MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

The rate of return on electric railways of the United States, compiled from census bulletin data by William J. Clark, and presented in his paper at the recent mid-year meeting of the American Street & Interurban Railway Association in New York, was as follows:

	1907.	1902.	Per cent. Dec.	Per cent. Dec.
Average percentage of net income to capital stock.	1.60	2.00	.40	20
Average return upon bonded indebtedness.....	4.26	3.39	.13	3

The causes which have brought about these decreases in the rates of return on investment are increased investment and operating costs, due to the enormous increase in cost of labor and materials: for instance, ties, 72 per cent; bridge timber, 80 per cent; fuel, 38 per cent; steel rails, 47 per cent; increased expenditures for damages and legal expenses; use of larger and heavier cars, resulting in increased maintenance costs and power consumption from 1.98 kw-hours per car-mile in 1902 to 2.94 kw-hours in 1907, an increase of 0.96 kw-hour, 48 per cent; increased number of passengers carried on free transfers, 22.25 per cent of fare passengers in 1902, as compared with 26.80 per cent in 1907, increase 4.55 per cent, equivalent to 20 per cent (the percentage of fare passengers carried on transfers on the Milwaukee city system, in the year 1909, was 34.80, which is 8 per cent more than the average of all the electric railways of the United States in the year 1907, equivalent to 30 per cent more transfer passengers carried); increased cost of labor, over 60 per cent of the total operating expenses, the average annual wages per wage earner increasing from $600.62 in 1902 to $658.33 in 1907, an increase of $57.71, approximately 10 per cent.

The possibility of reducing operating costs of electric railways may as well be dismissed from consideration, in view of the fact that the limit of economy in the management of the properties, consistent with safe and efficient operation, has been practically reached and that the costs of labor and material continue to advance.

The conditions of the business as disclosed by the figures in the census bulletin previously referred to cannot continue, and it may be necessary to do some or all of the following:

a. Abolish free transfers.

b. Inaugurate zone system of fares.

c. Increase the rate of fare.

d. Reduce or abolish taxes. Taxes of the Milwaukee Electric Railway & Light Company in 13 years increased 446 per cent; operating revenues increased 208 per cent.

e. Municipal ownership and operation, deficits to be made good by the taxpayers.

The Milwaukee Electric Railway & Light Company on May 1, 1910, voluntarily increases the rate of pay of its conductors and motormen 2 cents per hour for the first, second, third and fourth-year men, and 1 cent per hour for the fifth-year men; the rates being from 22 to 26 cents per hour. This follows an increase of 1 cent per hour made voluntarily on Sept. 1, 1909, and increases the rate of pay within 10 years over 40 per cent, while the average rate of fare per passenger in the same period has decreased over 20 per cent.

A detailed table showing disposition of revenue per passenger is published on this page.

This table shows that from the average revenue per passenger (including transfers), of the Milwaukee city railway system for the year 1909, of 3.17 cents, there remained only 0.07 cent, 2.32 per cent, after taking care of operating expenses, taxes, interest on bonds, dividends on stock and depreciation to the extent only of approximately 50 per cent of the average depreciation sustained by the railway property for the 10 years ending Dec. 31, 1906.

If the full measure of depreciation had been taken care of on the books, it would require 0.24 cent more than the 3.17 cents received, or 3.34 cents; therefore, the average cost in Milwaukee, for the year 1909, of carrying each of the 109,248,041 passengers carried during that period, was 3.34 cents.

The rate of return of the Milwaukee Electric Railway & Light Company on its railway investment, as shown by the testimony in the recent 3-cent fare hearing before the Railroad Commission of Wisconsin, varied from 4.37 per cent to 5.92 per cent, dependent upon the basis taken as to what constituted the cash investment in the railway property.

	Amount Cents.	Per-cent. of Total.
Way and structures	.12	3.67
Equipment	.17	5.21
Power	.27	8.54
Wages of conductors and motormen	.57	17.93
Miscellaneous transportation expenses	.18	5.72
Injuries and damages	.12	3.92
General expenses	.16	5.10
Depreciation (as per books)	.31	9.86
Taxes	.22	6.89
Interest on bonds	.39	12.36
Preferred stock dividends, 6 per cent	.20	6.16
Common stock dividends, 6 per cent	.39	12.32
Surplus	.07	2.32
Total	3.17	100.00
Surplus (as per books)	.07	
Depreciation (not taken on books)	.31	
*Deficit	.24	

*Exclusive of interest on working capital, providing for extraordinary contingencies or amortization of investment.

The average dividends paid on the common stock of the company, invested in its combined railway and lighting business, averaged, for a period of 13 years, 1897 to 1910, 3.23 per cent.

This means that with all the risks of the business assumed and carried, the rate of return has been practically only what is allowed by banks as interest on savings deposits, or to put it in another way, a little more than half farm mortgage interest without the usual security of two for one in farm lands.

The longest ride possible in Milwaukee in 1890, for 5 cents, was approximately four miles, 1¼ cents per mile; the ride, under horse-car conditions, consumed about 40 minutes.

The longest ride possible in Milwaukee in 1910 for 4 cents is over 12 miles, ⅓ of 1 cent per mile; the ride, under electric-car conditions is made in about 80 minutes.

The length of ride in Milwaukee in 20 years for one fare has increased 200 per cent, the time consumed in the increased ride is only one-half of this, 100 per cent, and the rate of fare per mile has decreased nearly 75 per cent, or in other words, a passenger pays per mile in 1910, for an electric-car ride, about one-fourth of what was paid for a horse-car ride in 1890.

The average rides per capita per annum on the Milwaukee city railway system in 1909 were, taking the population as 350,000, 231.

The saving of 1 cent on each ride in 1909, on the basis of a 4-cent fare, as compared with 5 cents in 1890, would be equivalent, for the entire population, to $808,500, or nearly 4 per cent on the company's capitalization invested in the city railway system.

Assuming that 70,000 of the 350,000 population of Milwaukee are heads of families, on the basis of a ratio of 5 to 1, and that each one of these heads of families saved in time in the year 1909 on the average the equivalent of one hour per week, the value of their time saved, figured at 20 cents per hour, would be equivalent to $728,000 per annum, or over 3 per cent on the company's capitalization invested in the city railway system.

From this it will be seen that in the year 1909 the population of Milwaukee, by reason of the decreased fare and electric car operation in 1909, as compared with the old rate of fare and horse car operation in 1890, saved $1,536,500, equivalent to approximately 7 per cent on the company's capitalization invested in the city railway system, more than twice the average annual dividend rate on the common stock of the company since its organization in the year 1897.

Some idea of the congestion in the downtown district may be had when it is stated that for a considerable portion of the time during the morning and evening rush hours, there is practically a car every 10 seconds crossing Third Street and Grand Avenue, with city cars turning into and out of Grand Avenue on one side of the street and interurban cars on the other side of the street.

* Abstract of address delivered before Community Club, Milwaukee, Wis., on April 22, 1910.

The company is in accord with Mayor Seidel in his position with reference to the necessity of wide streets, a most important question in any city, particularly in Milwaukee in the downtown district.

The company carried in the year 1909 approximately 300,000 passengers a day during the 24 hours, and approximately 120,000 were transported within a period of three hours, which means 40,000 per hour, or an average of 75 passengers per car, assuming that the company had on the streets, during the rush-hour period, its entire equipment, 531 cars, and was able to move them through the streets.

The number of passengers carried per car-mile, on the average, for 24 hours operation, is less than 20 per cent of the seating capacity of the cars, or, in other words, over 80 per cent of the seating capacity of cars per car-mile, on the average, is not used.

We frequently hear much regarding the low rates of fare and successful operation of the Glasgow Corporation Tramways of Glasgow, Scotland, a municipally owned and operated electric railway, but the difference in conditions and the analysis thereof are seldom, if ever, referred to.

The average rate of fare per mile in Glasgow is approximately 0.9 cent; the average rate of fare per mile in Milwaukee per length of ride offered is approximately 0.4 cent, less than one-half that of Glasgow.

The rate of wages paid the Glasgow conductors and motormen is about one-half that paid the Milwaukee conductors and motormen.

Glasgow, with three times the population of Milwaukee, has only about 50 per cent more trackage than Milwaukee and operates only about twice as many cars as Milwaukee, but the Glasgow cars carry about three times as many revenue passengers as the Milwaukee cars.

The Glasgow cars carry approximately 45 per cent more passengers per car than the Milwaukee cars, although the carrying capacity of the Glasgow cars is only about 50 per cent of the Milwaukee cars.

ELECTRIC BRAKING IN GLASGOW

On April 7 A. Gerrard read a paper before the British Institution of Electrical Engineers on some electric braking experiments made by the Glasgow Corporation Tramways. The first experiments were made ten years ago with British Thomson-Houston disc brakes and Westinghouse rheostatic brakes. They were soon abandoned, largely on account of the rapid depreciation of the motors. In 1901, the Newell magnetic track brake was installed. In this system, the motors generated current for the brake gripping magnets. There were also special wheel shoes and an arrangement of connecting rods and levers to permit the longitudinal movement of the track magnet simultaneously to apply these shoes to the wheels. While this installation was satisfactory from the braking standpoint, it was very hard on the motors as their potential sometimes rose as high as 1200. A shunt in parallel with the field was tried to remedy this but then the motors either would not excite at all or they would not build up quickly enough for an emergency stop. The next change was to use a solenoid for putting in the shunt automatically just as required. At first this solenoid was operated by a coil shunted across one of the armatures. This was operative but it was found that the time lag between the excitation of the machines and the closing of the shunt circuit was too great and the rise in voltage was apt to occur before the solenoid could operate. Finally a series coil was placed in the main braking circuit whereupon it was found that when the solenoid worked with 30 amp and brought in a shunt resistance of 0.2 ohm the potential did not exceed 600 volts without impairing the effect of the brake.

The present design is a double-barreled solenoid controlled together with track brake magnets of the Westinghouse 26 C and 25 B types. The vertical pull of these two magnets with different currents is given herewith.

Type of Magnet.	Exciting Current in Amperes.			
	5	10	25	50
26 C	2400 lb.	3250 lb.	3900 lb.	4100 lb.
25 B	1900 lb.	3550 lb.	4000 lb.	5150 lb.

At 30 amp solenoid No. 1 cuts in and shunts 0.2 ohm across the magnets. At 80 amp No. 2 comes to its assistance with another 0.2 ohm. With this control, the pressure never rises above 600 volts at high speed and even if the motorman passes over to the second braking point of his controller at 18 m.p.h. a shunt resistance of 0.1 ohm is in parallel with the field. Mr. Gerrard stated that the latest Westinghouse magnet has a greater effect with a current of 5 amp than the old magnet had with 50 amp, the consequence being a great reduction in the motor heating.

Several trial cars were equipped with this brake and one with the Maley brake. The latter, however, had Westinghouse 25 B track magnets and the brake rigging was very similar, the only radical difference being that the motion obtained from the movement of the magnets was utilized in pressing auxiliary track shoes on the rail instead of applying auxiliary wheel shoes. The application of the extra shoes to the rails instead of to the wheels minimizes any tendency to lock the wheels and cause skidding. The Maley brake is in regular service in Leeds and Birmingham. The following table shows the figures obtained for emergency stops with car No. 782, carrying the Maley brake and car No. 687 carrying the other brakes:

Car 782				Car 687			
M.p.h.	Stop Distance.	Max. Volts.	Max. Amp.	M.p.h.	Stop Distance.	Max. Volts.	Max. Amp.
17	34½ ft.	875	190	17	36 ft.	475	140
18	52½ ft.	1125	165	18	52½ ft.	535	150

Mr. Gerrard said that car No. 782 was subject to heavy surging, that is, in coasting down a steep grade, the car was almost brought to a standstill every 30 to 45 ft. The current then died away and the suspension springs lifted the magnets clear of the track. Then the car would plunge forward again and the movement would be repeated. Mr. Maley, who was present at the discussion, said that such symptoms had not been noted elsewhere than at Glasgow and he was inclined to believe that the trouble was due to defective underframing and faulty handling by the motorman.

In judging the two cars mentioned, Mr. Gerrard admitted that the emergency stop of car No. 782 with the Maley brake at 17 m.p.h. was somewhat better than that of car No. 687. He called attention, however, to the fact that in the 18-m.p.h. test car No. 782 always skidded once and sometimes twice during every stop whereas car No. 687 showed no signs of skidding. At 19 m.p.h. it became impossible to record car No. 782's readings, for the first skid always took place before the instrument had time to indicate the true voltage.

On comparing the emergency stops at 18 m.p.h., it was found that car No. 687 made the better stops, the last reading, 44 ft., indicating a retardation of 8.18 ft. per second when corrected for level track. As regards car No. 782, with the Maley brake, the only test where the true voltage was reported was the first or 52½-ft. stop. This might be compared against the readings on car No. 687 for a similar stop.

Mr. Gerrard's summary of the Maley brake was as follows: "This brake, with auxiliary rail shoes and parallel shoe magnets, is a powerful one and requires comparatively little current from the motors, but the voltage rise is excessive and the skidding serious when braking at high speeds, while the surging during coasting is prohibitive. The retardation obtainable is very high but very uneven, probably due to the tendency of the track shoes to grip the rails. The excessive voltage rise might be reduced by means of the solenoid control but it seems doubtful whether skidding and uneven retardation would be prevented."

Mr. Gerrard concluded from the Glasgow trials that although rheostatic braking and even track magnet braking used to be uncommonly hard on the motors, the latter are no longer subject to any extraordinary strains because the improved devices take much less current, do not involve a heavy rise in potential and are used with such efficient track magnets.

COMMUNICATION

THE NECESSITY FOR REVISING BLANK FORMS

New York, May 7, 1910.

To the Editors:

Your issue of April 30 contains an editorial on "Necessity for Revising Blank Forms." The editorial makes valuable suggestions on an important subject. The stationary bills of many railway companies can be cut in half by attention to those details which you mention, and by preventing waste of the printed forms. As supplementing your article the writer outlines herein some methods followed in organizing the operations of various companies.

On the margin of each report form and in fine type I customarily place "Directions for Use." Each time the form is used the employee has before him these directions and will follow them more carefully than if furnished separately. Of course, old employees become familiar with the use of the forms and do not need them so much as new employees, but in any case it removes any ground for misunderstanding on the part of anyone. These directions are revised as each new lot is printed, if found necessary, to insure correctness in rendering of reports. These directions also state how many copies of the report shall be made and to whom each copy should be mailed, and when.

In an old established organization it may be sufficient to revise the forms once a year, but in the case of a new organization it is my practice to keep a complete set of the blank forms on my desk. As the rendered reports are received at my desk I study them carefully, see if they include all the information wanted or any unnecessary information, or if the use of the form is frequently misunderstood, or if any improvement can be made. Any improvement desirable in any form is marked on the blank within my desk, and when an order finally arrives for an additional supply of any form I then have information ready at hand to see if any changes are to be made therein. It is difficult to recall the desired changes unless record is kept in this manner.

Reports may be economically printed and yet the supply may be wasted. Many employees are prone to use report forms as scratch pads. Or an additional supply may be requested, because the previous supply has been mislaid, accumulated in unused drawers, or lost. Such waste can be prevented. On the margin of each form I have printed in fine type the quantity ordered and date. Knowing the number required each month, it is easy to calculate how long the supply should last. When the storekeeper calls for the next supply an easy mental computation determines if the last supply has lasted as long as it should have done. When the forms are being wasted the storekeeper can easily keep an informal record of the supplies issued and locate the wasteful employee, or each employee can be given a quantity to last a certain length of time, say one month. An organization can quickly be taught that no waste of printed forms will be tolerated. I think such knowledge aids them unconsciously to avoid other waste.

In choosing paper for report forms I prefer thin paper because it keeps down the size of the files and permits manifold carbon copies. In a complicated organization great benefit can sometimes be had by having the original report made in manifold and delivered directly to the appropriate departments. Such method keeps each department advised of each other's work and enables all to work more nearly in unison.

The size of the report form sheet is often made unnecessarily large and of irregular sizes, inconvenient to file. My preference is to use a sheet no larger than the standard 8½-in. x 11-in. sheet. It can be bound and filed with the greatest convenience. The 8½-in. x 11-in. sheet cuts from the standard 17-in. x 22-in. sheet without waste.

The only interurban railway forms I have not been able to reduce to the standard 8½-in. x 11-in. sheet are the time-table and some forms that originate in the accounting department. In one interurban system we started out with 90 printed forms and reduced the number to 53, only counting once similar forms used by different companies within the system. These 53 forms are classified as to size as follows: 34 envelopes and sheets under 8½-in. x 11-in.; six sheets 8½-in. x 11-in.; seven sheets legal size, 8½-in. x 13-in.; and six sheets larger than 8½-in. x 13-in. Most of these larger sheets could have been reduced to 8½ in. x 11 in. without sacrifice. It is true that with the smaller sheet one sometimes requires to use two sheets but on the whole it is a saving to use it.

To decide the number and nature of report forms that should be printed in blank I know of no fixed rule. Most of the forms are used to collect and keep on file data in the accounting, legal or express departments. The necessity of any form can best be determined by ascertaining what real and necessary use is made of the information after reaching the office. A large number of report forms is not a proof that the system is being well managed unless the information collected is studied thoroughly, digested, and operation regulated accordingly.

THEODORE STEBBINS.

HEARING ON FARES IN RAYNHAM, MASS.

The Massachusetts Railroad Commission gave a hearing on April 28, 1910, upon the petition of citizens of Raynham for a reduction in fare on the Old Colony Street Railway in Raynham. Bentley W. Warren, for the company, stated that the Taunton fare 5-cent limits were extended some years ago from the Taunton-Raynham boundary to the business center of Raynham to permit citizens of Raynham to enjoy a 5-cent fare to Taunton instead of a 10-cent fare, and the Taunton transfer privileges. This change accommodated most of the inhabitants of Raynham, whose interests are largely connected with Taunton. It involved, on the through line from Taunton to Brockton, a change in the 5-cent zones, so that the second zone, which had previously been in Raynham, began at the business center of Raynham and extended only to the Raynham-Bridgewater boundary. The through-fare collections then became 5 cents from the Taunton limits to the center of Raynham, 5 cents from the center of Raynham to the Raynham-Bridgewater boundary, and 5 cents after crossing the Bridgewater boundary for the third zone. To facilitate travel in Raynham passengers who boarded cars between the Taunton-Raynham boundary and Raynham Center and desired to ride to points between Raynham Center and the Raynham-Bridgewater boundary were given identification checks, so that although their ride was partly in each of the two fare zones, they paid only a single fare. This privilege was not accorded to through passengers. The company regards a passenger as a through rider if he boards a car within the Taunton 5-cent district, and desires to go beyond the Raynham-Bridgewater boundary. Such a passenger, although taking a car between the Taunton-Raynham boundary and Raynham Center, is required to pay 15 cents to go to Bridgewater, as is the case with Taunton passengers. Few people who live between the Taunton-Raynham boundary and Raynham Center desire to go to Bridgewater, and the issue in the case was whether they should be granted the benefit of the local Raynham fare to the Bridgewater boundary, so that their fare to Bridgewater would be 10 cents instead of 15 cents.

The change made several years ago was at the request and for the accommodation of the people of Raynham, and, necessitating as it did a change in fare limits, was for the general public benefit. The number of persons who might occasionally be discommoded through the change in fare limits was too small to warrant a return to the old arrangement, which made the majority of people pay 10 cents to go to Taunton. The Selectmen of Raynham stated that they did not wish the fare to Bridgewater reduced if it would deprive them of any of the benefits of the present fare arrangement to Taunton.

The decision of the commission follows:

"The allegation of the petition is a discrimination in rates. At the public hearing, however, it appeared that the complaint

related to the reasonableness of rates rather than discriminatory rates. In determining this issue, the board has made a careful study of the whole territory included within the limits of Taunton, Raynham and Bridgewater. In this territory the citizens of Raynham are, upon the whole, sustaining no unreasonable charges for transportation. A readjustment of fares in this area might possibly result in a decrease in the through rate to Bridgewater, but it by no means follows that such a readjustment could be made and preserve the present 5-cent fare to Taunton. The petition is dismissed without prejudice."

STREET CAR TALKS IN CLEVELAND

Reference has been made previously in the Electric Railway Journal to the plan of G. M. Dahl, street railroad commissioner of Cleveland, to issue talks to the public to aid the public in understanding street railway problems better. The first of these talks was dated April 22, 1910, and is reproduced herewith. In this issue on page 882 will be found a reference to objections which have been made to some of the changes which Mr. Dahl has sought to institute.

Street Car Talks

By Gerhard M. Dahl, Street Railroad Commissioner

No. 1. Cleveland, Ohio, April 22, 1910.

Introducing "Street Car Talks"

The office of the street railroad commissioner wants to keep in touch with the car rider. The car rider wants to keep in touch with the office of the street railroad commissioner. "Street Car Talks" is intended as an aid to this mutual understanding.

The Rear Platform

The successful operation of the pay-enter car demands that the rear platform be kept clear. Ultimately all cars will be pay-enters. For the present one rule must apply equally to pay-enters and the old type cars. The platform is at once the entrance of the car and the office of the pay-enter conductor. It is here that the car riding public transacts its business with the street car company.

Will Cleveland car riders co-operate with the office of the street railroad commissioner in keeping clear the rear platform?

Two regulations will be placed in effect May 1, both tending to a clear rear platform.

Here are the regulations:

1. Except in the case of a car loaded to its full capacity, as for instance during the rush hours, no passenger will be allowed to stand on the rear platform.

2. Smoking on the cars will be prohibited.

"Move Forward"

A crowded platform is not necessarily an indication of a crowded car. **Frequently seats and standing room are to be found within; but the crowd on the platform has blocked the entrance.** The passenger boarding the car, after the platform crowd has gathered, must either swell the crowd or fight his way through it to the entrance door. The passenger leaving the car must shove his way to the steps, as best he can.

The collection of fares by the conductor meanwhile is demoralized.

Do the car riders of Cleveland consider the regulation against standing on the rear platform worth a trial?

No Smoking

The regulation against smoking is a necessary consequence of the regulation against standing on the rear platform. Much of the present platform crowding is due to the cigar, the pipe and the cigaret.

Cleveland cars probably should have been constructed with a view of permitting smoking on the front platform. In Chicago, where the pay-enter car is in use, the front platform is set aside as a smoker. But the front platform of the Chicago car is especially equipped with ventilating facilities. This unfortunately is not the case in Cleveland.

After all isn't quick, comfortable transportation the street car idea? Can't the cigar be enjoyed just as thoroughly before or after the ride on the street car?

Newsboys

Newsboys were excluded from the cars April 15.

Newsboys passing through the car help to block both the rear platform and the aisle within. Other cities have ruled them off the street cars—New York, Chicago, Philadelphia.

The new rule is justified on the basis of the protection afforded by it to the boys themselves. A hundred times a day every newsboy in the city, prior to this regulation, was subjected, while climbing on and off moving cars, to a hundred dangers.

Will not the improvement in service outweigh the inconvenience of buying a newspaper before boarding a car?

Improved Service

It is impossible at the present time to give the car riders that maximum comfort, convenience and service desirable. It will take time, effort and money to bring the tracks and cars up to a proper point of efficiency.

Details of the service, however, can and will be bettered. The new regulations are a step in this direction. Upon the co-operation given the conductors in the enforcement of these regulations by the car riders themselves will depend the success of the regulations and any improvement of the service resulting from them.

Will you help?

RESULTS WITH GAS FIRING AT COVINGTON

Practically all the power used for industrial purposes in the group of cities across the Ohio River from Cincinnati, including Newport and Covington, is furnished by natural gas piped from West Virginia. The Cincinnati, Newport & Covington Light & Traction Company is a large user of this fuel. The company supplies the railway service for the residence and industrial district across the river from Cincinnati, and operates 100 cars. A comparison of the operating figures as now obtained, when firing with natural gas, and as formerly obtained with high-grade Kentucky nut and slack coal from the Straight Creek and Black Raven mines was used, considerably favors the use of gas as fuel.

The boiler plant of the Railway & Light Company includes 14 Sterling water-tube boilers, which deliver steam at 150 lb. pressure to the electrical generating units. The boilers are all equipped with underfeed stokers, and 10 of them are arranged for forced draft. A supply of coal is kept on hand to provide for continuity of service in case of interruption to the gas supply, which is piped a distance of 140 miles. Two of the boilers, with a total capacity of 1000 hp, are fitted with superheaters to add 150 deg. of superheat to the steam. The output of these boilers is mixed with that of the other boiler plant. The electrical output of the station is used for commercial light and power, as well as for operating the railway system. The plant is operated continuously at an average load, which is about 45 per cent of the normal daily peak load.

Before the installation of natural gas firing, the plant was operated with about 3.95 lb. to 4 lb. of coal per kw-hour. The coal used had an average heat value of 14,000 b.t.u. per pound. It should be noted that the auxiliaries are all electrically driven, except the boiler feed pumps, and that they require from 9 to 10 per cent of the total output of the station; also that during the winter about 5 per cent of the steam generated is distributed for heating and operating the nearby railway shops. The gas consumption, under conditions compared with those for coal operation, is about 28.6 cu. ft. per kw-hour. The heat value of the gas has a total average of 1140 b.t.u. per cubic foot, and the available heat units are approximately 1080 per cubic foot. The cost of the gas delivered at the station is about 11 cents per 1000 ft. When firing with gas the boiler equipment can be operated with three or four less men than when coal is used.

The gas supply mains terminate in a valve house which has been erected about 100 ft. distant from the boiler house. The valve house is a substantial brick structure, heated with steam and designed with a view to complete accessibility of the piping which it covers. Gas is received at 30 lb. pressure, and a continuous record of the pressure is obtained by the use of a Bristol recording gage. The incoming gas passes through either of two sets of reducing valves installed in duplicate in the valve house. These valves lower the pressure from 30 lb. per square inch to 8 oz. or 9 oz. per square inch. Regulation of the pressure is controlled by pilot lines from the burners at the boilers.

A number of different types of gas burners have been tried. Good results have been obtained with the Equitable burner and with a burner designed by the engineering department of the Railway & Light Company. The latter burners are made in the company's car repair shop at a cost of about $2.75 each. They are made of standard pipe fittings and castings which require very little machine work. Twenty such burners are used in the equipment of one 500-hp boiler for gas-firing.

Eagle Rock Canyon, near Los Angeles, is being converted into a pleasure resort in the interest of the Los Angeles (Cal.) Railway at a cost of several hundred thousand dollars. Eagle Pass is about 45 minutes by electric railway from the center of Los Angeles amid picturesque mountain scenery between Pasadena and Glendale. The landscape gardening is in charge of William Heiddreich, a noted local gardener.

EFFECT OF COLLISION ON CAR CONSTRUCTION

The accompanying illustrations, Figs. 1, 2 and 3, show the vestibules of two 52-ft. interurban cars after a rear-end collision in which the forward car, Fig. 1, was struck in the rear by the car shown in Fig. 2. The photographs were taken in the shops after the vestibules were partially stripped of wreckage.

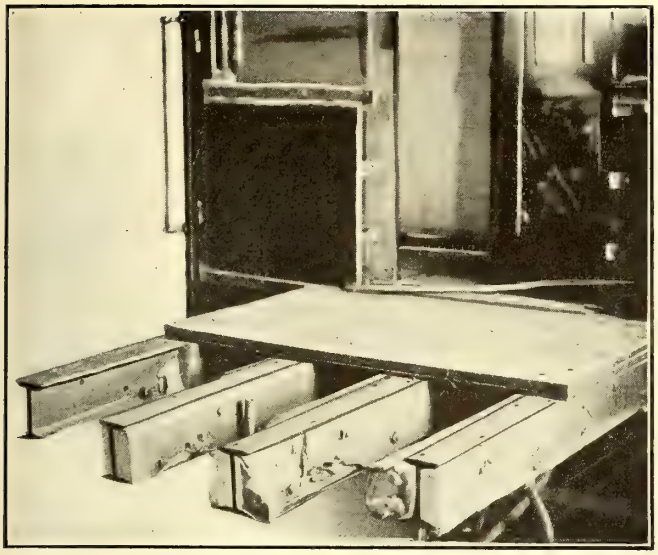


Fig. 1—Car with I-beam and Wood Filler Underframing Struck in the Rear

The I-beams on car, Fig. 1, are shown to be in perfect condition, while the same members on car, Fig. 2, from which the wood fillers were removed, are bent downward and twisted.

The center and intermediate sill construction of both cars

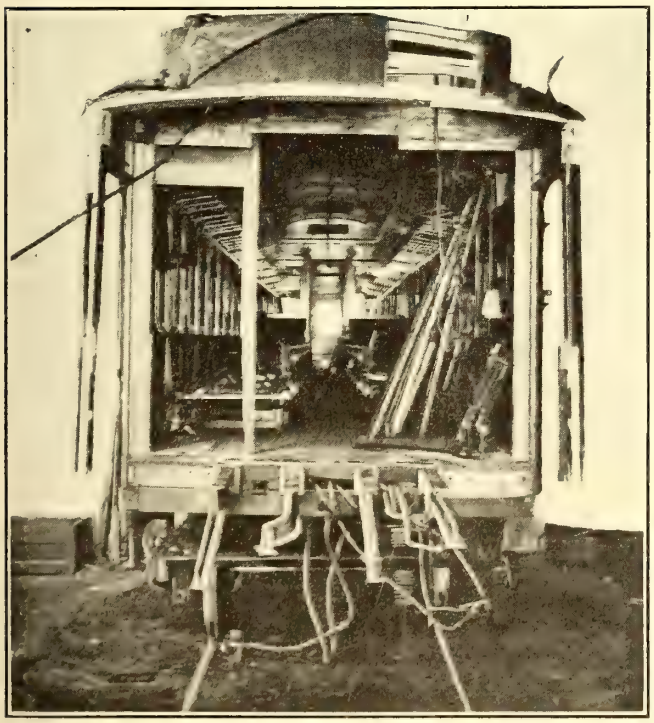


Fig. 3—View of General Damage to the Car Shown in Fig. 2

was identical, namely, of 6-in. I-beams, with yellow pine fillers continuous from bumper to bumper, with the exception that the top flange of the I-beam on car, Fig. 2, was cut away to receive crown pieces, while the crown pieces on car, Fig. 1, were gained to fit over the sills. This latter construction gave the full section of the I-beam from bumper to bumper.

The cars telescoped on striking. The buffer of the car, Fig. 1, rode over the car, Fig. 2, so that the bumper of the car, Fig. 1, was within a few inches of the bulkhead of the other car. The cars were of the same height over the bumpers, and the company believe that they would not have telescoped if the I-beam sills had not cut away on car, Fig. 2, causing the nosing to be knocked downward and thereby allowing the other car to ride over. Two cars of the same sill construction as Fig. 1 have been in a more severe collision than the one here noted and the damage was slight, the repairs costing less than $75.00 for both cars.

The result of the collision appears to show the advantage of a deep steel side sill plate as against a 6-in. channel used for

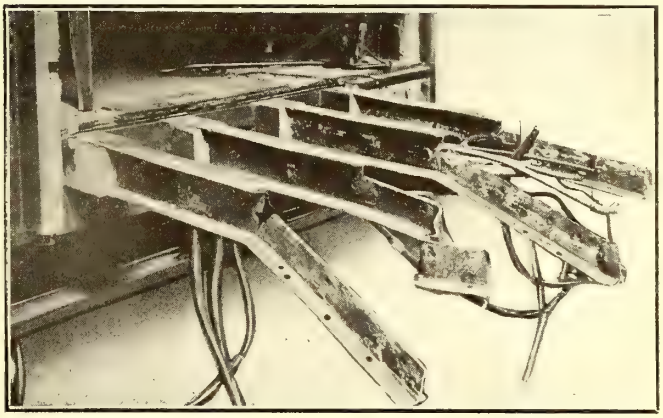


Fig. 2—Underframing of the Car Which Struck the Car Shown in Fig. 1

the same purpose. The car, Fig. 2, had steel side sill plates 3/8 x 30 in., and the body of the car was intact after the collision, while car, Fig. 1, whose side sills were of 6-in. channel and wood fillers, had a 2-in. kink downward along the whole body between the queen posts. Fig. 3 is another view of the car as shown in Fig. 2.

WESTERN ELECTRIC PENSION SYSTEM

The Western Electric Company was one of the first large corporations to adopt a pension system for employees. In March, 1906, the company set aside $400.000 as a permanent pension fund, and later $150,000 was added with further provision that $150,000 might be added to the fund in subsequent years. The fund is now $597,500. It is managed by a pension board of five officers, who are employees, appointed annually by the board of directors or executive committee. All employees who have reached the age of 60 years and have been in the company's service 20 consecutive years are eligible and are not debarred from going into other business if they accept the pension privileges. Employees who have been in service 30 years, or who have reached the age of 55 years and been 25 years in the service may be granted an allowance on recommendation of the president. Any employee who has served 10 years and through injury or sickness has been incapacitated may receive aid from the fund at the discretion of the pension board. The annual allowance for each employee retired is as follows: For each year of active service 1 per cent of the average annual pay during the 10 years next preceding retirement, with the provision that the board may base the pension upon the average annual pay of the 10 consecutive years of service during which the retired employee was paid the highest rate of wages. The pension allowance is paid monthly from the date of retirement until death and, at the discretion of the board, the allowances may be continued to widows or orphans for not more than one year. The cost of the pensions is borne entirely by the company. At present the company employs about 20,000 persons.

The municipality of Poltava, Russia, is said to be considering the advisability of constructing an electric railway there.

PITTSBURGH TRACTION SERVICE

Having digested the report and recommendations made by Emil Swensson, expert of the Pennsylvania State Railroad Commission, concerning the complaint of the City of Pittsburgh against the Pittsburgh Railways Company, both Mayor William A. Magee, of Pittsburgh, and President James D. Callery, of the Pittsburgh Railways Company, have presented their views to the commission. The Mayor said the railway company should expend $2,000,000 for new cars during the next six months; that the commission should compel the company to carry out all improvements in its power, and that the company should suggest to the city just what it should do to facilitate rapid transit. The Mayor grouped the recommendations under the following four heads: Increase the 80 cars already ordered to 340 cars, increase power-plant capacity, improve car-storage facilities and provide trucks and motors for 200 open cars; improvements to be made gradually, such as annual additions and replenishments to the rolling stock and improvements in management, schedule, tracks and roadway; joint improvements by the city and company, such as loops, extensions, rerouting and bridge changes; improvements wholly within the jurisdiction of the municipality, such as regulation of street traffic and widening of streets. Mayor Magee asked that the commission demand of the company a rehabilitation program, including a request for such additional franchises as may be necessary for the improvements. He also called for suggestions from the commission to the City of Pittsburgh.

In his reply to the Swensson report President Callery said that it was quite severe and in some respects it was unjust. The investigations had been made in December, January and February last, when the snowfall and other winter conditions made operation unusually difficult. Furthermore, the company, not through its own initiative, had made certain radical changes in the stopping and routing of its cars which led to great discontent among its patrons. He denied that there had been no apparent improvements in the service during the past 10 years and that the increase in the downtown trackage had been absolutely nil. Additional tracks, including loops, had been laid and the company had increased its trackage wherever it had been permitted. In 1906 a group of new franchises was before the city for approval when a change in administration took place, but since that time not a single ordinance has been passed for the relief of the congested terminal district. Mr. Callery stated that the Pittsburgh Railways Company was merely an operating corporation. There were originally about 40 independent lines, and for this reason many complications have remained to embarrass the company. As the company's system extends throughout two cities, 56 boroughs, and 32 townships, further complications of franchise and operating requirements are introduced as handicaps.

Since March 31, 1903, the operating expense had increased 37½ per cent, while the receipts had increased only 20 per cent. He felt that the company could not live under a universal transfer system. It was not a fact that the company had continued the operation of each of the original routes of the underlying companies instead of considering the system as a whole. Of 66 present routes, but one was in existence at the time of the consolidation, 47 routes having been changed and 18 routes created. In many cases it was impossible to make desirable changes because of franchise conditions. Mr. Swensson evidently lacked information about the matter of short hauls. Of the nine points mentioned in his report, eight had long been provided with short routes. Experimental short runs had been tried every year, but in most cases the short-route passengers crowded the cars on the long routes, leaving the other cars with only a few passengers. The number of cars running in the evening was 103 per cent greater than during the middle of the day, which in itself showed that an effort was made to follow the travel requirements. Even if the rights of the traveling public were paramount, some attention must also be paid to the rights of the employees. It was unwise to ask and impossible to get competent men to run the cars during the few rush hours without paying them living wages. To pay them a full day's wages for the short time would put upon the company a burden that it was unable to bear. The repair facilities were admitted to be insufficient, but plans had been completed for additional shops.

With regard to the percentage of standing passengers in the first fare district between 5 p. m. and 6 p. m., January, 1910, Mr. Callery said that the proper figure was 40 per cent of those seated and not 75 per cent. The company had procured 100 of the new 56-seat cars, but had found that it is impossible to operate them over the desired routes because of the refusal of the municipalities to sanction the necessary track changes. The company did not have 100 worn-out single-truck cars. Not more than 50 of the cars were more than 14 years old and no railway company could afford to throw away car bodies under 20 years of age. The estimate of the 5 per cent annual increases in seating capacity had been more than provided by the company during its existence. The estimate of 10 per cent annual renewal of rolling stock was entirely too high, as 5 or 6 per cent was quite sufficient. The recommendations as to adopting steam-railroad operating methods were not applicable to an electric railway operated largely over crowded city streets.

The suggestions that short-haul passengers should not be permitted to get on the long-haul cars were impracticable, since it would be impossible to keep them off the cars, for a passenger could not be required to announce his destination upon entering. The suggestions as to limiting the load on the cars were also impracticable and would surely result in dissatisfaction if attempted. Mr. Callery requested that the traffic squad system be extended throughout the congested section.

The company had made continual additions and improvements to its power plants and was continuing to do so. It did not see the necessity of trucks and motors for 200 additional cars. The new 56-seat cars, together with the open cars, would furnish ample accommodations for the summer business. If the recommendations of Mr. Swensson were fully carried out, they would involve an expenditure of $6,000,000, the greater portion of which would be for equipment used only during the rush hours of six days a week. This covered only about four hours a day and as the cars were practically empty in one direction the actual benefit to traffic would be but two hours a day.

Since the Pittsburgh Railways Company began operating the consolidated system, Jan. 1, 1902, it had expended for improvements and betterments $8,073,650, and for extensions $10,480,670. On none of the investments made since Jan. 1, 1902, had there been issued a dollar of overcapitalization or watered stock, nor had the Pittsburgh Railways Company ever paid one dollar in dividends to its stockholders. The expenditures for wages and supplies for eight years of operation aggregated $44,447,000. Of this amount, over $3,848,800 had been paid for taxes and street improvements. During this period, the company had paid to the holders of underlying stock and bonds $30,187,000 as interest on old horse-car lines, later changed into cable roads and still later into electric railways. In addition, the company had paid $2,009,000 interest on capital for improvements since 1902. In the last eight years and three months, preceding April 1, 1910, the receipts had increased only 3 per cent a year and the number of seats furnished had increased over 7 per cent a year. The extension of transfer privileges and fare limits brought the revenue per passenger down to a little over 4 cents. The operating expenses had steadily risen, while the 5-cent fare remained unchanged.

In conclusion, Mr. Callery stated if any suggestions were to be made to the city with reference to changes to permit the operation of the new cars, they ought to come from the commission or from the executive officers of the municipality. It was perhaps enough for the company to say that it was ever ready and willing to meet the traffic requirements provided the city would widen streets, increase the number of streets, change bridges and other structures as required.

On May 11 the commission considered Mr. Swensson's report and Mr. Callery's answer thereto. An early recommendation is expected.

DERAILS IN PAVED STREETS

The accompanying illustrations show the application of the Hayes model A, size 5, derails to a paved street in Athens, Pa., where the Waverly, Sayre & Athens Traction Company's tracks cross the Lehigh Valley Railroad. One of these views shows the derail in the open position, or off the rail, while the other shows it in the closed position or on the rail.

This derail consists of only two pieces. The derail block moves up, over and down onto the rail, being guided by the



Derail in Closed Position on the Rail

pins moving in the cam grooves of the guide box. There are no cranks, bolts, nuts, cotter pins or other loose pieces and the derail is simple track material rather than a complicated mechanism. When the derail block is on the rail the vertical thrust of a wheel is taken by the rail itself. The thrust at right angles to the rail is taken by the two seats against which the lower front sides of the block rest and the block cannot leave the rail except by rising an inch above it; the weight of the wheel prevents this and the block is therefore locked on the



Derail Operated by Pipe Line from Tower

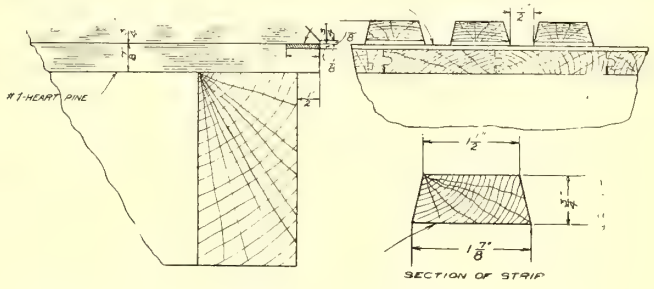
rail. The thrust parallel to the rail is carried by the side walls of the guide box directly to the ties. The block is thus held in position by the rail and by the portion of the guide box nearest the rail, the remainder of the guide box merely governing the motion to and from the rail.

The guide box is adapted to be made a fixed part of the track. The horizontal flanges bearing on the top of the ties have six holes for bolts, lag screws or spikes. Vertical flanges beneath bear against the sides of the ties. The derail may be operated by any mechanism which is used to throw a switch. It may also be operated by a pipe line from a main track switch stand and will work with any form of interlocking apparatus. In any case the operating rod is connected direct to one of the rear lugs by a 7/8-in. pin. In interlocking, the other lug is used for the locking connection, the indication in locking thus being direct from the moving piece and not through any crank, offset connection or other secondary attachment. Both pieces of this derail are made of the best malleable iron. Every casting has two test coupons which are subjected to rigid inspection before the castings are used.

About 35,000 derails, made by the Hayes Track Appliance Company, Geneva, N. Y., are now in use. The Brooklyn Rapid Transit Company alone has 142 in service.

REDUCING PLATFORM WEAR IN RICHMOND BY USING REINFORCING STRIPS

The Virginia Railway & Power Company, Richmond, Va., covers all of its car platforms with maple strips similar to those used inside the cars. To avoid replacing the entire platform when the flooring at the step is worn out, the mechanical department now inserts an iron strip flush with the pine under-



Platform Floor Stripping Over Steel Plate at Step

flooring and extending the entire width of the platform at the steps. This reinforcing strip is 1/8 in. thick and 1 in. wide. When the maple strips at the step are worn down, new ones are inserted for the necessary length, but no change whatever is made in the pine flooring below because of the protection afforded by the metal.

TROLLEY WHEEL PRACTICE AND CASTING FORMULA AT BOSTON

The Boston Elevated Railway Company has been remarkably successful in securing low trolley maintenance by the use of a light trolley harp and wheel. The total cost of wheels, harps, poles and trolley bases was given at not over $2,100 per year for over 40,000,000 car-miles by Paul Winsor, chief engineer of motive power and rolling stock, at the 1909 convention of the American Street & Interurban Railway Engineering Association. The company feels that to maintain perfect contact between the trolley wheel and the wire it is very desirable to make the wheel and outer end of the pole as light as possible, and on some of the heaviest equipment better service has been obtained from a 4-in. wheel than from larger wheels of the same chemical composition. The company uses a 12-ft. pole of steel, weighing about 23 lb., including the wheel. The company endeavors to obtain spring in the pole at the upper end, so as to absorb shocks and inequalities in the wire. A very light harp is used with the 4-in. wheel, and the latter is now standard practice for the entire surface system. The bushing on the 4-in. wheel is fitted with a 1/2-in. spindle in place of the 5/8-in. spindle used on the 5-in. wheels. The company does not consider it economical to use large wheels on suburban lines and later transfer them to its urban service. All the wheels used in Boston are made by the company after its own formula, which is as follows: Copper, 91.08 per cent; tin, 6.60 per cent; lead, 0.20 per cent; zinc, 1.95 per cent; phosphous, 0.17 per cent.

COLUMBUS STRIKE SETTLED

The strike of the employees of the Columbus Railway & Light Company, Columbus, Ohio, which was declared on April 29, 1910, was settled on May 5, 1910, through the efforts of the State Board of Arbitration. The company refused to recognize or deal directly with the representatives of the union which had been organized among the men. The men claimed that an agreement with the company which was made on April 6, 1910, had been violated and they took advantage of the situation in declaring the strike to demand an increase in wages to 27 cents an hour and time and a half for overtime, with no bonuses in the form of free uniforms or dividends on their wages. The Board of Arbitration did not go into the merits of the additional demands of the men, but considered only the interpretation of the agreement of April 6, the first three sections of which were as follows:

"1. The employees of this company may come at any reasonable time for conference with the management on any matter connected with their employment by this company.

"2. There will be no discrimination against employees because of membership in any union, nor of their right to join any such union.

"3. The wages of conductors and motormen in effect April 1, 1910, will be increased by 1 cent per hour, to take effect April 8, 1910, and ½ cent per hour, to take effect Jan. 1, 1911."

Section 4 of the agreement contained the names of four men who had been discharged and who were to be reinstated.

The supplementary interpretation of the agreement of April 6 by the Board of Arbitration, which was accepted by the company and which was also accepted by the employees when presented to them by the Board of Arbitration, is as follows:

"The company agrees to the following interpretation of section 2 in the agreement of April 6, with the State Board of Arbitration:

"Men are to be free to join or not to join any organization without intimidation or discrimination and the company agrees that when engaging employees the question of unionism or non-unionism shall be eliminated.

"Relating to the four men whose replacement is in dispute under section 4 of the agreement the company agrees that those men shall receive a compensation equivalent to that of their former positions, regardless of the runs assigned to them."

AVERAGING PERFORMANCE OF THE OHMER REGISTERS

The practice is followed monthly on Denver City Tramway, where Ohmer registers are used, of rating the efficiency of conductors in the use of Ohmer registers which are employed on that line. The plan followed is as follows: The total errors made by each conductor in registering fares on the register during the month is divided up by the number of days which that conductor worked, giving as a result the average number of errors per day. This amount is then deducted from 100, the remainder being that conductor's percentage for the month; for instance, John Smith works 30 days and makes 300 errors, which would result in an average of 10 per day, deducted from 100, would result in a percentage of 90 for John Smith for the month. These figures are then tabulated and published by the company in the *Tramway Bulletin* which is a monthly paper devoted to the interests of the company's mutual aid association. In the last issue of the bulletin there were 11 who were credited with 100 per cent and the general average was 95.09 per cent.

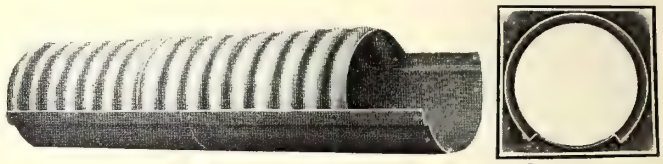
In addition to comparing the records for each man, those made on each division are averaged and there is considerable competition as to which division will make the best record. The North division won in March. The East division won in February with an average of 94.7.

An electric railway, to have a gage of 3 ft. 6 in., will shortly be built between Agua de Maiz and Los Dios Caminos, Venezuela, by J. A. Mosquera, A. Michaud and A. Aveledo.

CORRUGATED CULVERT WITH SMOOTH BOTTOM

A rather novel form of corrugated iron culvert is being installed by the highway culvert department of the Penn Metal Ceiling & Roofing Company, Ltd., Boston, Mass. The principal feature is the smooth bottom plate which permits water to flow freely by preventing débris, such as mud, pebbles and sticks from being caught in the corrugations. In other culverts, the bottom corrugations tend to fill up with sand or mud to make a bed for the water. Smooth-bottomed pipes minimize this trouble and consequently require practically no attention after cleaning.

The method of joining the corrugated top sections with the smooth bottom plates is also of interest. The corrugated top is rolled to the required diameter and fixed tight into the



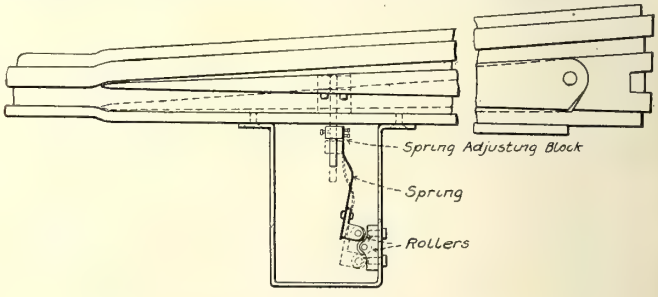
Smooth Bottom Corrugated Culvert

bottom section which has bent flanges without the liability of cracking the galvanizing and exposing the raw material to rusting. This method of joining the top and bottom sections also makes a keystone formation of the earth, minimizing strains and preventing the pipe from shifting its position.

In setting up the pipe, two bottom sections are bolted together, after which a short piece of corrugated top is added, then a full-size section of the top and so on until the desired length is obtained; the last section of the top is also a short piece. In this manner all the joints are staggered. The top pieces are joined by a lapping of one corrugation, one end being made a fraction of an inch smaller for that purpose. The bolts, which are also galvanized, all go to one side of the pipe, passing through the flange to the smooth bottom and through the corrugated top. The various portions of the culvert can be closely nested for convenient handling and can be quickly set up by ordinary section men with no other tool than a wrench.

SWITCH LOCK USED IN HOT SPRINGS, ARK.

The accompanying sketch shows a street railway switch lock used by the Hot Springs (Ark.), Street Railway Company. This lock was devised and has been recently patented by Edward Hardin, superintendent of transportation of this company. The lock is designed to prevent the movement of the switch-point unless it is thrown by the usual motorman's bar.

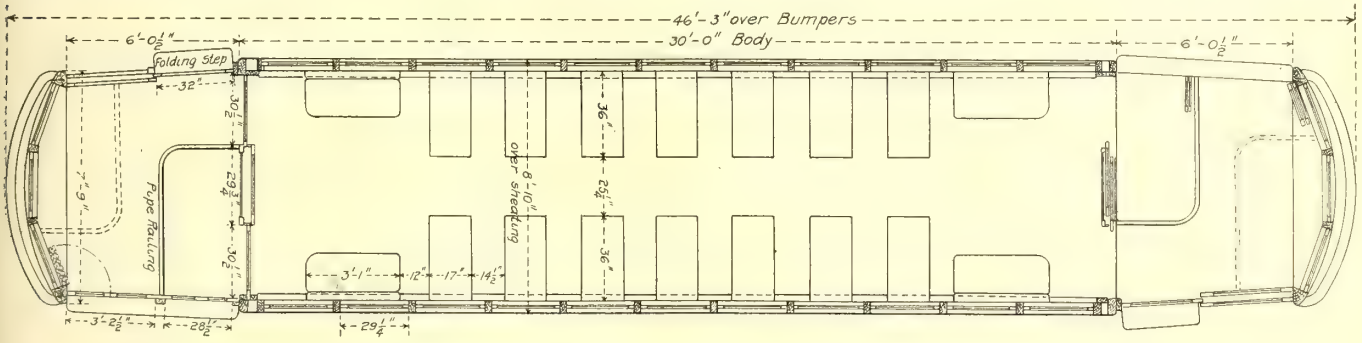


Switch Lock In Position

To the standard switch tongue is attached a through-bolt carrying a small roller mounted on a heavy leaf spring. Engaging this roller is a similar roller mounted inside the iron box which contains the switch lock mechanism. Movement of the switch raises the movable roller against the pressure of its spring, when it rolls easily over the stationary roller. The spring then snaps down automatically into its second position, after the centers of the rollers have passed. The carrying spring is mounted on an adjusting block through which its tension can be varied.

PAY-AS-YOU-ENTER CARS FOR THE BLOOMINGTON & NORMAL RAILWAY

The Danville (Ill.) Car Company has recently completed for the Bloomington (Ill.) & Normal Railway & Light Company six pay-as-you-enter cars under the license of the Pay-As-You-Enter corporation. As shown in the accompanying plan the type of car built is 44 ft. 11 in. long over the vestibules and 30 ft. long over the body, with an inside width of 8 ft. 1¼ in. This liberal width admits the placing of 36-in. cross-seats and an aisle of 25¼ in. between them, but to facilitate ingress and egress longitudinal seats are set in the corners. The body openings at both ends consist of two doors which slide into a center pocket. However, the most interesting feature of this design is the vestibule and platform arrangement. It will be observed from the plan that the vestibule sliding door which is operated in connection with a folding step slides against the end of the car instead of against the vestibule. The step openings at the vestibule swinging doors are equipped with the Brill folding gates, and the vestibule steps and the platform floor at each door opening are covered with Empire safety treads. The platform pipe railing is removable and reversible so that it can be used as a guard for the motorman to save him from jostling by passengers. This arrangement is shown in the dotted lines on the plan.



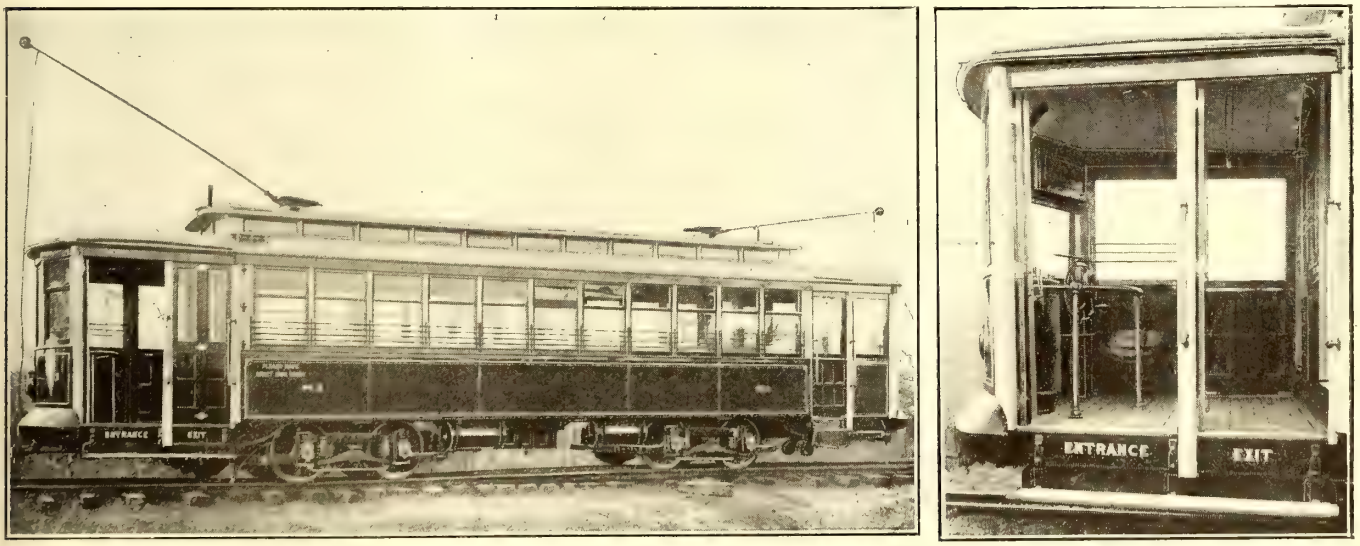
Plan of Bloomington & Normal Railway & Light Company's Pay-As-You-Enter Car

The bottom framing of each car consists of 4¾-in. x 7¾-in. long-leaf yellow pine, side sills plated with ⅜-in. x 18-in. steel; 5-in. x 7¾-in. white oak end sills; 3¾-in. corner posts, and 2¼-in. side posts. The outside sheathing is No. 14 sheath steel. The bolsters consist of a 1-in. x 10-in. top plate and a 1⅛-in. x 10-in. bottom plate with the necessary filler castings and spools of gray iron. The 1½-in. x 2½-in. inner truss rods are carried on high struts over each bolster and terminate in wrought-iron truss anchors at each corner of the car. The truss plank consists of ⅜-in. x 18-in. iron plate reinforced on the top by 2½-in. x 2½-in. x 1½-in. angle iron and securely bolted to the side posts and side sills. There is a continuous ash foot rest on top of this angle iron.

Double sash are used for the windows. The top sash are fixed, but the lower sash drop into pockets. The sash springs are O. M. Edwards spring rollers. The window shades are of Pantasote and have Curtain Supply Company's No. 88 ring fixtures. The specialties used for the fare collection system embrace a Brill four-till fare box, a double R-5 International register and the Consolidated Car Heating Company's push-button system.

The car body is mounted in two Brill No. 27 GE-1 trucks, having a 4-ft. 6-in. wheelbase, 5-in. axles and 3 3-in. cast-iron wheels. These trucks carry four GE-80 motors. The braking equipment includes Westinghouse air brakes, vertical ratchet hand wheels and the standard pneumatic sanders of the Illinois Traction System.

Other items which were supplied for these cars are the following: Consolidated electric heaters; United States 10-in. stationary headlights; Root track scrapers; H-B. wheel guards and Hunter destination signs. The latter are placed one in the center on each side and one in the vestibule at each end of the cars. The weight of a single car, including trucks, electrical equipment and air brakes, is 51,850 lb.; the weight of the trucks is 10,900 lb; the weight of the electrical material, 12,750 lb.

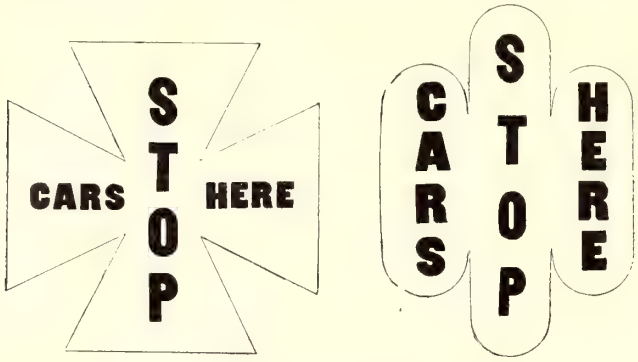


Pay-As-You-Enter Car for Bloomington & Normal Railway & Light Company

The Mobile (Ala.) Light & Railroad Company uses a somewhat uncommon bulletin arrangement for conductors and motormen. Instead of pinning or pasting the various notices on a board, the bulletins are dropped into glass-fronted cabinets like a picture in a frame. Thus the paper remains clean and untorn in its place as long as the instructions require publicity. A bulletin can be readily removed by lifting the glass out of the frame.

THE PROPOSED STANDARD CAR STOP SIGN

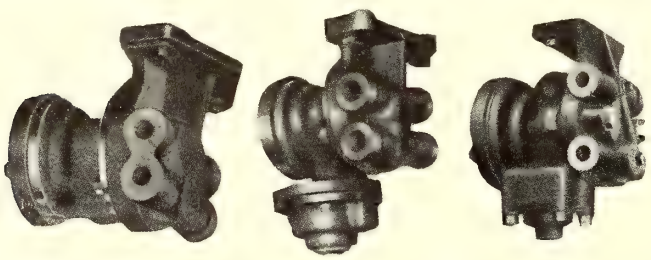
R. N. Hemming, assistant superintendent and electrical engineer of the Ohio & Southern Traction Company, Columbus, Ohio, is planning to bring the subject of a standard car stop sign before the next meeting of the Central Electric Railway Association which is to be held in Toledo, Ohio, on May 26. Mr. Hemming believes that it would aid both the traveling public and the electric railways to have one form of stop sign as familiar, for example, as the blue bell which has become synonymous with the long distance telephone. If this were the case, strangers in a city would avoid a great deal of trouble in seeking the stopping points and even the residents would find such signs a convenience. It should be understood that the end in view is not the standardization of stopping places, but simply of the methods for indicating them, as owing to the variety of stopping points throughout the country it is probably impracticable to have a national rule covering their location. Mr. Hemming has made up a number of differently shaped cardboard sample signs with the words "Cars Stop Here" in various positions and sizes of type. One of these, for example, is formed like an arrow 4 in. wide by 28 in. long, and another like a Victoria Cross 16 in. square. The cross and one other design are reproduced in the accompanying cuts.



Two Suggested Car Stop Signs

EMERGENCY AIR-BRAKE VALVES

The National Brake & Electric Company, Milwaukee, Wis., is making three types of emergency valves to add to straight air brakes the safety features usually associated with the more complicated automatic air-brake systems. The type "A" emergency valve is for installations where two cars with straight air equipments are operated together. Should a train part, the valve causes the brakes to set automatically. Vent valves are provided to permit the brakes to be applied in an emergency either by the conductor or motorman. The usual straight air-brake equipment of both the motor car and the trailer is supplemented by this emergency valve and bracket, vent valves, auxiliary reservoir and extra hose, in addition to which the trailer has an auxiliary reservoir. This equipment is recommended where the cars are light and the braking cylinders of small diameter. It may be used with any standard type of ½-in. motorman's valve.



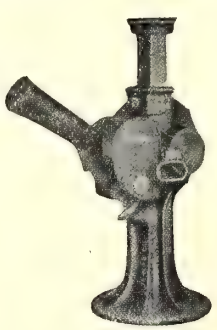
Emergency Valves and Brackets, Types A, B and C

Cars with small brake cylinders may be satisfactorily controlled by a combination of the straight air and the ordinary emergency equipment as the train pipe line is of sufficient area to accommodate the flow of air when the brakes are released after application. This is not true, however, of cars with large brake cylinders as the venting of air to the atmosphere through the long train pipe line requires much more time. In effect, the train pipe is obliged to discharge a greater volume of air through the same area. The type "B" emergency valve is designed to overcome this deficiency. It can only be used, however, with this company's type ¾-in. "SV" motorman's valve. The type "B" valve is similar in construction to the type "A," differing only by the addition of a local release valve. The service application of brakes is the usual straight-air method, but when the operating handle is moved to the emergency position, the brakes are automatically applied and a maximum of brake cylinder pressure is attained instantly.

The type "C" emergency valve, which may be used with any standard ½-in. motorman's valve, is adapted for single cars as well as for trains of two or three cars. It adds but little to the straight-air equipment and in a short time the motorman learns to operate it as efficiently as straight air brakes. The valve is made to offer the following advantages in train operation: Highest maximum brake cylinder pressure in an emergency application; quick automatic recharge of auxiliary reservoirs after an emergency application no matter what position the operating handle may have assumed; equal pressure in all the brake cylinders of the train, regardless of piston travel unless the train parts; graduated increase or decrease of brake cylinder pressure either by the straight air or automatic methods. When the straight air system is equipped with this emergency valve, the addition consists only of the valve itself and supporting bracket, supplemented by an auxiliary reservoir which conforms to the size of the brake cylinder.

A 40-TON GEARED RATCHET JACK

The Duff Manufacturing Company, Pittsburgh, Pa., maker of Barrett jacks, is selling through Fairbanks, Morse & Company, Chicago, a geared ratchet jack, known as Barrett Jack No. 400, which has a lifting capacity of 40 tons. An important feature of this jack is that when the load is being raised, the lowering mechanism is thrown out of service. When, however, the load is being lowered the lowering mechanism is thrown into place by a reversing lever on the front of the jack. When this lever is thrown downward it indicates that the lowering mechanism is in position. Hence, there are no superfluous parts to be shaken around while the jack is being operated. There is absolutely no movement of the lifting pawl in the socket lever when the jack is under a load, thus eliminating the socket-lever wear which occurs in jacks having pawls pivoted in the socket. The only wearing surfaces in this jack turn in accessible bronze bearings, which may be easily renewed if necessary. Back of the lifting bar there is placed a special bronze plate which can be adjusted for any wear to keep the rack and large pinion in proper mesh at all times. The jack frame consists of a strongly ribbed base, in which the lifting bar slides. The latter is raised by a hardened steel pinion which turns on its own bearings in bronze bushings and not on a steel pin as in other geared jacks. The hub of this pinion is connected to a large gear which is revolved by a second pinion. The hub of this second pinion has a suitable ratchet mechanism for its turning by a pawl in the socket lever; a retaining pawl is also provided. This jack raises a load of 40 tons to a height of 17 in. and weighs but 275 lb.



40-Ton Jack

The municipality of Pecs, Hungary, invites tenders for the construction of an electric railway in that city.

News of Electric Railways

Mayor of Toledo Accepts Proposal To Inspect Accounts of Company

Brand Whitlock, Mayor of Toledo, Ohio, on behalf of the Council of that city, has accepted the invitation of Albion E. Lang, president of the Toledo Railways & Light Company, to appoint a committee to examine the books of the company "in order to reach a definite knowledge of the most desirable street railway system for the city with special reference to routes, equipment and frequency of cars, and also as to the cost of operating such a system," preparatory to considering in the Council the question of granting the company an extension of its franchise. Under authority from the Council, Mr. Whitlock has appointed Carl Nau, treasurer of Cleveland under the Johnson administration, and J. B. Tanner, formerly assistant treasurer of the Municipal Traction Company, Cleveland. Messrs. Nau and Tanner are members of the firm of Nau, Tanner & Rusk. The letter of Mr. Whitlock to Mr. Lang accepting the proposal of the company was dated May 2, 1910. After referring to the suggestion of Mr. Lang that the status of the company be considered carefully before the subject of the extension of the franchises is taken up by the Council, Mr. Whitlock said:

"In reply to this suggestion and the offer here made to open your books generally to the inspection of representatives of the city, I am authorized to say that the city will avail itself of this opportunity, although in so doing it does not wish to be understood as assenting or agreeing in any way to a renewal or extension of franchises now held by the Toledo Railways & Light Company, nor to bind itself in any way to grant a new franchise or franchises to the Toledo Railways & Light Company or to any company, nor definitely to commit itself at this time to any program for the solution of the street railway problem.

"The city authorities, acting in this matter as a unit, agree with you that an investigation is necessary as preliminary to any discussion of this subject, and they desire to acquaint themselves and all the people of the city with every material fact and circumstance that relates to the whole problem of transportation in municipalities.

"I might say, too, that the city authorities desire to solve this problem in a manner just to the people of the city, and that they regard as the paramount prerequisite to any settlement that may be reached between representatives of a street railway and them, a determination of the legal relations between the city and the street railway that will recognize and establish the right of the municipality, through its authorized officials, to institute and preserve a continuing control of the service, both as to routes and schedules, including routes of interurban cars operated within the city, so as both to prevent waste and to insure a service satisfactory in character and adequate in quantity to the present and future needs of the city, and ultimately to provide for the undertaking by the city itself of the operation of street railways when it shall have been authorized by the State and its people decide so to do.

"The city, therefore, accepts so much of your company's invitation as tenders to its representatives the opportunity to examine the books and effects of the company, and it has appointed as its examiners in this respect Messrs. Nau, Tanner & Rusk, who will begin an inspection of your company's books immediately."

Arbitration in Detroit Postponed

The hearing before the board of arbitration which was appointed to consider the appraisals of the property of the Detroit United Railway has been postponed indefinitely. Mayor Breitmeyer failed to persuade Frederick T. Barcroft, who appraised the property of the company for the committee of fifty, to reconsider his decision not to appear before the board of arbitration, and Frederick W. Walker, who was appointed to succeed Mr. Barcroft, found it impossible to appear before the committee on May 9, 1910, which had been set as the date for the first hearing. Mr. Walker and Clyde I. Webster, principal counsel for the committee of fifty, have been going over the Barcroft appraisal in detail, and Mr. Webster has stated publicly that, up to May 9, 1910, the values placed on real estate, buildings and overhead charges had been considered, and that many differences had been found.

Following a caucus of the Republican Aldermen of Detroit on May 3, 1910, a resolution was adopted which gives the sanction of the Council to the board of arbitration as organized and instructs Corporation Counsel Hally to appear for the city in the proceedings. The proposal was lost to give the Council power to take the arbitration out of the hands of the Mayor and the committee of 50 whenever the Council should deem it advisable.

The Michigan United Railways, Lansing, Mich., has applied to the Council of Detroit for a 30-year franchise for an entrance to the center of the city from the West for its interurban lines.

Transit Affairs in New York

The Public Service Commission gave a public hearing on May 9, 1910, on the form of contract the commission will prepare for the construction, equipment, operation and maintenance of the tri-borough subway system. Arthur J. Baldwin, of counsel for the Bradley-Gaffney-Steers Company, referred to the willingness of the company which he represented to bid to build and operate the proposed system, but added that certain changes in phraseology should be made before the subject is presented to the public and the contractors in the shape it finally will be set forth. It should be made clear that wherever it is necessary to acquire real estate the city shall acquire it, thus removing this burden from the contractor, and a period of more than five years' operation ought to be guaranteed to the contractor. The city's claim should be in the nature of a second mortgage rather than a first, as proposed, and interest should be paid first to the holders of the bonds. James A. Allen, representing the Civic Alliance and the Independence League, wanted the commission to provide a way to settle the municipal ownership question immediately and finally. He said that the present city administration is fully committed to municipal ownership.

The members of the Public Service Commission conferred on May 7, 1910, with J. F. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit Company, and W. S. Menden, assistant general manager, regarding the proposition recently made by the Brooklyn Union Elevated Railroad to operate trains over the Williamsburg Bridge and through the Bridge-Loop Subway to Chambers Street. The Brooklyn Rapid Transit Company proposes a five-year lease, which would in all probability overlap upon the time when the Broadway-Lexington Avenue Subway will be in running order with its connection via the Bridge-Loop Subway for the Brooklyn branches going into the Tri-Borough route. The commission, it is said, will insist on a lease of a temporary character, which can be terminated when the Tri-Borough Subway is ready to use the bridge loop.

Cleveland Traction Situation

The Humphrey Company has filed a petition in the Common Pleas Court for an injunction to prevent the Cleveland Railway from charging a fare of 10 cents to Euclid Beach, a lake shore resort owned by the Humphrey Company. It is charged that an agreement was entered into in 1901, whereby one fare was to be charged to the beach. The Humphrey Company claims that the Cleveland Railway was given a right-of-way in the park, and that a large sum of money was spent in improvements in view of this agreement and that a heavy loss will be suffered if a fare of 10 cents is charged. It is admitted in the petition, however, that the company claimed the right to collect two 5-cent fares for service to Euclid Beach when the agreement was made.

J. J. Stanley, president of the company, says that the track in the park will not be used after May 15. In the

answer filed by the company, it acknowledges the agreement to operate at a 5-cent fare in return for the privilege of laying tracks through the park, but states that at no time has the company claimed the exclusive right to use these tracks. A reduction in the fare to the park would mean an advance within the city, as the receipts would not be sufficient to defray the expenses and pay 6 per cent interest on the investment. The distance between the Public Square, Cleveland, and Euclid Beach is between 10 and 11 miles and the operating cost for so long a haul makes the 10-cent fare necessary. If the present fare in outlying districts was not maintained, the minimum could not be charged within the city. A reduction in the fare of visitors to the park would not be just to residents of Collinwood, near the park, who pay 10 cents.

The hearing on this matter was begun before Judge Vickery on May 6, 1910. City Solicitor Baker asked that the city be dismissed from the action on the ground that it has no interest in the suit. Attorneys for the company contended that the city should remain a party to the suit, so that it would not be liable to a violation of the Tayler grant, which requires that certain conditions be maintained relative to the outlying districts. The court did not decide the point.

The report of the Cleveland Railway for April, 1910, has not been made public, but it has been announced that the surplus from operation for April is $24,617, as compared with $18,880 for March. The gross earnings for April were $475,364, as compared with $475,749 for March.

The street railway committee of the City Council has decided to recommend the expenditure of $250,000 for improvements, according to reports. Most of this money will probably be spent for converting the old cars into cars of the pay-as-you-enter type. It is estimated that about 230 cars could be improved by the expenditure of this amount of money.

The employees of the Cleveland Railway who are members of the union which has been organized among the men are said to have voted to demand a flat rate of 32 cents an hour for motormen and conductors after the expiration of the trial period with a 3-cent fare plus 1 cent for a transfer. At present the men receive 23 cents an hour for the first year, 25 cents for the second year and 26 cents for the third year and thereafter. The dispatchers asked for an advance in wages from $75 to $100 a month. This was refused, but later their pay was advanced to $85 per month.

Trouble has been encountered in enforcing the rules made by Commissioner Dahl which prohibit smoking and standing on the rear platform, and a number of suits have been filed by men who have been ejected from the cars by conductors. R. Van Rensellaer, an architect, who refused to ride inside a car, stating to the conductor that he preferred to remain outside, and was put off the car, has instructed his attorney to bring suit for $5,000 damages against the company to test its right to enforce a rule that specifies a certain place on the car which passengers must occupy. The company has ordered conductors to enforce the rules, using their own judgment as to the means necessary to be adopted in order to insure compliance with their instructions to passengers.

Tom L. Johnson, former Mayor of Cleveland, returned to New York on the *Mauretania* on May 5, 1910. Mr. Johnson is reported to have said: "I am in politics till I die. I went away a sick man. I am much better now, but have not recovered entirely. Before returning to Cleveland I shall stay in New York for a few days."

Strike in Vincennes.—The conductors and motormen on the Vincennes (Ind.) Traction Company are on strike. They demand a nine-hour day and 17 to 20 cents an hour, according to length of service.

New York State Convention.—The annual convention of the Street Railway Association of the State of New York is to be held this year on Tuesday and Wednesday, June 28 and 29, at Cooperstown. The headquarters of the association will be at the Otasaga Hotel. The program of the meeting has not yet been announced.

Proposed Interurban Terminal for Kansas City, Mo.—The Missouri & Kansas Terminal Building Company, Kansas City, Mo., has been organized by W. B. Strang, of the Missouri & Kansas Interurban Railway and others to build a union electric railway station in Kansas City, Mo. It is proposed to connect the new station with the union station for steam railroads in Kansas City so that baggage, freight and passengers can be interchanged between the terminal of the electric railways and the terminal of the steam railroad.

Suit to Recover for Failure to Comply with Commission's Order.—Trial was begun on May 9, 1910, before Justice Brady and a jury in the Supreme Court of the suit brought by the Public Service Commission of the First District of New York to recover $750,000 for failure on the part of Frederick W. Whitridge, receiver of the Third Avenue Railroad and the Union Railway, to equip the cars of these companies with wheel guards within a specified time, in accordance with an order of the commission.

Decision Against Operation of Interurban Cars on Wells Street, Milwaukee.—The Supreme Court of Wisconsin has decided that the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company, Milwaukee, Wis., have no right to operate cars of interurban railways entering Milwaukee on Wells Street, Milwaukee. The decision was written by Justice William H. Timlin and concurred in unanimously by the other members of the court. The decision will not become a matter of record in the Circuit Court of Milwaukee County for 30 days. In the meantime the companies have the right to ask for a rehearing.

Damage Suits Result From Surface Line Construction in Brooklyn.—The Court of Appeals has affirmed judgments in favor of the plaintiffs in three damage suits of property owners in Union Street for injuries to their property by the construction of a surface railway by the Brooklyn Rapid Transit Company in that street. Work on the Union Street line was begun in 1901, but cars were not placed in operation until May, 1905, on account of injunction suits. Justice Stover in the Supreme Court decided that the company had no right to condemn property for the proposed line. The Court of Appeals, however, ruled that the company had condemnation rights, but that the owners of abutting property were entitled to damages.

Subway Proposal Submitted in Philadelphia.—The Philadelphia & Suburban Street Railway formally placed before the Councils of Philadelphia on May 6, 1910, its plans to construct a subway in Broad Street, and the matter has been referred to the street railway committee of the Councils. The offer of the company provides that the city shall receive 10 per cent of the net receipts of the company and that after July 1, 1960, the city shall have the right to purchase the road on the basis of the company's earning power, capitalized at 6 per cent. In return for 10 per cent of the net earnings applicable to dividends the company shall be exempt from payments of any license fee on cars or other equipment, structures or apparatus of any kind owned or operated.

Important Decision in Crossing Suit in Indiana.—The Supreme Court of Indiana has decided that an interurban electric railway, with the consent of a town, may lay its tracks along the highway and across a steam railroad and that an injunction will not lie against the interurban railway to prevent a crossing notwithstanding the fact that the steam railroad may own the fee of its right-of-way. The court said that granting the right to an interurban company to use a highway for its tracks is not an additional burden on the fee of a steam railroad which the highway crosses, and held that in view of the fact that the Muncie & Portland Traction Company laid its tracks along the highways before the Pennsylvania Railroad extended its track, the steam railroad must bear the expense of putting in the crossing.

Little Rock Railway & Electric Company.—The Little Rock Railway & Electric Company, Little Rock, Ark., is the subject of an interesting article in a recent issue of the *Arkansas Gazette*, which contains brief descriptions of the company's power plant and car house and an outline of the various improvements made by the company to its railway and lighting service in the last two years. Mention is also made of the personnel of the company. Several illustrations are shown of the company's power plant, Forest Park and

scenes along the route. The *Arkansas Gazette* also printed in its issue of April 13, 1910, an editorial entitled "The Car Company Does Its Part," in which the work done by the company in the interest of the public of Little Rock was discussed.

Maryland Public Utility News.—James M. Ambler, chairman of the Maryland Public Utilities Commission, and Philip P. Laird, one of the two associate members—the other being Walter W. Abell, who is abroad—have taken up their official work. Attorney-General Straus of Maryland and the commissioners spent several days in going over the law, Mr. Straus, who drew up the measure, explaining its provisions. Appointments have not yet been made to the positions of counsel and assistant counsel to the commission. Attorney-General Straus will probably supply the deficiency until the permanent counsel is selected. One of the first complaints made before the commission was in regard to the alleged practice of the Consolidated Gas, Electric Light & Power Company, Baltimore, Md., in occasionally demanding a meter deposit of $5. The complainant did not object to the payment, but asked that the company be required to pay interest on the money deposited.

Lectures at the Massachusetts Institute of Technology.—The lectures of Prof. Harold Pender for graduate students next year at the Massachusetts Institute of Technology will extend the discussion contained in his advanced lectures of this year on high voltage alternating transmission and the utilization of power. Professor Jackson's lectures for graduate students on the organization and administration of public service companies have this year dealt particularly with questions of value of plant and the like. Next year the lectures will be directed more to the theory which underlies methods of charging for service by public service companies, with particular reference to charges for electric light and power, but with collateral consideration of railroad and tramway charges and charges for gas and the service of other public utilities. Professor Wickenden will originate a course of lectures on illumination, photometry and illuminating enginering which will become a part of the optional curriculum for undergraduate and graduate students. This year the institute will confer for the first time in its history the degree of doctor of engineering.

Papers Before Pacific Claim Agents' Association.—Ida P. Newel, secretary-treasurer of the Pacific Claim Agents' Association, who is connected with the Portland Railway, Light & Power Company, Portland, Ore., has made public the following list of papers to be presented at the meeting of the association in San Francisco, Cal., on May 20 and 21: "Investigating, (a) a Report, (b) a Claim," by J. H. Handlon, claim agent for the United Railroads of San Francisco; "What Should be the Relationship between the Claim and Operating Departments?" by E. J. Perrin, claim agent for the San Diego Electric Railway; "What Should be the Relationship Between the Claim and Legal Departments?" by J. N. Faulkner, attorney for the Seattle Electric Company; "What Should be the Relationship Between the Claim and Medical Departments?" by John Ferrin, claim agent for the Oakland Traction Company; "The Organization of a Claim Department," by T. A. Cole, claim agent for the Los Angeles Railway; "The Best Method of Obtaining Additional Witnesses," by H. K. Relf, claim agent for the Spokane, Portland & Seattle Railway; "The Best Way of Handling Blind Cases," by E. H. Odell, claim agent for the Tacoma Railway & Power Company.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—At a recent hearing Hollis French, consulting engineer, Boston, argued in favor of definite steps being taken toward the replacement of the steam locomotive by the electric locomotive in Metropolitan Boston and described electrical installations in successful operation in this country and Europe. Special stress was laid upon the danger of making rough estimates for Boston conditions on the basis of New York installation costs. The probable economies of electricity were also reviewed. On May 5 James F. Jackson, former chairman of the Massachusetts Railroad Commission, emphasized that the railroads were tardy in taking up the question at Boston with any promise of early action toward the use of electricity, and contended that the passage of an appropriate resolve by the Legislature was the initial step necessary to accomplish electric service. Mr. Jackson presented a resolve requiring the railroads to submit the results of a study of electrification at Boston to the joint board of metropolitan improvements by Sept. 1, 1910, and which requires the latter to submit to the Legislature of 1911 the draft of an act which shall provide for the electrification of the railroads within the metropolitan district in a stated time. The proper board or boards are to be empowered to determine the manner in which the work shall be prosecuted.

New Jersey.—Since the Legislature adjourned Governor Fort has signed a number of bills affecting electric railways. Among them are Senate Bill 26, which amends the railroad law of 1893 by requiring that annual reports to the Legislature shall be transmitted to the Controller, who, with the Commissioner of Reports, shall designate what portion shall be printed; Senate Bill 27, which adds to the free pass list the members, secretary and inspectors of the new Public Utilities Commission; House Bill 15, which authorizes cities to contract with street railways for the transportation of garbage and ashes; House Bill 277, which makes it a misdemeanor to sell or give away a transfer issued by a street railway. These measures are in addition to the public utilities bill, published in full in the ELECTRIC RAILWAY JOURNAL of April 2, 1910, and the measures mentioned in the ELECTRIC RAILWAY JOURNAL of April 16, 1910, page 717. The Governor vetoed House Bill No. 348, designed to revive certain franchises granted by municipalities since Jan. 1, 1902, which had not been accepted. He said that the bill violated the principles established by the limited franchise act.

New York.—The Legislature has passed a measure providing for a determination by the Appellate Division of the amount of bonds which may be excluded from the debt limit computation of New York City and applied to rapid transit work. The bill was introduced in the Senate on April 29 by the cities committee. On May 2 the first meeting since the introduction of the bill was held. In the meantime several minor amendments had been agreed upon. Through an emergency message from Governor Hughes, the constitutional requirement was obviated which makes it necessary for a bill to remain in its final form on the desks of members for 3 days before passage. Mayor Gaynor of New York has signed the bill. Governor Hughes has signed the bill amending the public service law so as to permit the construction of the proposed experimental moving platform subway under Thirty-fourth Street, New York, N. Y., and authorize the purchase of power by a rapid transit operating company. A clause of the amendment declares that rapid transit easement shall not be considered encumbrances preventing the investment of trust funds in mortgages on the property concerned.

Two workmen's compensation bills, which were introduced by the commission on employers' liability and causes of industrial accidents, unemployment and lack of farm labor on March 21, have been reported favorably by the judiciary committees of both the Senate and Assembly. The first bill applies to a special list of extra-hazardous employments, such as railroading, structural work, electric work, etc. Without taking away any existing rights it would give to a workman injured through the negligence of the employer or any superintendent, foreman or fellow workman, or through a risk of his trade, the right to get half wages from his employer during his disability, up to 8 years. It would give to the dependents of a workman who had been killed the right to a sum from the employer equal to the employee's wages for four years, with a limit of $3,000. The second bill applies to all employments. It provides certain moderate amendments to the existing employers' liability law, and permits employers and employees to make a contract by which the employee gives up his uncertain right to sue for damages in cases where he can prove negligence, in return for a certainty of compensation for all accidents of employment according to the same rates mentioned above, i. e., half wages for disability, three years' wages for death. On May 10, Assemblyman Parker's public service law amendments bill was further amended in the Senate so as to give the Public Service Commissions power to regulate commutation and mileage rates on railroads.

Financial and Corporate

New York Stock and Money Market

May 10, 1910.

The tone of the stock market improved during the past week and prices have almost recovered the losses sustained in the recent slump. Trading, however, continues to be dull and is still confined largely to professionals. The investing public is not in the market, a fact especially noticeable in the market for bonds, for which the demand is very light. The shares of the Interborough Rapid Transit Company are active, and prices, especially for the preferred stock, are stronger.

The money market is little changed. Quotations are a trifle easier than during the previous week and banks are sufficiently supplied with funds for all present needs. Rates to-day were: Call, 3 to 4 per cent; 90 days, 4 per cent.

Other Markets

Both Philadelphia Rapid Transit and Union Traction have advanced several points, the selling pressure having been relieved.

In Boston, Massachusetts Electric and Boston Elevated prices have advanced to some extent. Other tractions are quiet.

There has been some trading in Metropolitan Elevated in the Chicago market during the week, and both issues, especially the common, are stronger in price. A few shares of Chicago Railways Series 2 have been sold at about 28¼.

In the Baltimore market there has been less trading in the bonds of the United Railways Company than usual, but there have been some transactions almost every day in the stock. The sales of the latter have been around 13¼.

Quotations of various traction securities as compared with last week follow:

	May 3.	May 10.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	126	a127½
Boston & Suburban Electric Companies	*16	*16
Boston & Suburban Electric Companies (preferred)	*73	*75
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a44	a43
Brooklyn Rapid Transit Company	74⅝	79⅛
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	82¼	84¾
Capital Traction Company, Washington	a132	a131
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a100	a99
Chicago Railways, ptcptg., ctf. 2	a29	a28¾
Chicago Railways, ptcptg., ctf. 3	a13	a13
Chicago Railways, ptcptg., ctf. 4s	a7¼	a8
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104½
Detroit United Railway	59½	*59½
General Electric Company	146	149
Georgia Railway & Electric Company (common)	a115	a112
Georgia Railway & Electric Company (preferred)	a87	a87
Interborough-Metropolitan Company (common)	19⅜	21⅜
Interborough-Metropolitan Company (preferred)	51	56⅜
Interborough-Metropolitan Company (4½s)	79⅝	*79⅝
Kansas City Railway & Light Company (common)	*31	a28
Kansas City Railway & Light Company (preferred)	*77⅝	*77⅝
Manhattan Railway	132	136
Massachusetts Electric Companies (common)	16⅞	a18½
Massachusetts Electric Companies (preferred)	a88	a86
Metropolitan West Side, Chicago (common)	a16½	a17
Metropolitan West Side, Chicago (preferred)	a56	a58
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	70⅜	73¾
Northwestern Elevated Railroad (common)	a18	a18
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a49½	a49½
Philadelphia Company, Pittsburg (preferred)	a43½	a44
Philadelphia Rapid Transit Company	a16½	a19⅜
Philadelphia Traction Company	a85	a85¼
Public Service Corporation, 5 per cent col. notes	*96½	*96½
Public Service Corporation, ctfs	a103½	a102½
Seattle Electric Company (common)	*115	*113½
Seattle Electric Company (preferred)	103	103
South Side Elevated Railroad (Chicago)	*53½	a58½
Third Avenue Railroad, New York	6	7
Toledo Railways & Light Company	9	9⅜
Twin City Rapid Transit, Minneapolis (common)	112½	112¾
Union Traction Company, Philadelphia	a44	a48½
United Rys. & Electric Company, Baltimore	*12¼	*12¼
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	a37	36½
Washington Ry. Electric Company (preferred)	a91	90¼
West End Street Railway, Boston (common)	a87½	87½
West End Street Railway, Boston (preferred)	a101¼	102¼
Westinghouse Elec. & Mfg. Company	62	65
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Report of J. G. White & Company, Inc.

The report of J. G. White & Company, Inc., New York, N. Y., for the year ended Feb. 28, 1910, showed an increase in the surplus from $388,406 to $391,394. In his report President White says in part:

"It is pleasing to note that your company is acting as designing and supervising engineers for important work in Canada, amounting to several millions of dollars, receiving satisfactory fees and doing the work, as we believe, in a very efficient manner and with entire satisfaction to our clients. At present not only has your company no contracts on other than cost plus a fee basis, but none of our subsidiary or affiliated companies has any fixed price contracts.

"Your branch office, at San Francisco, established something more than a year ago, has not only been more than self-maintaining, but has assisted in securing important engineering and construction works now in progress. During the year a branch office was established at Chicago, and this has already proved to be more than self-maintaining.

"In addition to important steam railroad, steam power plant, street railway, gas and other varied work, your company is carrying out an exceptionally large number of important hydroelectric and irrigation developments. In these lines of work we now have an unusually large and experienced staff of engineers and construction men. Believing that much rich land in the United States will be reclaimed by drainage during the next decade, we have arranged to have a special engineering division for this work, equal to any in the country. Increased attention is also being given to industrial engineering. Your company has never had more desirable business in prospect than at present."

The balance sheet follows:

ASSETS.	
Good Will, Purchase of Business, etc.	$1,499,037.46
Uncompleted Contracts and Undertakings at Cost	331,160.45
Securities Owned and Syndicate Participations	1,765,816.19
Bills Receivable	54,516.09
Accounts Receivable	444,669.06
Interest and Dividends Accrued	7,361.58
Working Capital at Construction and Branch Offices (Net)	42,604.61
Cash in Banks and in Office	302,181.59
	$4,447,347.03

LIABILITIES.	
Capital Issued:	
15,000 Shares of Common Stock	$1,500,000.00
20,000 Shares of 6% Cumulative Preferred Stock	2,000,000.00
Bills Payable	400,855.00
Accounts Payable	125,097.88
Sundry Stockholders for Dividend on 6% Cumulative Preferred Stock, Payable May 1, 1910	30,000.00
Surplus or Undivided Profits	391,394.15
	$4,447,347.03

Belton & Temple Traction Company, Belton, Tex.—The property of the Belton & Temple Traction Company was sold under foreclosure at Waco, Tex., on May 3, 1910, by W. G. Haag, as special master, to Messrs Little and Ahrens, for $25,000.

Camden & Trenton Railway, Trenton, N. J.—Chancellor Pitney, Trenton, N. J., has directed that the property of the Camden & Trenton Railway be turned over by Receiver Sadler to Frysinger Evans, Eugene A. Martin and Charles R. Rens, who purchased the property at the foreclosure sale. Messrs. Frysinger, Evans and Martin are reported to have acted in the interest of the Public Service Corporation of New Jersey.

Consolidated Railway & Power Company, Fayetteville, N. C.—The property of the Consolidated Railway & Power Company has been sold under foreclosure for $67,000 to Mrs. Mary M. B. MacRae, Fayetteville, representing the estate of the late S. H. MacRae.

Eastern Ohio Traction Company, Cleveland, Ohio.—The eastern division of the Eastern Ohio Traction Company's lines, which extends from Lee and Wayfield roads, Cuyahoga County, Ohio, to Middlefield and Chardon, Geauga County, will be sold at public auction at the office of R. D. Beatty, the receiver of the company, Electric Building, Cleveland, Ohio, on June 10, 1910. The appraised value of the property is $1,130,000, and no bid for less than $750,000 will be received.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—The Fairmont & Clarksburg Traction Company

has offered for sale at 76½ to residents of the towns through which it operates $400,000 of preferred stock of the company.

Forty-Second Street, Manhattanville & St. Nicholas Avenue Railroad, New York, N. Y.—The sale of the property of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad under foreclosure has been further postponed by Judge Lacombe of the United States Circuit Court from May 16, 1910, to June 6, 1910. In the petition asking for the order of the court it is set forth that bonds to the amount of $1,460,000 secured by a mortgage of the company's property were sold under the decree of foreclosure of the property of the Third Avenue Railroad and that the plans of reorganization of that company under consideration by the Public Service Commission will take a little more time, and the best interests of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad will be conserved by the adjournment asked for.

Hartford & Springfield Street Railway, Hartford, Conn.—The directors of the Hartford & Springfield Street Railway have declared a semi-annual dividend of 1 per cent on the preferred stock of the company. This is the first dividend paid by the company since Nov. 1, 1907.

Interstate Railways, Philadelphia, Pa.—John A. Rigg, president of the Interstate Railways, has announced that the proposed issue of preferred stock by the company has been found to be impracticable because so large a proportion of the bonds is held by trustees who cannot legally accept the proposed stock in payment of interest on their securities, and that the contemplated plan of issuing the preferred stock has therefore been abandoned. The company deems it to the best interest of all parties concerned to consummate the Earle plan and the holders of bonds outstanding are recommended to deposit their bonds without further delay in order that the plan may be declared operative. The company is said to have arranged to lease the property of the Wilmington & Chester Traction Company and the Chester Traction Company to J. G. White & Company, Inc., New York, N. Y.

North Jersey Rapid Transit Company, Paterson, N. J.—The North Jersey Rapid Transit Company has filed at Trenton, N. J., an amendment to its articles of incorporation increasing the capital stock of the company from $1,000,000 to $2,000,000.

Northern Texas Electric Company, Fort Worth, Tex.—Estabrook & Company, Boston and New York, and Parkinson & Burr, Boston and New York, offer for subscription at 96 and interest the unsold portion of $1,100,000 of the present issue of $1,500,000 of collateral trust 5 per cent gold sinking fund bonds of the Northern Texas Electric Company, dated Jan. 1, 1910, and due Jan. 1, 1940, but callable as a whole or in part for sinking fund purposes only at 105 and interest on any interest date. The Commonwealth Trust Company, Boston, Mass., is trustee of the issue. The Northern Texas Electric Company owns 28,991 shares out of the issue of 29,000 shares of stock of the Northern Texas Traction Company.

Philadelphia (Pa.) Rapid Transit Company.—On May 5, 1910, the Common Council of Philadelphia and the Select Council authorized the Philadelphia Rapid Transit Company to borrow $2,500,000 and to issue car trust certificates. It is stated that the company will now be able to make a car trust loan on account of the purchase of new rolling stock to cost about $1,079,500. Bioren & Company, Philadelphia, in a circular which they issued on May 7, 1910, referred to the decline in the shares of Union Traction Company and Philadelphia Rapid Transit Company stock due to the labor troubles of the Philadelphia Rapid Transit Company, a certain persistent journalistic attack and the general decline in the stock market. They say in part: "The actual capital placed in the various street railway properties of this system during some 60 years of operation, with interest thereon when no dividends have been paid, receives an average return of but a fraction over 6 per cent. This fact is not generally known, else it would seem that attacks based on alleged large returns on invested capital would be discontinued."

Sao Paulo Tramway, Light & Power Company, Sao Paulo, Brazil.—The Sao Paulo Tramway, Light & Power Company reports earnings as follows for the year ended Dec. 31, 1909: Gross receipts, $2,439,486, as compared with $2,287,411 for 1908; operating expenses, $846,627, as compared with $783,051 for 1908; charges, $371,986, as compared with $365,468 for 1908; surplus, $1,220,873, as compared with $1,138,892 for 1908; dividends and construction accounts, $1,128,867, as compared with $1,136,538 for 1908; surplus, $92,005, as compared with $2,354 for 1908.

San Francisco, Vallejo & Napa Valley Railway, Napa, Cal.—Ralph W. Boyer, Milford, Mass., has asked that a receiver be appointed for the San Francisco, Vallejo & Napa Valley Railway. He alleges that the proceeds of an issue of bonds which were placed to extend the road from Napa to Calistoga were misused.

Trenton & New Brunswick Railroad, Trenton, N. J.—Irwin Shupp, Jr., and Charles Sinnickson, Philadelphia, Pa., acting for the bondholders of the Trenton & New Brunswick Railroad, purchased the property of the company on May 4, 1910, for $200,000 at the sale conducted by Frank S. Katbenbach, Jr., acting as master in chancery.

Union Traction Company of Kansas, Independence, Kan.—The Board of Railroad Commissioners of Kansas has approved an issue of $150,000 of bonds by the Union Traction Company, of Kansas, for improvements to the interurban railway of the company in Montgomery County. Bert Clark & Company, Chicago, Ill., offer at 96¼ and interest the unsold portion of $150,000 of first mortgage 5 per cent bonds of the company of 1907, of which $650,000 are outstanding.

United Railways Investment Company, San Francisco, Cal.—At the annual meeting of the United Railways Investment Company stockholders approved the plan to issue $6,000,000 of 6 per cent 20-year convertible bonds, subject to redemption at 105 on any semi-annual interest date, on 60 days' notice, the bonds to be convertible at par at the option of the holder into common stock at par, after a date, to be fixed by the board, but not within two years of date of issue. The proposal to increase the capital stock from $50,000,000 to $56,000,000 was also approved. This increase will all be in common stock and will be reserved in the treasury of the company to be issued on demand to holders of the above-mentioned bonds in accordance with the terms imposed. A further resolution was adopted directing that full power be conferred on the board of directors to utilize a portion of the authorized but unissued preferred stock of the company at par for payment or adjustment of arrears of dividends on the outstanding preferred stock. On any shares of the preferred thus issued dividends will accrue from April 1 or Oct. 1 next ensuing from the date of issue The directors were re-elected.

Wilkes-Barre & Wyoming Valley Traction Company, Wilkes-Barre, Pa.—F. M. Kirby and Abram Nesbitt have been elected directors of the Wilkes-Barre & Wyoming Valley Traction Company.

Youngstown & Sharon Railway & Light Company, Youngstown, Ohio.—Hearings were begun on April 27, 1910, before D. Cady Herrick, New York, N. Y., as referee, in an action against the New York Trust Company as successor to the New York Security & Trust Company, in which E. Clarence Jones seeks an accounting in behalf of the stockholders of the Mahoning Valley Railway, which has been merged with the Youngstown & Sharon Railway & Light Company.

A feature at Willow Grove Park, Philadelphia, in the summer each year is the appearance of celebrated bands and orchestras. The attractions this year include Patrick Conway's Band from May 28 to June 18; Fred A. Stock with the Theodore Thomas Orchestra of Chicago from June 19 to July 9; Victor Herbert and orchestra from July 10 to Aug. 13, and John Philip Sousa and band from Aug. 14 to Sept. 5. The Philadelphia Rapid Transit Company has issued a special folder about the musical attractions at the park in which is included a short history of the development of music in Philadelphia from Colonial days up to the present time. Portraits are reproduced of the musical conductors who will appear in the park during the summer of 1910 and of celebrities who have appeared before audiences in Philadelphia at various times.

Traffic and Transportation

Recent Advertising of the Twin City Rapid Transit Company

The Twin City Rapid Transit Company, Minneapolis and St. Paul, has issued two attractive advertising folders. The larger of the folders is entitled "How to See the Twin Cities, Minneapolis-St. Paul, on Electric Cars.". The smaller folder is devoted to the Minnetonka Lake resorts reached by the cars and steamers of the Twin City Rapid Transit Company and allied lines. Neither of the publications contains a timetable; it has rather been the plan to present useful information about each of the many picturesque places to which service is given.

The folder, "How to See the Twin Cities," is printed in two colors, with cover designs in four colors. The front cover design is a bird's-eye view of the Twin Cities located on the Mississippi River and surrounded by the numerous lakes for which the district is famous. The back cover, also an original design, shows Minneapolis and St. Paul with arms extended to greet visitors. In the background are Minneapolis, the Mississippi River and St. Paul. Below this is a view in which a passenger car is shown standing on tracks close to a dock to which one of the Twin City steamers is approaching.

The 48 reading pages of the folder are 8 in. x 9 in. in size, and contain 69 halftone views of resorts and scenic features. In addition there are several maps which show the shore line and electric roads to prominent lake and park resorts. The center piece of the folder is a four-color bird's-eye view map, showing Lake Minnetonka on the west, Minneapolis and St. Paul near the center and White Bear Lake and Stillwater on the north and east, representing a distance from east to west of 48 miles and from north to south of 16 miles. Clearly indicated on the map by red lines is the entire trackage of 373 miles of the Twin City Rapid Transit Company. The reading matter is so grouped as to present the attractive features and data about each of the notable lakes, parks, falls, mounds and other points of interest to sightseers who may visit the Twin City district.

The folders are being distributed at hotels, stations, etc., and by mail. The excursion and tourist season begins on May 15 and ends on Oct. 15. For four weeks previous to May 15 the passenger department of the Twin City Rapid Transit Company advertised in all the daily papers of Minneapolis and St. Paul and called attention to the new folder, stating that a copy would be mailed to any address on receipt of 4 cents in stamps to cover the cost of mailing. Between 50 and 150 replies a day were received from a widespread territory. A special envelope which exhibits a modest advertisement is used to enclose the folder when it is mailed. In addition to the means of distributing the folders previously mentioned they are placed in every folder rack in the Twin Cities and are circulated by the steam railroads which reach Minneapolis and St. Paul. The preparation, publication and distribution of the publicity matter of the Twin City Rapid Transit Company are in charge of A. W. Warnock, general passenger agent of the company.

Abandonment of Unsuccessful Line Approved by Commission

The Public Service Commission of the Second District of New York has approved the declaration of abandonment by the Port Jervis Traction Company of that part of its railway in Port Jervis known as the Kingston Avenue branch and has authorized the company to extend its line from Port Jervis to Sparrowbush.

On the question of abandonment the commission says that the railway now owned by the company has not been operated successfully either actually or financially during its entire history; that the Kingston Avenue branch has not yielded returns above operating expenses; that to restore the branch to proper operating conditions would involve the expenditure of approximately $14,000, and that while under the manner and methods of operation in recent years the service and accommodations afforded to the public on the branch have been wholly inadequate and frequently have ceased altogether to permit the making of car repairs, and statistics showing the patronage of the branch when in fair physical condition with good equipment and regular service were lacking in the case, nevertheless the character of the branch itself is not such as would warrant any other expectation than that the branch would, if operated, result in considerable loss of revenue and constitute a serious burden upon the finances of the company.

The commission is also of the opinion that the street railway in Port Jervis must continue to be operated with small patronage, and it is essential to the furnishing of satisfactory accommodation and good service to the public that the company be enabled in all reasonable ways to secure a sufficient amount of gross revenue.

The commission has given full weight and consideration to the interests of residents along and near the branch in the retention of the line and its restoration to a state of adequate accommodation and service, and recognizes that considerable disadvantage would be entailed upon residents by its abandonment. The commission is more strongly impressed, however, by the small amount of traffic which originates in certain parts of the city of Port Jervis, and recognizes that if Port Jervis is to have continued adequate trolley service, the operation of cars must be restricted for a considerable time at least to those portions of the city and vicinity which are likely to afford profits from operation. The commission has also taken into account the extension of the company's line to Sparrowbush for the purpose of adding to the company's revenue and affording an additional required service, and the further fact that the company cannot expect, in view of the general situation of its property and finances, to market bonds in excess of its present issue at this time except at a ruinously low price.

New Haven Railroad Increase Commutation Over Electrified Lines

The New York, New Haven & Hartford Railroad filed with the Interstate Commerce Commission at Washington, D. C., on May 2, 1910, certain changes in the rates for transporting passengers over its lines which affect more particularly the patrons of the electrified lines of the company who commute between New York and nearby towns and villages. The new schedule will go into effect on June 1, 1910, and will abolish the gradually decreasing commutation scale and place all commutation tickets on a flat rate basis. The following comparative table has been prepared to show the present monthly commutation rate, the new rate and the distance between stations of the company out of New York as far as New Haven:

Station.	Present rate.	New rate.	Miles.
Mount Vernon	$5.60	$6.75	13.7
Pelham	5.85	7.05	15.0
New Rochelle	6.35	7.65	16.5
Larchmont	6.75	8.10	18.7
Mamaroneck	7.00	8.40	20.2
Harrison	7.50	9.00	22.2
Rye	8.00	9.60	24.0
Port Chester	8.25	9.90	25.7
Greenwich	8.50	10.20	28.2
Cos Cob	8.55	10.30	30.0
Riverside	8.65	10.40	30.2
Sound Beach	8.75	10.50	31.5
Stamford	9.00	10.80	33.5
New Canaan	10.30	12.40	41.2
Noroton	9.35	11.25	37.0
Darien	9.50	11.45	37.0
South Norwalk	10.40	12.50	41.5
Bridgeport	12.75	16.80	56.0
New Haven	16.00	22.00	73.2

Increases in the rates of fare between New York and suburban stations on the New York Central & Hudson River Railroad, the Erie Railroad, the Delaware, Lackawanna & Western Railroad and the Central Railroad of New Jersey are also said to be contemplated. The Long Island Railroad will charge commuters over its lines out of New York 95 cents more a month as soon as service is begun under the East River to the terminal of the Pennsylvania Railroad at Seventh Avenue and Thirty-third Street, New York.

A delegation of persons along the New York, New Haven & Hartford Railroad within 25 miles of New York who would be affected adversely by the increase in rates proposed by the New York, New Haven & Hartford Railroad visited Albany on May 10, 1910, to protest to Governor Hughes of New York against the increase. They said that the new rates would impose a serious burden

upon many persons who had bought homes in the suburbs under the impression that the rates in force would be permanent. Real estate values would suffer, and incalculable loss would result to the merchants in towns and villages, as development would be arrested. The Governor was asked to send a special message to the Legislature urging the enactment of an amendment to the Public Service Commissions law which would give the commissions power to consider complaints regarding commutation, family and mileage rates of fare over steam railroads.

Long Trip by Trolley.—A start was made on May 10, 1910, on the trip by trolley from Utica, N. Y., to Indianapolis, Louisville, Toledo, Detroit and Cleveland, which was planned by business men of Utica and vicinity. The itinerary of the trip and a map of the route to be traversed were published in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, page 461.

Monthly Bulletin in Indiana.—The first monthly bulletin of the Indiana Railroad Commission will soon be issued. The purpose of the bulletin is to report changes in railway freight tariffs. The bulletin will show a number of changes in freight rates on steam railroads, but none on the interurban electric railways. The interurban railways are not required to file freight tariffs with the commission until their freight earnings equal 33⅓ of their gross earnings.

Precautions Against Accidents in Pennsylvania.—In response to the request of the State Railroad Commission of Pennsylvania, a majority of the electric railways in that State have informed the commission that the recent order that before a car crosses a railroad track the conductor must go forward and see that no train is approaching has been observed by many companies for years. Reports made to the commission by the electric railways show that in the first three months of 1910 there were 35 fatalities on the electric railways. In the same period 942 persons were injured on electric railways. The figures showing fatalities are higher than for the corresponding period in 1909, as 236 persons were killed on steam roads and 36 persons on the electric railways. The increase in the number of persons injured on the electric railways was 225 for the quarter ended March 31, 1910.

Increase in Wages in Syracuse and Utica.—The Syracuse (N. Y.) Rapid Transit Company has increased the wages of its employees as follows, effective on May 1, 1910: First 6 months, 21½ cents an hour; second 6 months, 23½ cents per hour; after 1 year, 25½ cents per hour. The Utica & Mohawk Valley Railway, Utica, N. Y., increases the wages of its employees as follows, effective on May 1, 1910: First 6 months, 21½ cents per hour; second 6 months, 23½ cents per hour; after 1 year, 25½ cents per hour; interurban work, 27½ cents per hour. C. Loomis Allen, who is vice-president and general manager of both companies, in announcing the increase made public a statement in which he said: "I know our men appreciate the manner in which the company has treated them. Our idea is to pay well and attract the services of a high class of men. We want to get the most efficient and careful service and we are willing to pay what it is worth. We have confidence in our men and they have confidence that we will always do as well by them as we can."

No-Seat-No-Fare Ordinance Defeated.—The proposal to incorporate a no-seat-no-fare clause in the proposed traffic law of Norfolk, Va., was defeated when the traffic law was considered before the ordinance committee of the Council of Norfolk. John Blair MacAfee, president of the Norfolk & Portsmouth Traction Company, was the principal speaker in opposition to the no-seat-no-fare feature of the code. Mr. MacAfee reviewed the failure that followed previous legislation which sought to enforce a no-seat-no-fare provision, and referred particularly to the recent fiasco in Trenton, of which mention was made in the ELECTRIC RAILWAY JOURNAL of April 23, 1910, pages 727 and 761. Section 11 of the ordinance was finally amended so as to strike out all reference to the no-seat-no-fare clause. Section 12 was amended so as to provide that cars of electric railways shall not be operated over street crossings at a speed of more than 6 m.p.h. and that the speed of cars shall not exceed 15 m.p.h. on streets south of Queen Street. Another amendment gives pedestrians the right of way over electric cars.

Personal Mention

Mr. Guy W. Talbot, vice-president and general manager of the Oregon Electric Railway, Portland, Ore., has been elected president of the Portland Gas & Coke Company, Portland, Ore., and a director of the company.

Mr. C. F. Uebelacher, chief engineer of Ford, Bacon & Davis, has been representing the Northwestern Elevated Railroad of Chicago in the conferences in that city on the proposed modification of union elevated loops.

Mr. Bernard Corrigan, who retired lately as president of the Kansas City Railway & Light Company, Kansas City, Mo., was recently presented with a set of library furniture by the employees of the company as a token of their esteem.

Mr. Robert Morrison, Jr., secretary of the Michigan United Railways, Jackson, Mich., for the last four years, has been elected treasurer of the company to succeed Mr. Pomeroy Ladue, resigned, and the offices of the secretary and treasurer will be combined.

Mr. W. C. Cuntz, general manager of the Goldschmidt Thermit Company, is one of the nine delegates appointed to represent the United States Government at the International Railway Congress in Berne, Switzerland, this summer. Mr. Cuntz sailed for Europe on May 10 to attend this congress.

Mr. Walter I. Slichter, who has been connected with the General Electric Company for the past 14 years, and is now electrical engineer at the Schenectady office, has been appointed professor of electrical engineering at Columbia University, from which he graduated in 1896. Mr. Slichter has been a full member of the American Institute of Electrical Engineers since 1903.

Mr. C. R. Gowan has been appointed general passenger agent of the Syracuse (N. Y.) Rapid Transit Company, Utica & Mohawk Valley Railway, Utica, N. Y., and the Oneida (N. Y.) Railway, to succeed Mr. Albert E. Eastman, who resigned recently as general express and passenger agent of these companies to become general manager of the Windsor, Essex & Lake Shore Rapid Transit Railway, Windsor, Ont.

Mr. F. W. Watts has been appointed general express agent of Syracuse (N. Y.) Rapid Transit Company, the Utica & Mohawk Valley Railway, Utica, N. Y., and the Oneida (N. Y.) Railway, to succeed Mr. Albert E. Eastman, who resigned recently as general express and passenger agent of these companies to become general manager of the Windsor, Essex & Lake Shore Rapid Transit Railway, Windsor, Ont. Mr. Watts was formerly division express agent of this company.

Mr. W. W. Wheatly has resigned as general manager of the railway department of the Kansas City Railway & Light Company, Kansas City, Mo., but expects to remain in Kansas City until July 1, 1910. Mr. Wheatly has been connected with the Kansas City Railway & Light Company since November, 1908, when he succeeded Mr. Charles N. Black, who is now general manager of the United Railroads of San Francisco. Mr. Wheatly was formerly connected with the Public Service Corporation of New Jersey and Brooklyn Rapid Transit Company, and accepted the management of the Mexico Electric Tramway, Ltd., Mexico City, Mex., at the solicitation of Werhner, Beit & Company, London, Eng. After serving as manager of the Mexico Electric Tramway for about two years he was elected president of the company. Mr. Wheatly remained in Mexico about a year after resigning from the Mexico Electric Tramway to look after his private interests, he being a director of the Mexico City Bank, the American Banking Company of Guadalajara and several other companies.

Mr. Lee Massengale, vice-president and general manager of the Iola (Kan.) Electric Railroad, whose appointment as general manager of the Lake View Traction Company, Memphis, Tenn., was announced recently in the ELECTRIC RAILWAY JOURNAL, was born at Denton, Tex., on July 6, 1865. He has been connected with steam and electric railways since 1883. His first position was in the shops of the Iron Mountain Railroad at Little Rock, Ark., where he served an apprenticeship of 2½ years as machinist. Sub-

sequently he became a fireman with the Iron Mountain Railroad. In 1885 Mr. Massengale entered the employ of the Lindell Railroad, St. Louis, Mo., and assisted in the experiment which was made of equipping one of the cars of the company with storage batteries. From 1887 until 1889 Mr. Massengale was connected with steam railroads. In the latter year, however, he returned to the Lindell Railroad in connection with the installation of the Sprague system, and subsequently became master mechanic of the company. In 1900 Mr. Massengale was appointed master mechanic of the United Railways of St. Louis, which took over all the lines in St. Louis except the St. Louis & Suburban Railway. In 1894 Mr. Massengale accepted the position of master mechanic of the East St. Louis & Suburban Railway, but resigned from the company in 1906 to become general manager of the Iola Electric Railway. On April 4, 1910, he was elected vice-president and general manager of the Iola Electric Railroad. These offices he now holds in addition to the position of general manager of the Lake View Traction Company.

OBITUARY

John H. Converse, president of the Baldwin Locomotive Works, is dead. Mr. Converse was 69 years old. He was born in Burlington, Vt., in 1840, and was graduated from the University of Vermont in 1861. He first turned his attention to newspaper work, being employed for 3 years as editorial writer on Burlington Times. He then went to Chicago, where he was engaged in railroad work for 2 years. In 1870 Mr. Converse became connected with the Baldwin Locomotive Works. Three years later he was made a member of the firm, and subsequently was entrusted with the general business and financial management of the company.

Walter C. Kerr, president of Westinghouse, Church, Kerr & Company, died at Rochester, Minn., May 8. On March 1 Mr. Kerr went to Rochester for treatment by the Doctors Mayo, surgeons of international reputation, who found that an operation for cancer was imperative. The operation was successfully performed, convalescence was apparently rapid, but finally complications ensued which were the immediate cause of death. Mr. Kerr was born at St. Peter, Minn., Nov. 8, 1858, the son of Rev. Aaron H. Kerr, a Presbyterian clergyman, and chaplin during the Civil War. He received his primary education in the public schools of St. Peter, and entered the mechanical engineering course at Cornell University, from which he was graduated in 1879. He remained at Ithaca as an instructor in Sibley College for a year, and assistant professor until 1883, when he resigned to join the Westinghouse Machine Company. From salesman he was promoted to manager of the company's New York office, and in 1884 became one of the organizers of the present firm of Westinghouse, Church, Kerr & Company, in which he first held the office of treasurer, later that of vice-president, and became president about 15 years ago. At one time he was vice-president of the Westinghouse Machine Company, and at the time of his death was a director in the Electric Properties Company, and in the Lackawanna & Wyoming Valley Rapid Transit Company. Mr. Kerr was a trustee of Cornell University for the past 20 years, and has always taken the warmest interest in Sibley College, which is much indebted to him, both as an adviser and as a liberal donor. He was a member of the American Institute of Electrical Engineers, American Society of Mechanical Engineers, Canadian Society of Civil Engineers, Franklin Institute, Lawyers' Club, Engineers' Club, New York Railroad Club, Psi Epsilon Club, Duquesne Club of Pittsburgh and the Richmond County Country Club. Mr. Kerr was a man of high ideals, both in his business and professional life and in his work as an educator. His temperament was such that he attracted all with whom he came in contact and he had a wonderful fund of information on all the broad affairs of life as well as an intimate knowledge of many special subjects. Early in his career he conceived the idea that engineering could be highly organized, and the masterly manner in which he developed this thought is evident from the statement that his company's present organization comprises, in round numbers, 500 office engineers, 700 engineers in the field and a total of 8000 men employed on various engineering works.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Dauphin Island Railway & Harbor Company, Mobile, Ala.**—Incorporated in Alabama in the interests of the Tidewater Company which proposes to build an interurban railway from Gadsden to Tuskaloosa, via Birmingham, the same to be extended by water and otherwise to Dauphin Island. Capital stock, preliminary, $3,000. Principal office, Birmingham. Officers and incorporators: George T. Bishop, Cleveland, Ohio, president and treasurer; F. F. Graves, Chicago, Ill., vice-president; J. M. Dewberry, Birmingham, secretary; Frank H. Ginn, Cleveland, and D. E. Mitchell, Lebanon, Tenn.

***Marysville & Colusa Railway, Colusa, Cal.**—Application for a charter has been made in California by this company which is affiliated with the Northern Electric Railway, Chico, to build a 30-mile railway from Marysville to Colusa, via Yuba City. Capital stock, $1,500,000. Directors: Charles H. Hammon, Leon J. de Sabla, Samuel Lilienthal, George E. Springer and Herbert W. Furlong.

***Marion (Ill.) Railroad.**—Incorporated for the purpose of building an electric railway from Marion to Johnson City. Incorporators: A. E. Harper, William D. Haynie, E. J. Hughes, L. D. Doty and C. A. Brickett, all of Chicago.

***Vincennes, Washington & Eastern Traction Company, Vincennes, Ind.**—Incorporated in Indiana to build an electric railway from Vincennes to Loogootee. Capital stock, $100,000. Incorporators: Joseph L. Ebner, Vincennes; Elmer J. Binford, Greenfield; John B. Seal, Loogootee; Austin F. Cabel, S. C. Eskridge and A. J. Padgett, Washington.

Sioux City & Eastern Interurban Railway, Sioux City, Ia.—Incorporated in Iowa to build an electric railway through Battle Creek, Climbing Hill and Ida Grove. Capital stock, $100,000. W. L. Harding, attorney. [E. R. J., Aug. 14, '09.]

Scranton & Lake Ariel Railway, Scranton, Pa.—Application for a charter will be made in Pennsylvania by this company on May 23 to build an electric railway between Scranton and Lake Ariel. Incorporators: John J. Brown, Valentine Bliss, W. J. Davis, John J. Holland, F. W. Wollerton, E. J. Lynett and A. G. Rutherford. [E. R. J., June 26, '09.]

***Walla Walla Valley Railway, Walla Walla, Wash.**—Incorporated in Washington to construct railways in and adjacent to Walla Walla, interurban line, and in Umatilla County, also to Milton, Ore. Capital stock, $500,000. Incorporators: Lewis A. McArthur, R. D. Greer and E. D. Hanna.

FRANCHISES

Riverside, Cal.—J. B. Jackson, who is said to represent the San Joaquin Valley Electric Railway, has applied to the supervisors for a franchise to build a 25-mile railway to connect Moreno, Lakeview, San Jacinto, Hemet and Florida. [E. R. J., April 30, '10.]

Golden, Colo.—Rees C. Vidler has been granted a franchise to build a railway from Golden to the foot of Lookout Mountain, from which point a cable line is to be built to the summit. [E. R. J., April 23, '10.]

Harvey, Ill.—The Eastern Illinois Railway, a subsidiary of the Chicago City & Connecting Railways has asked the City Council for a franchise to build a railway in Harvey. This line will connect West Hammond, Harvey, Burnham, Hegewisch and Riverdale.

Joliet, Ill.—The Joliet & Southern Traction Company has asked the Council for a new franchise on Jackson Street extending from the city limits over the new Jackson Street viaduct and connecting with several streets in Ridgewood.

Minooka, Ill.—The Chicago, Ottawa & Peoria Railway, La Salle, has been granted a franchise by the Council to build a railway in Minooka. This is part of the plan to build a 22-mile extension from Morris to Joliet.

***Frankfort, Ind.**—Robert Wood, Chicago, Ill., is asking the

Commissioners of Cass, Carroll and Clinton Counties for franchises to build an electric railway from Logansport to Burlington and thence by way of Michigan City to Frankfort. The company represented by Mr. Wood promises to begin work soon. The aim is to connect with the Kokomo, Frankfort & Terre Haute Railway now in course of construction.

***Plymouth, Ind.**—Omer F. Neff and associates have been granted a 99-year franchise by the Commissioners of Marshall County for the use of the highways from Bremen to the county line for the construction of an interurban railway to use either electricity or gasoline power. It will connect Bremen and Mishawaka.

Cedar Rapids, Ia.—William Dows and Isaac Smith have been granted an electric railway franchise in Cedar Rapids. [E. R. J., May 7, '10.]

Cedar Rapids, Ia.—The Illinois Central Electric Railway, Canton, has applied for a franchise to build an electric railway over certain streets in Cedar Rapids.

Detroit, Mich.—The Michigan United Railways, Lansing, has asked the Council for a 30-year franchise to build a railway through certain streets in Detroit. J. P. Clark, Jackson, general manager.

Ironwood, Mich.—The Ashland Power Company, Ironwood, has applied to the City Council for a franchise for electric light and power plant in Ironwood and for an interurban electric railway. The company has recently taken over the Gogebic Electric Company and proposes to construct an interurban electric railway along Gogebic and Ironwood to serve Vessimer, Wakefield and intermediate places. The power house with a capacity of 2000 kw will be constructed at Brownstown Falls.

Joplin, Mo.—The Joplin & Pittsburg Railway, Pittsburg, Kan., has been granted a franchise by the Council to build a double-track extension on West Fourth Street to Electric Park in Joplin.

Corning, N. Y.—The Corning & Painted Post Street Railway will ask the board of public works for permission to double track its lines in Corning.

Fremont, Ohio.—The Fremont City Street Railway has asked the Council to renew its franchise for 25 years so that the projected Fremont & Fostoria Railway, Fostoria, can use its line as an entrance to Fremont.

Harrisburg, Tex.—A. Foster Irwin, representing the Houston-Bay Shore Traction Company, Houston, has asked the County Commissioners for a 50-year franchise to build an electric railway over a number of the county's roads between Houston, Harrisburg and La Porte. The proposed line when completed will connect Houston and Morgan's Point. [E. R. J., May 7, '10.]

Seattle, Wash.—The Seattle, Snohomish & Everett Railway, Seattle, has been granted a 25-year franchise to build an electric railway in Snohomish. Charles W. Kimball, Seattle, secretary. [E. R. J., Mar. 26, '10.]

***Sheridan, Wyo.**—Albert Emanuel and William Sullivan, Dayton, Ohio, have been granted a franchise by the City Council to build a railway in Sheridan.

TRACK AND ROADWAY

Noccalula Railway, Light & Power Company, Gadsden, Ala.—This company will let contract for 2 miles of 50-lb. rails, trolley wire, insulators, etc. Louis Hart, Gadsden, Ala., is interested. [E. R. J., May 7, '10.]

Fort Smith, Van Buren & Interurban Light & Traction Company, Van Buren, Ark.—This company will receive bids during the next 30 days for the construction of its proposed 6-mile railway from Fort Smith to Van Buren. Officers: W. D. Pratt, president; Harry T. Daily, secretary and treasurer. [E. R. J., Jan. 22, '10.]

Northern Electric Railway, Chico, Cal.—This company has started the extensive improvements planned for Lake Winola. A 1-mile extension will be built from the present terminal to the Wilkes-Barre side of the lake. It has also decided to build a picnic ground. A grove of 44 acres has been leased. A. D. Schindler, San Francisco, purchasing agent.

Central California Traction Company, San Francisco, Cal.—It is announced that this company will construct a 12-mile extension from Lockeford to Stockton. This railway connects Stockton and Lodi and is building a line to Sacramento. Sam'l B. McLenegan, Stockton, general manager.

Chicago, Ottawa & Peoria Railway, La Salle, Ill.—This company, which is a part of the Illinois Traction System, has completed surveys for an extension of the eastern end of the line from Morris to Joliet. Rights-of-way are now being purchased and a franchise will probably be requested for an entrance into Joliet.

Bluffton, Ind.—The Ft. Wayne & Springfield Electric Railway, Decatur, is contending with the Cincinnati, Bluffton & Chicago Railway for possession of the old roadbed from Portland to Union City.

Indianapolis, Columbus & Southern Traction Company, Columbus, Ind.—It is reported that this company is preparing to build an extension from Seymour to Bedford by way of Brownstown.

Indianapolis, Ind.—Mayor Shank is said to be negotiating with the Indianapolis Traction & Terminal Company for the construction of several crosstown lines and two or more extensions of existing lines. The company's franchise stipulates that within 3 years crosstown lines should be built and the Mayor asks that this stipulation be complied with.

Cincinnati, Newport & Licking Valley Railway, Cynthiana, Ky.—This company has completed estimates for the construction of the railway between Cynthiana and Paris and grading will be started May 15. Contracts for material are now being let. R. H. Rees, Cynthiana, has charge of the construction work. [E. R. J., April 30, '10.]

Detroit, Lansing & Grand Rapids Railway, Grand Rapids, Mich.—It is announced that franchises have been secured and surveys are being made on this proposed 150-mile railway between Detroit and Grand Rapids. It is probable that two lines will be built on the section between Eagle and Lowell. F. A. Bean, 706 Union Trust Building, Detroit, chief engineer. [E. R. J., Apr. 23, '10.]

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company expects to extend its railway from Pass Christian, the present terminus, to Bay St. Louis and that a steam ferry will be used to transport cars from Henderson's Point to Bay St. Louis. W. F. Gorenflo, Gulfport, purchasing agent.

***Olive Street Railway, Clayton, Mo.**—This company has just completed plans for building a 14-mile railway from Etzel Avenue and Hodiamont tracks along Olive Street road to both Cleve Cœur Lakes, each of which will be reached by branch tracks. The contract to build the line has been let. Among those interested are: Frederick Essen, J. D. Pfister, W. K. Pfister, R. A. Stevens and Carl Feld.

***St. Louis, St. Charles & Northern Traction Company, Mexico, Mo.**—This company has been formed at Middletown for the purpose of building an electric railway from St. Charles north through Troy, Olney, Marling, Middletown, Mount Carmel, Laddonia, Mexico and Paris. Officers: C. B. Duncan, Olney, president and manager; C. H. Rigg, Middletown, second vice-president; Chris. Pearson, Middletown, secretary, and R. M. Hendershot, Middletown, treasurer.

North Missouri Central Railway, St. Louis, Mo.—This company, organized for the construction of a 60-mile interurban railway from Jefferson City to Mexico via Columbia, has increased its capital stock from $600,000 to $2,500,000. Headquarters, National Bank of Commerce Building, St. Louis. O. F. Spaete, president. [E. R. J., Dec. 11, '09.]

North Jersey Rapid Transit Company, Paterson, N. J.—This company has filed an amended certificate increasing its capital stock from $1,000,000 to $2,000,000. The proposed 14-mile railway will extend from Paterson to the New York-New Jersey line near Suffern. It is stated that the company is considering plans for the extension of its lines from the starting point in Bergen County to Garfield and from Suffern north to Spring Valley.

***Bayonne Subway & Developing Company, Port Richmond, N. Y.**—This company has been organized to build a subway from Bayonne to Port Richmond, where it is to connect with the Hudson & Manhattan Railroad and with existing lines on Staten Island. Capital stock, $100,000.

Officers: Wm. S. Van Clief, chairman; Frank Fogin, secretary, and Edward Doyle, treasurer. Among the directors are: Frederick Cozzens, A. L. Burbank, George P. Egbert and Geo. H. Treadwell.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company has secured private right of way between Silver Lake Junction and Bedford, and the line will be changed to that location as soon as possible. The company expects to secure private rights for the entire distance for its extension between Akron and Cleveland.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—This company will soon let contracts for construction of the railway from Nelsonvile to Athens and Logan. Surveys have been completed between Nelsonville and Athens and are now being made in upper Sunday Creek and on Sugar Creek. This company has taken over all the rights and property of the Hocking-Sunday Creek Traction Company, Nelsonville. Charles Tutt, general manager. [E. R. J.]

Albany (Ore.) Interurban Railway.—This company, recently incorporated, has almost completed the surveys from Albany to Sweet Home via Lebanon and South Santiam Valley. Rights of way are being secured. This proposed railway will connect Albany, Sweet Home, Lebanon, Brownsville and Holley. [E. R. J., Feb. 19, '10.]

Lane County Asset Company, Eugene, Ore.—This company reports that it has negotiated with the Coos Bay Rapid Transit Company, North Bend, for the use of its tracks from North Bend to Marshfield. The company is planning to build a 130-mile electric railway to connect Eugene, Florence and Coos Bay. John Baird, Eugene, secretary and treasurer. [E. R. J., May 7, '10.]

Coos Bay Rapid Transit Company, North Bend, Ore.—This company advises that construction was started May 1 by the Empire Construction Company, North Bend, and work is being rapidly pushed on its proposed 4.15-mile railway to connect North Bend and Marshfield. It will operate two cars. Power house and repair shops will be built in North Bend. Officers: W. P. Evans, president; M. E. Everitt, vice-president; C. D. Hockett, secretary, and A. M. Myers, treasurer, all of North Bend. [E. R. J., April 9, '10.]

United Railways, Portland, Ore.—This company has awarded a contract to Porter Brothers to build the Cornelis Gap Tunnel.

Altoona, Hollidaysburg & Bedford Springs Railway, Pittsburgh, Pa.—This company reports that it has 7 miles of poles erected and 1 mile of roadbed ready for ties. This 50-mile railway will connect Altoona, Hollidaysburg, Bedford and Roaring Springs. Headquarters, 427 Fourth Avenue, Pittsburgh, Pa. Geo. W. Burke, secretary and treasurer.

Waynesburg & Blacksville Street Railway, Waynesburg, Pa.—This company has engineers at work in the vicinity of Gamble's Station making changes in the survey of the proposed railway to connect Fairmont and Morgantown, W. Va., with Waynesburg and Pittsburgh. The West Virginia section of the railway is already built. Samuel Eakin, Wadestown, W. Va., president. [E. R. J., Jan. 15, '10.]

Pawcatuck Valley Street Railway, Westerly, R. I.—It is stated that this company is planning to rebuild its Watch Hill line between Westerly and Watch Hill, a distance of 6 miles.

Houston-Bay Shore Traction Company, Houston, Tex.—This company is reported to have secured right-of-way and construction will begin May 1 on the proposed 24-mile interurban railway from Harrisburg through Harris County to La Porte. The line will be laid with 75-lb. rails and there will be 19 bridges and culverts constructed along the line which will mostly be of concrete with the exception of the large steel structure crossing over the Southern Pacific tracks at La Porte. A. Foster Irwin, Detroit, president.

Port Arthur (Tex.) Traction Company.—This company has completed nearly 7 miles of track in Port Arthur and expects to operate cars within 30 days. Headquarters, 503 Reibold Building, Dayton, Ohio. [E. R. J., Aug. 28, '09.]

Clarksburg & Weston Electric Railway, Clarksburg, W. Va.—This company, recently incorporated to build a 24-mile railway from Clarksburg to Weston, including five bridges, has elected the following officers: S. L. Watson, president; C. W. Watson, vice-president; Walton Miller, secretary and treasurer; D. D. Britt, general manager, and James O. Watson, chief engineer. [E. R. J., April 30, '10.]

Wheeling (W. Va.) Traction Company.—This company has awarded a contract for building an extension, including the driving of a tunnel, to the Federal Engineering Company, Pittsburgh, Pa.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company will build a large depot at Seventh Street Junction in Wilmington and also establish extensive yards.

Quebec Railway, Light, Heat & Power Company, Ltd., Quebec, Que.—This company has decided to erect an eight-story office building on the Jacques Cartier market site. The plans and specifications are not complete, but the foundation will be made sufficiently strong to carry an additional four stories should it be deemed advisable at some future date to increase the height of the structure to 12 stories. The company will require four floors for its own use, and will lease the other floors. Tenders for the razing of the market building were submitted on April 28, 1910, and the company expects to commence the work of demolition at once. C. E. A. Carr, Quebec, general manager.

Virginia Railway & Power Company, Richmond, Va.—This company will build a concrete, brick and steel car house to cost $40,000.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—This company expects to build soon a new car house and car shop in Sheboygan.

POWER HOUSES AND SUBSTATIONS

Fort Scott Gas & Electric Company, Fort Scott, Kan.—This company advises that it expects to place contracts during the next two months for building a new power station and expects to purchase generators, engines, turbines and coal-handling machinery. F. D. Martin, Fort Scott, general manager.

Ashland Power Company, Ironwood, Mich.—This company, which has recently taken over the Gogebic Electric Company, Vessimer, Mich., and contemplates the construction of an interurban electric railway, expects to develop water power at Brownstown Falls at a head of 135 ft. The work on the plant of the company at Brownstown Falls will begin very soon. The initial equipment will consist of two 1000-kw generators. A high-tension transmission line about 35 miles long will also be constructed.

Brooklyn (N. Y.) Rapid Transit Company.—This company has awarded a contract to the Westinghouse Electric & Manufacturing Company for three 3000-kw rotary converters, together with transformers and switchboard apparatus. These converters are to be installed in the Bridge Street and Hudson Street substations. A switchboard was also ordered for the Williamsburg power house.

Toledo Railway & Light Company, Toledo, Ohio.—This company has awarded the contract for a 6400-kva, three-phase, 25-cycle, 4000-volt steam turbo-generator for its new power house in Toledo to the Allis-Chalmers Company. Ford, Bacon & Davis, New York, engineers.

Mount Vernon Railway & Light Company, Mount Vernon, Ohio.—It is stated that this company will soon erect a new power house in Mount Vernon to have a capacity of 1200 hp. [E. R. J., Dec. 25, '09.]

Portland Railway, Light & Power Company, Portland, Ore.—This company has placed on order with Allis-Chalmers Company for a 500-kw, 600-volt, 100 r.p.m., vertical-shaft, water-wheel type, d-c generator.

Kittanning & Leechburg Railways, Kittanning, Pa.—This company has started work on the reconstruction of its power house at Garrett's Run, Kittaning, which was recently destroyed by fire. [E. R. J., April 23, '10.]

Bellingham-Skaget Interurban Railway, Bellingham, Wash.—This company announces that the capacity of the Noosack power plant and the York Street station will be doubled. Work on the improvements will be started at once by the Stone & Webster Engineering Company.

Manufactures & Supplies

ROLLING STOCK

Fort Smith Light & Traction Company, Fort Smith, Ark., is arranging to purchase 12 new 35-ft. Brill semi-convertible single-truck cars.

Metropolitan Street Railway, Kansas City, Mo., has issued specifications for 25 cars, which it will order at once. Bids are now being received.

Fort Scott Gas & Electric Company, Fort Scott, Kan., expects to place, during the next two months, contracts for two cars. F. D. Martin, general manager.

Meriden, Middletown & Guilford Railway, Meriden, Conn., which is building a 20-mile line from Meriden to Guilford, is in the market for three cars. Francis Atwater, Meriden, president.

United Railways, San Francisco, Cal., reported in the ELECTRIC RAILWAY JOURNAL of April 16, 1910, as contemplating the purchase of 50 cars, has ordered this equipment from the St. Louis Car Company.

Utah Light & Railway Company, Salt Lake City, Utah, reported in the ELECTRIC RAILWAY JOURNAL of March 26, 1910, as contemplating the purchase of 24 cars, has placed the order with the St. Louis Car Company.

Illinois Traction System, Champaign, Ill., reported in the ELECTRIC RAILWAY JOURNAL of April 30, 1910, as contemplating the purchase of 10 interurban cars, will purchase 14 interurban cars in the near future. This company is also preparing designs for six electric locomotives, each to be equipped with four 200-hp motors.

Interborough Rapid Transit Company, New York, N. Y., has received bids and will shortly place contracts for 88 motor equipments for cars on the subway division, 60 motor equipments for the elevated division and 40 trailer equipments for the elevated division.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is reported to have placed an order for 100 cars with the St. Louis Car Company. This is, in addition to the order for 100 cars, which was mentioned in the ELECTRIC RAILWAY JOURNAL of Oct. 19, 1909.

Noccalulu Railway, Light & Power Company, Gadsden, Ala., which proposes to construct an electric railway from Gadsden to Lookout Mountain, is said to be considering the purchase of two cars having a capacity of 40 passengers each. Louis Hart and H. A. Rogers, Gadsden, are promoting the line.

Roanoke Railway & Electric Company, Roanoke, Va., mentioned in the ELECTRIC RAILWAY JOURNAL of March 26, 1910, as having contracted with The J. G. Brill Company for four semi-convertible cars of the pay-as-you-enter type, has drawn the following specifications for this equipment:

Length of body..38 ft. 8 in.
Over vestibule..42 ft. 8 in.
Width over sills. 7 ft. 10½ in.
Over posts at belt ..... 8 ft. 2 in.
Interior trim.....ash
Air brakes, Nat. Brake & Electric
Brakeshoes, A. S. I. R. A. standard
Bumpers.....Brill angle iron
Center bearings..Symington
Control system...GE K-28-B
Curtain fixtures, Curtain S. Co.
Curtain material...pantasote
Destination signs....Hunter
Gears and pinions, General Electric
Gongs .....Dedenda
Hand brakes.....Sterling
Heating system..Consolidated
Headlights.....A. & W.
Motors, type and number, 4-GE 80
Push buttons....Consolidated
Registers .....International
Seats, style.....Winner
Seating material.....rattan
Springs .....Brill
Trucks, type, Brill No. 27-GE1
Special device.....Wallace sliding door fixtures

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of March 10, 1910, as having ordered five suburban cars from the Cincinnati Car Company, has decided on the following details:

Bolster centers, length .....23 ft. 6 in.
Length of body....47 ft. 2 in.
Over vestibule..... 5 ft. 4 in.
Width over sills.... 8 ft. 7 in.
Height from top of rail to sills.....41 ft.
Body .....composite
Interior trim.....cherry
Underframe .....composite
Air brakes..West. straight air
Bolsters, body..built-up steel
Bumpers, ⅜ in. x 8 in. steel plate
Car trimmings, Persian brass-brush finish
Control system.....K-34
Couplers.....McConway & Torley M.C.B. radial
Curtain fixtures, No. 88 Ring fixtures
Curtain material...pantasote
Destination signs, illuminated dash
Fenders....locomotive pilots
Gongs .....14-in.
Hand brakes.....Peacock
Heating system, Peter Smith hot water
Headlights,..U. S. No. 1559
Motors, type and number, 4-GE 87-A
Roofs.....turtle back
Sanders, Ohio brass pneumatic
Sash fixtures..O. M. Edwards
Seats, style..H. & K. 199-AE
Seating material.....rattan
Step treads, Mason safety tread
Trucks, type.....Baldwin
Special devices,
1 Root No. 6 track scraper
Wood veneer headlinings

TRADE NOTES

Valentine-Clark Company, Chicago, Ill., has moved its office from 234 La Salle Street to 193 Michigan Avenue.

Phœnix Iron Works Company, Chicago, Ill., has moved its office from Room 929, Monadnock Block to Room 629 in the same building.

Pennsylvania Steel Company, Steelton, Pa., removed its Chicago sales office on May 1 to the McCormick Building at 193 Michigan Boulevard.

Lord Manufacturing Company, New York, N. Y., has acquired several additional iron, steel and brass foundries in order to meet the largely increased demand for its material.

United States Light & Heating Company, New York, N. Y., has moved its Chicago office from the Monadnock Building to the People's Gas Building, Michigan Avenue and Adams Street.

McGraw Publishing Company, New York N. Y., has moved its Chicago office from Room 590, Old Colony Building, to Room 1570 in the same building, where larger quarters have been secured.

B. E. Mitler, who for four years has been connected with the business department of the ELECTRIC RAILWAY JOURNAL, has resigned to become Eastern representative of *Municipal Engineering*, at 1 Broadway, New York, N. Y.

Albert B. Moore, formerly chief engineer of the Griffin Wheel Company, Chicago, Ill., has formed a partnership with Andrew W. Woodman under the firm name of Woodman & Moore, civil and mechanical engineers, with offices in the People's Gas Building, Chicago, Ill.

Peninsula Engineering Company, Chattanooga, Tenn., has applied for a charter in Tennessee to engage in general railroad work. Capital stock will be $15,000. Applicants for the charter are: W. M. Johnson, W. L. Frierson, L. M. Coleman, Paul Campbell and James F. Finley.

American Brake Shoe & Foundry Company, New York, N. Y., has purchased the patents and other property of the National Brake Shoe Company and the Featherstone Foundry & Machine Company. The foundries of the latter company are located at Melrose Park, Chicago, and Burnside.

W. C. Kalb has resigned his position as head of the brush testing department of the National Carbon Company to accept the position as general superintendent of the Dunlap Engineering Company, which was recently incorporated as a reorganization of the Columbus Pneumatic Tool Company. Mr. Kalb is a graduate of the Ohio State University in electrical engineering.

H. H. Seaman has resigned his position as assistant manager of the electrical department of the H. W. Johns-Manville Company, New York, N. Y., to take charge of the business of W. S. Seaman & Company, Milwaukee, Wis., of which his father was in charge at the time of his death. Mr. Seaman was connected with the H. W. Johns-Manville Company for the past six months, and previous to that time he was with the Electric Storage Battery Company of Philadelphia.

J. B. Comstock, for 6 years with the Westinghouse Electric & Manufacturing Company at its East Pittsburgh works, and for 4 years manager of its publication department and printing plant, severed his connection with that company in April to accept a similar position with the P. & F. Corbin Company, New Britain, Conn. Prior to Mr. Comstock's

connection with the Westinghouse company, he filled the position with the P. & F. Corbin Company that he has recently been recalled to assume.

Hemming Manufacturing Company, Garfield, N. J., announces that it has appointed Butler Keys sales manager with headquarters at 2 Rector Street, New York. Mr. Keys was connected with the Consolidated Car Heating Company for many years, and recently was with the Home Rubber Company. The Hemming Manufacturing Company owns the Hemming and Gummon patents and has completed a specially designed plant for the manufacture of fireproof and waterproof moulded insulating materials, under these patents at Garfield, N. J.

Dorner Railway Equipment Company, Chicago, Ill., has made the following sales during the past month: Grand Forks (N. D.) Street Railway, closed motor cars mounted on Brill 21-E trucks with GE 1000 motors; People's Street Railway, Galesburg, Ill., one 40-ft. double-truck car; Hattiesburg (Miss.) Traction Company, three open trail cars; Helena (Ark.) Street Railway, three open trail cars; Guthrie (Okla.) Street Railway, one 20-ft. closed motor car, mounted on Brill 21-E trucks, equipped with GE 800 motors; Indiana Union Traction Company, Anderson, Ind., four trail cars. The Dorner Railway Equipment Company was the subject of an article in the *Commercial Chronicle,* of Chicago, for April 22. The article contained a biographical sketch of Henry A. Dorner, president of the company, and told of the growth of the business under his management. The offices of this company will be moved soon from 315 Dearborn Street to the McCormick Building.

Ackley Brake Company, New York, N. Y., has arranged through its resident representatives for prominent exhibits of the Ackley adjustable brake at the International Exposition in Brussels and at the Argentine Centenary Exposition in Buenos Aires. The company reports recent orders received from Douai, Amiens, Lille, Limoges, Lyon, Marseille, Paris, Longwy-Bas, Nice and Rouen, France; Basle, Geneva, Bern and Zurich, Switzerland; Nivelles and Brussels, Belgium; Amsterdam, Vienna, Dusseldorf, Pamplona, Algiers and Yokohama, the latter being a cable order for 100 brakes. Since January, 1910, 1200 Ackley brakes have been ordered for foreign countries. Brakes have been shipped as far north as Trondhjem, Norway, and as far south as Melbourne, Australia. Ackley brakes are also in use as far east as Yokohama and as far west as Honolulu.

General Electric Company, Schenectady, N. Y., announces the following changes in personnel in the railway department of the New York office: S. W. Trawick has been appointed district manager of the department with general supervision over railway matters in the New York office territory, which includes the sub-offices at Buffalo, Syracuse and New Haven, Conn. H. D. Hawks has been transferred from New Haven to New York to look particularly after the steam railroads entering the city that have been and are being electrically equipped. C. B. Keyes has been transferred from engineering to commercial work. He will look particularly after the surface lines in the Metropolitan district and will assist Mr. Trawick generally in the work of his department. C. F. Scott has been transferred from the railway engineering department at Schenectady and succeeds Mr. Keyes in that department at New York.

Murphy Iron Works, Detroit, Mich., reports that the Boston (Mass.) Elevated Railway, after a thorough investigation, has decided to equip all its boilers at the Albany Street power station with Murphy automatic stokers. This is one of the largest stations operated by the Boston Elevated Railway, and contains 22 350-hp Stirling and eight 500-hp B. & W. boilers. Among other orders recently received for stokers are the following: City of Holyoke, Mass., Gas and Electric Department; Detroit Copper & Brass Rolling Mills, Detroit, Mich.; Massachusetts Cotton Mills, Lowell, Mass.; Anniston Electric & Gas Company, Aniston, Ala.; Poughkeepsie Light, Heat & Power Company, Poughkeepsie, N. Y.; Packard Motor Car Company, Detroit, Mich. The company also reports that the following companies have recently installed or will install Murphy heavy duty furnaces: Rochester Railway & Light Company, Rochester, N. Y.; American Woolen Company, Lawrence, Mass.; Poughkeepsie Light, Heat & Power Company, Poughkeepsie, N. Y.; Baldwin Locomotive Works, Philadelphia and Eddystone plants; Allegheny Plate Glass Company, Glassmere, Pa.; Aluminum Company of America, East St. Louis, Mo.

ADVERTISING LITERATURE

MacGovern, Archer & Company, New York, N. Y., have issued their May list of second-hand electrical and steam machinery, cars and equipment.

Ohmer Fare Register Company, Dayton, Ohio, has issued a small booklet calling attention to the merits of its indicating, recording and printing fare registers.

Jeffrey Manufacturing Company, Columbus, Ohio, has issued Booklet No. 38, in which the various products of the company and their wide range of application are illustrated.

National Brake & Electric Company, Milwaukee, Wis., has printed bulletin No. 389 in which its various types of National emergency and variable release air-brake valves are described and illustrated.

H. W. Johns-Manville Company, New York, N. Y., is mailing a folder entitled "Founded on a Rock," in which a description is given of J. M. asbestos roofing and the merits of the product are discussed.

American Goetze-Gasket & Packing Company, New Brunswick, N .J., has issued a 40-page catalog and price list describing and illustrating the various types of copper and metal gaskets and metallic packings which it manufactures.

Western Electric Company, New York, N. Y., has issued bulletin No. 5500-1 on Hawthorn solaris multiple direct-current arc lamps. Bulletin No. 5351, which has been reissued, replacing bulletin No. 5351 of March 1, 1908, describes the different types of Hawthorn motor-driven exhaust fans.

Crocker-Wheeler Company, Ampere, N. J., has issued Bulletin No. 119, in which its large engine type d.c. generators are described and illustrated. The publication also contains several tables and other useful data of interest to central station men. The company has also issued Bulletin No. 121, which is descriptive of small engine type d.c. generators, and Bulletin No. 124, on exhaust fans.

Westinghouse, Church, Kerr & Company, New York, N. Y., have just issued No. 4 of their publication *Work Done.* Among the electric railway installations carried out by the company and described in this number are those for the Denver & Interurban Railroad (single-phase); Gallatin Valley Electric Company, Bozeman, Mont.; Ohio Valley Finance Company, East Liverpool, Ohio; Pennsylvania Tunnel & Terminal Railroad's New York service plant.

NEW PUBLICATIONS

Electric Traction on City and Suburban Railways. By H. M. Hobart. London, 1910: *Tramway and Railway World;* 11 pages; illustrated. Price one shilling.

This pamphlet is a reprint of an article contributed to the *Tramway and Railway World* by H. M. Hobart, the well-known British authority on electric traction. Mr. Hobart deals with the question of acceleration of electric and steam cars; the analysis of energy consumed, as shown by diagrams giving the division into equipment losses, braking losses and work of propulsion. Mr. Hobart also compares d.c., single-phase and three-phase electric railway equipments as regards weight, cost of attaining given schedule speeds, etc.

American Producer Gas Practice and Industrial Gas Engineering. By Nisbet Latta. New York, 1910: D. Van Nostrand Company; 539 pages (illustrated), including index. Price $6.

This work is a compendium describing the construction and operation of typical examples of the principal gas producers now in service. A great deal of data is presented on the properties of gas in general; the temperature, reduction and conduction of heat; the choice of building materials, and the designing of pipes, flues and chimneys used in connection with producer gas plants. The author, however, has presented only one short chapter on gas engines, and most of the figures given, such as those on areas, floor space and gas consumption, are taken from European practice. Of course, there are not so many gas installations in this country as abroad; but it is to be regretted that Mr. Latta did not elaborate upon the qualities of the gas engine for handling different classes of service, and particularly the peak load conditions of railway plants.

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A Convention Hall for Exhibits

Saratoga Springs has made a proposal to the American Street & Interurban Railway Association for the construction of a hall which would be specially adapted for exhibit and convention purposes. Briefly the proposal is this: That in consideration of a contract whereby the American Street & Interurban Railway Association would agree to hold its annual conventions for three out of the next five years in Saratoga that town will erect a commodious structure whose plans and specifications will be submitted for approval to the association before construction was commenced. At the expiration of five years the building will become the property of the association under certain conditions stipulated in the proposal. It has long been a matter of surprise to us that the hotel men in such resorts as Saratoga Springs, Atlantic City, Manhattan Beach, etc., have not risen to their opportunities in respect to large industrial conventions. There are numerous associations in the steam railway, electric light, mechanical engineering and other departments of industry which require much the same sort of accommodations as the street railway associations. Even if these associations did not meet every year in the same city, there is a sufficiently large number of them, we believe, to warrant the construction, in some city with good hotel facilities and located on or near the Atlantic sea-board, of such a hall, suitably equipped with power plant and shipping, storage and railway facilities. We hold no brief for Saratoga Springs and are not prepared to say that it is the best place for a hall such as is proposed, or even that it is wise for the association to undertake the responsibility of owning a hall. But the fact that the citizens of that city have made the offer which they have entitles the plan to careful and serious consideration.

Five Levels of Electric Tracks

Within a few years the area in front of the Grand Central Station at Forty-second Street, New York, will be one of the most busy traffic points in the world, if the plans now under consideration by the New York Public Service Commission, First District, are carried out. Forty-second Street is one of the many narrow cross-town streets in New York, so that its improvement for rapid transit purposes has to be made vertically instead of longitudinally. As now planned the street at its junction with Park Avenue will contain railway tracks on five levels. At the upper level is the Third Avenue Elevated Railroad. Then below in consecutive order come the tracks for the surface cars, those of the Interborough Rapid Transit Company, those of the Hudson & Manhattan Railroad Company and those of the New York & Long Island Railroad operating the Steinway tunnel to Long Island City. This list is exclusive of the two levels of tracks in the station itself and the proposed double-decked four-track Broadway-Lexington Avenue subway

which crosses Forty-second Street one block east of Park Avenue. The possibilities of electric traction for underground service will certainly be well exemplified at this point.

Abandonment of an Unprofitable Branch

That the drastic course of abandonment of an unprofitable part of an urban railway system may be in the public interest is held by the New York Public Service Commission, Second District, in a decision affecting the Port Jervis Traction Company. The convincing reasons for the decision of the commission in this case are that the railway has not been operated successfully during its entire history and that the Kingston Avenue branch, whose abandonment was under discussion, has not yielded returns above operating expenses. In the hope that the financial condition of the company may become better the commission has approved the construction of an extension to the nearby community of Sparrowbush. This is not the first decision in which the commission has taken steps to conserve, if possible, some part of the property involved. Only in the present year, in conformity with the action of the same State authorities, the railway and the lighting properties, which had been combined in one company, were segregated. Securities were issued by the segregated properties that were based upon actual value and effected so sharp a reduction in capitalization as is indicated by a decrease from $735,000 to $357,000 in par values. Thus the steps which have been taken to revivify an unfortunate railway inflict loss upon security holders as well as inconvenience upon residents on the line of the abandoned branch. The community as a whole, however, will have a service that for the majority of people will be unimpaired or improved.

Good Results with Electric Sleeping Cars

The use of electric railway sleeping cars is not new, but the assurance of their successful operation has come only after considerable trial. The first electric railway sleeping cars were built for operation in Indiana and Ohio, but were never put into regular service there. Later these same cars were put into service between Springfield, Ill., and St. Louis, Mo., on a run of 97 miles. Recently two new cars have been put into service between St. Louis and Peoria, as previously mentioned in this paper, and have more than met the expectations of the road which is operating them. Although handicapped by lack of terminal facilities at the southern end of the road, because the McKinley Bridge into St. Louis has not yet been finished, the new cars average about 10 passengers nightly in each direction. The southbound business exceeds that northbound because of the difficulty of reaching the cars at midnight from St. Louis. Compared with the competitive steam railroad service between the points mentioned, a person making the trip on an electric car can have two hours longer at either terminal and save 25 cents berth fare. The sleepers are operated in connection with a day coach and the traffic department of the Illinois Traction Company has been surprised at the substantial earnings of the day coach, which makes the through 171-mile run after midnight. Some popular innovations on the new sleepers are a free breakfast of hot coffee and rolls, and "tipless" porters who are paid $50 a month and "lay-off" every other trip. Another idea thought to be new in transportation service is that of supplying passengers with stamped postal cards stating that the railway company desires to keep its service up to the highest efficiency and asks for criticisms and suggestions. The traveling public has been taught for so long the doctrine that little further improvement could be expected in sleeping-car accommodations it is refreshing to see these evidences of progress. We believe that the time is not far distant when other electric railway companies in the Central States will follow the practice of the Illinois Traction Company in the operation of sleeping cars.

COMPARATIVE RUNNING TIMES

Frequency of service is one of the strong points of electric railway competition with other transportation agencies. The determination of average running times between competitive points is a larger question than sometimes appears from a casual examination of the schedules, since the relation of the train or car headway to the time of transit between local and through destinations affords an opportunity for some very interesting and suggestive analysis. For every case of competitive service there are certain time relations which, if properly determined and brought to the attention of the public, will help to draw business away from rival agencies of service.

Given two competing schedules, as of an electric interurban and a parallel steam line, the important point is to determine how far a shortened electric train interval can aid in capturing traffic in the face of a somewhat faster running time over the tracks of the rival road. An experienced traveler is constantly making rapid mental estimates along this line, but the great majority of persons do not readily investigate the zone where a few minutes saved or lost warrant the choice of the electric service against the steam.

The average time of transit between any two points on each of two competitive systems should, when tabulated, take into account the advantage to the public of running trains with a short headway and a somewhat uniform schedule throughout the day. In a recent comparison of this kind the tables showed the average time to make the journey between terminals on each of three competitive systems, assuming that a passenger was ready to start from each end of the road each minute of the day. This average time was calculated by adding to the running time of each train and car one-half of the minutes which had elapsed since the departure of each preceding train and car, and then averaging these values, thus giving proper weight to not only the speed of the train units, but to the headway between them. The results showed that the average time of transit between terminals on the electric line was 51.6 minutes, compared with 89.6 minutes and 125 minutes on the two competing systems. The public can be given the basis of determining comparative speeds of this kind when the schedule times of the electric railway system are posted at strategic points along the line, but there is room for some pretty sharp analysis and subsequent publicity in this connection. Any manager with a bent for figures can deduce some valuable conclusions as to the ability of his service to beat that of his competitor if he investigates the conditions at various points on his line. From the calculations of average running time obtained graphically or otherwise the exact conditions determining when it will pay to patronize one service or the other can be ascertained, and emphasis can be laid upon the time values of each point on the line by suitable posters or other advertising matter. Obviously, the farther one goes from the competing steam railroad station

at either end, or from any local steam station, the more favorable are the chances of successfully handling the business by trolley. The public may realize this, in an indefinite way, but what is needed is an exact statement of the speed characteristics of the electric line, so that the stranger in the territory will choose the latter service so far as possible, and not waste his time either in walking to the nearest steam-railroad station or in waiting for trains which will save him little if any time on the journey.

SUBSTATION ECONOMY

On account of the difficulties in the way of controlling operating conditions the cost of handling electrical energy in substations of the rotary converter type is seldom analyzed with the degree of care that obtains in well-managed generating plants. Nevertheless, it is interesting to study the possibilities in substation economy, for by so doing one gets an idea of relative values which is suggestive. It is of the utmost consequence to secure as high an efficiency as is feasible in the transformation and application of electrical energy to rolling stock operation, for any saving at the end of the line most remote from the generating station becomes multiplied at the busbar by the reciprocal of the efficiency of the transmission and distributing system.

Analyzing the probable cost of operating a substation of, say, 500-kw capacity in railway service, it appears that a good load factor is quite as important in relation to a low unit expense as in an ordinary generating plant. A recently completed substation of this capacity cost $22,000, including land, or $44 per kilowatt. Under reasonably favorable operating conditions the ratio of the average output to the normal capacity of the installation might be 30 per cent, giving a total yearly delivery of 1,315,000 kw-hours at the d.c. bus. Taking interest at 6 per cent, insurance and taxes, 1 per cent each, and depreciation, 5 per cent, the fixed charges would reach $2,860 per year, or about 0.22 cent per kw-hour. In this installation three men are required, with wages totaling $8 per day, roughly. The labor cost then may be taken at about $2,820 per year, and allowing $780 for repairs and $400 for supplies, the total operating expenses reach $4,000, or about 0.30 per kw-hour. The total cost of handling the yearly service of the substation thus may be estimated at 0.52 cent per unit of energy delivered to the d.c. feeders.

Figures of this kind do not show the desirability of operating the machinery as close to its range of maximum efficiency as possible, for we must go back to the power station itself in order to determine the cost of wasted energy outside. They do indicate, however, the importance of cutting down the running cost of the substation by endeavoring to keep the controlling items low. The fixed charges cannot be altered, and upon the designer of the installation lies their burden. The opportunities for saving money here are not many, but something may be done by locating the building on relatively cheap land, by making it of sufficient size to permit the convenient handling of apparatus in setting up the equipment, including some sort of hoisting facilities, generally hand-operated; and by avoiding in small substations any tendency toward elaborate automatic features in the switching mechanism. By leaving the extra high-tension wiring out of the machinery room and basement, if any, something may be saved. It pays to look up the tax rate when a substation location happens to be near a town boundary.

The most feasible place in which to institute substation economy of operation is in the labor account. Without passing upon the ability of two men instead of three to handle a substation of the above size, it is apparent that in cases where other work can be performed decided saving can be effected, and generally without any impairment of the service. There is nothing new in combining the duties of the substation with a certain amount of repair-shop work, car-house inspection and light maintenance, service as ticket agent or freight clerk, but it might be possible to save from $1,000 to $1,500 per year in this way, and this would cut the cost of operation per kw-hour handled to from 0.23 cents to about 0.18 cents. Little can be done to reduce the cost of repairs and supplies, with careful handling of the equipment. Plainly, the substation does not furnish a very elastic field for the practice of economy, but if the matter is appreciated before and after construction, something can be done that is worth while in not a few instances.

SHIFTING STREET TRAFFIC AND REROUTING CARS

Important changes just made in the routing of cars in Minneapolis afford a good instance of the value of careful observation and a study of the trend of travel. The centers of business activity and traffic movement of all growing communities are continually shifting and a street railway company should be the first to recognize any changes in the trend of traffic so as to anticipate the need for increased or rearranged service. By giving this subject prompt attention, a railway company can often reduce street congestion and, at the same time, improve its service and cut down the car-miles and car-hours run. A knowledge of the actual situation in regard to the flow of traffic is also very useful to the transportation department when unreasonable routes are demanded by the city authorities as well as when the company is making its own plans for extensions of its service.

In eleven of the important changes in routing in Minneapolis the plan was followed of operating the cars of each line in both directions over the same route. Formerly many of the cars running into the business district were looped around several business blocks and thus did not use the same street on their inbound and outbound trips. This caused some confusion among passengers, especially strangers. Under the new plan it will be considerably easier for patrons to find the car they desire.

Through-routing of cars from one edge of the city to the other through the business district has been found satisfactory on those lines in Minneapolis so operated and the company now proposes to through-route as many lines as possible instead of looping the cars in the business district. Through-routing of cars frequently makes possible a reduction of several blocks in the length of a run without involving the passengers in any hardship. Such a reduction in car mileage means fewer cars to operate and higher speed of the others through a congested district. These questions of loop terminals, through-routing and plans of extensions of the service are of vital importance to all companies and should not be decided off-hand. Trustworthy traffic data are essential in reaching their proper solution and such data can be obtained only by continued and conscientious investigation.

ELECTRICAL DEPARTMENT OF THE METROPOLITAN STREET RAILWAY, NEW YORK—I.

The work of the electrical department of the Metropolitan Street Railway Company, of New York, begins with the handling of coal at the power station and ends with the delivery of current to the cars. It also includes the charge of the electrical appurtenances of all buildings and the investigations from an engineering point of view of apparatus not used under its jurisdiction. The following paragraphs will be devoted to a statement of some of the most important work accomplished by this department since the appointment of the receivers Sept. 24, 1907, in regular maintenance, extraordinary maintenance and new construction. The charts on pages 896 and 897 show the division of work and authority in this branch of the Metropolitan system.

STEAM CHANGES AT THE NINETY-SIXTH STREET POWER STATION

The steam department operates and maintains the steam apparatus and machinery in the power station and supervises all construction and reconstruction work connected with the power station. Its jurisdiction begins with the unloading of the coal boats and ends at the generators. An account of the improvements made in the Metropolitan Street Railway since the appointment of the receivers can then properly begin with the coal conveyor.

There is little usually in the way of improvement thought possible with the coal-conveying mechanism, but it was found that by using renewable bearings the lives of the conveyor axles could be materially prolonged. Hence the holes in the old wheels have been bored out and have been fitted with cast babbitt-metal bushings. New wheels are bought with holes properly drilled for these bushings. Longer life for bearing and shaft has also been secured by filling the cast hollow wheels with grease to obtain good lubrication.

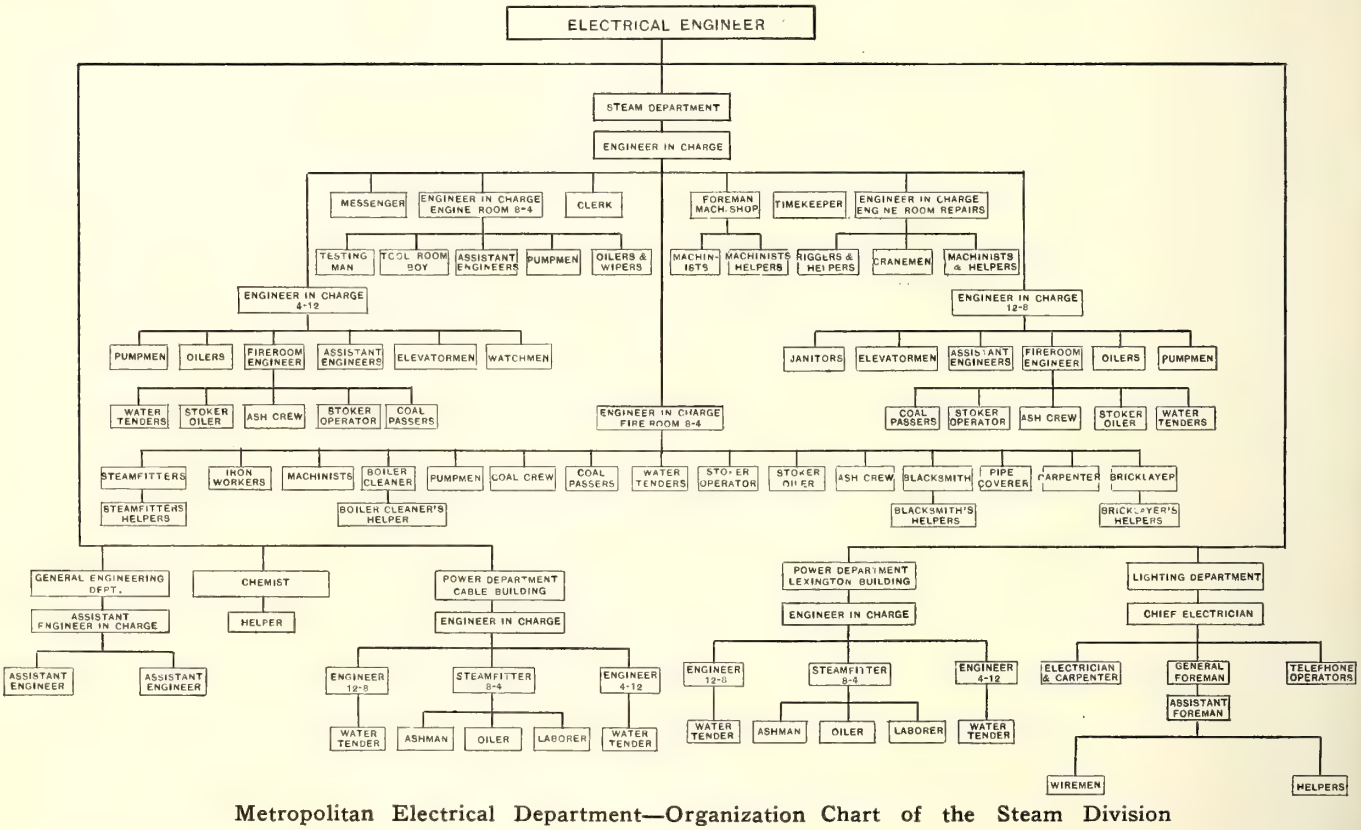
The surface condensers have been replaced by the Allis-Chalmers jet or barometric type as both the surface condensers and their pumps had reached the state where it was very expentive to keep them operative. One reason for this was that the condensing water taken from the East River contains a great deal of sewage, salts, etc. It is believed that much of this difficulty will be overcome in the new installation. The pumps which operate the new condensers are of the centrifugal type. The condenser repair cost since the change has been reduced approximately $10,000 a year. This figure includes the expense of the two extra pump men required for the new condensers. The steam consumption per horse-power output of the engines has been decreased approximately 6 per cent by the new condensers and the capacity of the station has been increased about 9 per cent.

The change in condensers was accompanied by the installation of a new Hoppes open feed-water heater. This auxiliary delivers water to the boilers at from 190 deg. to 200 deg. Fahr., which is 40 deg. higher than that previously obtained. In addition to the fuel saving thus induced, there is a decrease in water consumption equivalent to $7,200 a year.

The several savings noted have been accomplished in the face of a reduction in the load factor of the station—that is, between rush hours the load of the station is less and during rush hours heavier than it has been during the recent years. Other improvements made at the Ninety-sixth Street station include dredging the slip to give deeper water for coal boats and removal of all wooden flooring and partitions to reduce the fire risk.

COAL SPECIFICATIONS

All coal is now purchased in accordance with specifications and on the basis of heat values and analyses. When the coal runs above the standard, the contractor receives a bonus and when the coal runs below the standard penalties are imposed in proportion to the reduction in heating value below the standard. This method of buying coal has proved very satisfactory as it gives the company some control over the grade of coal received, which was not the case with the flat-rate system. When the coal is sold on the heat basis, also, the contractors are likely to exercise more care in selecting the fuel to be furnished. The saving in the amount paid for hard coal during the last nine months purchased on the specification basis, over that which the company would have had to pay on a flat basis, was approximately $11,000, or about $15,000 a year.



Metropolitan Electrical Department—Organization Chart of the Steam Division

DUTIES OF THE ELECTRICAL DEPARTMENT OF THE POWER AND SUBSTATIONS

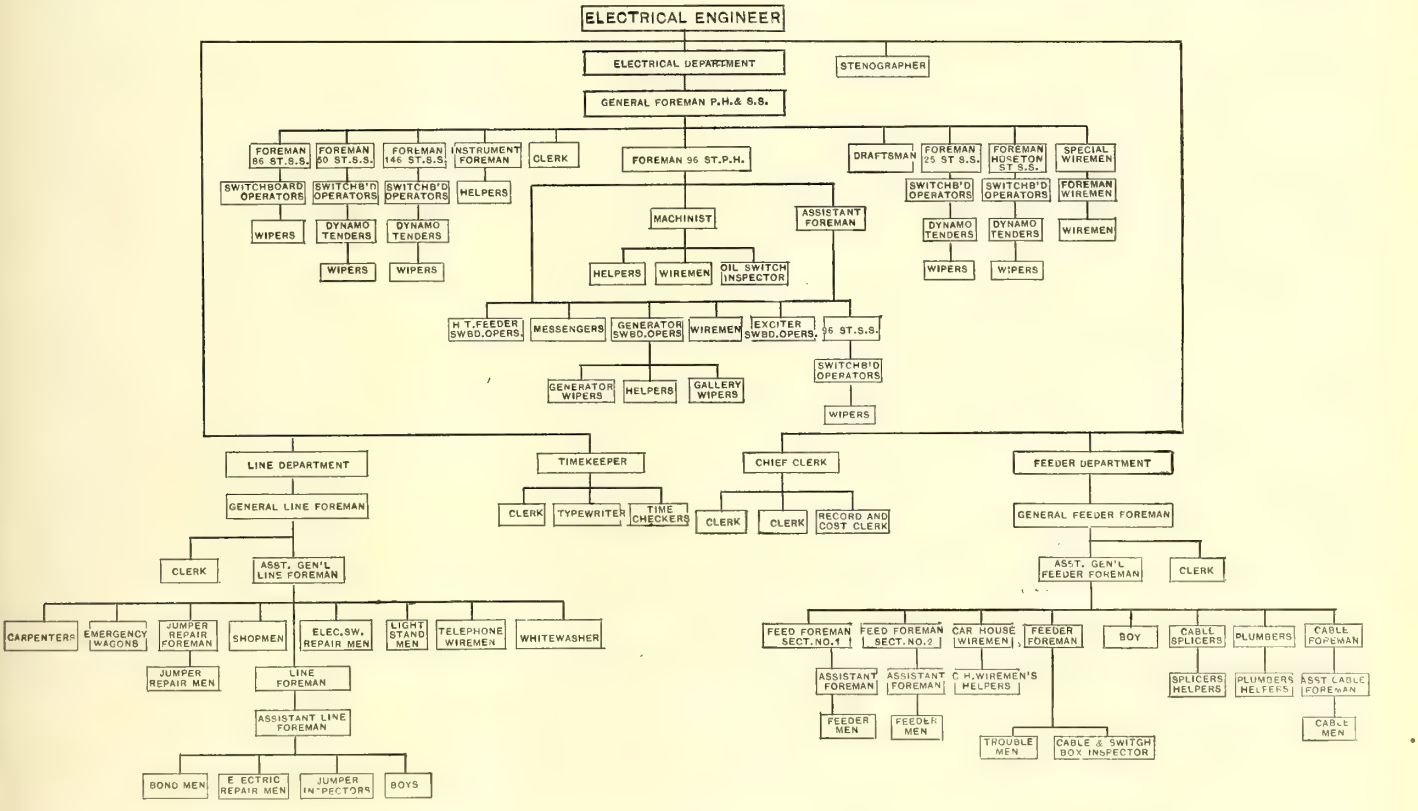
The electrical department of the power and substations has charge of the operation and maintenance of the electrical ma-

chinery, apparatus and wiring in the various stations; it also supervises and inspects all construction and reconstruction work installed in the stations under contract, and carries out all such work of this kind which the company does directly. The general electrical foreman supervises the operation and maintenance of the electrical apparatus in the power stations and substations. All foremen and their men use the same methods in the respective stations.

In general, all orders in regard to operation are issued through the high-tension operator at the main control board in the Ninety-sixth Street power house. This is referred to throughout the system as "High Tension." When the high-tension board instruments indicate that the changes in the load require the cutting in or cutting out of a generator, the steam department is notified by signal and the high-tension operator connects or disconnects machines from the system. Likewise when the load in the substations changes and it is necessary to cut feeder units in or out, the substation man notifies the high-tension operator. On the other hand, the high-tension operator can tell the substation loads from the indicating meters on the feeders running to the respective substations. "High Tension" also controls the cutting in or cutting out of high-tension feeders to the substations. In general, any variation in the substation units or feeders operated is telephoned to "High Tension." All reports received or sent out are numbered, timed and entered consecutively on a log kept by the high-tension operator, who in turn informs the division which should make any necessary repairs. A similar log is carried in the substations.

On the whole, "High Tension" is a clearing-house for all trouble in the station feeders, on the lines or anything else that in any way causes an interruption to the service. Furthermore, when normal operation is re-established, the report is immediately transmitted to "High Tension." In this way, the heads of the respective sub-departments of the electrical department are kept in touch with any irregular operation which comes under their jurisdiction. A report of all such trouble is promptly communicated to the electrical engineer to inform him and his subordinates of what is going on at all hours of the day and night. In emergencies reports are promptly made to the general manager. "High Tension" is also notified when the following men report for and go off duty: All station foremen, assistant station foremen, switchboard men, feeder foremen, line foremen, time checkers, machinists, special wiremen and draftsmen. These men report over the private telephone system and state the point from which they are calling up. When they change from the location at which they are working, they are required again to notify "High Tension" and state the point of their destination and also to report upon arrival. Thus a complete record is kept of the location of all men at work and of the time it takes to go from one place to another. The line gangs also notify "High Tension" of the location where they will be working, so that they can be located and called to the scene of emergency repairs by messenger. When the report clerk has sent the emergency wagon to any point, as requested by "High Tension," he so notifies "High Tension." Should the emergency wagons require assistance they can call directly on "High Tension" for help. On returning from a call the emergency wagon men give both the report clerk and "High Tension" all details of the trouble and its cause.

The substation apparatus is systematically overhauled. As far as possible this labor is done by the station operators, but



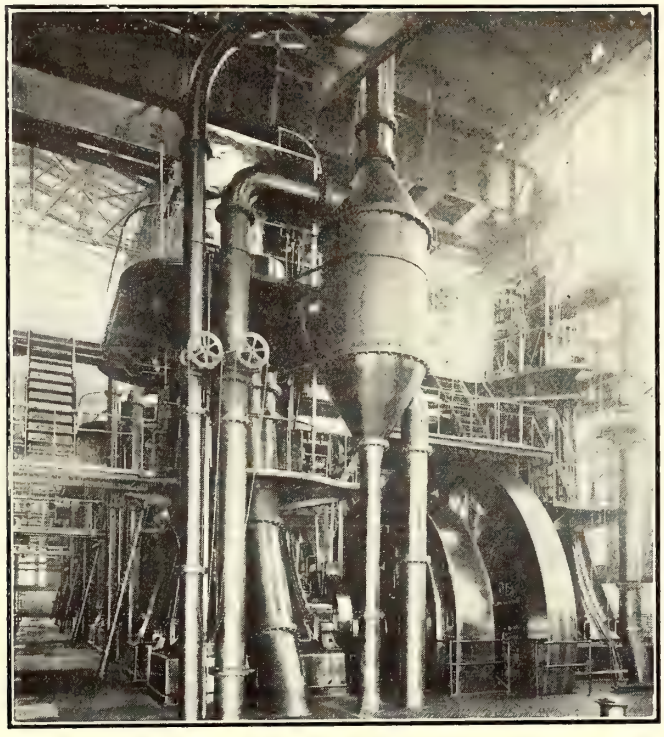
Metropolitan Electrical Department—Organization Chart of the Electrical Division

for such work as the maintenance of oil switches and the repairing of machines, the company has machinists, oil-switch repairmen and wiremen who work at all stations. Each time a machine is shut down, it is inspected and cleaned by the operators. Oil very often accumulates on the windings. If this oil is allowed to remain it tends to deteriorate and reduce the life of the insulation. The machines, therefore, must be cleaned before they have cooled and the oil has had a chance to harden or to be absorbed by the insulation.

INSTRUMENT CALIBRATION AND POWER RECORDS

On a system as extensive as the Metropolitan the number of units operated and of feeders in service is very large, consequently, many indicating and recording instruments are necessary. The calibration of these instruments requires a corps of specialists. The instrument foreman has also been trained to act as a substitute for the operating foremen when the latter are absent. The instrument men have charge of the instruments installed on feeders supplying power from the Metro-

politan station to the Third Avenue lines as well as to the lines of other companies and also check the instruments installed on feeders supplying power to the Metropolitan from the Third Avenue station. The checking of these instruments is of special importance as a slight error in their calibration might result in a considerable difference in the charges made for power bought and sold.



Metropolitan Electrical Department—New Condenser at Ninety-sixth Street Station

The exciter-board operator at Ninety-sixth Street, in addition to having charge of his own board, gets the records of all maintained at the power house. The exciter-board operator receives reports of the power delivered to the substations and distributed therefrom, while the high-tension operator records all power generated and distributed from the power house to the substations. At the end of every 24 hours the substation distribution log sheets, together with the records of power-house operators, are sent to the general electrical foreman, and the distribution of power for each 24 hours is tabulated by him. The losses in each of the feeders and in each of the transformering substations are noted, so in this way an additional



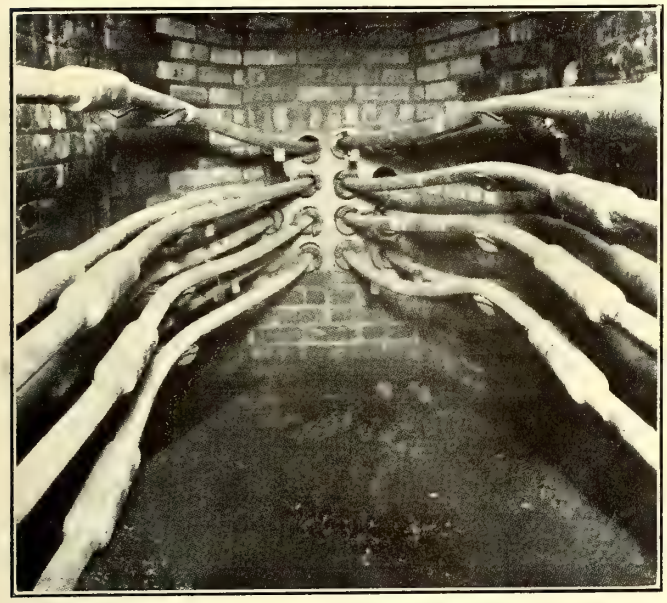
Metropolitan Electrical Department—South Side of Bus Compartment, 146th Street Substation



Metropolitan Electrical Department—Interior of Houston Street Substation

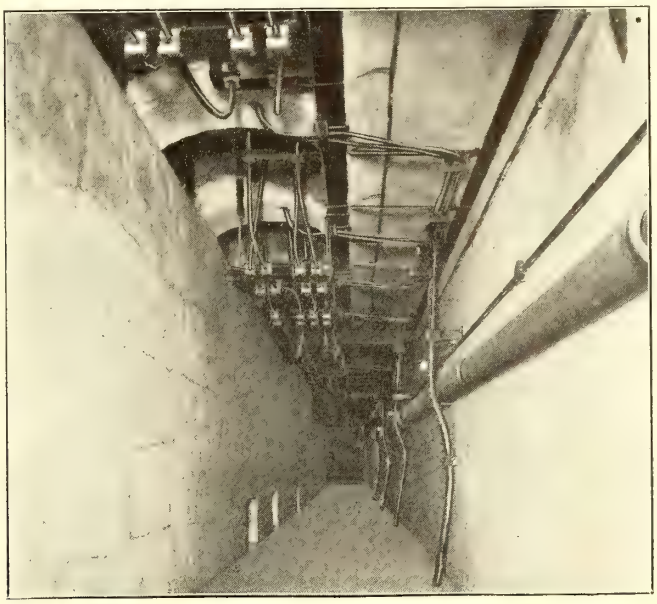
a.c. power received at the substations and also of the distribution of d.c. power to lines from the substations. These readings are telephoned to the exciter-board men every eight hours. In this way a complete record of the power distribution is always check is obtained on the instruments and any irregular operation is noticed should the losses in any part of the equipment vary materially from the regular amounts. Copies of all log sheets are forwarded to the electrical engineer's office with com-

plete hourly tabulations and statements of the losses. The general electrical foreman also sends to the electrical engineer a statement of the total distribution of power during each month, showing the amount of power generated, the amount distributed to the substations and from the substations to lines and car houses, also the amount of power sold to and purchased from other electric railway companies.



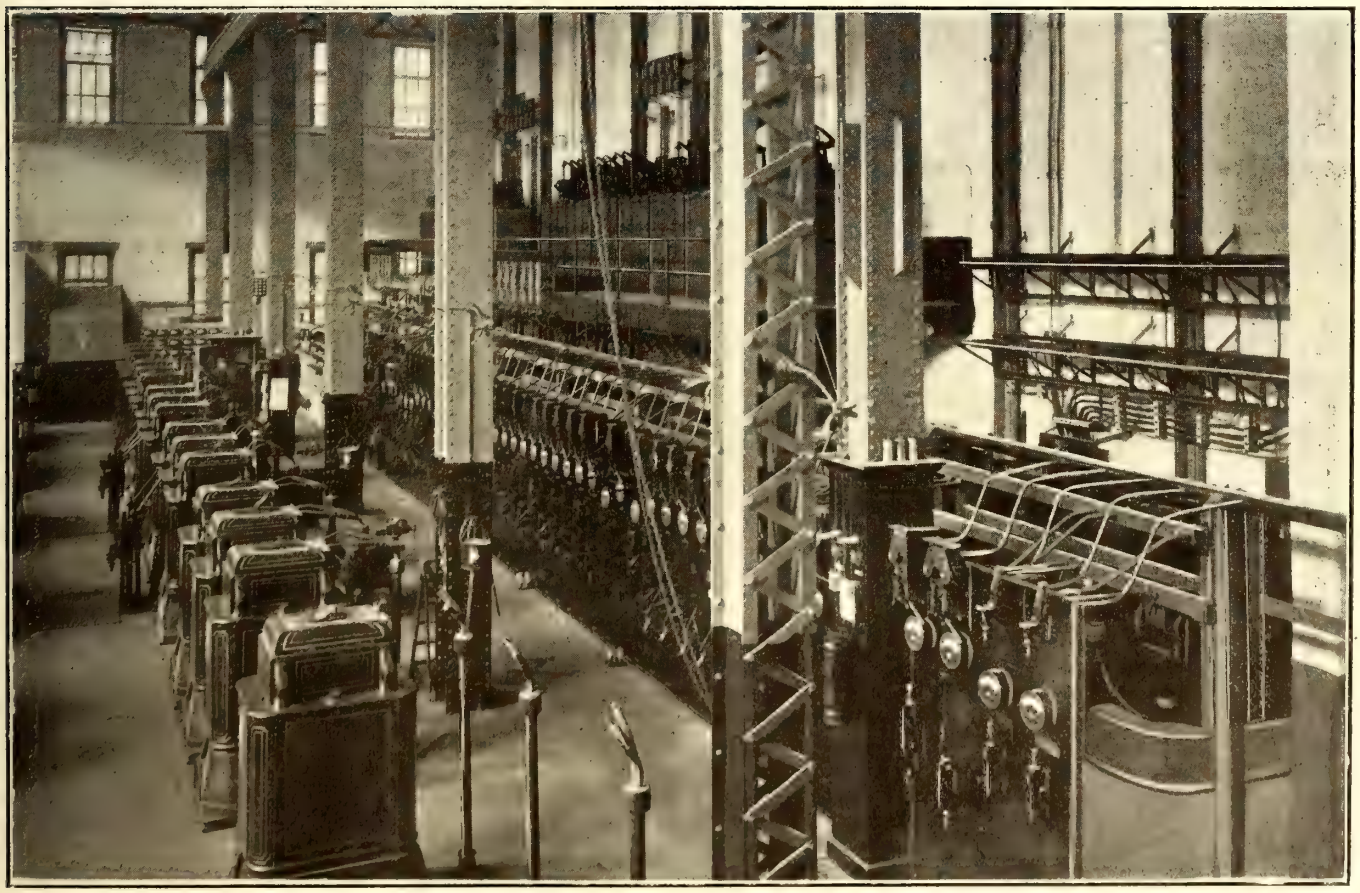
Metropolitan Electrical Department—D.C. Manhole at 146th Street and Lenox Avenue

insulation were considered safe, but it has since developed that no type of insulation can be considered absolutely reliable. Porcelain insulators reduce the liability of breakdowns and afford more protection to the employees.



Metropolitan Electrical Department—Air Chamber, Twenty-fifth Street Substation

The reconstruction of the 146th Street and Twenty-fifth Street substations and the construction of the Houston Street substation are practically completed, and the reconstruction of



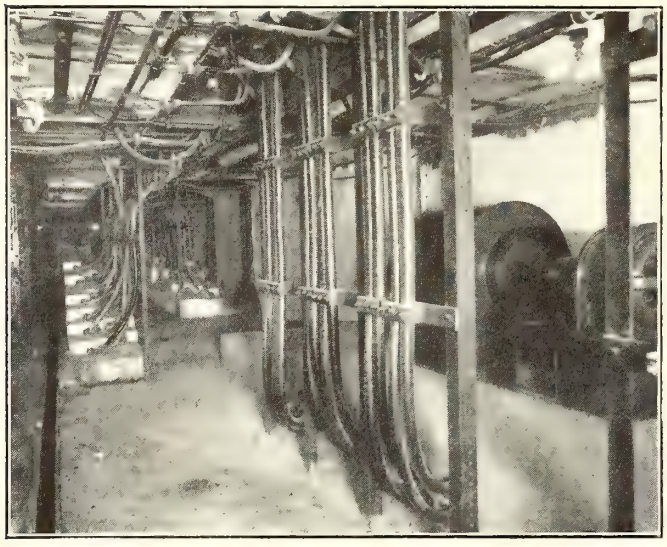
Metropolitan Electrical Department—Top of Bus Compartment and Oil Switch Gallery in the 146th Street Substation

HIGH-TENSION IMPROVEMENTS

One of the advances in high-voltage station construction made since the pioneer Metropolitan installation is the use of porcelain insulators. Formerly station cables protected with extra heavy

the Ninety-sixth Street switchboard and wiring is under way. All of the high-tension wiring is being installed on high-tension insulators and the individual wires, wherever possible, separated by brick or asbestos barriers. Knife switches are placed in

series with the oil switches. These knife switches will assist materially in maintaining the oil switches, and will also protect the repair man. Formerly oil-switch repairs could be made only at light load, but with the knife switches in series it will be possible to cut out a switch from service any time. In the reconstructed substations the high-tension cable bus has been

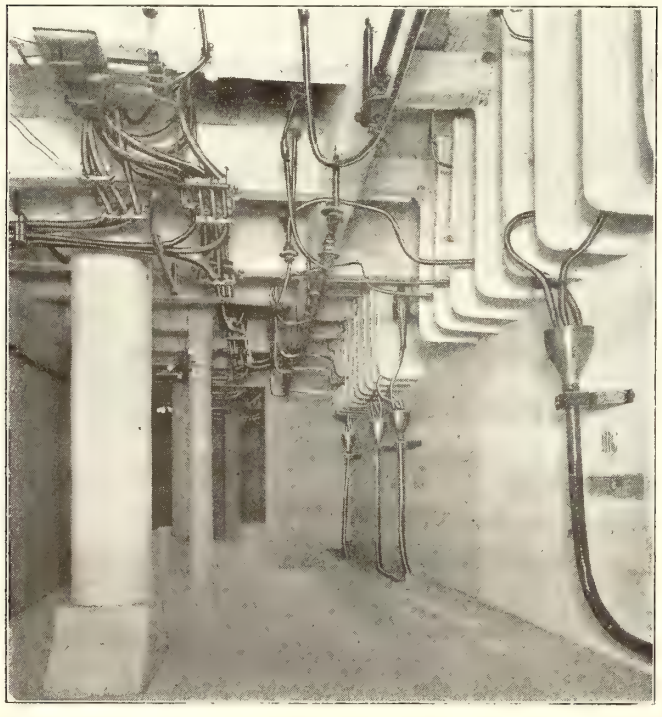


Metropolitan Electrical Department—Cables, Blowers and Air-Chamber Wall at 146th Street Substation

replaced by a copper bus on insulators in brick compartments, isolating each bus by continuous soapstone slabs.

CONTROL BATTERIES AND BLOWERS

Control batteries of 15-amp capacity, to operate the large oil switches and general control, have been placed in all substations except at Ninety-sixth Street. The emergency lamps fed by these batteries cut in automatically when a station stops, but only enough lamps are installed to give the operator sufficient



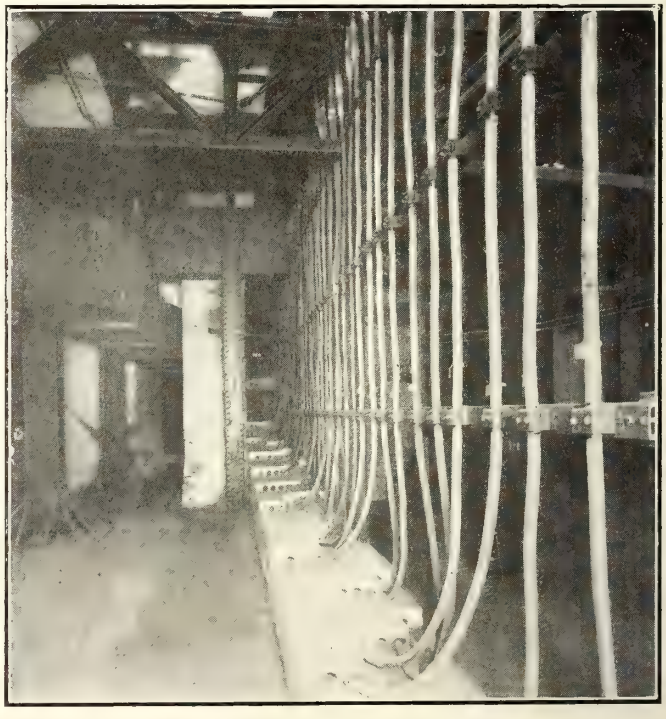
Metropolitan Electrical Department—Air Chamber of Houston Street Substation

light to start after a shutdown at night. The time lost incident to using oil lamps is thus eliminated. Primarily a control battery was installed to have separate means of operating apparatus, such as oil switches, etc., in the station during shutdowns, also to reduce the number of shutdowns due to disturbances transmitted to the control circuits. Formerly a motor-generator set was employed for control. This motor-generator was operated from the power bus so that when the station or the motor-generator shut down there was no way to control the larger switches. At such times the control circuits were switched to a certain number of cells of power batteries, but these were subject to the same disturbances as the station and very often caused interruptions in the control system.

New blowers of the Sturtevant turbine type have been installed in the reconstructed substations because the transformers were running at a temperature dangerous to their insulation. This arose from the condition that as additional rotaries had been installed the blower capacity had not been increased in proportion. The new blowers are driven by G. E. induction motors instead of d.c. motors, thereby eliminating all commutator troubles. Under the new conditions the maintenance cost of both the transformers and the blower motors should be reduced materially.

146TH STREET SUBSTATION RECONSTRUCTION

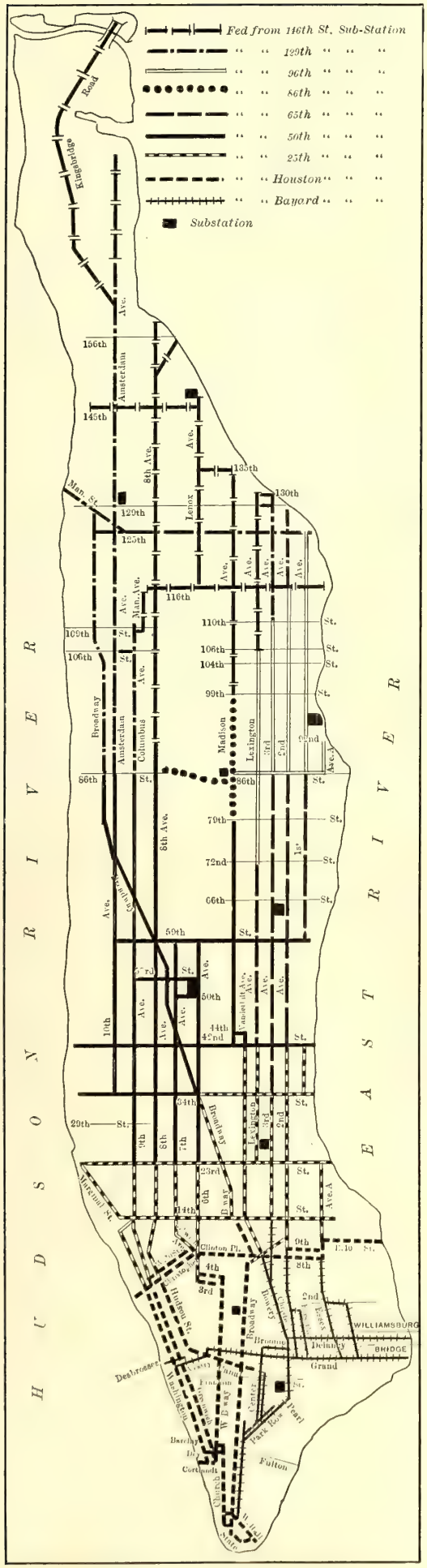
The substation at 146th Street was reconstructed in conjunction with the adjacent car house. When the 146th Street car-house fire occurred, the basement of the substation was flooded with water. Much damage to the basement equipment, which included switchboard apparatus, was obviated only by keeping a large steam pump and an electric pump running for some days. The flooding of the substation basement was due to the low elevation of the floor which necessitated at all times an electric pump to handle the water. When the wall between the car house and substation was reconstructed it was necessary to move considerable apparatus and high-tension wiring to permit reinforcing the wall foundation and installing more steel work to carry the upper floors of the car house. Advantage was taken of this movement to transfer the apparatus to a new gallery which had been erected in the substation. As the reconstruction involved moving the brickwork of the oil switches, the new brickwork was laid out for new mechanism instead of re-using the old switches. When the high-tension bus was re-



Metropolitan Electrical Department—Rearranged D.C. Feeders at Twenty-fifth Street Substation

moved from the basement it was installed in an a.c. brick compartment of the type previously described.

In this station the control system for the large switches had been supplied by motor-generator sets and by tapping some cells



Metropolitan Electrical Department—Substation and Feeder Layout

in the power battery. The 15-amp control battery which is now used is charged by the original motor-generators. This separate power supply for the control system materially facilitates the ease of running the station and reduces the liability to interruptions of the service. The emergency lights which replace the oil lamps are in circuit with the control battery. The power battery in this substation was installed some 10 years ago and to have it reconstructed would have required an entirely new set of positive plates. The battery, however, represented but a small percentage of the substation capacity, so that when the shutdown occurred it carried only a few sections of line for a short time. The cost of reconstructing and maintaining this battery, therefore, was not considered justifiable when compared with its very small insurance against interruptions. The valuable area of 50 ft. x 140 ft. once occupied by this battery is now a part of the reconstructed car house. The battery also has been used for starting rotaries, but a.c. switches were installed on two of the rotaries to meet this requirement. It was felt that it would be sufficient to equip only two rotaries because of the remote probability of both being out of commission at the same time. All of the rotaries have a d.c. starting device, so that after a complete shutdown and the first rotary is started from the a.c. side the others can be started from the d.c. station bus. The d.c. starting devices have been reconstructed and equipped with an auxiliary contact for operating the d.c. starting breaker.

The air chamber in this substation was completely overhauled and reconstructed. The cables entering the chamber either have been installed in clay ducts or on porcelain insulators arranged to reduce the liability of short-circuits between the cables. The new blowers in this station also are driven by induction motors. The wooden ceiling or floor over the substation has been replaced by concrete to reduce the fire hazard and make the record room upstairs practically fireproof.

In reconstructing the southern wall of the car house along 146th Street, a new duct was constructed outside of the car-house wall in 146th Street, and running from Lenox Avenue to the substation. The individual ducts in the bank were so arranged that the cables entering the station were completely isolated. Both the old steelwork and the new steel framing in this substation were scraped and painted.

RECONSTRUCTION OF SUBSTATIONS AT TWENTY-FIFTH STREET AND HOUSTON STREET

Work very similar to that done at the 146th Street substation was carried out at the Twenty-fifth Street substation. A considerable amount of the original cable machinery was removed, new duct subways were installed and a new 1500-kw rotary converter was purchased. A lighting system, supplied from the Ninety-sixth Street station, is also being installed.

The Houston Street substation has also been overhauled. The rotaries formerly at Front Street have been moved to Houston Street and the Front Street station has been shut down. Two new 1500-kw rotaries have been purchased for Houston Street. If the value of the Front Street land thus made available for sale is deducted from the cost of making the change it will be found that for a net cost of approximately $8,700 the management has obtained additional equipment amounting in value to over $100,000.

LOCATION OF SUBSTATIONS

The company has at present six substations located as marked on the accompanying map, which also shows the sections fed by each substation. The 146th Street substation receives a.c. current from the Kingsbridge power plant of the Third Avenue Railroad. The other substations are fed from the Ninety-sixth Street power station, which also supplies current to two of the substations of the Third Avenue Railroad, that at Sixty-fifth Street and Second Avenue and that at Bayard Street and the Bowery.

NEXT ARTICLE

The second portion of this article will describe the electrical improvements at the Ninety-sixth Street station, rotary converter changes, feeder developments, line department and general engineering.

MEETING OF THE COMMITTEE ON INSURANCE

A meeting of the committee on insurance of the American Street & Interurban Railway Association was held at the headquarters of the association in New York on May 10, 1910. Those present were: Henry J. Davies, of Cleveland, chairman; F. A. Healy, of Cincinnati; A. H. Ford, of Birmingham, Ala., and S. L. Tone, of Pittsburgh. James F. Shaw, president of the association, and H. N. Staats, of Cleveland, were also present for part of the time. The meeting was the first regular meeting of the committee since its appointment in February last.

Mr. Davies presented to the members of the committee a tabulated statement of the data received from the member companies on the subject of insurance. This information had been compiled from inquiry sheets sent out by the association and also from investigations made independently by Mr. Davies, and included every year since 1901. Altogether 98 companies reported for 1909, and of these 73 sent complete reports. The figures showed a lower average premium rate, but a larger amount of insurance carried than for any previous year since 1901. The committee decided that for the advantageous prosecution of its work, statistics from a larger number of member companies were very desirable and a data sheet will be sent to those companies not reporting, with the earnest request to reply to inquiries of the committee.

The first subject discussed was that of schedules. Mr. Healy showed a sample policy of the Ohio Electric Railway Company, described in the Electric Railway Journal for Feb. 19, 1910, and stated that each piece of property of the company, except cars, was mentioned in the policy with its appraised value. These values were determined annually by the company and were then checked by the manager of the Ohio Inspection Bureau, representing the insurance companies. The value of rolling stock was put in as a lump sum, but the individual values of the different cars were kept on a card list in the company's office. A record is kept of all repairs made to cars so that this list is always up to date. Mr. Healy did not think that the rules on depreciation of freight cars used by the Master Car Builders' Association of 6 per cent per annum, with a certain definite minimum value, should be applied to electric passenger cars which are frequently overhauled.

Mr. Ford, of Birmingham, thought each company should have an appraisal of its property for fire insurance purposes made at intervals so as to form a basis for adjustment in case of loss.

The committee decided it would be advisable to incorporate in the forthcoming report some information in regard to the methods of making adjustments in case of loss.

The relative advantages of a central rating bureau and of separate rating agencies were then discussed. Mr. Healy stated that the steam railroad companies usually place their insurance with some one company through a broker of record, and that the insurance company then reinsures in other insurance companies. In this way a fixed rate to cover the entire property is secured. The steam-railroad companies have never taken concerted action to reduce rates and their rates are now probably the highest for a number of years. Several steam-railroad companies carry their own insurance either in whole or in part. The Philadelphia Rapid Transit Company was mentioned as one electric railway company which followed this practice and the Public Service Corporation, of Newark, N. J., as a company which was planning to do the same thing.

Mr. Shaw remarked that all the electric railway companies want is a fair rate of insurance, and one based on equitable conditions. He said that in New England it had been impossible for him to learn the basis on which the rates on his properties were determined.

Mr. Davies said that the Cleveland Railway Company in 1904 and 1905 was paying a very high rate. The subject was taken up seriously by the company at that time. It tabulated the premiums and losses of many traction companies. After some negotiation, the insurance companies made a comparatively small reduction in their rates. The Cleveland company then decided to install automatic sprinklers in its car houses, and invited the representatives of the factory mutual insurance companies, as well as of the old line insurance companies, to inspect the tests of these sprinklers. At the suggestion of Mr. Staats, the car houses were protected by aisle line sprinklers as well as by ceiling sprinklers. The tests were very successful and after their completion the old line insurance companies made a reduction of 90 per cent in rates on car houses and their contents. The present average rate paid by the Cleveland Railway Company on $5,000,000 of insurance was a little more than 40 cents per $100 of value, all policies covering both protected and unprotected properties.

The committee then discussed the plan of engaging a fire insurance expert to investigate the properties of members of the association or of those which wished to take advantage of his services, and the following letter was drawn up for submission to the executive committee of the association, outlining the plan recommended by the insurance committee.

Recommendation to Executive Committee

"At a meeting of the committee on insurance, held at the office of the association on May 10, the following resolution was adopted: Resolved, That this committee recommend to the executive committee of the American Association the employment of an insurance expert with authority to employ such assistants as may be necessary to advise the members of the association, or such of them as may desire to avail themselves of his services, on all matters relating to fire insurance, including forms of policies, appraisals of property, schedules of rates, the elimination of the payment of unnecessary commissions, the construction and improvement of properties with a view to the lessening of hazard by fire, and the adjustment of losses consequent upon fires, and to represent member companies, upon request, before inspection and rating bureaus, or other bodies having to do with fire insurance.

"If the recommendation embodied in this resolution meets with your approval, the committee on insurance will immediately undertake to ascertain the probable expenses of such an expert and his assistants, and submit to the executive committee, before the next meeting of the association, an estimate of such expenses and a plan for their distribution."

At a meeting of the executive committee, held on May 11, this recommendation was approved.

Mr. Davies then brought up the subject of insurance on loss of business due to fire, similar to the insurance policies issued to cover use and occupancy of buildings by certain fire insurance companies. He then read a draft of a proposed policy of this kind. Several members of the committee thought that insurance of this kind is more necessary in the case of small companies than in the case of a large company because the former would be more apt to lose a considerable portion of its rolling stock by a single fire. Mr. Tone said that one of the constituent companies of the Pittsburgh Railways Company had had such a policy before it was taken over by the present company, and that the former owners considered it desirable.

Mr. Healy described the fire drills and other methods of protection against fire on the Ohio properties, and said that he considered it very desirable for interurban cars to carry chemical extinguishers. Since this plan had been followed on the Ohio Electric Railway, 10 interurban cars had been saved by the use of chemical extinguishers and the loss in no case had exceeded $100. These extinguishers are carried in the front vestibule and the acid and other contents are renewed every six months. Mr. Healy did not consider this plan necessary on city cars because the city fire departments could be summoned in case of fire. By carrying these extinguishers the Ohio Electric Railway had obtained a rate of 50 cents on its cars. Mr. Ford said that in Birmingham there had been no trouble with cars catching fire in the streets. Mr. Tone said that there had been several instances of this kind in Pittsburgh.

To avoid frequent small claims, Mr. Healy said that his

companies did not make any claim on the fire insurance companies for small fires until the amount of the losses aggregated $500, although the fire insurance adjustor is notified promptly of the loss. He also said his company had employed on its Ohio and Indiana properties an inspector who was entirely independent of the local operating officials. His only duty was to visit every insurance risk at least once each month and make a report of the exact conditions then existing. These reports cover general condition and cleanliness, as well as the wiring of buildings and cars and inspection of the fire drills, and also embrace recommendations to reduce the fire hazard. On receipt of these monthly reports in his office, copies are made and forwarded to the operating officials having jurisdiction. In his opinion, this is the most valuable part of their plan to prevent fires. A man occupying the position of inspector must be of a high order of intelligence and have had sufficient experience to properly criticise and condemn, if necessary, existing conditions. He must not be under the jurisdiction of any of the operating officials so that he would be subject to discharge by them, as he may have to make adverse reports on their methods as well as against employees under their jurisdiction.

The committee then adjourned, but will hold another meeting during the summer.

MEETING OF THE EXECUTIVE COMMITTEE OF THE A. S. & I. R. A.

A meeting of the executive committee of the American Street & Interurban Railway Association was held at New York on May 11 to consider the place of holding the next convention of the association. Those present were: President, James F. Shaw of Boston; Arthur W. Brady of Anderson, Ind.; Thomas N. McCarter of Newark, N. J.; George H. Harries of Washington, D. C.; W. J. Harvie of Utica, N. Y.

President Shaw reported that four members of the committee on location, representing the association and the Manufacturers' Association, had visited Saratoga on April 26. Saratoga possesses many advantages as a convention city. Its chief objection is that there is no large hall where the exhibits can be shown. In consequence, at the 1903 convention, which was held in Saratoga, the exhibits were contained in temporary buildings in the courtyard of the Grand Union Hotel. A committee representing the commercial interests in Saratoga, however, has offered, if the association will agree to meet in Saratoga for three years during the next five years, to erect a concrete building suitable for exhibits and provided with different assembly rooms in which the different associations can hold their conventions. This building would be approximately 300-ft. by 400-ft. so that it would contain about 120,000 sq. ft. It would be in a desirable location on the main street of the city within 7 minutes' walk from the principal hotels, and would be provided with railroad connections inside and outside the building. The representatives of Saratoga further agreed that the charge for space in this building would be no more than that which the Manufacturers' Association paid for space at the last convention at Atlantic City and that if at the end of the 5 years' interval mentioned the receipts for rent for the building from the Manufacturers' Association and from any other purposes for which it might be rented are equal to the original gross cost of the building, the building and the land on which it is located will become the sole property of the American Street & Interurban Railway Association. It is expected that the gross cost of the building will be about $150,000 and from the receipts from space at the last three conventions it is expected that the receipts from space during three future conventions, added to those received as rent for other purposes, would more than pay for the hall. The Saratoga representatives further agreed that if the plan was adopted the plans and specifications for the building would be submitted for approval to the officers of the association before the building was erected. Representatives from the principal hotels also submitted schedules of the standard rates for their rooms and agreed that there would be no increase in these rates during conventions of the association.

The executive committee did not think it wise to accept this proposition without further knowledge of the wishes of the membership at large on the plan, but requested the president to investigate the subject further and also to see whether propositions of a similar character could be obtained from other cities.

It was the sentiment of the committee that for many reasons it was desirable for the association to possess a good hall of this kind, if it could be done without cost or financial risk to the association. Such a plan would greatly reduce the cost of holding conventions. At the same time it would in no way prevent the association from meeting in other cities during any years, except during three of the next five years. The committee feels, for instance, that during the next six years one meeting should certainly be held in Canada, one in the middle west and one on the Pacific coast. The places of meeting of the association have always been determined in the past by the geographical distribution of the membership and there is no intention of departing from this plan in the future, except so far as the meetings in the East are concerned. Even if the association possessed a building it probably would continue to go West every other year, and could even select some other city in the East in the alternate years if there should be good reasons for doing so. But the fact that the association possessed such accommodations would make it more independent than if it did not have property of this kind.

The report which President Shaw will prepare on the subject of a permanent convention hall to be owned by the association either in Saratoga or in some other city will be presented at the next annual meeting of the association, when there will be ample opportunity for obtaining a consensus of opinion of the membership on the subject.

No definite plans were made for the meeting place in 1910, but President Shaw announced that an invitation had been received by the association from Richmond, Va., to meet in that city next October. This invitation is in addition to those already mentioned in the paper. It is expected that a selection will be made soon of a city for the 1910 convention.

DEPRECIATION AND RESERVE FUNDS OF ELECTRICAL PROPERTIES*

BY WILLIAM B. JACKSON, OF D. C. & WILLIAM B. JACKSON

Every company operating an electric light and power property, a street railway property, or a telephone property, or contemplating entering into any such field of activity, must take into account certain expenses that cannot be appropriately included in the day-by-day operating and office costs or in the current maintenance expenses of the property, if its accounts are to show in full the actual cost of performing the services required.

I refer to the sums of money that must be set aside to cover depreciation, replacements and to provide a reserve fund to care for extraordinary costs as hereafter explained.

The term depreciation as here used may be divided into two parts:

1. Decrepitude—Which covers the gradual wearing out of the apparatus from the effects of use and of age, which cannot be overcome by current repairs, and which results eventually in ending the operative life of the apparatus.

2. Obsolescence—Which takes into account the reduction in the useful life of apparatus, on account of advances in the art whereby otherwise operative apparatus is made uneconomical for further use.

The term reserve fund, as here used, may also be divided into two parts:

*Abstract of a paper read before the Western Society of Engineers, Chicago, Ill., April 27, 1910.

1. Required reconstruction—Which takes into account reconstruction costs made necessary by municipal or other legislative requirements.

2. Special insurance—To cover expenses that cannot be forecast with any degree of certainty, caused by extraordinary occurrences, such as unusual storms, explosions, great conflagrations, acts of strikers, etc.

In considering depreciation it is well to separate clearly in one's mind the annual depreciation of the plant as an average whole and that of the component parts making up the plant. If we consider electric railway track, there are the ties with short life and no salvage; there are the rails with medium life and good salvage; there are the frogs and switches with short life and low salvage; and there is the electrical bonding which may be considered as having the same life as the rails and to have medium salvage. It would be impossible to determine a fair annual depreciation for track considering all of these parts together, but it is possible to obtain the fair average depreciation by taking the aggregate of the amounts found by considering the several parts individually.

The total amount of depreciation to be annually charged against any part of the installation should be equal to the first cost of the part installed ready for service plus the cost of removal, less any salvage obtainable for the part when discarded, divided by the years of probable life of the part.

The estimation of what is the fair useful life for any part of a plant presupposes a thorough knowledge of the nature of the service demanded of the part, a broad acquaintance with the general experience respecting like kinds of plant, a studied survey of the probable effect of local conditions upon the useful life, and a keen knowledge of the past and present progress of the art for the purpose of making an intelligent forecast of the rate of depreciation caused by approaching obsolescence.

The factor of obsolescence entering into the question of useful life of plant, whether of buildings, machinery or other plant, is a disturbing one. This has the effect of reducing the estimated useful life of many parts of most plants below that which would be indicated by the ravages of decrepitude, and it likewise affects the probable salvage. Where the factor of obsolescence is estimated as likely to terminate the useful life of a part before decrepitude would be likely to cause its rejection, the former factor must determine the useful life. Consequently, the factor of obsolescence may be the determining factor in fixing the length of the useful life of some parts of a plant, and decrepitude may be the determining factor in fixing the length of useful life of other parts. In other cases these two factors may jointly influence the length of life. The factor of obsolescence has been an exceedingly important one in the several kinds of properties under consideration, and especially so in connection with all kinds of switchboards and other controlling apparatus. But its effect is very apparent, even when considering what we think of as the most stable parts of an electric generating plant, though revolutionary effects are not so apparent to-day as they have been in the past.

Most public service companies are forced to make large expenditures by ordinances of municipalities or by other legislative action. These are required changes, such as changes from overhead construction to underground construction, relocation of distribution lines on account of new street surveys, changes from wooden poles to iron or steel poles, changes in track construction owing to paving of streets, etc. The costs of such changes up to the value of the original construction should not be made an addition on capital investment and they cannot appropriately be considered as a part of current maintenance, but they should be provided for by a required reconstruction fund.

The question of what annual charge should be made on account of special insurance is also difficult to solve with exactness, but it is one of which sight should not be lost. The ordinary maintenance expenses should not be expected to include such costs as those occasioned by the destruction of a power house roof by a wind storm, the annihilation of a boiler-room by a boiler explosion, the razing of a pole line by sleet and storm, etc. It is, therefore, appropriate that an annual amount be laid aside for each part of the plant, except, of course, land, to create a fund to remedy such damages which come once in a while to every plant. The element of chance must enter very largely here, but chance is not such a fickle factor in operations when its effects are distributed among many parts of a plant.

These factors of required reconstruction and of special insurance, which I have considered under the heading reserve fund, are quite different in their characteristics from depreciation, but a plant will just as surely get into the breakers if its reserve fund, or some equivalent to meet these expenses, is not kept in good shape as when no provision is made to take care of depreciation.

If replacements are taken care of by capital account, a property becomes burdened by an imaginary capital investment in physical property which is almost sure to be a serious handicap when the company desires to reduce rates or make improvements. Where replacements are permitted to be taken care of by capital account, the capital account becomes something like the wallpaper in a room (to use a homely comparison) which has been put on layer upon layer, the old not having been removed when the room was newly papered. The papering is not worth more than the last effective layer, and in fact the lower layers sometimes prove the destruction of the whole, and so it may be with an inflated capital account.

By capitalizing replacement costs, the burden of carrying these costs is thrown upon the future without limit of time in cases of unlimited franchises, when this burden should have been borne by the past, except during the period in which a company is still in process of building up its business to a remunerative one.

Most plant managers have not yet come to a full appreciation of the dire straits a plant must come to sooner or later if the depreciation appropriations or their equivalent are not systematically and intelligently attended to.

A third division is sometimes made in depreciation called inadequacy. This factor covers costs which are occasioned by the necessity of discarding otherwise serviceable plants on account of growth of business. This factor should be of small importance in a plant planned and operated with excellent engineering judgment, and it is so closely allied to obsolescence that it does not seem necessary to add a third division to depreciation. It may be properly considered as a part of obsolescence whenever it enters as an appreciable factor in any consideration of depreciation.

The expenses that are considered in this paper are as real as the payroll and other daily operating expenses of a plant, but the ravages of depreciation frequently do not show to a noticeable degree until several years after the beginning of the operation of a plant, and there are also likely to be long periods during which it is unnecessary to make much, if any, outlay on account of required reconstruction and special insurance. For these reasons there is serious danger of overlooking the importance of these expenses in promoting a new enterprise, or in the early days of the operation of a public service company. But if the earnings of a company, after it has become well settled in its business, are not sufficient to cover a fair appropriation annually to the depreciation and reserve funds, as well as to cover the regular operating expenses and a reasonable return to the investment, that company is one that conservative investors should shun. If the conservative estimated earnings of a new project do not show that they will provide such returns, it should not be considered an attractive project.

The coming of public service commissions, having power to regulate the rates of public service companies, has raised the question whether the depreciation of a plant should have an influence upon the earning power of the company. It seems patent that a company should be permitted to earn a fair return on a full, reasonable, unimpaired capitalization regardless of depreciation, so long as it supplies equally good service. This

question would not seem to me to be open to doubt were it not sometimes a subject of serious discussion, and were it not that some respected publicists seem to hold that the net earning power of a public service company should be less after its plant has been subject to depreciation than when brand new, even if it gives equally good service and the stockholders have received back no part of their invested principal, but only fair returns in interest.

With a properly conducted property the fact that the property has suffered depreciation, which is unavoidable in any electric plant, should not have the effect of injuring the quality of its service or of impairing its capital, which would be the case if its recognized earning capacity were expected to decline proportionally with the increase of its depreciation fund. If the security holders are permitted to receive interest and dividends based upon a fair return on the investment in their property during the first years of its operation, I am unable to see how this basis may be fairly changed during later years, so far as investment is concerned, after the plant has depreciated, as the investment has remained unchanged.

The tendency of today is to make sweeping changes in plant and methods, to permit of less expensive or of improved service. On this account many excellent plants in good operating condition are shut down and the requisite power received from other sources. A company cannot well charge off of its capital account the value of such plants which may be comparatively new when they are put out of commission. Unless it is necessary to retain the plants in reserve, I believe they should be dismantled and the capital of the company reduced by the amount received from the sale of discarded machinery and other property. Then the difference between the amount received from their sale and their actual capital value to the company may still be continued as a true asset of the company, and that value be gradually charged off at the normal depreciation rate of the plants discarded, the capital of the company being reduced each year by actual liquidation of that amount. The economies derivable from abandoning the discarded machinery should be sufficient to extinguish in this way the capital value of the abandoned plants, or else the transaction is not an advisable one.

In conclusion I will say that, where electrical properties have been failures in the past, a goodly proportion of the failures may be traced to lack of provision for depreciation expenses and for extraordinary expenses. The reserve fund, besides covering such extraordinary expenses as are mentioned in the foregoing discussion, must be sufficient to care for losses occasioned by any recession of income which may come in the train of the physical results of the extraordinary occurrences discussed. The proper organization of a depreciation fund in conjunction with the reserve fund will also fortify a company against difficulties on account of reduced net earnings during lean years, which every company must expect, and which lean years will be offset by good years.

THERMIT WELDING IN RICHMOND

The Virginia Railway & Power Company, Richmond, Va., has had very successful results in repairing motor housings by thermit welding. For the repair of the broken half of a motor case, the company uses a mixture of 25 lb. to 35 lb. of thermit and 10 lb. of steel shavings. The pre-heating is done with a compressed air-gasoline torch. The cost for repairing a GE-67 half is about $15; whereas a new half costs $90. This repair cost includes the expense for gasoline and labor, but not the depreciation on appliances nor the compressed air which is available throughout the shop anyway. About three to four gallons of gasoline are used per weld. The labor charge is $3, and is made up of the day's work of two $1.50 men who carry out the complete process from the making of the molds to the chipping of the case. The low cost for labor shows conclusively how little skill is required in this method of welding after the men have had a little experience.

INVESTIGATING ACCIDENT REPORTS AND CLAIMS*

In considering this subject let us determine upon the questions that ordinarily confront the claim agent in endeavoring to decide upon the proper action to be taken in investigating an accident report. Briefly they are:

1. Is the case apparently of sufficient importance to warrant an immediate investigation, or would any advantage be lost by deferring action until a claim develops?

2. Is the case apparently of sufficient importance to warrant a personal investigation, or will a written statement from the witness by mail suffice?

3. If a personal investigation is determined upon, what is the method to be pursued to gather all vital facts so that the claim agent will be guided in reaching a just conclusion as to the merits of the case and in safeguarding the interests of the company in the event of litigation?

As to the most advantageous time to investigate a report, it is advisable to investigate all accidents immediately after a report is received. Unfortunately, lack of facilities for doing so or press of important cases needing immediate attention will not permit a prompt investigation of all reports.

Accidents which should be investigated promptly might be classified into those in which personal injuries are sustained, because personal injuries, as a rule, develop into the most stubborn and costly cases. Deception is practiced more successfully in such cases than in any others. In accidents where property only is damaged it would seem good policy to have an immediate appraisement made so that if a claim should afterward arise, the claim agent, in making an offer, will be guided by the appraiser's estimate. A personal investigation could follow then. However, letters addressed to the witnesses often bring the information needed by the claim agent to determine the question of liability.

If it has been decided to make a personal investigation of an accident report the person detailed should promptly call upon the witnesses, and after interviewing them as to the facts of the accident, he should make inquiry in the immediate vicinity of the accident to locate additional witnesses or gathering other data of sufficient importance to report. Supplemental statements could be obtained from the car crew, for there is every likelihood that they will not be as fully descriptive as the claim agent desires. A photograph of the scene of the accident is often a material factor should litigation ensue.

The following facts should be collected by the investigator in interviewing witnesses in cases where vehicles have been struck:

(a) Point of view of witness.
(b) Speed of car.
(c) Ringing of bell.
(d) First view of vehicle.
(e) Location of vehicle.
(f) Direction of vehicle.
(g) Speed of vehicle.
(h) Whether passenger on vehicle was looking toward car.
(i) Part of car hit vehicle and part of vehicle car hit.
(j) Distance from car when vehicle was first driven on track.
(k) Distance car went after vehicle was hit.
(l) If vehicle had covered top.
(m) Location of vehicle after being struck.
(n) If at night, was street lighted and did car carry headlight.

Where pedestrians have been hit, the following facts should be ascertained:

(a) Point of view of witness.
(b) Speed of car.
(c) Ringing of bell.
(d) First view of pedestrian.
(e) Location of pedestrian, with particular reference to cross-walk.
(f) Direction of pedestrian.

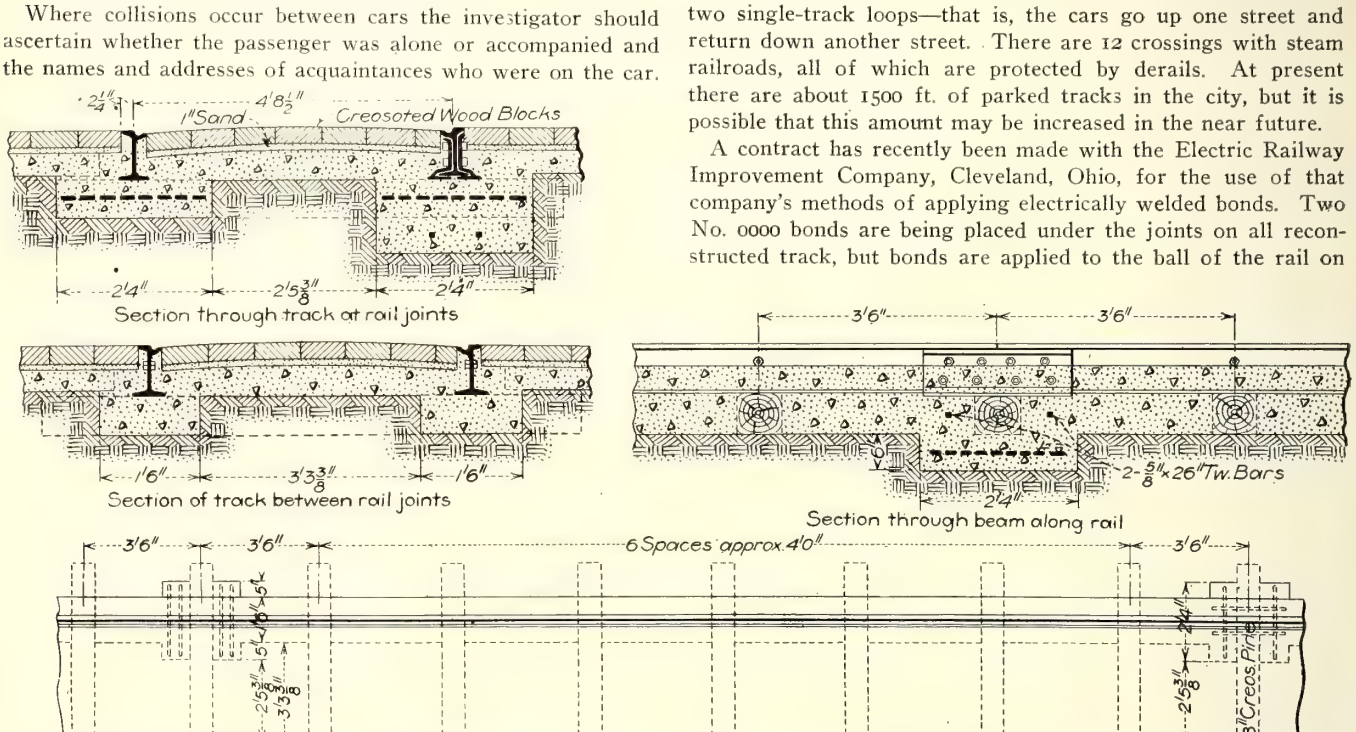
*Abstract of a paper presented by J. H. Handlon, claim agent of the United Railroads of San Francisco, before the May 20-21 meeting of the Pacific Coast Claim Agents' Association, held in San Francisco, Cal.

(g) Speed of pedestrian; that is, whether walking or running.
(h) Whether pedestrian was looking toward car.
(i) Distance from car when pedestrian stepped on track.
(j) Part of car hit pedestrian.
(k) Distance car went after hitting pedestrian.
(l) Location of injured party after being struck.

Where persons have been injured in boarding or leaving cars the following facts are of importance:

(a) View of witness.
(b) Location of conductor.
(c) Whether steps were clear.
(d) Unusual movement of car.
(e) Position of injured party when accident occurred.
(f) Location of car at time of accident.
(g) Distance car went after accident.
(h) Position and location of injured party after accident.
(i) Cause of car stopping after accident.

Where collisions occur between cars the investigator should ascertain whether the passenger was alone or accompanied and the names and addresses of acquaintances who were on the car.



Concrete Beam Construction in Mobile, Ala.

If an investigation has been made immediately after the accident, or as soon thereafter as circumstances will permit, the claim agent is usually well informed as to the merits of the case when a claim is filed. However, there are additional facts to be gathered after a claim has been made. As an illustration, the writer has found it profitable to ask the claimant or his attorney for the names and addresses of witnesses, although this is often refused, if the claimants or their attorneys are fully confident of the justness of their claim, or there is a disposition to avoid litigation, they are likely to co-operate with the company in that respect.

In personal injury cases an examination by the company's surgeon should be insisted upon and an itemized list of expenses arising from the accident should also be obtained. If no report has been made by the car crew of the accident in which the claimant contends that he was involved, it would seem advisable to make a secret investigation of the character of the claimant, of the length of his residence in the locality, etc. If he has recently removed from some other city, it is advisable to write to the street railway company operating there to ascertain whether the claimant has ever made a similar claim.

TRACK WORK IN MOBILE

Since November, 1909, the Mobile (Ala.) Light & Railroad Company has reconstructed 2 miles of single-track on account of the paving of certain streets. It is expected that 2 miles more will be reconstructed within a short time if the city carries out the project it now has for the repaving of other streets. The railway company, however, is not planning to build any extensions. The usual track construction in the city on unpaved streets is made up of 70-lb. and 80-lb. A. S. C. E. sections. In the country 60-lb. A. S. C. E. rail is used. In the paved district the principal rail used was the Lorain Sect. 89, No. 319 semi-grooved section, although the company retained in service some 80-lb., 7-in. T-rail. Continuous joints are used on all rail. The Mobile municipal authorities do not compel the use of a grooved rail in wood-block paving, but the railway company itself prefers to use the Sect. 89, No. 319. Most of the lines in Mobile are double-track, but some of the lines have two single-track loops—that is, the cars go up one street and return down another street. There are 12 crossings with steam railroads, all of which are protected by derails. At present there are about 1500 ft. of parked tracks in the city, but it is possible that this amount may be increased in the near future.

A contract has recently been made with the Electric Railway Improvement Company, Cleveland, Ohio, for the use of that company's methods of applying electrically welded bonds. Two No. 0000 bonds are being placed under the joints on all reconstructed track, but bonds are applied to the ball of the rail on other track. The special work is being thoroughly rebonded.

In the reconstruction of track for paved streets, the company is using the concrete beam and wood tie construction shown in the accompanying drawing. The beams are 18 in. wide x 7 in. deep under the base of the rail except under the joints, where the beam is 26 in. wide and 11 in. deep, thereby extending 4 in. beneath the tie. Creosoted ties are placed at joints. The following concrete mixture is used for the beams: One part Portland cement, 2½ parts sand and 5 parts gravel. The concrete beam is reinforced at every joint with 4⅝-in. diameter twisted bars, 26 in. long. The joints are staggered. The city paving contract calls for 4 in. of concrete, 1 in. of sand for cushion and 4-in. creosoted blocks. The company takes a subcontract from the paving contractor for the city concrete between rails, so that the beam and paving concrete is all put in at once, forming a monolith. The company increases the strength of the mixture required by the city at its own expense. The ties are installed at intervals of 4 ft., and tie rods every 7 ft. In laying the new rails those ties which were found in good condition were allowed to remain, but the decayed ones were replaced by ⅞-in. x 8-in. x 8-ft. creosoted pine ties to maintain alignment.

PAINTING PRACTICE ON LONDON UNDERGROUND RAILWAYS

The London Underground Electric Railways Company, of London, operates two distinct classes of rolling stock—that for the electrified Metropolitan District line differing considerably from the cars installed for the three tubes built for electric traction from the start. The Metropolitan District cars are built of fireproofed wood, with aluminum panels, whereas the tube cars are all-steel. The former cars have been found more costly to maintain from the painting standpoint, because they operate in semi-open tunnels, and besides the leaching out of the fireproofing salts used in the wood is very destructive, both to the paint and metal covering of the cars. Both types of cars measure about 50 ft. over all, but the superficial areas of the Metropolitan District cars are somewhat greater than the tube coaches, in addition to their having side doors and partitions. The following paragraphs will describe in detail the painting practice followed for these two classes of cars and services:

METROPOLITAN DISTRICT CARS.

Every five years the cars of the Metropolitan District line are repainted according to the following schedule, for a total cost of £26, of which amount two-thirds are required for the cost of the labor.

First day—The old paint is burnt off from the woodwork with a lamp or gas, care being taken not to scorch the wood. A paint remover is found more advantageous for large sections of aluminum or other metal work, as the lamp heats the metal, thereby causing the latter to buckle and the paint to stick. As most paint removers are very inflammable, great caution must be exercised in their use. It is found safer to complete all necessary burning off before bringing the paint remover near the car. While paint removers may be used on woodwork, the lamp or gas flame is better, because it leaves a surface which is sure to be dry, and it is also cheaper. When using paint removers, the surface is well cleaned with turpentine or benzoline, so that no wax or grease will be left upon the panels. After removing the paint, the panels are sandpapered down and the work primed with white lead.

Second day—All screw holes and crevices are filled with a hard stopping.

Third day—Apply the second coat of white lead priming.

Fourth day—One coat of filling or rough stuff.

Fifth day—Second coat of rough stuff.

Sixth day—Third coat of rough stuff.

Seventh day—Rub smooth with stone and water.

Eighth day—Apply coat of white lead priming and paint the belt rails and facias a dark lead color.

Ninth day—Stop up with sandpaper stopping, sandpaper down, apply a second coat of white lead priming and paint the belt rods and facias with chocolate ground in japan.

Tenth day—Apply two coats of body color (chocolate or red) ground in japan.

Eleventh day—Pick out with japan color and varnish on the same day with hard-drying body varnish.

Twelfth day—Stand.

Thirteenth day—Second coat of hard-drying body varnish.

Fourteenth day—Stand.

Fifteenth day—One coat of finishing body varnish.

The roof and platform are painted before the last coat of body color is put on the car. To improve the durability of the varnish, the car is allowed to stand four to seven days after being repainted and varnished before going back to service. Despite the hard condition of operation in smoke-filled tunnels, the painting program outlined has proved so satisfactory that two years is permitted to elapse before a car comes into the shops again for a general clean down, touching up and varnishing. The dates of the complete painting, overhaul and of the touching-ups are painted in small white letters on the front of the cars. Between these processes the cars are brought into the paint shop for thorough inside cleanings, to wash down the ceiling, paint the floor, scrub the seats, etc.

THE TUBE CARS.

The painting of the cars operated in the clean Piccadilly, Charing Cross and Bakerloo tubes is far less expensive than those of the Metropolitan District, as may be judged from the fact that in 1908 the repainting of 108 Piccadilly cars cost only an average of £8 6s. 4d. ($40.48) per car for a job which is to be repeated every three years. It may be mentioned that all inside laid-on work has been abolished. The figure given in this paragraph for the Piccadilly work embraced the following process: Peeling off rusty panels, which were refilled and glazed; washing and rubbing down the entire exterior and applying two coats of varnish; painting the roof; washing down the interior; giving the ceiling three coats of flat white; oiling down the panels, and giving the floor two coats of paint. All the gates and protection railings at the ends of the coaches received one coat of black paint.

The Bakerloo cars cost about £1 3s. ($5.58) more for a similar program, because their bodies are cream and bright red. These are more delicate colors than the engine lake chocolate brown used on the other tube cars, and cannot be matched up so easily. In the case of the darker color it may be sufficient to repaint only a portion of the panels, whereas it is necessary to repaint and glaze the entire Bakerloo coach, even if a large part is still in good condition.

In connection with the accompanying detailed labor and material statement on a typical Bakerloo car it may be interesting to give the painting schedules of tube cars in general, as follows: First two days, washing, scraping down and priming; third and fourth day, filling and stopping; fifth and sixth day, rubbing down. The Bakerloo cars then receive three coats of the cream exterior, which is ground in oil and applied one coat a day; the exterior covering of the other cars is ground in japan, and consists of one coat of lead color, one coat of brown and two coats of engine lake, which are applied at the rate of

CAR NO. 4. DATE IN SHOP, APRIL 27, 1909. DATE OUT OF SHOP, MAY 22, 1909. LONDON ROAD DEPOT B. S. & W. RY.

Date	Nature of Work Done (Exterior)	Hours Spent	No. of Men Engaged	Rate per Hour Sh.	Rate per Hour Pence	Total Cost of Labor £	Total Cost of Labor Sh.	Total Cost of Labor Pence
.....	Washing down	22	2	4			14	8
.....	Painting Trucks and Roofs	12	1	4			4	0
.....	Scraping	30	1	5	1/2		13	9
.....	Priming	7	1	5	1/2		3	2 1/2
.....	Filling and Stopping	12	1	5	1/2		5	6
.....	Rubbing down	17	1	5	1/2	1	1	9 1/2
.....	"	21	2	4				
.....	Painting	21 1/4	2	8		1	8	4
.....	Varnishing	17	2	8		1	2	8
						5	13	11
	(Interior)							
.....	Washing	22 1/2	2	4			15	0
.....	Painting Ceiling	12 1/2	2	8			16	8
.....	Varnishing	12 1/2	2	8			16	8
.....	Painting Floors	4 1/2	1	5	1/2		2	1
.....	" Gates and Lattice	8	1	5	1/2		3	8
.....	Motor Cab	37 1/2	1	5	1/2		17	2
				Rate		£ 3	11	3
	MATERIALS USED (EXTERIOR)							
.....	Varnish, 1 1/2 gall.	...	...	12	0		15	0
.....	White Lead in Oil, 12 lb.	...	...		3		3	0
.....	Body Red, 5 lb.	...	...	1	9		8	8
.....	Purple Brown Roof Paint, 1 1/2 gall.	...	...		4		6	0
.....	Black Japan, 3 pts.	...	...	8	0		3	0
.....	Filling Powder, 3 1/2 lb.	...	...		1 1/2			5 1/2
.....	Dry White Lead, 1 1/2 lb.	...	...		2			3
.....	American Turpentine, 2 1/2 gall.	...	...	2	4		5	10
.....	Mineral Turpentine, 1/2 gall.	...	...	1	2			7
.....	Soft Soap, Sapon and Pumice Powder	...	...	....			5	0
						£2	7	9 1/2
	(Interior)							
.....	Varnish, 3 qts.	...	...	12	0		9	0
.....	White Lead in Oil, 15 lbs.	...	...		3		3	8
.....	American Turpentine, 1/2 gall.	...	...	2	4		1	2
.....	.....	...	...	....			13	10
	Total	...	...	....		£12	6	9 1/2

Names of Painters, PREECE AND BANKS.
Date, May 24, 1909.
Signed, W. H. JONES, Foreman Painter

Form Showing Tabulation of Painting Costs

two coats a day. It will be seen from this schedule that the exterior work on the Bakerloo cars requires nine days, against eight for the other cars. While the exteriors are being painted, the interiors are cleaned by laborers and then painted as follows: Three coats of flat white, consisting of one coat of lead and two coats of Satinette. One day is allowed for each coat, but both coats of Satinette could be applied the same day if necessary.

PROGRESS OF THE UTICA TROLLEY TOUR

The 2050-mile electric railway trip of Utica business men through central New York to Cleveland, Detroit, Toledo, Indianapolis, Louisville and return was successfully started on Tuesday morning, May 10. The party numbered from 21 to 30 persons and was accompanied as far as Cleveland by C. Loomis Allen, vice-president and general manager of the Syracuse Rapid Transit Company, the Utica & Mohawk Valley Railway Company and the Oneida Railway Company. The complete itinerary for this trip, which is planned to end in Utica on Monday, May 23, at 10 p. m., was given in the Electric Railway Journal of March 12, 1910, page 461. The entire run is being made in one of the Oneida Railway Company's cars. The car will have to be used as a trailer on the 1200-volt d.c. line between Indianapolis, Ind., and Louisville, Ky.

Each tourist was furnished with a dairy containing a schedule of the trip and a series of statements about the business and social advantages of Utica. Every member of the party also had a Utica lapel button and silver-mounted cane. The first stop was made at Syracuse for luncheon and short automobile tours given by an entertainment committee which included W. K. Archbold, of the Archbold-Brady Company. At Syracuse the party was joined by H. C. Beatty, assistant to the general manager of the Syracuse, Lake Shore & Northern Railroad and assistant secretary of the Auburn & Syracuse Electric Railroad, to pilot the visitors over the lines of the Beebe syndicate into Rochester. The party reached Rochester in the evening, where the visitors inspected the park system in care of the Chamber of Commerce. Rochester was left on May 11 at 9 a. m. and Buffalo was reached at noon. At 1:25 p. m. the car left for Erie, Pa., in charge of vice-president J. C. Calisch and general manager M. C. Brush, of the Buffalo & Lake Erie Traction Company. After a pleasant run through the vineyard districts served by this company the party entered Erie, where it was welcomed by a delegation from the local chamber of commerce. Cleveland was entered May 12 after stops were made at Conneaut and Ashtabula. At Ashtabula, the tourists were met by officials from the Cleveland, Painesville & Ashtabula Railroad Company and near Willoughby, the car was boarded by John J. Stanley, Charles H. Clark and George L. Radcliffe, president and general manager, chief engineer and transportation superintendent, respectively, of the Cleveland Electric Railway. At Cleveland, Mr. Allen was obliged to leave on account of urgent business matters, but he arranged to meet the delegates on their return. Columbus was entered on May 13 after passing through Elyria, Mansfield, Galion, Bucyrus, Marion and Delaware. At most of these places the visitors were met by entertainment committees from the next town on the route. Dayton was reached on May 14. In recognition of the efforts made by the members of this party to advance the interests of their home city, arrangements are being made in Utica to give the delegates a public welcome and banquet on their return.

The American Street & Interurban Railway Transportation and Traffic Association's committee on interurban rules has issued a circular in which the member companies are asked to state their operating conditions; whether they are using the standard code modified or unmodified, and if not, why they are using some other code; what action has been taken on the standard rules by State railway associations and commissions; whether the electric interurban code should conform with the standard code of the American Railway Association (steam railroads), etc.

CADET AND APPRENTICESHIP COURSES OF THE PUBLIC SERVICE RAILWAY

For the past two years, the Public Service Railway Company of New Jersey has been employing college men as cadet engineers, very largely along the lines contained in the report of the committee on education presented at the 1907 meeting of the American Street & Interurban Railway Association. This plan of taking men just graduated from a technical school and giving them an opportunity to learn the rudiments of the various departments before settling them permanently in any one department met with the strong approval of R. E. Danforth, general manager of the Public Service Railway and as a result, 11 men from several universities were accepted by his company on July 1, 1908, to work in different departments for a period of 25 months in all. It was planned to divide the course as follows: Mechanical department, six months; transportation department, seven months; track department, four months; line department, two months; power station, three months, claim department, three months. All of these divisions have been retained except the claim department which has been dropped from the list. It will be understood, of course, that the students were not all started in any one department but were scattered among them all in the most practicable manner.

The assignments to the mechanical and transportation departments were tentatively sub-divided to avoid tying a man down too long on one class of work. Thus the six months in the mechanical department were divided as follows: Pits, one month; armature room, one month; machine shop, one month; general repairs, one month; controllers, one-half month; car wiring, one-half month; test car, one-half month; storeroom, one-quarter month; car inspection, one-quarter month. The seven months in the transportation department were divided in the following manner: Car-house clerk, two and one-half months; inspector, two months, division superintendent's office, one month; conductor and motorman, one-half month; with general superintendent, one-half month; time-table department, one-half month. The only change made in the transportation assignments has been the lengthening of the time-table course from two weeks to one month.

It has not been possible to follow exactly the schedule outlined because the cadets often fill regular positions for which their successors have to be broken in. In general, however, the overlaps have not been of any great importance in affecting the plan of the course. Owing to the elimination of the claim department assignment, the total length of the cadet period would have been cut down from 25 months to 22 months but by extending the time for some of the other subjects, the course has been fixed at 24 months. Consequently, the first group of men taken on in July, 1908, will be eligible for permanent positions next July.

The purpose of assigning the men to so many different kinds of work is not with the expectation that they will become experts in the short time in which they are engaged in the department, but to make them familiar with the lines of thought and points of view taken by the different classes of employees. Furthermore, the close personal contact with the various types of workmen which they thus acquire tends to develop the character of the cadets and gives them a splendid opportunity to show how much diplomacy and executive ability they possess.

The course began with 11 men of whom three resigned to accept more lucrative positions elsewhere. During 1909, six more were taken, making a total of 14 students. To every applicant a straightforward explanation was given to the effect that he would have to begin at the bottom of the ladder in each department just as any unskilled laborer and that he would have to render the same obedience to the rules of the company. Practically every position successively held by the students is of subordinate character aside from such exceptions as sub-foremen in the track department. The initial monthly salary is $40 with periodical increases of $5 per month.

The company naturally expects that during the training period, a man will disclose his special aptitude for certain kinds of work but no promise is made by the company that every man or any one of them will be given a regular position after the two years are over. Whether the student is retained or not, he has gained an all-around education which is sure to be of great assistance to him in seeking electric railway work elsewhere.

Each department chief reports monthly on the work done by the cadets in his department. These reports are filed and tabulated both for the information of the company and the students. The management requests that these reports be made out under 10 heads aside from the reporter's general impression. These heads are loyalty, habits, determination, executive ability, diplomacy, originality, training, adaptability, skill and thoroughness or determination. As a rule, the men who make the best showing are those who come from high class engineering colleges and have supplemented their laboratory experience by shop work during the summer vacations between school terms. The company has been gratified to find that each of the men who are completing the second year has shown marked ability in one or more of the departments. The plan is to get excellent transportation men as well as good mechanics and engineers. Some of the men have turned out to be splended "mixers" and are very popular with their fellow workers. The department heads have also been well satisfied with the work of the cadets but each one seems to think that the students are not allowed to stay long enough in his department. A longer course, however, would discourage the apprentice. In any event, the department head has the opportunity of securing the permanent return of an apt pupil after the latter has completed the regular curriculum given by the company.

Besides the two-year cadet course for college graduates, the company has established an apprenticeship grade for boys having a common high school education. These apprentices are not shifted about from one department to another except at their own request. They are employed at regular wages but closer watch is kept of their progress. The older apprentices associate with the cadet engineers at the monthly meetings of the latter where papers are read and discussions held on matters relating to the company's business.

CAST IRON AND STEEL WHEELS ON SIX SOUTHERN ELECTRIC RAILWAYS

The following brief notes on cast-iron and steel wheels were gathered on a recent trip to Southern properties and may be of interest as showing the practice of the companies mentioned.

ATLANTA

The Georgia Railway & Electric Company uses for its city service almost exclusively the Atlanta chilled-iron car wheel made by the Atlanta Car Wheel & Manufacturing Company. These wheels are guaranteed for 40,000 miles, but the company reports that for the last two years practically all of the wheels considerably exceeded the guaranteed mileage. For 1909, the total distances covered by the Georgia Railway & Electric Company's wheels was 500,000 miles in excess of 1908. This mileage was obtained at a reduced wheel and axle cost of about $800 over 1908. This was due to the fact that while 1120 new wheels were used in 1908, not more than 1000 were required in 1909. The wheels are 33 in. in diameter and are used with 4-in. hammered steel axles on single-truck cars and with 4¾-in. hammered steel axles on the double-truck cars. The allied Atlanta Northern Railway Company, which is an interurban line, also uses Atlanta chilled wheels, but these are 34 in. diameter. The Atlanta company has some Schoen solid-steel wheels which have been running seven months, and thus far have given over 40,000 miles without returning.

MOBILE

The Mobile Light & Railroad Company use 33-in. chilled cast-iron wheels of Decatur, Atlanta and St. Louis make. For the past 19 months it has had in service under some double-truck cars solid-steel wheels of Standard and Schoen manufacture.

RICHMOND

The Virginia Railway & Power Company, Richmond, Va., operates chilled cast-iron wheels on all city lines and rolled-steel wheels on all high-speed suburban and interurban lines. This company has standardized its cast-iron wheels so that one wheel fits all the different type trucks. The Richmond track conditions are such that on account of the narrow-groove rail the excessive flange wear makes it impossible to get the maximum life out of the wheels. However, a guarantee of 35,000 miles per wheel is obtained on the cast-iron wheels.

LYNCHBURG

The Lynchburg Traction & Light Company's standard wheel is a chilled cast-iron wheel made by the Atlanta Car Wheel & Manufacturing Company. Although Lynchburg is a very hilly city, this wheel has been found very satisfactory and has given little trouble from broken or chipped flanges. The company has also been trying solid steel wheels during the past year. So far as its experience to date is concerned, it has found the cast-iron wheel to be cheaper for city operation, but the steel wheel is considered better for the interurban service. The steel wheels have made 50,000 to 60,000 miles without being returned, but the mileage made between the first and second turning has not exceeded 40,000 miles.

CHARLESTON

The Charleston Consolidated Railway, Gas & Electric Company uses for city service the Atlanta and St. Louis cast-iron chilled wheels of 33-in. diameter, 2¼-in. tread, with a ¾-in. flange, ⅞ in. thick on account of the full-grooved rail. This company operates over 2 miles of trestle, for which service there is used a cast-iron wheel with a 3-in. tread and a flange ⅞ in. deep by 1¼ in. thick. The extra wide wheels weigh 445 lb. each. This company has not yet tried any solid steel wheels

SAVANNAH

The principal chilled-iron wheel used in Savannah is of the Atlanta type. The Savannah Electric Company has had in use one set of steel wheels for over two years and four other equipments have been added since, thus providing two double-truck cars with Schoen wheels and three single-truck cars with Standard wheels. It is estimated that the steel wheels are good for a life of over 200,000 miles, which would make them cheaper to the company in the long run than the cast-iron wheels. On this basis a steel wheel would cost about 10 cents per 1000 miles, including the charges for three turnings, whereas the cast-iron car wheel would cost 13 cents per 1000 car-miles, based on a life of 48,000 miles. It is interesting to add that 85,000 miles were secured from the first set of Standard wheels before it was found desirable to make the first turning.

FINANCIAL REPORT OF AMERICAN STREET AND INTERURBAN RAILWAY MANUFACTURERS' ASSOCIATION

The 1909 financial report of the American Street & Interurban Railway Manufacturers' Association submitted by George Keegan, secretary-treasurer, shows the following items: Total receipts up to Dec. 8, 1909, $30,859.05, made up of a balance of $6,851.88 from the preceding year, $11,390 for membership and badges, $12,340.80 for exhibit space, and $276.37 for miscellaneous; total disbursements up to Dec. 8, 1909, $25,989.76, including $5,420.96 for exhibit expenses; balance on hand, $4,869.29.

The report by T. R. Johnson, chief commissioner of the New South Wales Government Tramways for the quarter ended Dec. 31, 1909, gives the following results: Miles open, 158¾; revenue, £297,291; expenditures, £260,717; miles run, 5,032,539; earnings per mile, 1 shilling 2¼d. (28½ cents); expenditure per mile, 1 shilling ½d. (25 cents); percentage of expenditure to earnings, 87.70; number of passengers carried, 50,417,125. Two extensions were opened for traffic during the quarter, the total length being 3½ miles.

COMMUNICATION

REVISING BLANK FORMS

New York, May 16, 1910.

To the Editors:

Referring to the discussion relative to the "Necessity for Revising Blank Forms," the interesting communication from Mr. Theodore Stebbins, on page 873 of your issue of May 14, contains two statements to which exception may be taken.

Mr. Stebbins speaks of the general practice of printing the date and quantity ordered in the margin of each form. Having recently analyzed several hundred blank report forms, the writer wishes to protest against this method of indicating the date and "number printed." He has found it more misleading than helpful because if anyone desires to use the information, say, as a guide to ordering fresh stock, he cannot tell if the particular form is from the last edition. The writer in tabulating certain forms with respect to the quantity ordered came near making an expensive error and had to re-do considerable work on discovering that some of the samples were from the second and third previous "runs" instead of the last. There was no way of telling from the samples themselves whether or not subsequent editions had been run. As commonly printed a form may bear a symbol like 9-15-09-5 M, indicating that on Sept. 15, 1909, 5000 were printed. Who can say from this that no later editions have been printed except by looking up some other record? It would be better to obtain all desired information direct from the primary record.

It may be argued that care should be exercised to obtain only the latest samples, but this is not always easy. It is hardly economical, providing no essential change in the form has been made, to destroy stock left over from a previous edition. So long as old samples are in stock in the back cabinets or desk drawers they will turn up sooner or later. The marginal information would be helpful only if it were feasible to insure that only the last run of any form would be in circulation, but this is not possible, even on small roads.

The better way is to print nothing on the margin except the "Form Number" and then to keep a record of each form, dates of respective runs and number printed, average monthly requirements and any other data desired. Notes can also be entered in the record relative to change to be incorporated in the next revision of the form. The record is very easily maintained and it will save an endless amount of bother in keeping track of blank forms.

Your correspondent makes another suggestion that ought to work out well, but does not. In his second paragraph he states "On the margin of each report form and in fine type I customarily place 'Directions for Use.' Each time the form is used the employee has before him these directions and will follow them more carefully than if furnished separately * * * These directions also state how many copies of the report shall be made and to whom each copy should be mailed, and when." The writer's experience is that it is not only a waste of paper and of effort to attempt to put "Directions for Use" on each report form, but that these instructions, as they usually appear on forms, are more misleading and confusing than otherwise, mainly because on many forms it is not practicable to give all of the needed directions in the space available. Usually the instructions are so voluminous that the average clerk or employee becomes confused trying to read them, or else they are so brief that they do not convey the desired thought. A better plan is so to draft the form that its use and handling will be self-evident. For instance, the information as to where the form is to be sent should be indicated near the top by a line reading "To" etc., giving title or department as "Chief Engineer" or "General Manager" or "Auditing Department." This practice is decidedly better than using the names of individuals as the forms will then remain unaffected by changes in the organization of the company.

The column headings and the introductory matter should be self-explanatory. Each form should also carry as a conspicuous headline a clear, concise definition of what it is and the period of time, as daily, weekly or monthly, which it covers, for example, "Daily Statement of Defective Cars" or "Monthly Report of Passenger Earnings." Below should be left a blank line for filling in the exact date, as "For month ending ——, 19—."

The following is a standard arrangement applicable to practically every form needed:

1. Name of company (which should appear on every form).
2. Form number (preferably in upper left-hand corner).
3. Designation or name of form, with time period indicated as previously described.
4. Date line.
5. The word "To" followed by title of official or name of department to which report is to be forwarded.
6. Body of form, including introductory or explanatory matter, with column headings and cross-rulings, if required.
7. Line for signature, with title, of person making the report, and line or lines for approving or confirmatory signature, if required.

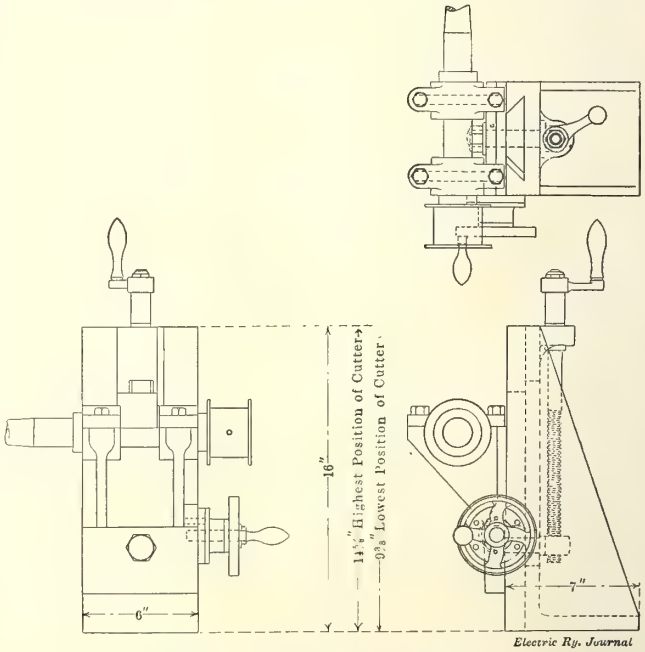
In the case of duplicate, triplicate or additional copies, if there is any doubt as to where they are to be sent, designating words as "Original for Auditor," "Duplicate for General Manager," "Triplicate for Superintendent of Transportation" may be printed near the top of the respective copies.

Contributor.

DRAWING OF COMMUTATOR UNDERCUTTING DEVICE

In the Electric Railway Journal of April 9, page 654, a half-tone was shown of a commutator undercutting device used by the Boston Elevated Railway Company, and a short review was given of the practice of the department of rolling stock and shops in connection with this branch of motor maintenance. Below is printed a working drawing of the tool holder, which fits an ordinary lathe.

The slotting tool is mounted on a shaft driven by a spindle

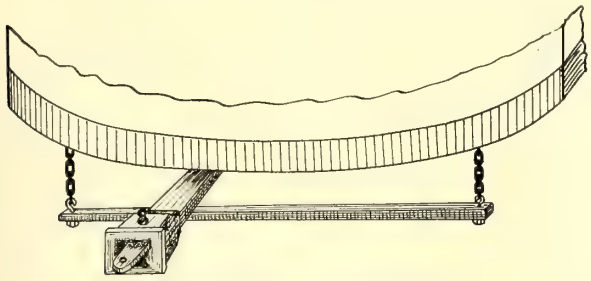


Details of Commutator Slotter

carried in the bearing shown in the side elevation, and maximum facility of adjustment is afforded by the horizontal and vertical spindles illustrated. The cutting tool can be raised to a maximum height of 14⅝ in. above the ways of the lathe, and lowered to a height of 9⅜ in. above the bed. The maximum width of the frame supporting the tool and driving pulley is 7 in. The device may be locked on the carriage of the lathe with ease. Accuracy rather than speed has been the company's aim in handling this class of work, as it has found that hasty undercutting either leads to electrical troubles in service or else the work has to be done over again in the shop to a greater or less extent.

CHAIN CARRY-IRON FOR DRAW-BARS

The Little Rock Railway & Electric Company, of Little Rock, Ark., uses an improved form of draw-bar carry-iron on its trailers. This consists simply of a pair of chains so that in rounding curves the draw-bar carry-iron is allowed to swing. Thus the amplitude of the coupler arc is increased and the derailing or damage of trailers on sharp curves is prevented.

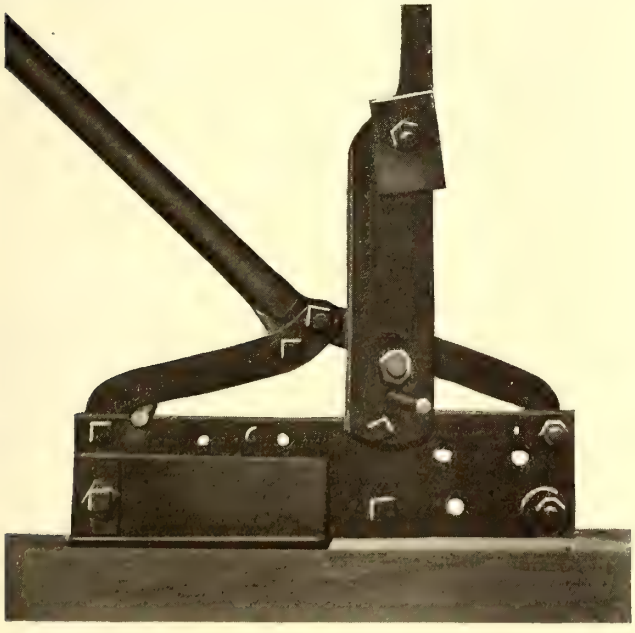


Chain Hanger for Couplers

HOME-MADE METAL CUTTER

The accompanying illustration shows a combination plate and bar cutter devised in the shops of the Charleston (S. C.) Gas, Railway & Electric Company. The plate-cutting portion comprises a toggle lever, one arm which is a cast-steel cutter for handling any piece of cold iron up to and including ¼ in. thickness and 3½ in. breadth; the other arm is a soft steel cutter for hot iron up to and including plates ¾ in. by 4½ in. The cast steel cutter has a notch at one end to permit the cutting of round iron of ¼ in., ⅝-in. and ½-in. diameter. The rounds cut in this manner need no chamfering to make them fit standard dies.

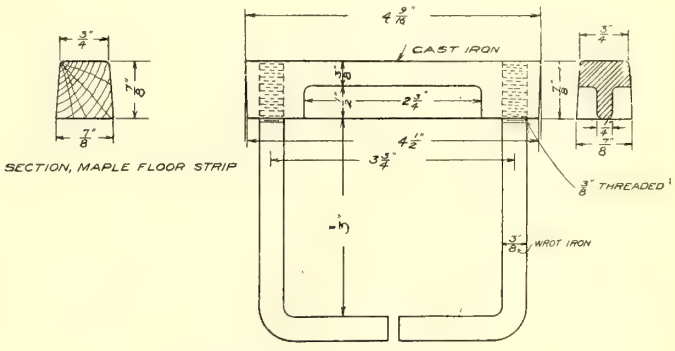
Bar-iron of ⅞ in. and 1 in. diameter is cut by means of a ratchet lever, parallel plates and dies in the following manner. The bar first is slipped through the corresponding hole bored in the plates, one of which is movable and the other stationary. The movable piece carries cast-steel cutting dies and is notched at the top to mesh with the ratchet lever. Hence when the latter is pulled over in either direction, the dies are made to bear against the bar and cut it. The base of this combination cutter consists of an old compromise rail-joint. The plates for the bar-cutter portion were made from abandoned brake-beams, while a discarded piece of trolley pole tubing answers as a sleeving to increase the leverage.



Device for Cutting Bar Iron

AN UNUSUAL TRAP DOOR LIFT INSTALLED IN RICHMOND CARS

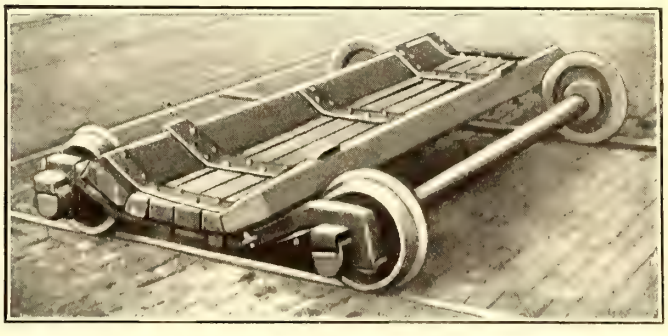
Many motor trap doors are raised either by means of a ring fastened to the floor in a depression made by cutting away a portion of the floor strips or by placing the top of a lift yoke between the adjacent strips, which have been beveled for the hand. Both of these methods are open to the objection that people with high-heeled shoes, particularly women, may trip in these holes, and thus find an excuse for injury claims. This possibility is avoided by the design of trap-door lift devised by the mechanical department of the Virginia Railway & Power Company. This method is shown in the accompanying drawing. Enough of one strip is cut away over each trap door for the insertion of a piece of cast iron 49/16 in. long. This casting is exactly as wide as the strip and flush with the rest of the floor. It is made as an inverted "U." The rest of the lift consisits of ⅜-in. wrought-iron rods threaded into the top piece as shown. The usual space between the strips is ample for the insertion of the fingers without requiring any depressions in the floor.



Richmond Trap Door Lift

WRECKING TRUCK USED IN PITTSBURGH

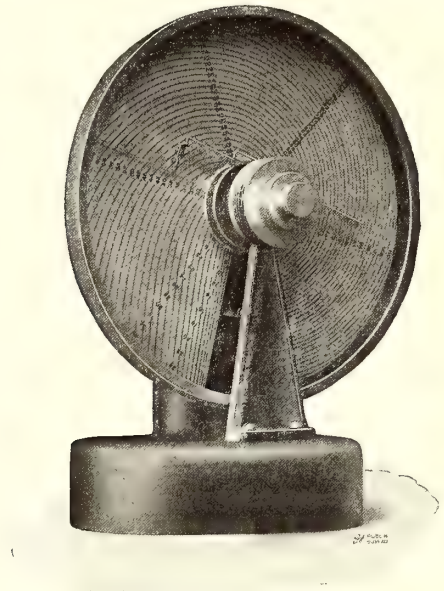
For pulling in cars with broken wheels or axles the Pittsburgh Railways Company uses the low truck shown in the accompanying engraving. One of these trucks is hauled behind the wrecking car to the scene of the breakdown, and after the disabled truck is jacked up the cradle is run under it and the truck lowered so the wheels or motor rest on the heavy planks forming the platform of the cradle. The disabled car can then be run into the shop under its own power. The side frames of the cradle consist of 2-in. x 2-in. steel bars bent down in the center and turned over at the ends to form the outside pedestal jaws. Straps ¾ in. x 2 in. are bolted to the underside of the frames and are bent down to form the inside pedestal jaws. They are continued across under the journal boxes and bolted to the ends of the outside pedestal jaws. The three planks forming the floor of the cradle are 3 in. thick, and are secured to the side frames with strap bolts. This truck is light enough to be lifted on or off the track by two men, and has been found to be very useful in handling serious breakdowns.



Wrecking Truck Used in Pittsburgh

STEAM AND AIR FLOW METERS

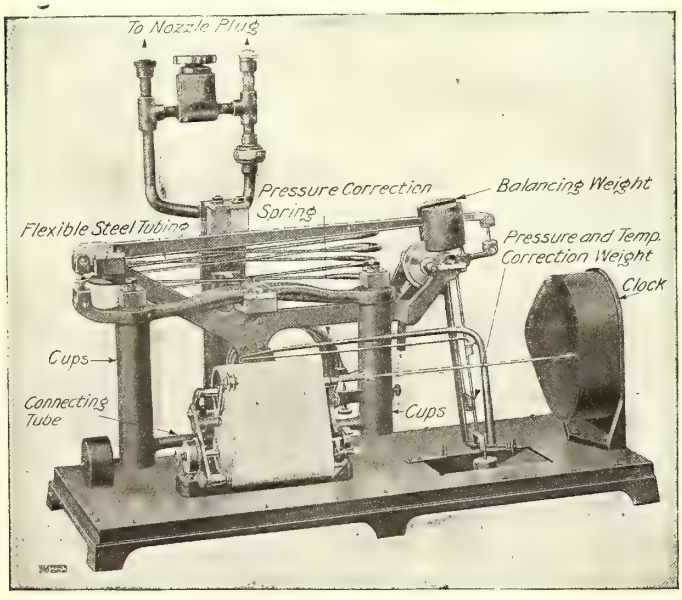
Over four years ago the General Electric Company began experiments to perfect a practical steam meter, and as a result of these tests it has developed a recording steam-flow meter, two types of indicating steam-flow meters and an indicating air-flow meter. Each of these instruments will accurately measure the rate of flow of steam, air or other gases in any



Indicating Flow Meter

size pipe, under any commercial conditions of pressure and temperature.

The acting principle of the flow meter is a modification of that of the Pitot tube. A brass nozzle plug, screwed into the pipe at the point where the flow is to be measured, carries two sets of openings: a leading set, facing the direction of flow and extending diametrically across the pipe, and a trailing set, consisting of two openings at 90 deg. and one at 180 deg. to the direction of flow. The impingement of the steam against the



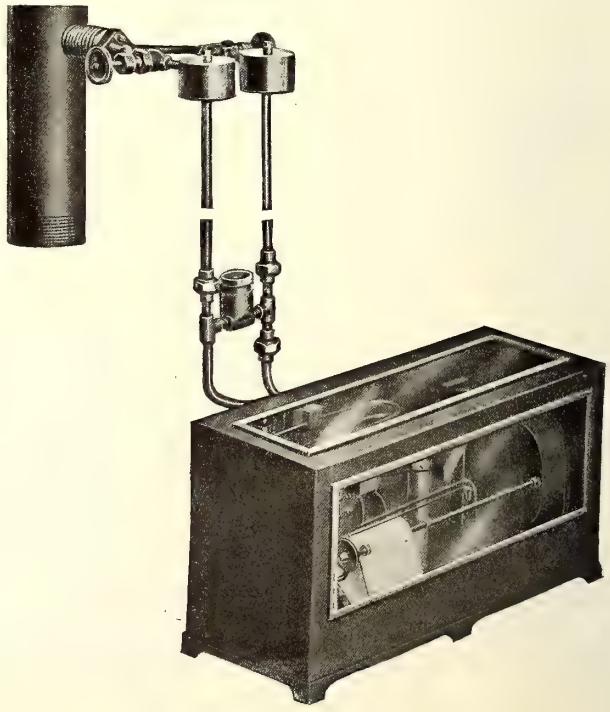
Automatic Pressure Correction Device

leading openings sets up in them a pressure equal to the static pressure plus the pressure due to the velocity head, while the trailing set is acted on by the static pressure less that due to the velocity. The difference in these values is a measure of the velocity, and for constant temperature and pressure gives the rate of flow. The pressures existing in the two sets of openings are communicated through separate tubes to the outer end of the plug and from there by ¼-in. iron pipes to the meter.

The recording steam-flow meter, Type R, Form D, is a curve-drawing instrument, calibrated to record the total rate of steam flow in pounds per hour. In this meter there are two cylindrical cups filled with mercury to about half their height and joined at the bottom by a hollow "U" tube, which is supported on, and free to move as a balance about, a set of knife edges. The two pressures obtained by the nozzle plug are communicated to the cups by flexible steel tubing, whereupon the difference in pressure is equalized by a rising of mercury in the left-hand cup and a falling in the right-hand cup. Due to the mercury displacement, the beam carrying the cups tilts on the knife edges until the moment of the counterweights on the extreme right of the meter exactly balances the moment caused by the displacement of the mercury in the left-hand cup.

The motion of the beam is multiplied by levers and is registered by a pen. The time element of the meter consists of an eight-day clock driving a drum and feeding paper at the rate of 1 in. an hour. Charts are supplied in sizes to measure a flow of from 2000 lb. to 240,000 lb. per hour, and of sufficient length to last one month. The rate of flow can be read at any instant or the average rate of flow calculated for a given time. The meter is adjustable for different conditions through a correction weight on a graduated arm. A chart supplied with the meter shows the correct position for any existing condition.

If the pressure in the steam main varies more than 10 lb. from normal, compensation is necessary for the error thus introduced. An automatic pressure correction device, consisting of a hollow spring, similar to the pressure spring in a steam gage, is connected so as to be influenced by the static pressure of the steam at the point where the flow is being measured. Any variation of the static pressure causes the spring to expand or contract, and this movement actuates the small correction counterweight and affects the movement of the pen to correct the recorded rate of flow. The meter weighs 55 lb.



Steam Flow Meter

complete. As the glass front of the cover is removable, the working parts of the meter are readily accessible at any time.

The Type I, Form F, steam-flow meter is to meet the requirements for an indicating rather than a recording instrument. It is especially useful for testing work, locating leaks, etc. The meter consists of an iron casting, core cut to form

a "U" tube, and partially filled with mercury. The difference in pressures, as transmitted from the nozzle plug, causes a difference in the mercury levels, and the displacement of the mercury actuates a pulley by means of a small float suspended by a silk cord. The pulley moves a small "U" magnet on the end of the shaft next to the dial in proportion to the change in level of the mercury in the "U" tube. The indicating needle is mounted in a separate cylindrical casing. The pivoted end consists of a bar magnet, free to turn in the same plane as the magnet on the inside of the meter. The mutual attraction of the two magnets keeps them parallel; a packed joint to transmit the motion of the pulley to the indicating needle is thus eliminated.

Proper adjustments for the existing conditions of pipe diameter, pressure and temperature are readily made by setting the graduated cylinder which actuates the rack carrying the pointer. When these settings are made, the rack is rotated by hand until the pointer coincides with the indicating needle. The point on the calibrated dial at the intersection of the needle and pointer gives the true instantaneous rate of flow in pounds per hour per square inch pipe area. This meter finished weighs only 25 lb.

The Type I, Form F, indicating air-flow meter is identical in principle and method of operation with the Type I, Form F, indicating steam-flow meter, except that water is used in the "U" tube as a working fluid and the chart dial is calibrated to read in cubic feet free air per minute at 70 deg. Fahr. per square inch pipe area. The air-flow meter is made in two ranges: low pressure 12 lb. to 35 lb. absolute, and high pressure 10 lb. to 120 lb. gage.

All meters are calibrated for operation under steady flow conditions, but will not accurately measure a periodically intermittent flow, such as is required by intermittent flow turbines, reciprocating engines, pumps, etc. In such a case, unless the meter can be placed so close to the boilers that steady flow conditions exist, recalibration for the existing conditions is necessary after installation.

Station piping arrangements are not interfered with in making installations, since it is necessary only to drill a ½-in. hole in the pipe and insert the nozzle plug. The plug must be placed in a straight run of pipe at least 10 pipe diameters from a preceding elbow or tee, and at least two pipe diameters before a following tee or elbow. The same nozzle plug is used for all types of meters, steam or air, the only difference being in the method of piping to the meter. The steam meter can be placed at any desired position below the level of the nozzle plug, provided the ¼-in. iron pipes to the meter have a slight downward slope throughout. As the piping for an air meter is not filled with water, the air meter can be placed at any desired position whatsoever, above or below the nozzle plug.

Some of the uses for which the meters are adapted can be summarized as follows: Recording the total amount of steam generated by a battery of boilers; equalizing the load on individual boilers of a battery; discovering internal leaks in boilers, as shown by the difference in the water input and the steam output; determining the deterioriation of efficiency of a boiler due to formation of scale, etc.; determining the efficiency of stoking; measuring the amount of steam sold; discovering losses originating from leaks between boilers and points of consumption, as in defective traps, gaskets, valves, and other steam apparatus.

A PAINT SHOP KINK

An improvement over the usual method of constructing drying racks for varnished sash frames is to use triangular strips on the sides instead of rectangular strips or trays. Only the lower corners of the side pieces of the sash frames come in contact with the supporting strips so that the varnished surfaces are not marred in any way. A considerable saving in the space required between the sashes is also effected and more frames can be placed in a rack of the same height. Canvas curtains should be used in front of the drying frames to keep out dust.

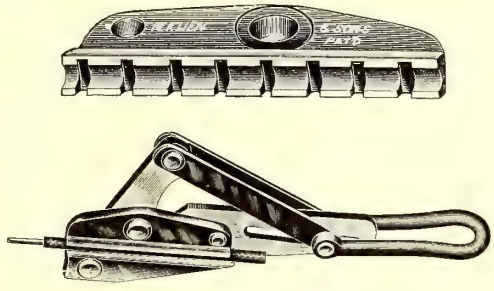
AUTOMOTONEERS IN THE SOUTH

The Norfolk (Va.) & Portsmouth Traction Company is now using 150 automotoneers on 75 of its cars, which include all of the interurban rolling stock. These controller regulators were furnished by the Electric Service Supplies Company, of Philadelphia, and are giving such satisfactory service as equipment savers that the company is considering the equipment of all of its cars in the same manner.

The Charleston (S. C.) Consolidated Railway, Gas & Electric Company was having a great deal of trouble on one of its lines from commutator flash-overs, burnt-out fuses and armatures owing to improper operation of the controller. In December of last year, however, the company equipped 12 cars with automotoneers, which have stopped practically all of the electrical troubles formerly given by the cars in question. The company is so pleased with the results that it intends gradually to equip the entire system with this device. Automotoneers are also being used by the Mobile (Ala.) Light & Railway Company.

GRIP FOR INSULATED WIRE

Mathias Klein & Sons, Chicago, Ill., manufacturers of the "Chicago" wire grip, have recently brought out a design for handling No. 10 insulated wire in addition to the grips for larger sizes ranging from No. 4 to No. 0000. The peculiar feature of this grip is the construction of the upper or sliding jaw, which is divided into alternate flat spaces and transverse grooves. The effect on the wire is such that the pressure due to the pull causes a slight depression in the insulation where contact is made with the flat spaces and the wire is forced



Grip and Upper Jaw

slightly into the transverse grooves to grip just tightly enough without injuring the insulation. The lower jaw has a longitudinal groove with an extension lip along its side for a firm support around a large part of the body of the wire. The draw link of this grip does not hang at right angles and, therefore, is not in the way of the line wire when the grip is applied. The loop never drops below the horizontal position shown, but is free to move upward. This feature is a valuable one when it is necessary to reach out on the wire to apply the grip when pulling in slack.

A NEW INSULATING MATERIAL

A new insulating material, known as "Hemit," has recently been put on the market by the Hemming Manufacturing Company, of New York. It is a composition molded under pressure into various forms and shapes required for all kinds of electrical insulation. While it is not brittle, it is very hard and will take a high polish. It also has great tensile strength, and not being subject to contraction and expansion, metal parts may be fixed in place during the molding process. It is also claimed to be both fire and waterproof.

Among some of the forms in which this material has been made up, the following may be mentioned: Switch handles, switch bases, insulating bushings, controller parts, commutator rings, brush holders and overhead insulators.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES

Alabama.—Misconduct Toward Street Car Passenger—Excessive Damages.

One thousand seven hundred and fifty dollars was an excessive recovery by a street car passenger for the company's failure to permit him to alight at his destination, and for indignities inflicted by the motorman and conductor, though he had to walk half a mile, and had been sick, and was made nervous, and was insulted by the motorman and conductor, where he suffered no ill effects of a serious or permanent character and had habitually taunted the motorman on former trips. (North Alabama Traction Co. vs. Daniel, 48 S. Rep., 50.)

Michigan.—Statutes—Construction—Railroads—Removal of Grade Crossings—Damages—Public Improvements—Measure of Damages—"Damaged"—Evidence—Construction of Agreement with Railroad.

Neither the rule that remedial statutes should be construed liberally, nor the rule that statutes should not be construed so as to enlarge the meaning which the words employed will bear, will justify a disregard of the language of a statute.

Comp. Laws 1897, sec. 4231, provides that, upon an agreement being made by a city with a railroad company for a separation of grades, the city may compromise with any person having an interest in any lands abutting on that portion of the street within the city of which the grade is to be changed according to said agreement, and which may be damaged by the proposed change of grade. Section 4241 provides for a jury which, under section 4244, shall ascertain the amount of damages to such property as may be damaged thereby. Held, that compensation can be given only for damages to property abutting on that portion of the street the grade of which is to be changed, and for such damages only as result from such change of grade, and damages for inconvenience caused to the general public and to claimant on account of rendering the street less convenient for use, and for injury or inconvenience resulting from closing the street to public travel during the progress of the work, are recoverable.

The measure of damages to abutting property being the difference in value thereof just before and just after the change, abutting property, none of which is taken, is not "damaged" within the meaning of the statute, where it is worth no less after the improvement than it was before, whether the interest be that of tenant or owner.

As the statute contemplates that compensation shall be awarded in gross before the improvement is begun and apportioned among those interested, damages for injury to a business as such, carried on upon abutting property by the owner or tenant, is not recoverable, as the determination of the amount thereof would be mere speculation.

In proceedings by a city to separate the grades of a street and intersecting railroads, under Comp. Laws 1897, sec. 4229 et seq., testimony on the question of damages to abutting property as to the effect of other separations of grades upon property in the immediate vicinity, and testimony that on other streets in the city the slope of the street exceeded that upon the street in question after the improvement, was properly excluded.

In proceedings by a city, under Comp. Laws 1897, sec. 4229, et seq., to separate the grades of a street and intersecting railroads, testimony heard on the question of damages, which is too uncertain to establish a right to compensation under the statute cannot be made certain by throwing the burden of the uncertainty upon the city because it is the active party.

A city, proceeding under Comp. Laws 1897, sec. 4229 et seq., to separate the grades of a street and intersecting railroads, agreed with the railroad companies and a street car company operating a line on the street to assume the payment of all abuttal damages to property of persons other than the street car and railroad companies, and the street car and railroad companies waived any and all claim for damages by reason of the change of grade of any of the streets from loss of traffic, and to any abutting property owned or controlled by any of them. Held, that the street car company's waiver thereunder was not limited to damages as respected streets on which it operated its road at the point of intersection with the railroads, but covered damages suffered by it on other streets affected by the agreement, in some of which it was interested as owner of abutting property, or of a railway in operation, or both. (City of Detroit vs. Detroit United Ry. et al., 120 N. W. Rep., 600.)

New Jersey.—Street Railroads—Determination as to Construction—Necessity of Hearing and Notice—Consent of Abutting Owners—Proceedings of Council—Resolution—Approval by Mayor.

Act April 21, 1896 (P. L. p. 329), prohibiting the building of street railroads, except by permission of the municipality, with the written consent of the owners of at least one-half of the lineal feet of property fronting on the street, and after public notice and hearing, and Act April 3, 1902 (P. L. p. 284), sec. 14, pl. 40, empowering cities to regulate the use of their streets by street railways, apply to the original installation of street railroads, and do not prohibit a city council from passing a resolution, without notice and hearing and the consent of abutting owners, authorizing a street railroad company operating a single track to construct two turnouts, 206 ft. and 261 ft. long, respectively, which were necessary for use as switches.

Under Act April 3, 1902 (P. L. p. 289), sec. 14, empowering a city to regulate the use of its streets by street railroads, but requiring such power to be exercised by ordinance, and section 11 (page 287), requiring all ordinances passed to be submitted for the mayor's approval, a resolution, which is not submitted for the mayor's approval, authorizing a street railway to construct turnouts, was a nullity. (Specht et al. vs. Central Pass. Ry. Co., 72 Atl. Rep., 356.)

New Jersey.—Railroads, Franchises and Powers—Corporations—Power to Hold Stocks and Bonds of Other Corporations—Express and Implied—Power to Become Stockholder—Railroads—Power to Control Street Railway.

Under the general railroad act (P. L. 1903, p. 647, sec. 3), a railroad company may exercise the general powers conferred by the corporation act of 1896 only so far as the same are appropriate to and not inconsistent with the railroad act or with the provisions of the act under which such company may have been created and organized. Under this section a railroad company may not claim any general power that is not appropriate to and consistent with the construction, maintenance and operation of its railroad between the termini declared by it pursuant to the railroad act.

The power to purchase, hold, etc., stock and bonds of other corporations, conferred by section 51 of the general corporation act (P. L. 1896, p. 294), is to be exercised subject to the limitations imposed by Sec. 2 of the same act (P. L. 1896, p. 278); that is to say, the power exists as a primary power only when the purpose to exercise it as such is expressed in the certificate of incorporation, and otherwise it exists as an incidental power only so far as necessary or convenient to the attainment of the objects that are set forth in the charter or certificate of incorporation.

3. Express and Implied—Power to Become Stockholder.

Corporations possess only such powers as are specifically granted by the State, and such incidental powers as are necessary for carrying these into effect. Hence arises the rule, generally obtaining in this country, that one corporation cannot become a stockholder in another unless authority is clearly granted by statute.

A railroad company incorporated under P. L. 1903, p. 645, for the purpose of constructing, maintaining and operating a line of railway, with definite terminals, held, to be without power to hold the stock and bonds of a street railway company operating beyond those terminals, and thereby to control the operations of the street railway.

A railroad company organized under P. L. 1903, p. 645, having by an usurpation of franchises acquired ownership of all the bonds and of substantially all the stock of a street railway company organized under P. L. 1886, p. 185 (Gen. St. 1895, p. 3216), and having thus practically absorbed the street railway company into itself, held, that the exercise by the railroad company of the control resulting from such ownership, including the operation of its

cars over the street railway lines, and the making of an agreement ostensibly between the two companies for the continuance of such operation, likewise constitutes a usurpation of franchises by the railroad company.—State v. Atlantic City & S. R. Co., 72 Atl. Rep., 111.)

New York.—Street Railroads—Receivers—Attendance Before Public Service Commission.

Since the receivers of a street railway company might conclude to bring the matter of the operation of one line and the equipment of another line of cars with fenders and wheel guards under an order of the New York Public Service Commission before the State courts, and, in order to do this effectually, it might be necessary that the receivers be represented at the hearings before the commission, it was proper that they should attend such hearings, though it appeared that they would probably accomplish nothing by such attendance because of the extreme power of the commission and the ex parte nature of its proceedings.—(In re Metropolitan St. Ry., 166 Fed. Rep., 1006.)

New York.—Carriers—Carriage of Passengers—Issuance of Transfers.

A rule of a street railroad company that transfers shall be isued only at the time of payment of fare, and that a passenger should be required to give the destination line when asking for transfers, is a reasonable and proper rule, and does not infringe a passenger's right under an agreement to give passengers a continuous trip between any two points in the city by the most direct route for a single fare, which agreement was not to be construed as entitling a passenger to a return trip or round trip.—(Crandall v. International Ry. Co., 117 N. Y. Sup., 1055.)

LIABILITY FOR NEGLIGENCE

California. — Damages — Evidence — Admissibility — "Expenses" Incurred—Witnesses—Examination—Answers —Responsiveness—Appeal and Error—Harmless Error —Admission of Evidence—Questions of Fact—Excessive Damages—Personal Injuries.

In a personal injury action, where plaintiff claimed damages for medical and nurse hire, a question to him as to what expenses he was put to by the injuries for medical attendance, medicines, etc., was not objectionable as requiring testimony of anything but actual expenditures, within the rule forbidding evidence of liability incurred, but not discharged, under an allegation of payment: "expense" meaning the laying out or expending of money or other resources.

An answer by witness that he supposed "somewhere in the neighborhood of $500 or $600" was responsive to a question as to what expenses he was put to by his injuries for medical attendance, medicines, etc.

In a personal injury action in which plaintiff claimed damages for medical attendance, etc., any error in striking an answer to a question as to what expense plaintiff was put to for medical attendance, etc., that he "supposed somewhere in the neighborhood of $500 or $600," as too indefinite, was not prejudicial, where plaintiff afterward testified that this $500 or $600 included doctor bills, nursing, medicines, and increased household expenses because of the injuries, and that he paid the nurse $35 a week for four weeks, and paid physicians over $100, but had not yet paid some physicians, and the court instructed that plaintiff could only recover for medical expenses actually paid out, and that the elements of damages, consisting of physicians' expenses and nurse hire, were subjects of direct proof, and must be proved by direct evidence, and plaintiff could only recover such actual damages as the evidence showed to a reasonable certainty he had sustained.

What is a proper compensation for personal injuries is for the sound discretion of the jury and its verdict will not be disturbed on appeal as excessive, unless the award is obviously disproportionate to the injuries proved, so as to justify the conclusion that the verdict was not the result of dispassionate consideration.

In a passenger's action for personal injuries by being thrown from a street car in a collision, evidence held to sustain a finding that plaintiff's injuries had permanently affected his nervous system, so as to seriously interfere with his comfort and happiness and affect or destroy his ability to conduct his business, so that a verdict for $6,400 was not excessive. (Kimick vs. San Jose-Los Gatos Interurban Ry. Co. et al., 104 Pac. Rep., 312.)

Delaware.—Damages—Personal Injuries—Aggravation of Injury by Disease—Death—Death of Child—Loss of Services—Refusal to Give Instructions.

In an action against a carrier for the pain and suffering of a passenger, plaintiff cannot recover for the effects of a disease contracted by the passenger after the accident, unless such disease was the natural and probable consequence of the negligence.

Plaintiff can recover for the aggravation of a previous disease only to the extent that such aggravation resulted from defendant's negligence.

A father in an action for the death of his child cannot recover for the loss of services after the death of the child; his right being limited to the loss occurring before the child's death.

Where, in an action by a father for the loss of services of a minor child, who died before majority, the evidence showed that the value of the lost services of the child before her death and the expenses incurred by the father in her behalf before her death exceeded the amount of the verdict, and the court expressly limited the right to recover for loss of services and expenses during the daughter's minority, the refusal to charge that damages for loss of services could not be allowed after the death of the child was not reversible error. [People's Ry. Co. vs Baldwin (two cases), 72 Atl. Rep., 979.]

Indiana.—Railroads—Care Required as to Trespassing Animals—Injury to Animals—Lookouts.

A railroad company owes no duty to the owner of animals trespassing on its right of way, when the same is properly fenced, and is not liable for injury to them, unless its employees have been guilty of wanton and reckless misconduct in the operation of cars.

A railroad company need not keep a lookout for animals at places where its tracks are properly fenced. (Indianapolis & E. Ry. Co. vs. Goar, 86 N. E. Rep., 968.)

Indiana.—Negligence—Contributory Negligence—Pleading and Proof—Collisions—Injury to Property—Complaint —Imputed Negligence.

Burns' Ann. St. 1908, Sec. 362, providing that, in actions for negligence causing personal injury or death, it shall not be necessary for plaintiff to allege or prove want of contributory negligence, does not apply to an action for negligent injury to personal property, but in such actions plaintiff must affirmatively aver in the complaint that he and his servant in control of the property were without fault, or must allege facts conclusively showing that they were not guilty of contributory negligence.

A complaint in an action for injuries to a carriage in a street car collision, which shows that at no time after the carriage entered a street, neither while the same was going north along the street a distance of 100 feet, nor when opposite another street in approaching the tracks, did the driver look for an approaching car, and which fails to allege that the driver used due care when he drove on the track, is fatally defective for failing to show freedom from contributory negligence.

The negligence of a servant in control of a carriage contributing to the injury thereof in a street car collision is the negligence of the master, defeating a recovery. (Potter vs. Ft. Wayne & W. V. Traction Co., 87 N. E. Rep., 694.)

Iowa.—Street Railroads—Injuries—Contributory Negligence —Care Required.

While one cannot rely upon nice calculations as to his safety in going into a place of imminent danger by crossing a street car track, mere error of judgment does not conclusively show contributory negligence, if the injured party is exercising reasonable care for his safety.

The duty of street car employees to avoid injuring one approaching the track was not greater than his duty to himself to use care to avoid injury.

If plaintiff was negligent in failing to look out for the approaching street car immediately before he went upon the track and was struck, the company would not be liable for the negligence of its employees in failing to avoid injuring plaintiff at that time. (Powers vs. Des Moines City Ry. Co., 121 N. W. Rep., 1095.)

News of Electric Railways

Program of Central Electric Railway Association

The Central Electric Railway Association will meet at Toledo, on May 26 and 27. The principal features of the meeting, as announced by the secretary, follow:

MAY 26, MORNING SESSION, 10 A. M.

Address of welcome by the Mayor of Toledo.

Report of the committee on address of George F. Whysall, president of the association, at the South Bend meeting.

Discussion.

Discussion of paper, "Prevention of Accidents," which was read at the South Bend meeting of the association by E. F. Schneider, secretary, claim agent and purchasing agent of the Cleveland, Southwestern & Columbus Railway.

MAY 26, AFTERNOON SESSION, 1 P. M.

Paper, "Valuation of Operating Properties," by E. S. Nethercut.

Paper, "Universal Standard Car Stop Sign vs. Present Methods of Indicating Car Stops," by R. M. Hemming, assistant superintendent and electrical engineer of the Ohio & Southern Traction Company.

Discussion.

MAY 27, MORNING SESSION, 10 A. M.

Business session and reports of special and standing committees.

Paper, "Track Bonding," by T. W. Shelton, master mechanic of the Indianapolis, Columbus & Southern Traction Company.

Discussion.

Paper, "Relations between Accounting Department and Operating Department," by A. F. Elkins, auditor of the Columbus, Delaware & Marion Railway.

Discussion.

The secretary states that the program, as announced above, is not entirely complete and there may be additions to it before the meeting.

Preparing for Arbitration in Detroit

Since the meeting on May 11, 1910, of the board of arbitration appointed to set a valuation on the properties of the Detroit United Railway for the purpose of furnishing authoritative details on which to base a settlement ordinance, the work that has been done by the members of the committee of fifty and its representatives and by the city administration would be of little interest to the public if it were given out, except that part of it which pertains to the attendance and testimony of 25 or 30 engineers and experts who assisted Frederick T. Barcroft in making the appraisal.

Frederick W. Walker, vice-president and chief engineer of the Milwaukee Northern Railway, Cedarburg, Wis., who was appointed to represent the city during the hearings before the court after the withdrawal of Mr. Barcroft, has been working to familiarize himself concerning the details of the appraisal.

The efforts to discredit the plan to have the board of arbitration effect a settlement of the differences have been encouraged by some of the local politicians who hope to prevent the submission of any sort of a settlement ordinance before the regular November election. If these politicians succeed they would go before the people in the fall campaign with the cry that the present administration and its plan of settlement have been a failure. The campaign to discredit the plan for settlement is supported by one of the four English daily newspapers in Detroit. Various clubs and organizations throughout the city, however, are preparing to support the administration by starting a campaign for the approval of the settlement ordinance when the final valuation is determined before the board of arbitration and the Council has approved the submission of a franchise ordinance to the electorate at a special election.

Practically all of the important commercial and manufacturing interests of the city want a settlement. They are tired of the 20-year wrangle between the politicians over traction questions, and, furthermore, they feel that the city needs the extensions and the improvements in service that an equitable settlement would assure. There have been practically no extensions of the lines for several years and the city has outgrown the street railway system.

Brief mention was made in the Electric Railway Journal of May 14, 1910, page 881, of the application of the Michigan United Railways, Lansing, Mich., to the Council of Detroit for a 30-year franchise for an entrance to the center of the city from the west for its interurban lines. The company has named several routes, over any one of which it would be willing to enter the city. Perhaps the most important feature of the proposal is the offer to sell tickets at the rate of 8 for 25 cents, good over its line into the city, and to operate a special city service on a 10-minute schedule over the line on which the interurban cars would enter the city. A reasonable rental, to be decided by arbitration if necessary, is suggested as compensation for the privilege which the company desires. T-rails, to weigh not less than 70 lb. per yard, are suggested. It is recommended that all paving between the rails and outside the tracks should be done by the board of public works, but that the foundations should be constructed by the company.

Cleveland Traction Situation

The detailed report of operation of the Cleveland Railway for April, 1910, submitted to Street Railway Commissioner Dahl on May 12, 1910, shows that the surplus, with the maintenance charge computed on the basis of 4 cents per car-mile, was $25,257.93, as compared with a surplus of $18,880.94 for March. The statement of earnings for April compared with that of March follows:

	April	March
Gross receipts	$475,210.86	$475,749.50
Operating expenses	313,857.95	321,181.86
Net earnings	$161,352.91	$154,567.64
Miscellaneous income	2,077.29	1,743.56
Total net earnings	$163,430.20	$156,311.20
Taxes	26,715.17	26,641.84
Interest	111,457.10	110,788.42
Surplus	$ 25,257.93	$ 18,880.94

Car miles operated in April	2,024,890
Car miles operated in March	2,072,141

Prospects for the immediate success of a 3-cent fare plus 1 cent for a transfer have been somewhat dimmed by Judge Vickery, of the Common Pleas Court, granting the Humphrey Company's plea for a permanent injunction preventing the Cleveland Railway from collecting a fare of 10 cents to and from Euclid Beach. The court held that the contract made in 1901, by which the company agreed to carry passengers from the Public Square, Cleveland, to Euclid Beach for 5 cents in return for track privileges in the park is a lease. Attorneys for the company argued that it was a license. This agreement was to continue until 1906. No new contract was made, however, and the single fare was collected until March 10, 1910, when the company began charging 10 cents. The court also held that the lease holds good until January, 1911. The city was held as a party defendant in the suit on account of the conditions of the Tayler grant, and was enjoined with the company against continuing the double fare. The company will probably not appeal the case, as a legal decision places it in position to reckon with the city in case the change endangers the low fare within its limits. It is said that Mayor Baehr, City Solicitor Baker and Commissioner Dahl have decided not to appeal the case on behalf of the city.

At the regular meeting of the City Council on May 9, 1910, the rules promulgated by Mr. Dahl against smoking on cars and standing on the rear platform were approved as to pay-as-you-enter cars, but on all others the old conditions are to prevail. About 240 out of 800 cars are affected by the change which the Council made in the rules. As fast as the cars of the various lines are equipped for pay-as-you-enter operation, however, the Dahl rules will go into effect.

People insist upon riding where they please, feeling that

neither the city nor the company has a right to dictate to them so long as they pay their fares. As anticipated a week ago, Richard Van Rensselaer, an architect, has filed suit for damages to the extent of $5,000 against the company because he was ejected from a St. Clair Avenue car. He alleges that drawings he was carrying were injured by another passenger bumping against him and that he went to the platform to prevent their being further injured. He was ordered inside the car by the conductor, and was put off when he refused to go inside. He intends to test the right of the company to compel passengers to ride inside the cars.

The Cleveland Railway will ask the Council for authority to construct a crosstown line on West Sixty-fifth Street to accommodate the West Side. While there are two such lines on the East Side, none have as yet been constructed west of the Cuyahoga River.

The local branch of the Amalgamated Association of Street & Interurban Railway Employees has requested the Cleveland Railway to dismiss about 250 men who remained at work during the strike after the Municipal Traction Company took over the property of the Cleveland Electric Railway. Some time ago a number of men hired by the Municipal Traction Company were replaced by men formerly in the employ of the Cleveland Electric Railway. The company is willing to have these men join the union, provided that they are allowed to retain their present standing with the company as regards seniority and runs. The officials of the union insist that the men shall take their places at the foot of the list if they are admitted to membership.

Transit Affairs in New York

The Public Service Commission at its regular meeting on May 13, 1910, adopted resolutions instructing the chief engineer to report upon the feasibility from an engineering point of view of a rapid transit line extending from Battery Park to Fifty-ninth Street, by way of Greenwich Street, West Broadway, Varick Street, Seventh Avenue and Queensboro Bridge, and thence into the Borough of Queens. This is assuming that the city will decide to extend Seventh Avenue to connect with Varick Street and that Varick Street will be widened. The Rapid Transit Commission, which was succeeded by the Public Service Commission, laid out a route which was known as the Seventh and Eighth Avenue route, extending up both avenues to Fifty-ninth Street, and continuing in Eighth Avenue to 153d Street, and bids were called for the work, but none was received. The time for completing a substantial part of this route was extended to Oct. 15, 1911. For some time negotiations have been carried on between the Interborough Rapid Transit Company and the commission with a view of having the company extend its present subway line down Seventh Avenue past the new Pennsylvania tunnels. A hearing on the new route has been fixed for May 26. It will cover the proposed route and also the desired connections in Queens County, which will be built on the assessment plan. Another resolution adopted by the commission directed counsel to prepare the necessary preliminary papers to lay out the route in question and also to prepare a report on the feasibility of extending the Eighth Avenue route to Queensboro Bridge and of laying out a route from the eastern terminus of Queensboro Bridge to the North River, on Fifty-ninth Street.

More than 150 property owners in the vicinity of Nostrand Avenue, Brooklyn, have petitioned the Public Service Commission to construct a subway extension of the so-called Eastern Parkway subway, beginning at Eastern Parkway and Nostrand Avenue, running southerly to Nostrand Avenue, and thence to Coney Island, and the cost to be assessed upon the property benefited.

The Public Service Commission has received a letter from Ira A. Place, vice-president of the New York Central & Hudson River Railroad, announcing that plans were under way in connection with the new Grand Central terminal for the construction of a joint concourse to connect the railway station with all the rapid transit lines in Forty-second Street.

The Public Service Commission has granted an extension of time to the Hudson & Manhattan Railroad for completing its tunnel in Sixth Avenue as far as Twenty-third Street. The time expires on June 15, 1910, and the extension is for one year. The same conditions apply to the spur on Ninth Street from Sixth to Fourth Avenues. The company has filed the consent of property owners along the proposed route from Thirty-third Street to the Grand Central Station at Fourth Avenue and Forty-second Street. Should the commission approve of the consent filed, work would have to begin within six months and be completed in three years.

The hearing before the Public Service Commission on May 16, 1910, on the form of contract for the construction on the city's credit of the proposed tri-borough subway system digressed largely into a meeting at which the representatives of various civic organizations and property owners' associations took it upon themselves to advance protests in the interest of the particular parties which they represented.

Exhibits Before Engineers' Society of Pennsylvania.

The space has all been taken for the exhibit to be held in the car house of the Central Pennsylvania Traction Company, Harrisburg, Pa., in connection with the convention of the Engineers' Society of Pennsylvania on June 1, 2, 3 and 4, 1910. Among those who will exhibit at the convention are the following: U. S. Metal & Manufacturing Company, *Engineering News*, A. Pomerantz & Company, John A. Roebling's Sons Company, Clement Restein & Company, Westinghouse Publicity Bureau, the Pennsylvania Steel Company, Q. & C. Company, James Boyd & Brothers, Harrison Safety Boiler Company, Harrisburg Foundry & Machine Company, Van Dyke-Churchill Company, Harrisburg Pipe & Pipe Bending Company, The J. G. Brill Company, W. K. Mitchell & Company, Alliance Machine Company, Cleveland Pneumatic Tool Company, Green Fuel Economizer Company, Norton Company, Van Dorn & Dutton Company, The Rail Joint Company, Cleveland Twist Drill Company, Crane Company, Hunter & Dickson Company, Electric Controller & Manufacturing Company, Henry, Millard & Henry, H. Bellfield Company, Keystone Chemical Company, Ingersoll-Rand Company, Goldschmidt Thermit Company, Pressed Steel Car Company, Merritt & Company, Garlock Packing Company, American Iron & Steel Manufacturing Company, American Car & Foundry Company, J. H. Jolly & Company, Detroit Graphite Company, Standard Roller Bearing Company, The Standard Tool Company, McGraw Publishing Company, Heany Fireproof Wire Company, Call Automatic Switch Company, National Lead Company, York Engineering Company, Standard Scale & Supply Company, Semet Solvay Company, Michigan Lubricator Company, Joseph Dixon Crucible Company, Ford & Kendig, Nelson Valve Company, W. H. Wynn & Company, Henry Gilbert & Son, Nachod Signal Company, Eugene Dietzgen Company, Link Belt Company, H. C. Roberts Electric Company, Dauphin Electrical Supplies Company, Williams, Brown & Earl, Sloan, Howell & Company, Allis-Chalmers Company, W. C. Robinson & Son, General Electric Company, W. R. Jones & Brother, Western Electric Company, Geo. Oldham & Son Company, Keystone Lubricating Company, Pratt & Whitney, Yale & Towne Manufacturing Company, Homestead Valve Company, Holophane Lamp Company, Strong Machinery & Supply Simplex Valve & Meter Company, Electro-Clock Company.

Oklahoma Convention in September.—The meeting of the Oklahoma Public Utilities Association which was to have been held at Sapulpa, Okla., on May 10, 1910, was adjourned on account of the small number of plant operators present. The members of the association will convene again at Oklahoma City on Sept. 30 and Oct. 1, 1910.

Strike in Vincennes Ended.—The strike of the conductors and motormen in the employ of the Vincennes (Ind.) Traction Company was ended on May 14, 1910, on the basis of an increase in wages of one cent an hour and a 12 hour day. The men demanded an increase in wages of three cents an hour, a 9-hour day and recognition of the union.

Suit for Failure to Comply With Commission's Order Dismissed.—Justice Brady, of the Supreme Court, dismissed the suit brought by the Public Service Commission of the First District of New York to recover $750,000

for failure on the part of Frederick W. Whitridge, receiver of the Third Avenue Railroad and the Union Railway, to equip the cars of these companies with wheel guards in a specified time, in accordance with an order of the commission. The case came to trial before Judge Brady and a jury on May 9, 1910.

Appeal in San Francisco Suit.—W. I. Brobeck, representing Horace C. Platt in the suit to enjoin San Francisco from selling bonds for the reconstruction of the Geary Street, Park & Ocean Railroad as a municipal line, has filed in the Supreme Court an application for a temporary restraining order during the hearing of the appeal from the recent decision of Judge Ellison of the Supreme Court of Panama County declaring the bonds valid. A motion has also been filed for an advancement of the hearing of the trial of the appeal, so that the issue may be decided at once.

Additional Time Asked in Which to Install Fenders in San Francisco.—A resolution calling on the police of San Francisco to proceed against the United Railroads of San Francisco for failure to comply with the ordinance requiring improved fenders to be placed on all street cars, has been referred to the public utilities committee of the Board of Supervisors. The company says that it will not be able to secure the needed fenders before Aug. 1, 1910, and has asked for an extension of time within which to equip the cars with fenders. The ordinance requiring the placing of fenders on the cars fixed April 30, 1910, as the date on which fenders should be installed.

Principal Long Island Railroad Offices in New York.—Ralph Peters, president of the Long Island Railroad, has announced that it has been decided that the office of the president and the principal executive officers of the company will be moved to the Eighth Avenue end of the third floor of the Pennsylvania Railroad's station at Thirty-fourth Street, New York, N. Y., instead of to Jamaica, Long Island. The offices of Mr. Peters, the general superintendent, the real estate agent, the purchasing agent and the electrical superintendent, now in Long Island City, will be moved to the new offices; the offices of the legal department, the claim department and the general secretary will be moved from the corner of Cedar Street and Broadway, New York; the offices of the traffic manager, the general passenger agent and the auditor, which are now at Twenty-ninth Street and Fifth Avenue, New York, N. Y., together with the office of the chief engineer of electrical traction, which is a joint office of the Long Island Railroad and the Pennsylvania Railroad, will be moved from Bridge Street, New York, N. Y., to the Pennsylvania station.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—Governor Draper has signed the bill exempting the transit bonds of Boston from the provisions of the law which relates to loans made by the municipality, and has also signed the bill which provides that no street railway shall require passengers whom it permits to ride upon the platform to do so at their own risk. The Railroad Commission has submitted a draft of a bill to allow the Boston Elevated Railway to acquire control of other street railways which contains several provisions not in the original draft by the company's attorneys. A section which deals with minority control provides that whenever the company acquires 35 per cent of the stock of any street railway, it shall offer to purchase all remaining stock at the price paid for the 35 per cent, the offer to hold good for six months. The possible prevention of competition in connection with the leasing of Boston tunnels or subways has been taken care of in a section which provides that the act shall take effect if the company accepts the measure within one year from its passage, and agrees that at least one year before the expiration of the term of the several existing contracts for the use by it of the tunnels and subways owned by Boston it will execute extensions of such contracts to the dates when the bonds issued by the city for the construction of such tunnels and subways become due.

The Joint Commission on Metropolitan Improvements has advised the committee on metropolitan affairs to report against legislation at the present session to authorize the construction of a tunnel between the North and South stations at Boston. The committees on railroads and street railways have decided to report favorably a bill to provide for the acquisition of the Berkshire Street Railway by the New York, New Haven & Hartford Railroad, subject to the approval of the Railroad Commission. Improvement to be carried out as specified by the measure will involve an expenditure of $2,000,000 within the next two years. The committee on railroads has introduced a resolution which provides that the Railroad Commission shall report to the next Legislature how the danger from fire from steam locomotive operation may be decreased, with recommendations for legislation. The committee on street railways has reported a bill which limits the time of construction of electric railways which have been granted certificates of exigency by providing that a company must expend at least 10 per cent of its original stock in construction within two years from the date of its certificate and open the line in four years. A similar provision applies to extensions. The resolution which provides that the Boston Transit Commission shall report upon subways from Park Street to Milton, Dorchester and South Boston has been given a first reading in the Senate. The House resolution which provides for an investigation by the same board of the cost of a subway from Park Street to the South Station has been passed to be engrossed by the Senate. It is probable that this measure will be enacted and that next year a bill will be passed to authorize the construction of such a subway. The committee on railroads has reported a bill to transfer supervision of the transportation of explosives from the Railroad Commissioners to the district police. The committee on street railways has reported a bill which provides for the transportation of pupils of industrial schools at half fare. The bill does not apply to students of normal schools and business colleges. The committee on metropolitan affairs has voted to report a resolution to the House to provide for an investigation by the Massachusetts Railroad Commission of the problem of electrifying the railroads within 10 miles of Boston, the report to be made by Nov. 1, 1910. The Boston, Revere Beach & Lynn Railroad is investigating gasoline and gasoline-electric cars under the law recently passed which gives railroads the right to use other motive power than steam or electricity, subject to the approval of the Railroad Commission.

New York.—The bill to empower the Public Service Commission to certify to the public necessity of one street surface railway to use the tracks and equipment of another in a city of the first class, has been reported favorably by the committee on miscellaneous corporations. This is the bill introduced in the interests of the Manhattan Bridge Three-Cent Line, and would make possible in the discretion of the Public Service Commission for the company the use of the tracks of other street railways in building its proposed railway from the North River to the Flatbush Avenue depot of the Long Island Railroad across the new Manhattan Bridge.

Governor Hughes has signed the so-called New York City debt limit bill of the Senate cities committee which was approved by Mayor Gaynor. The bill is designed to carry into effect the constitutional amendment approved by the people at the election in November, 1909, to give New York City additional funds estimated at $100,000,000 for subway construction. The bill provides the legal procedure necessary to exclude self-sustaining subway and dock bonds in computing the debt limit of New York City. On May 17 Governor Hughes sent to the Senate an emergency message insisting upon the immediate passage of the amendment to the Public Service Commissions bill to give the commission for the second district power to determine rates of fare on railroads covering suburban traffic. The Assembly has passed the bill placing the telegraph and telephone companies of the State under the supervision of the Public Service Commission for the Second District. On May 11 the Senate passed the Wainwright-Phillips workmen's compulsory compensation bill, drafted by the legislative employers' liability committee. It provides the same rates of compensation to be paid to an employee in case of accident as the permissive bill passed on May 10, but it only applies to certain dangerous employments. These include the operation of elevators and hoisting apparatus, work on scaffolds, work about electric conductors or gunpowder, the operation of steam and electric railroads, the construction of tunnels and subways and work under compressed air. The principal features of these bills were referred to in the Electric Railway Journal of May 14, 1910. page 883, after they had been favorably reported by the judiciary committees of the Senate and the House.

Financial and Corporate

New York Stock and Money Market

May 17, 1910.

While the tone of the Wall Street stock market during the past week has been strong and prices have as a general thing advanced, trading has been dull and brokers and commission houses are greatly discouraged. Outsiders are neither trading in stocks nor investing in bonds. Tractions have had their full share in the limited trading. Interborough issues continue fairly active, and Brooklyn Rapid Transit has been one of the market leaders.

The money market continues easy. There are plenty of funds for those who wish to trade and rates are moderate. Quotations to-day were: Call, 3 to 4 per cent; 90 days, 4 per cent.

Other Markets

Traction prices in the Philadelphia market have been well maintained. Rapid Transit has hovered around 19 or 20, but there has not appeared any distinct selling pressure. The new bond issue of the company, it is said, has been satisfactorily underwritten.

In the Boston market there have been a few scattering sales of traction stocks during the past week. Massachusetts Electric and Boston Elevated have been the most active, but the changes in price have been merely fractional. A few shares of West End have also been sold.

In Chicago, a few sales of Chicago Railways Series 2 at about 28½ have practically been the total of the business.

In the Baltimore market the regular trading in the bonds of the United Railways Company has been done at unchanged prices.

Quotations of various traction securities as compared with last week follow:

	May 10.	May 17.
American Railways Company	a45¼	a45
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a127½	a128½
Boston & Suburban Electric Companies	*16	a16
Boston & Suburban Electric Companies (preferred)	*75	a74½
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a43	a43
Brooklyn Rapid Transit Company	79⅛	a81¼
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84¾	85
Capital Traction Company, Washington	a131	a130½
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a99	a100
Chicago Railways, ptcptg., ctf. 2	a28¾	a29
Chicago Railways, ptcptg., ctf. 3	a13	a12
Chicago Railways, ptcptg., ctf. 4s	a8	a7½
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104
Detroit United Railway	*59½	*59½
General Electric Company	149	a150
Georgia Railway & Electric Company (common)	a112	110
Georgia Railway & Electric Company (preferred)	a87	a87
Interborough-Metropolitan Company (common)	21⅜	20⅜
Interborough-Metropolitan Company (preferred)	56⅜	55
Interborough-Metropolitan Company (4½s)	*79⅝	80½
Kansas City Railway & Light Company (common)	a28	a27½
Kansas City Railway & Light Company (preferred)	*77⅝	a77
Manhattan Railway	136	a138
Massachusetts Electric Companies (common)	a18½	a18½
Massachusetts Electric Companies (preferred)	a86	a87
Metropolitan West Side, Chicago (common)	a17	a18½
Metropolitan West Side, Chicago (preferred)	a58	a57¾
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*100	*110
North American Company	73¾	*73¼
Northwestern Elevated Railroad (common)	a18	a19
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a49½	*49½
Philadelphia Company, Pittsburg (preferred)	a44	*44
Philadelphia Rapid Transit Company	a19⅜	a18¾
Philadelphia Traction Company	a85¼	*85¼
Public Service Corporation, 5 per cent col. notes	*96½	*96½
Public Service Corporation, ctfs.	a102½	a102½
Seattle Electric Company (common)	*113½	a112½
Seattle Electric Company (preferred)	103	a102
South Side Elevated Railroad (Chicago)	a58½	a59
Third Avenue Railroad, New York	7	a7¼
Toledo Railways & Light Company	9⅜	*9⅜
Twin City Rapid Transit, Minneapolis (common)	112¾	*112¾
Union Traction Company, Philadelphia	a48½	a48¾
United Rys. & Electric Company, Baltimore	*12¼	*12¼
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	36½	35½
Washington Ry. & Electric Company (preferred)	90¼	a91
West End Street Railway, Boston (common)	87½	88
West End Street Railway, Boston (preferred)	102¼	102
Westinghouse Elec. & Mfg. Company	65	64½
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Annual Report of Public Service Corporation

The first annual report of the Public Service Corporation of New Jersey, covering the year ended Dec. 31, 1909, has been issued. It contains the following statement of gross earnings of the systems operated by the Public Service Corporation, the Public Service Gas Company, and the Public Service Railway Company:

	Corporation			
	From operation.	Miscellaneous.	Gas company.	Railway company.
*1903	$1,776,558	$187,404	$3,026,993	$4,471,244
1904	3,502,812	463,250	5,378,440	8,415,279
1905	3,721,632	640,406	6,059,446	9,488,358
1906	4,161,918	723,658	6,526,316	10,086,934
1907	4,647,219	1,023,951	7,251,480	10,705,393
1908	4,584,682	1,246,721	7,349,930	11,086,354
1909	5,117,728	1,457,432	7,870,879	12,114,412

* Seven months only.

Earnings and expenses of the corporation, the gas company, the railway company and controlled companies during the calendar year 1909 were as follows:

Gross earnings of leased and controlled companies	$25,103,019
Public Service Corporation of New Jersey miscellaneous income	1,457,432
	$26,560,451
Operating expenses and taxes	13,331,228
	$13,229,223
Bond interest and rentals of leased and controlled companies	10,111,403
	$3,117,820
Fixed charges of Public Service Corporation of New Jersey	1,689,372
Surplus	$1,428,448

Thomas N. McCarter, the president, in his statement to shareholders, says in part:

"Dividends were paid for the first two quarters of the year 1909 at the rate of 4 per cent per annum, and for the last two quarters at the rate of 5 per cent per annum.

"When the corporation began business in 1903, the electric properties acquired by it were in a fair operating condition and state of development. The gas properties now operated by the Public Service Gas Company were in a high state of efficiency, with one or two minor exceptions. The street railway properties acquired and now operated by the Public Service Railway Company were run down and demoralized, and required rehabilitation, and it is only now that they have been brought to a proper operating condition.

"At the instance of bankers, the properties of the corporation, the gas company and the railway company were thoroughly examined during the year 1909 by Stone & Webster, of Boston, and E. C. Foster, of New Orleans. On the strength of their reports a sale of $8,000,000 at par of the general mortgage bonds of the corporation was negotiated with J. P. Morgan & Company, of New York, and Drexel & Company, of Philadelphia.

"The 5-cent zone and the transfer limit have both been largely extended by the railway company, so that with certain exceptions, where such a result would be altogether impracticable, it is now possible to travel on a continuous journey with a single transfer, throughout the limits of any one division, for five cents.

"During the period between June 1, 1903, and the date covered by this report there have been three increases in the pay of the railway men, and during the year 1909 the company adopted a new and comprehensive wage scale, effective Jan. 1, 1910, and increasing in subsequent years until the maximum is reached.

"When this plan shall have been consummated the first year men will each receive 23 cents per hour, second year men 24 cents per hour, and men who have been in the employ of the company above two years 25 cents per hour. This is regarded as a fair, liberal wage scale, and has been received by the men in a manner most gratifying to the company.

"The runs are based as nearly as practicable on a 10-hour a day basis, and time and a half is given to men who volunteer for an extra run. By the same plan each man on the extra list who presents himself at every roll call for a week is guaranteed a minimum wage of $10.50 per week.

"A repair shop having a capacity of 125 cars was built on the Plank Road in 1905, together with a large storage barn at the same point for 108 large cars, and a storeroom for supplies for all the northern divisions.

"In Camden a repair shop for 20 cars was constructed in 1907, and also a new car house with a capacity of 91 cars.

"It is the intention of the company to construct, annually, two or more first-class modern car houses, until the entire equipment of the company is properly housed.

"At Hudson Place, Hoboken, a double deck terminal is being completed at a cost of $250,000. This terminal will double the facilities for car operation at that point. At Fourteenth Street Ferry, Hoboken, a new terminal has also been constructed, which has greatly improved the conditions there.

"In the maintenance of way department extensive improvements have been made at Passaic Wharf, where many money- and labor-saving devices have been provided, including a large sand-drying plant and a tie-treating plant. At Fairview, on the Bergen Turnpike, a large quarry has been purchased and modern stone crushing machinery installed, which enable the company to turn out crushed stone at minimum cost for practically the entire system, except the Southern division.

"A complete equipment of large work cars has been installed, with which the company is able to haul track building materials, thus doing away with the teams which it was necessary, formerly, to hire to do such work.

"The pay-as-you-enter system of fare collection was investigated in 1907, and 150 p-a-y-e cars were purchased and put in service in the spring of 1908, and other cars have since been converted into p-a-y-e or other prepayment type. As of this date we have 650 prepayment cars of this general character in service.

"This system eliminates the missed fares. Where these cars are used the receipts have been substantially increased. Passengers are relieved from the annoyance caused by conductors passing back and forth through the cars collecting fares, and from mistakes being made by conductors in demanding fare a second time. By this system the conductor is also to remain on the rear platform to attend to the safety of passengers boarding and leaving the car. It is proposed eventually to have all cars operated in city service equipped with fare boxes, so that the prepayment system of fare collection may be used. It has been found advisable, in order to reduce the number of accidents arising from passengers boarding and leaving cars while the latter are in motion, to equip the cars with doors or gates at the entrance and exit steps, these doors or gates at the rear platform to be operated by the conductor from his station, the doors at the front exit being operated by the motorman. On all cars so equipped in 1909 the platform accidents were practically eliminated. This p-a-y-e system as a whole has proved popular with the public and the operating force of the company.

"On July 1, 1903, the amount of insurance in force on the properties controlled by the corporation was $9,455,000, and the annual premium thereon was $122,400, or an average rate of $1.29 per $100 of insurance. At the present time the insurance carried amounts to $20,273,000, and the annual premium thereon is $122,909, or an average rate of 60 cents per $100. Thus the total amount of insurance carried has been more than doubled for practically the same premium. The total losses occurring during the same period aggregated $158,600, of which all but $22,500 was covered by insurance.

"To secure these results the corporation has authorized, up to the present time, the expenditure of approximately $200,000 for minimizing the fire hazard by installing fire extinguishers, sprinkler systems, fire hose, fire doors, parapet walls, concrete floors, etc.

"It is expected that additional substantial economies will be obtained in the near future, either through the further lowering of rates by the insurance companies, or the establishment of a self-insurance fund which the corporation now has under consideration."

The taxes paid by the properties during the year aggregated $1,225,583, of which $702,566 were paid by the railway, $337,295 by the gas company, and $185,722 by the corporation.

Of a total of 695 miles of track, 416 miles were main track, 242 second main track, 17 turnouts and 20 in carhouses and yards. There were available for operation 1391 closed cars and 506 open cars, of which there had been added since 1903 a total of 640 closed cars and 130 open cars. In 1910 there will be added 110 closed cars.

The number of municipalities served by the railway company was 101, with a population in 1905 of 1,398,153.

Expenditures charged to capital account for the railway during the period from June 1, 1903, to December 31, 1909, aggregated $20,004,341, of which $1,610,789 was charged during the last calendar year.

Following are the railway traffic statistics for 1904, 1908 and 1909:

	1904.	1908.	1909.
Revenue passengers	165,400,000	219,421,974	238,171,257
Transfers and passes	50,000,000	74,688,628	81,548,978
Total passengers	215,400,000	294,110,602	319,720,235
Percentage of passengers using transfers	21.8	23.0	23.0
Average fare per passenger	3.83	3.70	3.72
Car-mileage	32,168,888	39,519,972	40.890,360
Car-hours	4,003,614	4,598,714	4,747,729
Passengers per day	588,525	803,581	875,946
Passenger receipts per car-mile, cents	25.59	27.56	29.08
Passenger receipts per car-hour	$2.06	$2.37	$2.50

No Bids at Metropolitan Street Railway Sale

When part of the property of the Metropolitan Street Railway, New York, N. Y., was offered for sale under foreclosure on May 12, 1910, no bids were received, but L. C. Krauthoff, counsel for the joint reorganization committee of the bondholders, announced that the reorganization committee will bid on the property as soon as it is offered for sale in its entirety. Protests against the sale were also offered by Adrian H. Joline, one of the receivers of the Metropolitan Street Railway; the representative of the bondholders of the Fulton Street Railway; the representatives of the holders of the first mortgage 5 per cent bonds of the Second Avenue Railroad, and William W. Burnham, who is a stockholder in the Central Park, North & East River Railway. A communication from Frederick W. Whitridge, receiver for the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, was also read, in which Mr. Whitridge gave notice that any purchaser of the property of the Metropolitan Street Railway would be subject to the rights, claims and equity of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway to operate the tracks on Amsterdam Avenue between Seventy-first and 125th Streets. The following statement was filed with William L. Turner, special master, explaining why the joint reorganization committee, of which G. D. Tripp is chairman, was not willing to bid for the property at this time:

"The joint committee on reorganization, representing the bondholders' committees of the general 5 per cent and refunding 4 per cent bonds of the Metropolitan Street Railway, has qualified as a bidder at the special master's sale advertised for this day. It has not, however, utilized its qualification because its familiarity with the conditions bearing upon the situation makes its members feel certain that a sale of the property cannot at the present time be satisfactorily had. Self-evidently, a purchase can be made only for reorganization purposes. The property now offered is but a part of what is known as the Metropolitan system.

"However important a part it may be, it cannot be operated except in connection with the indispensable portion thereof which is not and cannot now be offered for sale. The latter portion will, in all probability, be made the subject of a decree of foreclosure at an early day, and in due course offered for sale. The committee believes that the interests of all concerned and of the public require that a sale of the properties should be had so that they can be purchased at practically the same time. The large amount of new cash to be raised and the practical conditions to be met are each of such a character that the property can be utilized only as a 'unitary system.'

"It is manifestly to the interest of the public that this shall be done, and it is an absolute necessity, from every standpoint, that this difficult and complicated situation shall be permitted to be solved on a broad basis.

"As soon as the property constituting the unitary system is offered for sale this committee intends to bid thereat in full accord with the terms of the decree under which this sale has been advertised, and in the meantime it will proceed, with all possible expedition, to complete a plan of reorganization of the system as an entirety, now well under way, the most important and difficult problems of which have already been solved, and of arranging for the funds and other steps necessary to effect a purchase and the provisions of such plan, and thereby a conservation of every interest concerned."

The following is a summary of the principal provisions of a plan for reorganizing the company, which is said to have been prepared in the interest of the holders of the 4 per cent and 5 per cent bonds of the company: New 5 per cent or 6 per cent bonds to raise $12,000,000 cash; application of the proceeds of the new issue to retire $3,500,000 of receivers' certificates which are outstanding, to pay franchise taxes which are due from 1900 to 1907, to pay the running expenses of the receivership and to pay $1,500,000 of accident claims against the New York City Railway; replace with new issues the $12,500,000 of collateral trust 5 per cent bonds of 1908 and the $16,000,000 of refunding mortgage 4 per cent bonds of 1902; readjust the rental terms upon which many of the underlying properties still in the Metropolitan Street Railway system are operated; reduce taxes to a nominal amount by offering the city in return for remitting taxes now unpaid a share in the net earnings of the company; the remission by the holders of the 5 per cent bonds of 1898 of $200,000 in interest now paid to the trustees of their mortgage by the Metropolitan Street Railway upon bonds of underlying properties included in the collateral of the mortgage.

Berkshire Street Railway, Pittsfield, Mass.—The Railroad Commission of Massachusetts has authorized the Berkshire Street Railway to issue 3000 shares of stock, amounting at par value to $300,000, for the purpose of carrying out the terms of consolidation with the Pittsfield Electric Street Railway, the stock of the Berkshire Street Railway to be exchanged share for share for the stock of the Pittsfield Electric Street Railway.

Brooklyn (N. Y.) Rapid Transit Company.—The directors of the Brooklyn Rapid Transit Company have declared a quarterly dividend of 1¼ per cent, payable on July 1, 1910, to holders of record on June 9, 1910. The company has paid a dividend of 1 per cent quarterly since April, 1909. The Brooklyn Union Elevated Railroad, a subsidiary of the Brooklyn Rapid Transit Company, has declared a dividend of 5 per cent on its common stock, payable on June 10, 1910, to stockholders of record on May 31, 1910. The Brooklyn Rapid Transit Company owns $12,530,831 of the $13,000,000 of common stock of the Brooklyn Union Elevated Railroad and $4,785,985 of the $5,000,000 of preferred stock of the company. The Brooklyn Rapid Transit Company will therefore receive through this distribution $626,542.

Chicago (Ill.) Consolidated Traction Company.—The bondholders of the Chicago North Shore Street Railway have agreed to the plan for the reorganization of the Chicago Consolidated Traction Company as the United Railways Company in accordance with terms proposed by Chas. G. Dawes, of the Central Trust Company, Chicago, Ill., as outlined in the ELECTRIC RAILWAY JOURNAL of Jan. 22, 1910, page 164. As the holders of the bonds of other underlying companies have already approved the Dawes plan, the reorganization of the company in accordance with the terms of that plan seems to be assured. It is stated that the agreement under which the lines of the Chicago Consolidated Traction Company will be operated by the Chicago Railways has been completed with the exception of minor details.

Dartmouth & Westport Street Railway, New Bedford, Mass.—The Railroad Commission of Massachusetts has authorized the Dartmouth & Westport Street Railway to issue $237,500 additional capital stock at $150 a share, in part to retire $90,000 bonds payable, it is said, Oct. 1, 1910, and the remainder on account of improvements and additions. The new shares when issued will increase the capital stock to $500,000.

Duluth-Superior Traction Company, Duluth, Minn.—The Wisconsin Railroad Commission has authorized the Duluth Street Railway to create $2,500,000 of 5 per cent general mortgage 20-year gold coupon bonds of $1,000 each, redeemable at the option of the company on any interest day after May 1, 1915, at 105. Of the total issue $300,000, it is stated, are to be used to reimburse the treasury for additions and extensions made during 1908 and 1909, and the remainder only for subsequent additions, extensions and permanent improvements. The bonds are to be issued at not less than 75 per cent of par.

Frederick (Md.) Railway.—The Frederick Railway has filed a mortgage to the Fidelity Trust Company, Baltimore, Md., as trustee, to secure an issue of $1,500,000 of first and refunding 50-year 5 per cent gold bonds, to refund outstanding bonds and provide for extensions and improvements. The new bonds are dated April 29, 1910, and mature on March 1, 1960, but are subject to recall as an entirety only on any interest day at 105. The present issue is to be $500,000, $250,000 of the remaining $1,000,000 to be reserved to take up the $250,000 of prior liens.

Henderson (Ky.) Traction Company.—The interests which control the Evansville & Eastern Electric Railway are reported to have secured control of the property of the Henderson Traction Company and the Owensboro City Railroad.

Mohawk Valley Company, New York, N. Y.—The Mohawk Valley Company has declared a dividend of 1½ per cent on its common stock, the first since February, 1907, before the readjustment of the stock. The dividend is payable on July 1, 1910, to stockholders of record on June 15, 1910.

New York State Railways, Rochester, N. Y.—The New York State Railways has declared an initial dividend of 1½ per cent on its preferred stock, payable on July 1, 1910, to holders of record on June 15, 1910. On Dec. 31, 1909, the New York Central & Hudson River Railroad owned $8.866,507 of the $14,777,264 of common stock of the company.

Niagara, St. Catherines & Toronto Railway, St. Catherines, Ont.—The Niagara, St. Catherines & Toronto Railway has made a mortgage to the National Trust Company, Ltd., Toronto, Ont., as trustee, to secure an issue of second mortgage bonds at the rate of $10,000 per mile for the 43 miles of line included in its system.

Saginaw-Bay City Railway & Light Company, Saginaw, Mich.—The Saginaw-Bay City Railway & Light Company having sold certain of the securities deposited under the collateral trust indenture dated on Sept. 1, 1903, for which it has received $3,216,600, the Michigan Trust Company, Grand Rapids, Mich., trustee thereunder, will, as required by the indenture, receive tenders for the sale of bonds secured thereunder at not more than $105, up to 3 p. m. on May 23, 1910. There were at last accounts only $3,355,000 of the bonds outstanding.

San Jose (Cal.) Railroads.—The San Jose Railroads, which was incorporated in December, 1909, with $5,000,000 of capital stock, all common, as a consolidation of the street railways in San Jose and vicinity, has made a mortgage to the Mercantile Trust Company, San Francisco, as trustee, to secure an issue of $1,500,000 of 5 per cent 45-year gold sinking fund first mortgage bonds of $1,000 each, dated Jan. 1, 1910, and due in 1955, with sinking fund from Jan. 1, 1915.

Watsonville (Cal.) Transportation Company.—Edward White, receiver of the Watsonville Transportation Company, has been ordered by the court to offer the property of the company for sale at public auction on May 23, 1910.

Worcester & Southbridge Street Railway.—The Massachusetts Railroad Commission has approved the purchase of the property of the Hartford & Worcester Street Railway by the Worcester & Southbridge Street Railway for $140,000.

Justice O'Gorman, in the Supreme Court, has decided that the tunnel under the East River was properly embraced in the assessment of the State Board of Tax Commissioners, and has confirmed the assessment. The suit to review the assessments and reduce them was brought by E. P. Bryan and others as trustees of the New York & Long Island Railroad. The suit was filed to review the assessments of $3,175,000 and $3,350,000 for the years 1908 and 1909 respectively. The assessments were made by the State Board of Tax Commissioners against the special franchise of the railroad in question in the Borough of Manhattan. The alleged illegality was that the State Board improperly included in the assessments the value of the tunnel under the East River.

Traffic and Transportation

Northampton Fare Changes Approved

The Railroad Commission of Massachusetts has issued an order approving the petition of the Northampton Street Railway relative to a readjustment of fares and transfers amounting to an increase in charges as described in the Electric Railway Journal of May 7, 1910, page 823. The board says:

"In 1909 the Northampton Street Railway increased the unit of fare on its lines from 5 cents to 6 cents, and upon complaint of Northampton and others the board on Feb. 26, 1909, issued an order declaring the increase unreasonable and excessive.

"The Northampton Street Railway now asks a modification of the order referred to and of such other orders of the board as are inconsistent with its proposals, and submits with its petition schedules of proposed changes in its rate of fare. The company contemplates increases of fares between Easthampton and Northampton and between Williamsburg and Northampton, leaving the fare within the city limits of Northampton at 5 cents, as heretofore.

"The authority to fix rates of fare upon street railways is conferred by statute upon the companies, subject, however, to review and recommendation by the Railroad Commissioners. The sole question presented, therefore, is whether, in view of the whole situation, a modification of the orders of the board ought in the public interest to be made. In determining this question the board must of necessity assume that the company is proposing to establish the fares submitted in the schedules filed with its petition.

"After a careful study of the proposals now before it, and a review of the financial condition of the Northampton Street Railway, the board is of opinion that its outstanding orders should be so modified as to permit the adoption of the schedules of fare submitted by the petitioner."

Change in Commutation Rate over Long Island Railroad

The Long Island Railroad, through P. H. Woodward, secretary to Ralph Peters, president of the company, has announced that after the terminal of the Pennsylvania Railroad at Seventh Avenue and Thirty-third Street, New York, N. Y., is opened to the trains of the Long Island Railroad, that company will add 95 cents a month to the cost of tickets to the terminal over the previous rates to the foot of Thirty-fourth Street, New York, for the additional distance between the East River and the terminal station at Seventh Avenue. There will be no change, however, in either the straight or the commutation fares on the Long Island Railroad between any point on Long Island and Long Island City. A charge of $1.05 a month is now added to the commutation rate over the Long Island Railroad to Long Island City to cover ferriage from Long Island City to the foot of Thirty-fourth Street, New York. After the terminal at Seventh Avenue is opened, $2 a month will be added to the commutation now in force over the Long Island Railroad to Long Island City, or 95 cents will be added to the commutation now in force over the Long Island Railroad to the foot of Thirty-fourth Street, New York. It is explained that this readjustment of fares will work to the benefit of the commuter, as comparatively few of those who travel over the Long Island Railroad regularly have their places of business within walking distance of the Thirty-fourth Street ferry. Those patrons of the company who are compelled to ride to their places of business in New York from the Thirty-fourth Street ferry now pay approximately $3 a month in car fare in New York for this service, whereas the increase in fare between the rate now charged to Thirty-fourth Street, New York, and the terminal at Seventh Avenue will be only 95 cents a month. Thus a monthly saving of $2.05 will be effected in the case of the commuter who now is compelled to patronize the street railways in New York to reach his place of business, but who will be able to walk to his place of business from the Pennsylvania terminal, which is centrally located.

Train Service Over the Pacific Electric Railway.—Service with two-car trains has been begun between Los Angeles, Alhambra and San Gabriel by the Pacific Electric Railway.

Fatalities on Electric Railways in Ohio.—Six fatal accidents occurred on the interurban electric railways in Ohio during April, 1910, according to the report made by the State Railroad Commission.

Side Door Trains in the Subway.—The Interborough Rapid Transit Company has notified the Public Service Commission of the First District of New York that it has 27 side-door trains in operation in the subway.

Terms of Service to Be Arbitrated in Detroit.—The differences between the Detroit (Mich.) United Railways and its employees regarding the readjustment of the terms of service of the men are to be submitted to arbitration.

Comet Specials.—The Carbon Street Railway, Mauch Chunk, Pa., has taken advantage of the interest aroused in Halley's comet by the newspapers to run special cars over its line early each morning to Flagstaff Park, the point of highest elevation on its lines.

Service Between Seattle and Everett.—The extension of the line of the Seattle-Everett Traction Company from Hall Lake to Everett has been completed and regular service is now being given between Seattle and Everett with four cars.

From Stockton to Sacramento.—The Central California Traction Company, which established service over its line between Stockton and Sacramento on May 9, 1910, will operate cars between the cities every hour for the present. It is expected within a short time, however, to run cars every 15 minutes.

Freight Terminal of Illinois Traction System in St. Louis.—The Illinois Traction System, Peoria, Ill., established its own terminal in St. Louis, Mo., on May 1, 1910, for handling package freight. The arrangement which the company had with the Big Four Transfer Company has been discontinued.

Increase in Service Between Indianapolis and New Castle.—The Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., will increase the service over its line between New Castle and Indianapolis as soon as the new substation is installed at Newcastle, and will reduce the running time from 2 hours and 30 minutes to 2 hours.

Meeting of Central Electric Traffic Association.—The meeting of the Central Electric Traffic Association at Fort Wayne, Ind., on May 14, 1910, was executive in character, and the proceedings are not available for publication. In point of attendance the meeting was very satisfactory. The next meeting of the association will be held on June 11, 1910, in the office of the chairman in Indianapolis.

Trade Campaign by Trolley.—Members of the Trade Association of Indianapolis, Ind., have arranged to tour Indiana in special interurban cars to arouse the interest of residents of the State generally in Indianapolis, and incidentally to better the trade of the city. The first trip was scheduled for May 21, 1910, to be made over the lines of Indiana Union Traction and the Winona Interurban Railway.

New Indiana Road Opened.—The Bluffton, Geneva & Celina Traction Company, Bluffton, Ind., announced that it would open its line from Bluffton to Geneva on May 15, 1910, with a three-hour passenger service and one freight car a day. The road was built as an extension of the Marion, Bluffton & Eastern Traction Company's line. The company has added a portable substation to its power equipment.

Passengers to Board and Alight from Right Side of Cars in Harrisburg.—Hereafter patrons of the lines of the Central Pennsylvania Traction Company, Harrisburg, Pa., will get on and off the right side of street cars in obedience to the following resolution adopted by Common Council, concurred in by the Select Council and approved by the Mayor of Harrisburg: "Resolved, That the Central Pennsylvania Traction Company be and is hereby requested to see that all passengers are received and discharged from the right side only of the cars on the highways of the city."

Arbitration of Wages in Michigan.—The board of arbitration which is considering the terms of service of the employees of the Kalamazoo and interurban lines of the Michigan United Railways held its first session in Lansing, Mich., on May 10, 1910. The board is composed of F. A.

Kulp, who represents the men; Sanford W. Ladd, who represents the company, and Justice R. C. Ostrander of the Supreme Court of Michigan. The employees of the company in Kalamazoo receive 21, 22 and 23 cents an hour, according to length of service. They have asked for a flat rate of 25 cents an hour. The employees of the interurban lines receive 23, 24 and 25 cents an hour. They desire 25, 26 and 27 cents an hour.

Crusade Against Smoking in New York Subway.—Following several conferences which he held recently with Commissioner of Health Lederle of New York, Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, sent a letter on May 11, 1910, to the Public Service Commission of the First District of New York in which he said: "Referring to the conversation had with you several days ago on the subject of smoking in the subway, would say that I had a conference with Commissioner Lederle of the Health Department, at which it was agreed that we would have printed large signs calling attention to the fact that smoking or carrying lighted cigars, cigarettes or pipes into the subway would not be permitted. These signs we have had posted in conspicuous positions in the subway and special orders have been issued to all employees to call attention to any violation of this ordinance."

Increase in Wages in Toledo.—The Toledo Railways & Light Company, Toledo, Ohio, has increased the wages of conductors and motormen on the city lines 1 cent, as follows: First year, 21 cents; second year, 23 cents; third year, 23 cents; over three years, 24 cents. Similar increases have been made in the wages of employees on the lines of the controlled companies. For the first year's service on the Maumee Valley Railway and the Toledo, Ottawa Beach & Northern Railroad conductors and motormen will receive 21 cents an hour; second year, 22 cents; third year, 23 cents, and fourth year and over, 24 cents. Employees on the Toledo & Western line will receive 20 cents the first year, 21 cents the second year, 22 cents the third year and 23½ cents the fourth year. The men in the shops, power houses, operating, lighting and heating departments receive a proportionate increase.

Attractive Advertising of Hayden Lake.—The traffic department of the Spokane & Inland Empire Railroad, Spokane, Wash., has published a booklet entitled "Golf at Hayden Lake," prepared by Charles E. Flagg, publicity agent of the company. It is 5 in. x 9 in. in size, with a cover of heavy-coated stock embossed in gold and white. Two or more half-tone engravings illustrate each page and interspersed artistically are small reproductions of wood berries and native ferns. The larger half-tone engravings show Bozanta Tavern and several views of the grounds about the tavern and station, including the golf course. Other engravings show wilder scenes of lake, mountain and woods. The Cœur d'Alene division of the Spokane & Inland Empire Railroad is the only transportation line to Hayden Lake, which is in the Government Forest Reserve of Idaho, 40 miles east of Spokane. Six trains are operated daily between Hayden and Spokane.

Limited Service Changes of the Detroit United Railway.—Many important changes have been made in the limited car service by the Detroit United Railway. Under the new schedules there are six cars a day each way between Detroit and Toledo, leaving Detroit at 7:20 a. m. and every two hours thereafter until 5:20 p. m., while on Saturdays and Sundays an extra limited car leaves Detroit at 7:20 p. m. and Toledo at 7:35 p. m. The regular limited cars leave Toledo at 7:20 a. m. and every two hours thereafter. To Port Huron there are five limiteds each day daily at 6:45 a. m. and every three hours until 6:45 p. m. To Flint there are five limited cars each way daily, leaving Detroit at 6:35 a. m. and every three hours to 6:35 p. m. The first, third and fourth limited cars run through to Saginaw without change and leave Saginaw at 6 a. m., 11:30 a. m. and 5 p. m. No change has been made in the operation of the four limited trains to Jackson.

Brooklyn Rapid Transit Company, a Brooklyn Institution.—The following advertisement was published by the Brooklyn (N. Y.) Rapid Transit Company in the Brooklyn section of the *New York World* of May 8, 1910: "The Brooklyn Rapid Transit lines employ 13,000 persons—practically all of them in Brooklyn. Upon these 13,000 employees many families are dependent. It is estimated that 65,000 persons—a city the size of Troy—earn their bread and butter from the local traction system. The weekly payroll of the Brooklyn Rapid Transit lines exceeds $200,000. Almost the entire amount of that payroll—$10,000,000 a year—is expended in Brooklyn. Beyond that are the millions that the company spends each year in Brooklyn for materials and supplies. As its business grows within this borough the Brooklyn Rapid Transit lines will employ many more persons who will add greatly to that weekly payroll. As the community grows so grow its transportation companies. As the transportation companies grow so grows the community. Their interests are identical."

Complaint Against Increase in Fare on New Haven Road.—The Public Service Commission of the Second District of New York has served on the New York, New Haven & Hartford Railroad the complaint of W. P. Hickok and D. G. Tallman against the increase in commutation rates between Mount Vernon and New York. The company has been required to make answer within 10 days. Messrs. Hickok and Tallman allege that the rates which are to go into effect between Mount Vernon and New York on June 1, 1910, are unjust, unreasonable and unlawful and contrary to and in violation of law, and they ask the commission to commence proceedings in the Supreme Court of New York to prevent the increase in rates and charges either by mandamus or injunction, on the ground that the company is about to demand unjust and unreasonable rates and charges in violation of law. It is suggested that preliminary to making this order a hearing be accorded the complainants and others who may care to go on record as opposed to the proposed increase.

Seeing Lancaster County from a Trolley Window.—This is the title of a publication of 80 pages 6¾ in. wide by 10 in. high with a story woven around the electric railways, because they afford one of the most convenient and economical modes of travel for the sightseer. The book is divided into the following parts: Part 1, The City of Lancaster; Part 2, A Trip to Marietta; Part 3, A Trip to Elizabethtown; Part 4, A Trip to Pretty Pequea; Part 5, From Quarryville to Lancaster; Part 6, A Trip to the "East End"; Part 7, A Trip to Pierre Hill; Part 8, A Trip to Ephrata and Adamstown; Part 9, A Trip to Manheim and Lititz; Part 10, Lancaster in the Days of Yore. There is a map of Lancaster County which shows the lines of the Conestoga Traction Company and the population of the townships, and there is also an index to the various trips and to the illustrations. The front cover contains a section of an electric railway car filled with passengers, who are presumably taking one of the trips described in the publication. "Seeing Lancaster County from a Trolley Window" is published by the Conestoga Traction Company, Lancaster, Pa., to sell at 10 cents a copy.

Service Orders in Washington.—The District Electric Railway Commission has recently adopted several orders relative to the operation of street cars in the District of Columbia. One modifies a previous order regarding service on the Fourteenth Street division of the Capital Traction Company by requiring the company to operate a sufficient number of cars with a seating capacity of 36 or more over the Fourteenth Street line between the Peace Monument and Fourteenth Street and Park Road, Northwest, to maintain a headway of not more than one minute between 4:15 p. m. and 6:15 p. m. on all days except Sundays and holidays. Another extends until June 30, 1910, the order adopted on Feb. 18, 1910, which provides for the employment of conductors on trail cars. Other orders prescribe the service which shall be furnished between certain hours on the Maryland line of the Washington Railway & Electric Company and the City & Suburban Railway and the Center Market route of the Washington Railway & Electric Company and the Anacostia & Potomac River Railroad. To make it possible for cars to operate on short headway in congested districts the commission has modified that portion of section 7 of the regulations governing the operation of street cars, which says that "no street car shall follow a preceding car moving in the same direction at a less interval than 100 feet unless coupled thereto," to read that "no street car moving at a speed exceeding 10 m.p.h., shall follow, etc."

Personal Mention

Mr. C. F. Bruce, Tulsa, Okla., has been appointed general manager of the Port Arthur (Tex.) Traction Company, which is completing 7 miles of electric railway in Port Arthur.

Mr. Van Horn Ely has resigned as president of the Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio, to devote his attention to the Beaver County Light Company, Beaver, Pa.

Mr. J. E. Sewell, formerly general manager of the Connecticut Railway & Lighting Company, Bridgeport, Conn., has been appointed general manager of the Shore Line Electric Railway, New Haven, Conn.

Mr. George Faulk has been elected secretary of the Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio, to succeed Mr. Edward McDonnell, who has been elected president and treasurer of the company.

Mr. Edward McDonnell, secretary and treasurer of the Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio, has been elected president of the company to succeed Mr. Van Horn Ely. Mr. McDonnell will retain the office of treasurer.

Mr. W. C. Cuntz, of the Goldschmidt Thermit Company, whose appointment by the United States Government to represent it at the International Railway Congress at Berne, this summer, was mentioned last week, was erroneously given the title of general manager of the company.

Mr. Charles Murray has been appointed manager of the Schuylkill Railway, Girardville, Pa. Mr. Murray has been superintendent and manager of different properties controlled by the Railways Company General for nine years, and for the last three years he has been connected with J. G. White & Company, Inc., and Ford, Bacon & Davis, New York, N. Y.

Mr. J. C. Rothery, who has resigned as general manager of the Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio, will give his attention to the construction of electric railways in South American cities. Mr. Rothery has been succeeded with the Steubenville & East Liverpool Railway & Light Company and the East Liverpool Traction & Light Company, East Liverpool, Ohio, by Mr. W. R. W. Griffin, as announced in the Electric Railway Journal of May 7, 1910, page 849.

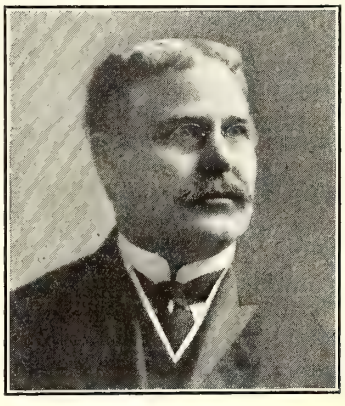
Mr. W. C. Callaghan as superintendent of transportation of the city lines of the New York State Railways (Rochester Lines) and Mr. M. D. Kilbride as superintendent of transportation of the interurban lines of the company at Rochester, will divide between them the responsibility of the office of general superintendent, from which Mr. W. R. W. Griffin recently resigned to become general manager of the East Liverpool Traction & Light Company, East Liverpool, Ohio, and the Steubenville & East Liverpool Railway & Light Company.

Mr. F. W. Watts, who has been appointed general express agent of the Syracuse (N. Y.) Rapid Transit Company, Utica & Mohawk Valley Railway, Utica, N. Y., and the Oneida (N. Y.) Railway, entered electric railway work in 1903 as local express agent of the Utica & Mohawk Valley Railway at Little Falls. In October, 1907, he was appointed division express agent of the company, and in January, 1908, he was appointed division express agent of the Oneida Railway. Before becoming connected with the Utica & Mohawk Valley Railway Mr. Watts served in the traffic department of the New York Central & Hudson River Railroad for 14 years.

Mr. J. G. Baukat has accepted a position as mechanical engineer with the Foundation Company, New York, N. Y., which makes a specialty of constructing foundations for large buildings, bridge piers, mining shafts, power plants, sea walls, wharfs, dams, etc. Mr. Baukat was chief engineer of the Miami Valley Construction Company, from December, 1909, until the company went into the hands of a receiver. Previous to this, he was for four years assistant superintendent of electrical equipment with the New York Central & Hudson River Railroad, in charge of maintenance of electrical equipment and repair shops. Before his connection with the latter company, Mr. Baukat was engineer of the Schenectady (N. Y.) Railway. Mr. Baukat began his railway work by spending three years in the railway department of the General Electric Company at Schenectady.

Mr. Walter G. Barlow has resigned as master mechanic of Easton (Pa.) Transit Company, effective on May 15, 1910, to go to Galion, Ohio, to attend to personal business. Mr. Barlow was born at Galion on Oct. 22, 1873, and attended the public schools there until January, 1888, when his parents moved to Philadelphia. He then entered the Philadelphia Manual Training School and was graduated from that institution in 1892. In 1894 he was graduated from the Philadelphia College of Pharmacy, and in March, 1896, was graduated from the electrical department of the Drexel Institute of Science. He entered the employ of the Philadelphia & West Chester Traction Company on April 1, 1896, as electrician in charge of cars and lines, and was later promoted to master mechanic, and in 1898 was appointed assistant superintendent of the company. In February, 1900, Mr. Barlow accepted the position of general superintendent and master mechanic of the Lewiston & Reedsville Electric Railway, Lewiston, Pa., but resigned from that company on July 1, 1903. He was employed from 1903 to 1905 in the line and cable department of the Philadelphia Rapid Transit Company under Mr. F. H. Lincoln. For a year Mr. Barlow was associated with his brother as a druggist. Subsequently he had charge of electrical construction for the Keller-Pike Company, Philadelphia, Pa., electrical engineers and contractors.

Mr. E. E. Downs has been appointed general manager of the Chicago & Milwaukee Electric Railway, Highwood, Ill., to succeed Mr. A. W. McLimont, who has been elected vice-president and general manager of the Michigan United Railway, Lansing, Mich., as noted in the Electric Railway Journal of May 7, 1910, page 849. Mr. Downs has been connected with the construction and operation of electric railways for the last 17 years, and for the last two years he has been vice-president and general manager of the Sterling & Dixon Electric Railway, Sterling, Ill., and the Lee County Lighting Company, Sterling. Mr. Downs was born in Boston, Mass., and his first business experience was in general contracting and telephone work. When the electrification of street railways began he became connected with the construction department of the Thomson-Houston Company and had charge of installing electricity on the Second Avenue Passengers' Railway, Pittsburgh, Pa., the first railway in Pittsburgh to adopt electricity. Later Mr. Downs installed electricity on the Missouri Street Railway, St. Louis, Mo.; City Electric Railway, Little Rock, Ark.; Fort Clark Street Railway, Peoria, Ill., and the Fort Wayne & Belle Isle Railway, Detroit, Mich. In his work at Little Rock Mr. Downs was associated with Mr. Bion J. Arnold. Subsequently Mr. Downs became manager of the street railways in Kalamazoo and Battle Creek, Mich., for the General Electric Company, and later was associated with his brother and Mr. F. N. Rowley in the Michigan Traction Company and the Railways Company General. Mr. Downs next assisted in constructing an electric railway between Anderson and Marion, Ind., and in 1897 was engaged by Mr. George J. Kobush, St. Louis, Mo., as general manager of the Winnebago Traction Company, Oshkosh, Wis., with which company he remained for more than seven years. In October, 1904, Mr. Downs went to San Francisco in the interest of E. H. Rollins & Son, Boston, Mass., as general manager of the Petaluma & Santa Rosa Railway. In March, 1906, he returned to the East and promoted and partially completed Beechwood Park, near Philadelphia. In March, 1908, he succeeded Mr. E. R. Kirk as general manager of the Sterling, Dixon & Eastern Electric Railway.



E. E. Downs

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Central Ohio Promoting Company, Columbus, Ohio.**—Incorporated in Ohio to promote an interurban railroad between Columbus and Zanesville. Capital stock, $25,000. Incorporators: Albert E. Boone, Dorse H. King, Henry A. Auxline, James L. Holden and James L. Grimsley, Zanesville.

***Astoria (Ore.) Southern Railway.**—Application for a charter has been made in Oregon by this company to build a railway from Young's Bay, Astoria, to points on Nehalem Bay and Tillamoon County. Capital stock, $500,000. Incorporators: L. W. Humphreys, W. Thomas and C. J. Kraemer.

***Consolidated Traction Company, Philipsburg, Pa.**—Application will soon be made in Pennsylvania for a charter by this company to build an electric railway from Philipsburg to Curwinsville via Blue Ball, Wallacetown, Bigler, Woodland and Clearfield. It is said to be backed by Philadelphia capital.

Mt. Adams Railway, White Salmon, Wash.—Incorporated in Washington to build a 60-mile railway from White Salmon to Glenwood. Capital stock, $50,000. Incorporators: Charles L. Colburn, Tunis Wyers, Rik Field, Rudolph Lauterback and Theodore F. Shepler, all of White Salmon, Wash. [E. R. J., Jan. 15, '10.]

FRANCHISES

***San Rafael, Cal.**—W. L. Courtright and associates have asked the Council for a franchise to operate an electric railway in Fourth Street, San Rafael, as far as the town limits toward San Anselmo.

Griffin, Ga.—The Griffin City & Suburban Railway has been granted a franchise by the Council to build an electric railway in Griffin, with the stipulation that work must start within the next twelve months. [E. R. J., April 23, '10.]

Harvey, Ill.—The Eastern Illinois Railway has been granted a 50-year franchise by the Council to build an electric railway in Harvey. This line will connect West Hammond, Harvey, Burnham, Hegewisch and Riverdale. [E. R. J., May 14, '10.]

Milford, Ind.—Neff Brothers, Milford, have asked the County Commissioners for a franchise to build an interurban railway from Bremen to Mishawaka. [E. R. J., April 23, '10.]

Williamston, Mich.—The Detroit, Lansing & Grand Rapids Railway, Detroit, was granted a franchise at a recent special election to build a railway in Williamston. [E. R. J., March 19, '10.]

Hoboken, N. J.—The Hoboken Manufacturers' Railroad has asked the Common Council for a franchise to extend its tracks across the city to the west side, and thence to the Lackawanna Railroad, in Hoboken.

Ashland, Neb.—Frank Schaaf, representing the Omaha, Western & Lincoln Railway, Lincoln, has asked the Council for a franchise to build a railway in Ashland. A similar franchise is asked for in University Place. This is part of a plan to connect Omaha, Hastings and Lincoln with an electric railway, a distance of 219 miles. [E. R. J., April 30, '10.]

Altoona, Pa.—The Altoona & Johnstown Street Railway, Johnstown, has accepted the franchise granting it an entrance into Altoona. Construction will be started in June and the work will be divided in 15 sections. This 40-mile projected railway will connect Altoona and Johnstown. Geo. L. Holman, Johnstown, general manager. [E. R. J., April 9, '10.]

Norristown, Pa.—The Norristown Transit Company, a subsidiary company of the Philadelphia & Western Railway, Philadelphia, has been granted a franchise by the Town Council to operate a 2-mile railway over certain streets in Norristown.

New Castle, Pa.—The New Castle & Beaver Valley Street Railway, Beaver Falls, has asked Council to extend the time for a period of six months in which to begin work on its 22-mile railway from New Castle to Beaver Falls. [E. R. J., Feb. 5, '10.]

Fort Worth, Tex.—The Northern Texas Traction Company has been granted a franchise to extend and double-track several of its lines in Fort Worth.

Salt Lake, Utah.—Le Grand Young, representing the Emigration Canyon Railroad, has been granted a franchise by the County Commissioners to build an extension of the line to Holliday.

Spokane, Wash.—The Washington Water Power Company has asked the Council for a franchise to extend its Cannon Hill Line through Cannon Hill Park, Irving Heights, Clifton Highlands, Jerome Park and the Highlands additions to Twenty-ninth Avenue and Howard Street, in Spokane.

Morgantown, W. Va.—The South Morgantown Traction Company has asked the council for a franchise to extend its tracks in Morgantown.

TRACK AND ROADWAY

Los Angeles (Cal.) Railway.—This company has started work on its Eagle Rock extension, also on a 1½-mile extension to Harvard Boulevard.

Pacific Electric Railway, Los Angeles, Cal.—This company has obtained right-of-way for its 7-mile extension from Corina to San Dimas and Lordsburg, and construction of the line will soon begin.

Peninsular Railway, San José, Cal.—This company has started work grading on its extension from Palo Alto into Ravenswood and Woodland Place.

Evansville & Eastern Railway, Evansville, Ind.—Interests which control this company have purchased the Owensboro City Railroad and the Henderson Traction Company, and are planning, according to a report, the organization of a large interurban system having Evansville as a base and extending through that section of Indiana and Western Kentucky. The Evansville & Eastern Railway already has connections with Newburgh, Yankeetown, Hatfield, Rockport and Richland, and the plan now proposed is the extension of the line from Rockport to a point opposite Owensboro, the building of a bridge across the Ohio at that point and the connecting of Owensboro and Henderson by way of Calhoun, Ky. Surveys for these lines have already been made. Those who are interested are: W. H. McCurdy, president of the Evansville & Eastern Electric Railway; A. S. Karges, president of the Evansville Terminal Railway; Charles Hartmetz, Albert Funkhauser, Arthur Funkhauser and C. C. Tennis. [E. R. J., March 12, '10.]

Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.—This company announces that it will at once begin double-tracking its lines between Pullman, Ill., and Gary, Ind., a distance of 17 miles. The construction work, for which material is being received, will be done by the Cleveland Construction Company. It is expected to have the new track finished this fall. It is probable that the entire line will soon require double-tracking. The new work will be in charge of J. B. Tuffel as superintendent of construction for the Cleveland Construction Company.

Louisville & Northern Railway & Lighting Company, New Albany, Ind.—This company expects to build an extension into the county to connect with the grounds of the New Albany Park & Fair Association, provided the city grants the right of way for the extensions in the city limits.

Wabash & Northern Indiana Traction Company, Warsaw, Ind.—Press reports state that this company is now financed and work will be started within 2 months on this projected railway between Wabash, North Manchester and Warsaw. J. A. Berry is interested. [E. R. J., Dec. 11, '09.]

***Des Moines, Ia.**—F. C. Hubbell, B. F. Kaufmann and G. M. Hippee are promoting the construction of a 100-mile interurban railway between Red Oak and Des Moines, via Greenfield.

Sioux City & Spirit Lake Railway, Sioux City, Ia.—This company announces that satisfactory progress is being made in the work preliminary to the construction of a 106-mile

freight and passenger electric railway to connect Sioux City and Spirit Lake. It will traverse a section of the State which now has only indirect rail connections with Sioux City and Omaha. Intervening towns on the proposed route are: La Mars, Potosia, Ellendale, Granville, Primghar and Hartley. The new line will afford a short route to the Okobojee Lakes and to Spirit Lake, which are the only lake resorts of any considerable size in Iowa. The project, while yet in the preliminary stage, is said to be near the construction period. General offices, American Block, Sioux City. Fred Davis, secretary. [E. R. J., Nov. 6, '09.]

Lexington & Interurban Railway, Lexington, Ky.—This company has completed its new line between Lexington and Nicholasville, a distance of 12 miles, and has put it into operation. Cars will be run every four hours. The company now controls 4 lines extending out of Lexington.

***Butte, Mont.**—I. A. Heilbronner and Charles F. Kelley are said to be projecting the construction of an electric railway to Anaconda by way of Gregson Springs.

Missoula (Mont.) Street Railway.—This company, which is building a street railway in Missoula, will probably extend it to Hamilton.

Hudson, Center & New Salem Electric Railway, Schafer, N. D.—Press report states that this company has secured right of way for its proposed 110-mile electric railway from Center to Hettinger, Hudson and New Salem. Charles Whitmere is in charge of the work. [E. R. J., March 8, '10.]

***Akron, Canton & Youngstown Electric Railway, Canton, Ohio.**—Press report states that interest has again been revived in this proposed railway to connect Akron, Canton and Youngstown. Milton Schaffer, Canton, president.

Fostoria, Ohio.—Charles A. Bliss, Toledo, representing the Toledo Promoting & Developing Company is securing right of way for an electric line from Fostoria to Paulding. Right of way has been secured nearly to Bloomdale and the Council in Bloomdale has granted a franchise to the company. [E. R. J., Dec. 4, '10.]

Lawton & Fort Sill Electric Railway, Lawton, Okla.—A bill has been introduced in the House by this company, asking additional right-of-way through 2½ miles of public domain near Lawton, whereby the line can be built between Lawton and Medicine Park. This proposed 15-mile railway will connect Lawton, Medicine Park & Fort Sill. D. L. Sleeper, vice-president. [E. R. J., March 19, '10.]

Lehigh Valley Transit Company, Allentown, Pa.—This company will build a steel bridge, paralleling the New Street bridge. It is estimated that the bridge will cost $100,000.

Clarion & East Brady Electric Railway, Clarion, Pa.—This company advises that it will soon start the construction of its proposed 30-mile railway to connect Clarion, Reidsburg, Sligo, Rimersburg and East Brady. Its power house, which will have a capacity of 2000 hp, and repair shops, will be located between Sligo and Rimersburg. The company also plans to furnish power for lighting. Capital stock, authorized, $1,000,000. Bonds authorized, $1,000,000. Officers: G. E. Arnold, Clarion, president, and T. S. Arnold, secretary and treasurer. [E. R. J., Feb. 5, '10.]

Slippery Rock & Grove City Railway, Grove City, Pa.—It is announced that this company will begin the construction of its 9½-mile gasoline motor railway between Slippery Rock and Grove City within ten days. The contract for building has been awarded to Alfred De Mayo & Company. H. B. Graves, Butler, chief engineer. [E. R. J., March 19, '10.]

Central Pennsylvania Traction Company, Harrisburg, Pa.—It is stated that this company has reached a mutually satisfactory agreement with the Pennsylvania Railroad whereby it will be allowed to build its extension from Rockville to Dauphin through the Dauphin Narrows.

Chambersburg, Greencastle & Waynesboro Electric Railway, Waynesboro, Pa.—This company is building a 3-mile extension from Memorial Square, Chambersburg, to the Red Bridge along the Conococheague Creek. Materials are at hand and the line will be in operation July 4.

Quebec Railway, Light, Heat & Power Company, Ltd., Quebec, Que.—This company proposes to build a double-track extension westward from Maple Avenue to the top of Sillery Hill, a distance of 2½ miles. As soon as the required time under the railway act has elapsed the company will proceed with the work. Rails and other materials are on order and it is expected to have the line in operation early in July. The company does not at present contemplate operating to the Quebec Bridge, neither does it propose to construct a double track from Montmorency Falls to Ste. Anne de Beaupre this year. C. E. A. Carr, Quebec, general manager.

Aberdeen (S. D.) Street Railway.—This company has let the contract for the material for 5 miles of track to the Bell Lumber Company, of Minneapolis. Charles N. Herreid, Aberdeen, general manager. [E. R. J., March 5, '10.]

Lake View Traction Company, Memphis, Tenn.—This company, which proposes to build a 160-mile railway to connect Memphis and Clarksdale, Miss., advises that it is now laying rails on the section from Memphis to Lake View, a distance of 11 miles. It is expected to have this division in operation by July 1. The company has decided to operate by electricity instead of using gasoline motor cars, as was originally planned. The overhead construction will consist of double pole suspension, No. 0000 Fig. 8 trolley wire and No. 0000 10-in. compressed flexible bonds, furnished equally by the Ohio Brass Company, American Steel & Wire Company, and the General Electric Company. Lee Massengale, Iola, Kan., general manager.

***Dallas, Tex.**—H. M. Hyatt, of the Empire Construction Company, St. Louis, is organizing a company in Dallas to build an interurban railway from Dallas to Cleburne via Eagle Ford, Grand Prairie, Webb, Mansfield, Lillian, Pleasant Point, Alvarado and Mooston. It is said that St. Louis interests will finance the project if $350,000 is subscribed by citizens along the line.

Clarksburg & Weston Electric Railway, Clarksburg, W. Va.—This company advises that construction will begin this month on its proposed 24-mile electric railway between Clarksburg and Weston. Capital stock, $500,000. Officers: S. L. Watson, president, Fairmont; C. W. Watson, Baltimore, Md., vice-president; Walton Miller, Fairmont, secretary and treasurer; James O. Watson, Fairmont, general manager; A. T. Watson, Fairmont, purchasing agent, and D. D. Britt, Clarksburg, chief engineer. [E. R. J., May 14, '10.]

Sheridan Railway & Light Company, Sheridan, Wyo.—This company advises that it is ordering material and will begin construction within two months on its 13-mile interurban railway in Sheridan, Wyo., extending 9 miles out of Sheridan to various coal mines in Wyoming. Power station will be located 7 miles west of Sheridan, and repair shops in Sheridan. It will also furnish power for lighting and power for the mines, and will operate six cars. Albert Emanuel and William Sullivan, Conover Building, Dayton, Ohio, are promoting the line. [E. R. J., May 14, '10.]

***Ontario Railway Company, Ontario, Wis.**—This company is being organized for the purpose of building a line on the route recently surveyed from Ontario either to Wilton or Norwalk. A. E. Rau, Sparta, engineer. C. Lord, Ontario, is interested.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company expects to build a new depot on North Fair Oaks Avenue in Los Angeles.

Centerville Light & Traction Company, Centerville, Ia.—This company has secured a site for the erection of a waiting room in Centerville, and has also started work on its new car house, 60 ft. x 100 ft. It will be built with concrete foundation. Frank S. Payne, Centerville, general manager.

New York, Westchester & Boston Railway, New York, N. Y.—This company plans to build stations at the following places, and bids for the work will soon be asked for: Morris Park, Pelham Parkway, Allerton Avenue, Dyer Avenue, Gunville Road and Baychester Avenue, Bronx; South Third Avenue, East Sixth Street, Lincoln Avenue, Fulton Avenue and Columbus Avenue in Mount Vernon; one at North Pelham, Pelhamwood, at Webster Avenue and North Avenue, New Rochelle, and at New Rochelle.

Lake View Traction Company, Memphis, Tenn.—This company plans to build a car shed adjoining its power station, to be 24 ft. x 140 ft. and 24 ft. high in front and 20 ft.

in the rear. It will contain two standard-gage tracks, with a 60-ft. cement pit under each track, also a small machine shop.

Houston-Bay Shore Traction Company, Houston, Tex.—This company, which will build an electric ralway between Houston and La Porte, proposes to erect a passenger station at South Houston and six cement passenger and express depots along the line. [E. R. J., May 14, '10.]

Seattle, Snohomish & Everett Railway, Seattle, Wash.—This company will soon erect a new interurban depot at Pacific Avenue and Hoyt Avenue. It will be constructed by the Stone & Webster Engineering Corporation.

POWER HOUSES AND SUBSTATIONS

Hudson & Manhattan Railroad, New York, N. Y.—This company has recently been furnished by the American Blower Company, Detroit, with its entire supply of ventilating equipment. The following apparatus has been installed: At the Hoboken station, two 140-in. steel plate fans, housed with pedestals and direct connected to 40-hp variable speed motors; two 100-in. steel plate fans, direct connected to 13-hp variable speed motors; at the Fifteenth Street station, two 96-in. cone fans direct connected to 30-hp variable speed motors; at Morton Street shaft, two 180-in. steel plate fans direct connected to 55-hp variable speed motors; at Hudson Street station, two 100-in. steel plate fans connected to 50-hp variable speed motors.

Interborough Rapid Transit Company, New York, N. Y.—This company has awarded a contract to the Westinghouse Electric & Manufacturing Company for 1,000 line switches and various minor appliances.

Public Service Railway, Newark, N. J.—It is reported that this company, which recently purchased the Camden & Trenton Railway, will build a power station at Burlington, N. J.

Oklahoma City (Okla.) Railway.—It is stated that this company has completed plans for enlarging its power station at Belle Isle. New apparatus will be installed and it is estimated that the total cost of the improvements will be $150,000.

Gettysburg (Pa.) Railway.—This company has placed an order with the Coatsville Boiler Works for two 200-hp boilers for its power plant in Gettysburg.

Lake View Traction Company, Memphis, Tenn.—This company advises that it will soon erect a power plant on that section of its line which is now being completed between Memphis and Lake View. The engine room will be 40 ft. x 40 ft., and the boiler room will be of the same size and will contain three 200 or 250-hp Heine water-tube boilers. The electrical equipment will consist of two 200-kw, 550-volt d.c. generators for railway service and one 200-kw, a.c., 60-cycle, 2300-volt, single-phase generator for lighting service.

Northern Texas Traction Company, Fort Worth, Tex.—This company will erect a substation and waiting room at Grand Prairie and will increase the substation capacity at Oakcliffe.

Houston-Bay Shore Traction Company, La Porte, Tex.—This company will build a joint steam power station and car house, 225 ft. x 175 ft. and 24 ft. in height. It will be constructed of concrete and will have a steel frame. The power plant will have a capacity of 900 hp. The car house section will have a storage capacity of 16 cars. Estimated cost is $110,000. The company will also build a substation at South Houston. [E. R. J., May 14, '10.]

Utah Light & Railway Company, Salt Lake City, Utah.—This company is installing a new 1000-kw Westinghouse steam turbine at the Jordan River station.

Rutland Railway, Light & Power Company, Rutland, Vt.—This company is building a new substation at Fair Haven, and also expects to build one at Poultney.

Wheeling (W. Va.) Traction Company.—This company advises that it will place contracts during the next three weeks for one low-pressure, 1875-k.v.a. turbine, two 500-kw motor generator sets, with all necessary switchboards; also two motor-driven centrifugal pumps and condensing apparatus. George O. Nagle, general manager.

Manufactures & Supplies

ROLLING STOCK

Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, S. A., is building 12 cars at its own shops.

Scranton (Pa.) Railway is building a combination baggage and express car at its shops in Scranton.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill., is said to be considering the purchase of three 50,000-lb. capacity second-hand flat cars.

Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Ia., has under consideration the purchase of additional heavy electric freight locomotives.

Schuylkill & Dauphin Traction Company, Williamstown, Pa., is in the market for a 30-ft. single-truck, open work car, with roof, for hauling dirt and lumber, to be equipped with two GE-800 motors.

Sheridan Railway & Light Company, Sheridan, Wyo., which is preparing to begin work soon on an electric railway in Sheridan, will require six cars. Albert Emanuel, Conover Building, Dayton, Ohio, is promoting the line.

Interborough Rapid Transit Company, New York, N. Y., has placed an order with the Westinghouse Electric & Manufacturing Company for 188 motors, with controls, wiring, etc., for the subway division, and 120 motors and controls for the new elevated cars.

Clarion & East Brady Electric Railway, Clarion, Pa., will need three interurban, several box and trailer cars, also an electric locomotive for its line between Clarion and East Brady, Pa., upon which construction is to be begun at once. G. E. Arnold, Clarion, Pa., president.

Elmira Water, Light & Railroad Company, Elmira, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of April 2, 1910, as contemplating the purchase of several cars, has placed an order with The J. G. Brill Company for six closed single-truck cars for delivery in September. They will be equipped with two GE-78 motors each.

Humboldt Transit Company, Eureka, Cal., mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, as having ordered four cars of the California type from the W. L. Holman Company, has drawn the following details for this equipment:

Seating capacity.....30	Bolsters, body.....Holman
Weight (car body only) .....18,000 lb.	Bolsters, truck.....Standard
Bolster centers, length..19 ft.	Car trimmings.....A. & W.
Length over vest...33 ft. 9 in.	Control system.....G. E.
Width over sills.... 7 ft. 6 in.	Couplers .....Holman
Width over posts at belt ..... 8 ft.	Curtain fixtures...Cur. S. Co.
Sill to trolley base.. 9 ft.	Curtain material..Cur. S. Co.
Body .....wood	Gears and pinions.....G. E.
Interior trim.....ash	Gongs.....A. & W.
Underframe .....composite	Hand brakes.....Holman
	Trucks, type.....Standard

Oregon Electric Railway, Portland, Ore., reported in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1910, as having ordered two observation parlor cars from the Niles Car & Manufacturing Company, has included the following in its specifications for this equipment:

Seating Capacity.....35	Underframe .....semi-steel
Weight (car body only) .....33,000 lb.	Axles.....St'd Steel Works
Bolster centers, length .....38 ft. 6 in.	Bolsters, body.....Niles
Length, body.....51 ft. 3½ in.	Bolsters, truck.....Baldwin
Over vest.....60 ft.	Control system.....GE
Width over sills.. 9 ft. 2 in.	Couplers..Janney ....M.C.B.
Width over posts at belt..... 9 ft. 6 in.	Curtain material...pantasote
Sill to trolley base 9 ft. 6½ in.	Heaters.....Smith hot water
Height, rail to sills...42½ in.	Sanders .....Nichols-Lintern
Body .....wood	Seats, Parlor chairs, Heywood
	Seating....leather and plush
	Trucks, type..Baldwin 78-30-B

American Railways Company, Philadelphia, Pa., has ordered 21 cars from The J. G. Brill Company and the G. C. Kuhlman Car Company for use on the lines which it controls in Dayton, Ohio; Scranton, Pa., and Joliet, Ill. The

car bodies will be 20 ft., 30 ft. and 36 ft. long, respectively, and will have turtle-back roofs with space between roof and headlining for ventilation. They will be equipped with the Cooke vacuum system.

TRADE NOTES

Hobart Allfree Company, Chicago, Ill., has moved its office from 470 Old Colony Building to Room 1380 in the same building.

American Wood Preserving Company, Chicago, Ill., has moved its main office to its new factory location at 1345-1351 North Branch Street, Chicago.

Gerard Van Schaick has been elected president of the W. K. Kenly Company, Chicago, Ill., succeeding his brother, A. P. Van Schaick, resigned.

Cutter Electrical & Manufacturing Company, Philadelphia, Pa., has moved its Western office to 98 Jackson Boulevard, Chicago, Ill.

Dressel Railway Lamp Works, New York, N. Y., has moved its Chicago office from the Western Union Building to Suite 1216 of the People's Gas Building.

General Railway Company, Chicago, Ill., has moved its office from the Monadnock Building to the People's Gas Building, Michigan Avenue and Adams Street.

McKeen Motor Car Company, Omaha, Neb., recently shipped two 55-ft. cars to the North Coast Railway, Spokane, Wash., and one 70-ft. car to the Virginia & Truckee Railway.

Lackawanna Steel Company, New York, N. Y., has appointed Arthur P. Van Schaick district sales agent in charge of the Chicago office and territory, succeeding Charles R. Robinson.

Robert Wetherill & Company, Inc., Chester, Pa., have opened an office in New York at Room 2053, Hudson Terminal Building, 50 Church Street, in charge of Robert Wetherill, Jr.

Electric Equipment Company, Philadelphia, Pa., has received an order from the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., for two 10-bench and one 11-bench open cars for use on its Red Bridge Park extension.

National Brake & Electric Company, Milwaukee, Wis., has made changes in its advertising and purchasing departments, whereby E. Durr has been appointed advertising manager to succeed A. C. Loose, who will have charge of the purchasing department.

Union Spring & Manufacturing Company, Pittsburgh, Pa., has appointed W. F. La Bonta representative, with headquarters in the American National Bank Building, Richmond, Va. Mr. La Bonta was formerly purchasing agent of the Chesapeake & Ohio Railroad.

Power Specialty Company, New York, N. Y., has removed its Chicago office from the Rookery to the People's Gas Building, where larger quarters have been secured for handling the company's increased business. The office is in charge of R. B. Nutting, manager, and R. H. Wyld, assistant manager.

F. J. Angier, who recently resigned as manager of the tie and timber department of the Chicago, Burlington & Quincy Railroad, has accepted a position with the Kettle River Quarries Company, with office in the First National Bank Building, Chicago, Ill. On account of this change, the headquarters of the Wood Preservers' Association, of which Mr. F. J. Angier is secretary and treasurer, will also be in the same building.

Cooper Heater Company, Dayton, Ohio, has been awarded a number of contracts recently. Among them are the following: 25 heaters for the Omaha & Council Bluffs Street Railway, Omaha, Neb.; 8 for the Parsons Street Railway & Light Company, Parsons, Kan.; 5 for the Peoria Railway & Terminal Company, Peoria, Ill.; 8 for the Gary & Interurban Railway, Gary, Ind., and 7 for Lawrence Railway & Light Company, Lawrence, Kan.

Buckeye Manufacturing Company, Anderson, Ind., has built a gasoline motor car, which was recently operated on a test run over 65 miles of steam road, at a cost of $3.74, which includes the cost of fuel and the crew's time. The car ran at a maximum speed of 38.2 miles an hour, and made the trip from Anderson to Lebanon, 65 miles, in 2 hours and 19 minutes. The car will shortly make a run into Ohio over various steam and interurban lines.

Ohio Brass Company, Mansfield, Ohio, has purchased a controlling interest in the Insulator Pottery, Barberton, which for the past two years has been manufacturing the O-B Hi-Tension porcelain insulators, sold exclusively by the Ohio Brass Company. G. A. Mead, previously chief engineer of the Ohio Brass Company, is in active charge of the pottery. Orders and inquiries will be handled from the main office of the Ohio Brass Company, at Mansfield, as heretofore.

Electric Storage Battery Company, Philadelphia, Pa., has opened two new sales offices, one located at 729 Ford Building, Detroit, Mich., and another at 1424 Wazee Street, Denver, Colo., so that customers in adjacent territory will be better served. A stock of battery material will be carried in Denver, from which orders can be promptly filled. The addition of these offices and the St. Louis Exide storeroom, opened recently at Sixteenth Street and Pine Street, very materially increases the facilities of the company in the West.

ADVERTISING LITERATURE

Frank Ridlon Company, Boston, Mass., has issued its list of second-hand electrical machinery for May.

United Nut Lock Company, Springfield, Mass., has issued a small catalog and price list of "Hugtite" nut and bolt fasteners.

National Machinery & Wrecking Company, Cleveland, Ohio, has just issued a list of new and second-hand steam and electrical machinery.

E. Prouty, Chicago, Ill., is mailing a circular describing the Prouty type of gasoline car. A set of motor specifications accompanies the circular.

Dearborn Drug & Chemical Works, Chicago, Ill., has issued an attractive folder calling attention to its new headquarters in the McCormick Building, Michigan avenue and Van Buren street.

Curtis & Company Manufacturing Company, St. Louis, Mo., operators of the St. Louis Steel Foundry, have published a new catalog, No. 8, showing a large assortment of castings of machinery, electrical, manganese and carbon steels.

R. E. Dietz Company, New York, N. Y., has issued catalog No. 41, which contains complete descriptions of the various types of railway lamps and lanterns which it manufactures. Each description is accompanied by a price list and illustrations in color. The catalog contains 100 pages.

Joseph Dixon Crucible Company, Jersey City, N. J., has published "Graphite" for May, 1910, which contains a brief account of the recent convention of the American Railway Engineering and Maintenance of Way Association. A group photograph taken at the banquet of the association accompanies the article.

McGuire-Cummings Manufacturing Company, Chicago, Ill., has issued catalog No. 120 on sprinkling cars. Each of the three types of sprinklers made by the company is illustrated and described in detail. Tables showing weights, dimensions and areas sprinkled, based on actual tests with the cars operated at different speeds are given. Attention is also called in the catalog to several types of trucks manufactured by the company.

Sprague Electric Company, New York, N. Y., has issued catalog No. 321, in which various sizes and types of direct-current and alternating-current fans are described and illustrated. The company has also issued a 28-page booklet on Sprague flexible steel armored hose for compressed air or steam. Another catalog issued by the company, No. 233, describes and illustrates a few of the types of electric hoists which it manufactures.

W. N. Matthews & Brother, St. Louis, Mo., have printed the second edition of their Telephone Line Construction Book. Besides most of the data which has been retained from the first edition, 13 pages of specifications and diagrams have been added on the subject of interior block distribution and the proper sag for open wire construction. In addition, several new inventions are described, and an article is included by Charles Milan on "The Use of Cable Rollers."

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Effect of Raising the Transmission Voltage

The practical doubling of high-tension transmission voltages, made possible through the development of suspension insulators for 100,000-110,000-volt service, promises to have an important commercial effect on existing power stations which hitherto have been outside the sphere of hydroelectric influence. Maximum voltage transmission is a necessity for the hydroelectric promoters because so few of their plants are near industrial centers. The unfavorable feature of this development, so far as the owners of existing steam-power stations are concerned, is that they must compete ruinously with the cheaper power. On the other hand, operating companies can often secure power more cheaply than it can be generated in their own stations, and new railway projects will be encouraged, as no investment will be required for power generation.

The Accounting and the Other Departments

The close connection between the accounting and the other departments of an electric railway company is emphasized in a paper presented at the Central Electric Railway convention this week by A. F. Elkins. The developments of the last few years have undoubtedly increased both the actual and the relative importance of the accounting department in the average electric railway organization. Formerly the chief interest of the public and the State in a railway company was with the service which it furnished. Only meager operating reports were required and except in a few States there was but little supervision over the issue of securities. Only a little more importance was attached to the form in which the accounts were kept than if they related to the personal expenses of the president of the company. The function of the accountant, except on the larger roads, was simply that of checking up the receipts and disbursements and tabulating the results when required to do so by the chief operating officials. The changes which have occurred since have been broadly in the best interests of the electric railway companies. We could not return to the primitive methods of the early days, even if we would, but no one wishes to do so. The more attention that is given to detailed costs and statistics of operation and the greater the opportunity of comparison with other properties, the more exact becomes the science of electric railway operation, and upon the accountant rests a large part of the responsibility of providing the basis upon which this improvement can be made.

Clearing Right-of-Way

Weeds in summer and snow in winter are persistent bugbears of the interurban section foreman. Of the two, weeds are most exasperating because they require constant attention to keep them down just at the time when work on the track is most urgently needed. If allowed to grow unmolested they soon become a menace to ties and fence posts and a source of con-

stant danger from fire during the summer. One of the largest interurban systems in Ohio solved the problem of relieving the section gangs from the discouraging, because unending, fighting of weeds and snow by arranging with the farmers to do it. Contracts were made with the owners of land along or through which the interurban right-of-way extended to keep a specified section of the right-of-way free from long grass and weeds during the summer and clear of deep snow during the winter, the work to be done under the supervision of the section foremen. For this work a lump sum, agreed upon in advance, was paid regardless of the rate of growth of the vegetation or the severity of the winter. The money was not paid until the expiration of the contract, so that the prospect of future payment was a constant incentive to the farmers satisfactorily to carry out their contract. This arrangement saved money for the company in the end because it took no risks and dispensed with extra section gangs in the summer and emergency help at high wages in the winter. During two severe winters no serious delays to cars were caused by failure of the farmer contractors to keep tracks clear on their sections. In the summer the section gangs devoted their entire time to track maintenance with resulting improvement in the general condition of the roadbed.

Making or Buying Shop Appliances

A striking feature of electric railway shop practice is the remarkable diversity in the tools and methods used for repairing and maintaining exactly the same lines of equipment. In a large measure this condition is due to the ingenuity of individual master mechanics who feel that they can save money for their employers by devising their own appliances rather than by purchasing standard devices. This trend evidences a most commendable spirit, but it is proper to ask where the line should be drawn in pursuing a policy of this kind. There are, of course, numerous situations where odds and ends can be used with profit to build shop appliances, particularly in those cases where accuracy, speed and fine machining are of no great importance. Thus, worn steel rails make first-class reinforcing material in concrete construction or they may be made to serve as crane runways; old ties and pole stock can be employed for blocking; cast-off air-brake cylinders and fittings can frequently be used to advantage in making a machine for cutting or bending pipe and bar stock; for intermittent power operations, motors and resistances of bygone periods can be pressed into convenient service at little expense. On the other hand, it is questionable whether it pays a railway company to build such contrivances as commutator slotters and truing devices, coil winders and babbitting molds unless it has the best facilities for accurate machining. Doubtless many of these home devices are doing good work, but their very variety proves that most of them are not giving the best and most economical service. It is but natural that in the long run the best of these inventions should be exploited for general sale with such additional improvements as are due to their being manufactured from patterns and jigs and to the changes suggested by a large body of users. Pride in his own invention should not prejudice a master mechanic against recommending the best thing available. Sometimes the management is at fault in refusing to sanction a direct cash outlay, but more often it expects the master mechanic to prove whether there would be any economy in buying a finished tool if its first cost would exceed that of a home-made article built up of shop scraps.

BROADENING THE USEFULNESS OF THE TROLLEY SYSTEM

The close relationship existing between a progressive electric railway system and the public which it serves is a more valuable asset than is sometimes realized in either executive or popular circles. The steam railroads have wrought significant changes in the life of communities which they have entered, but the house-to-house characteristics of the electric line have still more intimately touched the standards of neighborhood existence and scattered provincialism from the routes of traffic. In the country districts this influence has been potent beyond easy measure, and by bringing town and farm closer, and at the same time lowering the cost of transit between the country and the city, the trolley lines have performed an economic service still far from appreciated.

Observation of the results of extending usefulness of electric railways which reach far into the rural districts inclines one to the belief that much yet remains to be done in raising the effectiveness of electric traction as a community force and as a prospering business organization. In many quarters little or no attempt has as yet been made to handle other than a passenger service; the advantages of limited cars, particularly in the summer season, are still to be recognized in many instances; the business-getting results of an established through schedule over lines formerly operated on the step-by-step principle need to be more generally practiced in some localities; and the possibilities of competing with the automobile delivery wagon in the handling of high-class merchandise deserve to be taken into account. The admirable development of a multiple transportation service in some parts of the country may well be followed in others.

The usual headway of 30 minutes to an hour on such systems leaves considerable room for additional service without creating congestion of car movements, and, in general, the spreading of traffic units over a wider time interval accomplishes much the same gain in the system load-factor that the day motor service of a modern central station effects. Anything which tends to substitute the relatively even movement of rolling stock in multiplied units for the use of a few cars operated on a long headway tends to introduce lower costs of power production and distribution, quicken the response of the community to the facilities offered in competition with other means of transit, and diminish the percentage of idle operating time from which rural services suffer so frequently and heavily. Such an increase in the number of car units on the lines cannot be maintained profitably without a liberal supporting traffic, and in very sparsely settled territory with few large towns at the central points probably little can be done to multiply the established service without danger of overburdening expenses. It is not so much along the line of decreased headways in any given type of service that improvement may be expected as in broadening the facilities of the electric railway in such a manner as to fill up the hollows in the hourly earnings curve.

In some of the most thickly settled suburban districts of the country the handling of milk and garden products from the farms into the city is at present done by cumbersome and expensive methods which might well give way to electric railway service during the small hours of the night and early morning when traffic is at its lowest ebb. Combining this class of business with the outward delivery service from the city into the suburban and rural tributary regions would greatly increase the

earning power of many properties which now derive little benefit from any except passenger travel. The operating economies of all off-peak service are more important than is frequently recognized. The handling of mail is another branch of rural service which emphasizes the usefulness of the trolley, and the creation of a popular demand for transportation outside the hours when the equipment is normally taxed to its utmost capacity is a step in the right direction. The gist of the whole matter is that there are innumerable points of contact between the public and the street railway system, and that many of these can more or less completely be turned to account in developing business which comes outside the hours when the strain upon the road is the heaviest. The consumer of the future will be brought into closer touch with distant centers by the trolley service than obtains in many present cases, and the mercantile districts will profit correspondingly from the extension of facilities which tap a larger purchasing area.

THE UTICA TROLLEY TRIP

We can see considerable possibilities in the way of trolley trips similar to that completed this week by a number of business men of Utica. The excursion lasted just 14 days and included several of the most important cities of the Central States, such as Cleveland, Detroit, Toledo, Indianapolis and Louisville. Its primary purpose was to advertise Utica as a desirable location for factories, to make new business connections and advance the interests of Utica generally, But we do not see why, as this trip was successful, it should not be the precursor of others of the same kind or for any purpose, where the tourists wish to see more of the country through which they are passing than is possible through the windows of a steam train. The car used weighed 40,000 lb. and trouble with clearances was encountered at only one point. This was at a low bridge, but by manipulation of the trolley pole the difficulty was overcome.

The success of the Utica method of booming is attested by recent statements to the effect that a similar trip will be undertaken by members of the Indianapolis Trade Association. The latter intend to visit 32 towns in cities in Northern Indiana and will, according to the reports, travel with a printing press which will be set up in the baggage car of the train so that circulars and other literature can be promptly issued, inviting local merchants to visit Indianapolis during Buyers' Week in June.

The connection of the various networks of interurban electric railways in the Central States makes trips of this kind practicable to an extent which does not exist elsewhere in the country. The through operation of private cars to meetings of the Central Electric Railway Association, which has been a feature of the meetings of that organization, has made a knowledge of these through routes general and has, undoubtedly, been a large factor in interesting the general public in trips of this kind. There have also been instances where similar excursions have been organized by agricultural colleges to educate the communities along the different electric railway routes in scientific farming, and by political spell-binders to instruct the voters before an election as to the issues of a coming campaign. We hardly know where to set a limit on these modern pilgrimages.

WATCHING THE EXCURSION PARTIES

The passenger agent of an electric railway company which desires to encourage a special-party service, would do well to study the sales methods of the retail merchant. He will learn that the salesman who seriously attempts to encourage regular trade lives up to the saying that a satisfied customer is the best advertisement. He will also find that to attract a customer the goods displayed must fully meet the promises of the advertisement. They must be offered for sale in a courteous way and, if sold, must be delivered at the promised time. Any electric railway passenger agent or traffic manager may safely apply to his own field these methods which get substantial results in the commercial world. When the passenger department has closed a bargain for the handling of a special party it should not think its work is practically concluded after the trainmaster has been given a memorandum of the time of starting and leaving, otherwise the operating department will carry all of the responsibility for making good the passenger traffic solicitors' promises. The operating department usually has its own troubles in securing equipment, crews and running time for special trains; and while undoubtedly it will do its best to fulfill the schedules, it has been known to follow them so rigidly that the party for which a special train was run has been seriously inconvenienced. It is the duty of every member of the operating organization to follow his instructions to the letter, and, usually, these instructions cannot be changed on the spur of the moment or without consultation with headquarters. There are so many ways in which an excursion or special party can be favored at no cost or serious inconvenience to the railway company, it is very advisable for the traffic agent who has solicited the special party to see that everything goes off smoothly, even if he or a representative from his office has to spend part or all of the day with the road's customers to be sure that the service fulfills all expectations.

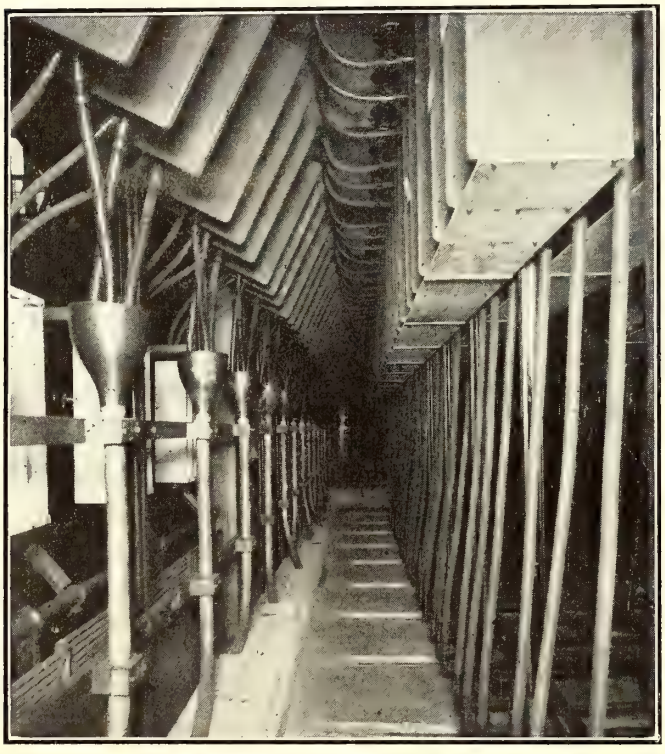
In this connection we have in mind the practice of the traffic officials of the Chicago, Lake Shore & South Bend Railway to have one representative of the traffic department ride over the road with all excursion parties. Often on such occasions it has been found that a considerable favor can be done for a large number of patrons, either by rearranging the schedule and affording a stop-over at some point of interest, or by postponing the return trip for an hour or so, just to make the day's outing on the electric line one that will be remembered with pleasure. Such favors from a railroad are quickly recognized and appreciated and the number of satisfied customers and boosters is increased. It is the practice on the road mentioned for the representative of the passenger department to report fully to the general manager regarding the apparent success in the transportation furnished each special party. Such reports should be in the form of constructive criticisms so that the general manager will know the weak details of the service that might profitably be rectified. If the representative of the passenger department will mingle with the excursionists so that he can be certain that the road is delivering good service on time as promised, and when the trip is over will write out a full and unbiased report of his observations, possibilities for improvement will be immediately evident.

ELECTRICAL DEPARTMENT OF THE METROPOLITAN STREET RAILWAY, NEW YORK—II

The first portion of this article as printed in the May 21 issue of the Electric Railway Journal described the steam generating improvements at the Ninety-sixth Street power station, high-tension betterments and substation changes. The following paragraphs complete the account of the electrical department.

THE NINETY-SIXTH STREET POWER STATION SWITCHBOARD RECONSTRUCTION

Equally important changes are under way in the switchboard and wiring at the Ninety-sixth Street power station. The situation there before this work was begun was not greatly different from that which might be expected in a station built 10 years or so ago, and not subsequently brought up to date. All of the switchboard galleries were congested to their utmost capacity. The control wires for the oil switches, current transformers, potential transformers, etc., were crowded into a cable well so that there was liability of injury to all in case of a single



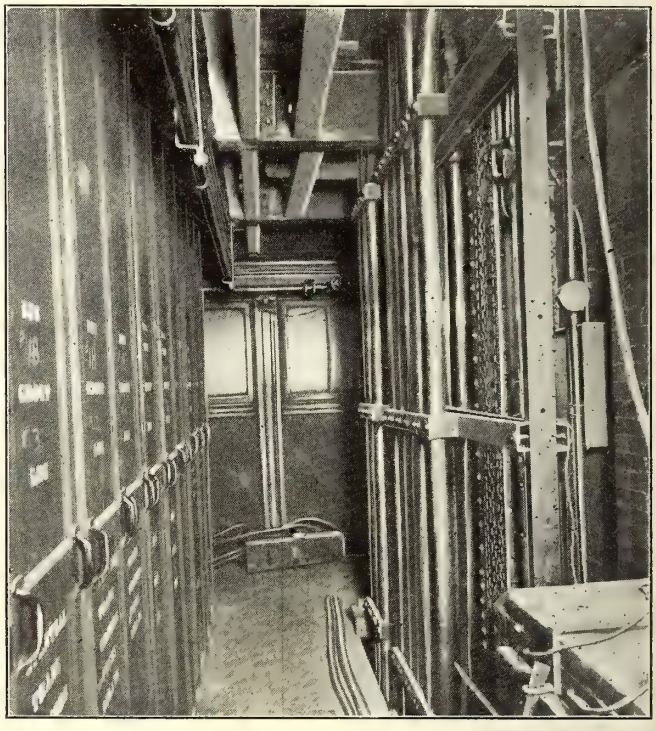
Metropolitan Electrical Department—High-Tension Feeders at Ninety-Sixth Street Power Station

burn-out. There was also considerable crowding of the control wires where they terminated under the two control boards. The high-tension wiring ran directly from the a.c. buses to the oil switches.

The management at first thought that it might be possible to install porcelain insulators on the individual wires, and separating the wires as far as possible, thus reducing the liability of one wire being affected by the breaking down of another. But further investigation showed conclusively that the reconstruction and complete overhauling of all the switchboard apparatus and appurtenances were necessary. Plans were drawn up for this work, in conjunction with one of the large electric companies, and the latter was then requested to submit a bid on the plans which had been decided upon. Its proposal amounted to approximately $100,000. As this price was too high, the general manager directed the Metropolitan's engineers to work out plans for a more economical, yet safe reconstruction. The new plans resulted in reducing the cost by approximately one-third.

The reconstruction covered by the revised plan embraced the following: The high-tension feeders were so arranged in the cable wells that they could be installed in clay ducts when they reach the feeder oil-switch gallery. The individual feeders were carried in clay ducts to the respective switches, to which they were connected. In this way each feeder was insulated from an adjacent feeder, reducing the effect of a breakdown to one unit. High-tension knife switches were installed between the end of each feeder and its oil switch, and between the oil switches and the a.c. bus to isolate completely the feeder and the oil switch during testing and repairs. The result of this improvement is the reduction of labor in cutting off a feeder from its oil switch, in disconnecting an oil switch from the bus or a feeder for repairs, and protection to the employees. Formerly repairs could be made only when the load on the stations was light, namely, between midnight and 6 a. m., when it was possible to make part of the bus dead.

The oil-switch mechanism and framework were also completely reconstructed. Shutdowns had occasionally resulted from the power jumping from the oil pots to the iron framework in the base of the switch. The breaking-down and the short-circuiting of a switch due to this cause has been prac-



Metropolitan Electrical Department—Cable Run and South Section of Bus Compartments Under Construction

tically eliminated by reconstructing the iron framework in each of the cells to give a much greater clearance between the live copper and the framework. The top of the switch has been rearranged so that the switch, when thrown in or thrown out from the control board on the lower gallery, remains in the position to which it is thrown. Prior to the reconstruction of this switch, any disturbance on the control circuit or lowering of its voltage would cause all the station switches to open, thereby shutting down the station. Now when any disturbance occurs on a particular control circuit, or on the power cables running to and from the oil switch, the oil switch thus affected automatically cuts itself free from the power supply.

The auxiliary or control switches for operating the oil switches, which are located on bench boards in the operating gallery, have also been rearranged. To separate the wires running from the oil switches, etc., to the control switches, it was necessary to increase the distance between the respective control switches. In doing this, the switches were arranged to indicate whether the particular oil switches with which they were connected were cut in or cut out of circuit. A diagram of

the power circuits was placed on each bench board to indicate just how each switch is connected with respect to the bus and the feeders, and an arrangement also was provided whereby the switches are shown in and out of service. Red and green bull's-eye lamps are used for the tell-tales.

The control wires are being replaced by new four or six-conductor cables in a metal conduit carried from the oil switches to control switches and instruments on the operating gallery. Should this piped multiple conductor break down it will be necessary to pull out and replace only the cable affected. The liability of interrupting other circuits will be practically eliminated, as each burn-out will be confined to one part.

A.C. COLLECTOR RINGS ON ROTARY CONVERTERS

A great deal of trouble has been experienced from the effect of the copper brushes on the a.c. collector rings of the rotary converters. These brushes would cut grooves in the rings, and then, unless the rings were turned down, splinters from them would fall across adjacent rings and short-circuit the rotary, notwithstanding the fact that care was observed in cleaning the rotaries and in blowing them out so that the dust would not be carried into the windings. Short-circuits between the rotary rings were often caused also by the copper dust from the brushes and rings. These troubles have been eliminated by using carbon instead of copper brushes on the a.c. collector rings. The practice proved so desirable that the next set of specifications drawn for the purchase of three new rotaries contained the provision that the a.c. rings should have carbon brushes. This was such a radical departure from the then existing general practice that it was some time before the contractors agreed to comply with it. Shortly after this one of the old rotaries was equipped with a set of carbon brushes and put into regular service. This rotary has now been operating over 16 months with entire satisfaction. The three new rotaries equipped with carbon brushes have been in operation about two years. The use of carbon brushes has also greatly increased the life of the rings.

Formerly the average life of the collecting rings on a converter was estimated at from 9 to 10 years. With the carbon brushes it should be three times as long. The danger from grounds and short-circuits on the collector rings also has been practically eliminated by using carbon brushes.

POWER STATION INTERRUPTIONS

During the last 10 years the service continuity of the Ninety-sixth Street power station has been interrupted but 12 times, and the average length of these interruptions has been only 31 minutes and 35 seconds. The longest interruption lasted 135 minutes and was due to the bursting of a defective steam valve. Eliminating this exceptional case, the average length of the other shutdowns was approximately 20 minutes and 20 seconds. Some of these interruptions were due to construction work, but in all of these cases the automatic devices operated satisfactorily in cutting the power off the main bus.

One result of the rehabilitation which has been carried on during the last two years is shown by the following tabulation indicating the number of times that the continuity of service in a substation or the main station has been interrupted during the four years ended Sept. 24, 1909. This period is taken because it shows the situation during the two years prior to the receivership and the two years subsequent thereto:

INTERRUPTIONS TO METROPOLITAN POWER DISTRIBUTION SYSTEM

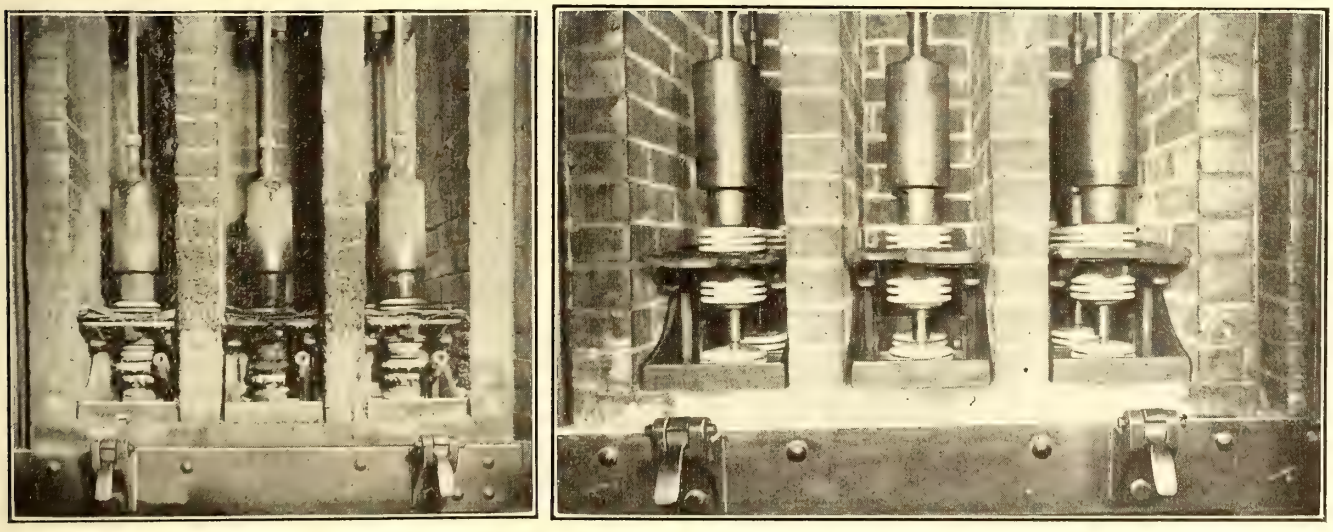
	Power station		Substations	
Year ending:	Number of times out.	Minutes out.	Number of times out.	Average minutes out.
Sept. 24, 1906.....	1	135	58	19.8
Sept. 24, 1907.....	1	28	46	17.8
Sept. 24, 1908.....	1	16	51	8.2
Sept. 24, 1909.....	1	4	36	11.8

On more than one-half of the occasions when the continuity of service in power stations or substations was interrupted the trouble was due to causes outside of the stations themselves. If two substations were affected at the same time due to any cause, such condition is considered as two substation interruptions in the record.

FEEDER DEPARTMENT

The feeder department of the Metropolitan Street Railway Company installs and maintains all the cable and appurtenances of the feeder system. Emergency crews are used to get lines in operation in the shortest possible time after any troubles occur on the feeder system. For this purpose switch boxes are installed in the manholes for transferring sections of lines to different feeders and substations so as to keep the line in operation until repairs are made. The load transfer switches are also used when abnormal loads occur at a substation or when substation units fail. Special men are detailed for general inspection and repairs requiring the splicing of cables, drawing cables in ducts, erecting them in manholes, placing covering on the cables and bonding and grounding them in the manholes.

All cable is purchased in accordance with standard Metropolitan specifications, and is thoroughly inspected both at the factory and after delivery. All ducts are bought on specifications and are inspected on delivery; and during the laying of a standard mandril is used to see that the holes are straight, smooth and large enough. Other electrical apparatus is also inspected by this department, as are the construction of manholes and all other work affecting the installation of feeders.



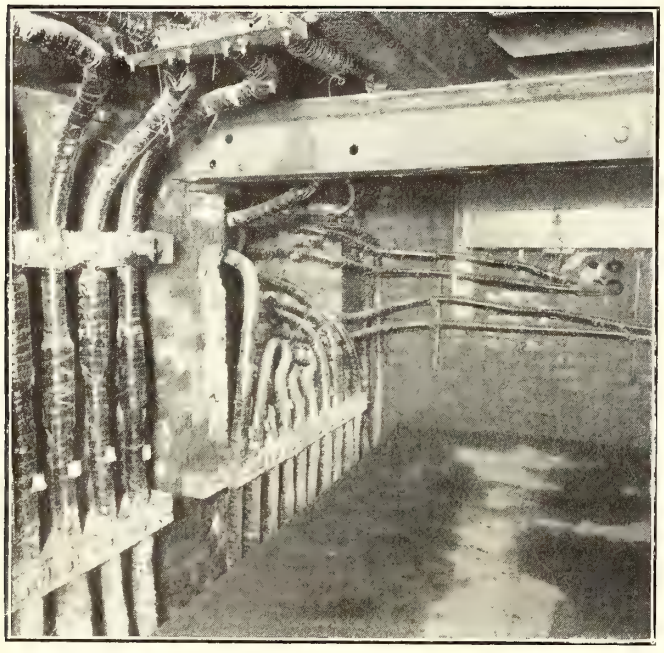
Metropolitan Electrical Department—Old Short-Circuited Oil Switches and the Design with the New Terminals

FEEDER RECONSTRUCTION AND NEW CONSTRUCTION

Considerable changes and additions of new cable have been made in the feeder system because of increased service on the various lines, and the removal of the substation machinery from Front Street to Houston Street. The more important changes have been as follows:

The Fourteenth Street line has been divided into three sections and increased by approximately 16,720 ft. of 1,000,000 circ. mil cable. The Avenue A route, which is the only outlet for the Brooklyn service over the Williamsburg Bridge, has been segregated and increased by approximately 14,000 ft. of additional feeders. The Eighth Street line has been reinforced by approximately 18,000 ft. of additional cable. In the upper part of Lexington Avenue, which had been carried only on the conductor rails, ducts and approximately 7200 ft. of 500,000-circ. mil cable have been installed. The change in route of the Sixth and Amsterdam Avenue and Broadway cars from Fifty-ninth Street to Fifty-third Street necessitated the installation of a separate feeder for the Fifty-third Street line, which was approximately 9390 ft. of 1,000,000-circ. mil cable.

The upper West Side near the Hudson River, viz., Eighth Avenue and 116th Street, was so greatly increased and improved with cable that there was not a single tie-up in the entire operation of the extraordinary service required for the Hudson-Fulton celebration in October, 1909. Extra capacity was also required for the operation of the original Madison Avenue pay-as-you-enter cars now used on these lines. About 87,000 ft. of 1,000,000-circ. mil cable was installed on Eighth



South Side of Manhole at Twenty-Third Street and Fourth Avenue.

Avenue (Fifty-ninth Street to 150th Street), 116th Street Crosstown and Lenox Avenue. The pay-as-you-enter cars on Madison Avenue required the installation of approximately 8500 ft. of feeders. The Broadway line, between Thirty-fourth and Forty-second streets, has been equipped with additional feeder of approximately 8600 ft., and the Twenty-third Street Line with one of about 11,000 ft. In all, the length of additional feeders installed since the appointment of the receivers amounts to 170,400 ft., and the length of feeders removed and installed in connection with reconstruction work amounts to 623,000 ft., making a grand total of 803,410 ft.

FEEDER DEVELOPMENTS AND IMPROVEMENTS

Many of the feeders in manholes over the principal power cable routes have been covered with an asbestos and fireproof coating. This has greatly decreased the number of burn-outs, as is shown by comparing the amount of burn-outs before and after this change began:

Year.	Cables lost in manholes (no protection).	Cables lost in manholes (protected).	Number of cables lost in manholes (partly protected).
1907	202	..	..
1908	92	1	..
1909	49	..	23

The net saving in maintenance effected by this reduction amounted to from $15,000 to $25,000, to say nothing of the additional revenue derived through the continuity of the service.

The cable protection now used is the result of six months' experimenting which was performed to develop some form of fireproof and waterproof protection. The usual form of protection is that of asbestos wrapped around the cable and held in place by wire. The main objections to this method are that it is not waterproof and in case of a manhole burn-out a wire wrapped spirally around the asbestos tends to carry the arc to the cables running into the ducts leading from the manhole. The Metropolitan company's method is to saturate asbestos, cut to the proper size, in a fireproof compound. The asbestos thus saturated is wrapped around the individual cables and tied in place with ordinary twine or cord. When this is accomplished, another coating of the fireproof compound is applied with a brush. The asbestos saturated with the compound hardens within a few hours. The compound so applied to the asbestos is to some extent soluble in water, and consequently a waterproof compound must be added. The latter prevents the fireproof compound from being dissolved by water in the manhole.

All the positive cables are tagged with an odd number stamped on a special-shaped brass tag fastened with a lead seal. The negative cables are tagged with an even number on a differently shaped tag similarly sealed. Any tag will become covered with mud and must be rubbed off, but by using different shapes on positive and negative feeders one-half of the search for a defective cable is eliminated. As far as possible positive feeders are placed in the west and north ducts relative to the negative of the same section. This also is of considerable advantage. It is of the utmost importance to know which cable is being cut, as all the splicing work is done on live cables. The fact that the Metropolitan has never had a splicer in the hospital speaks for itself.

Many of the manholes have been enlarged because there was insufficient room properly to hang, support and care for the increased number of feeders. Seventy-five such manholes have been so enlarged and the enlargement of 50 others is now being considered. This change greatly reduces the danger of accidents to workmen, and in case of trouble in the feeder system, the manholes are cleared quicker and at less expense. The original lumber supports for the cables and hangers have been replaced by iron racks bolted to the brick wall. Many of the cables originally ran straight across manholes, obstructed passage and were subjected to abuse by being stepped upon by men in going up and down the manholes for cleaning. These cables have been pieced out around the enlarged holes, protected and supported in first-class shape.

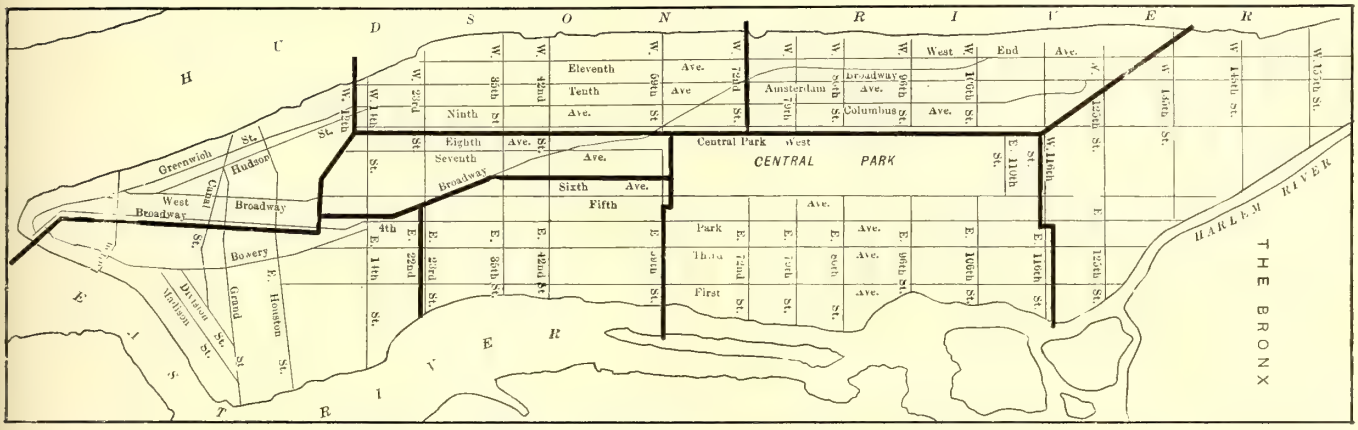
The present method of keeping water out of the switch-box legs is to strip back the lead for a short distance from the terminal on the end of the cable. The cable adjacent to the terminal, and where the cable insulation was removed, is then filled with solder and the portion of the cable between the terminal and the lead sheath is well protected with insulating tape. Over this tape is installed a rubber sleeve which extends back from the terminal over the top of the lead sheath. Lately an additional protection to keep out moisture has been installed adjacent to the terminal. This consists of a slightly tapered collar soldered to the terminal and protected with insulating tape.

LINE DEPARTMENT

The line department maintains, inspects and installs all conductor rails, bonding, conductor-rail equipment and connections to conductor rails of equalizers and feeders. It also operates and maintains the emergency wagons, has charge of the private telephone system, etc. The principal maintenance items of the conductor-rail system consist of repairing and renewing conductor rails, bonds, insulators, insulator pins, conductor-rail pins and brackets, taps of equalizers and feeders to the conductor rails. The total amount of single-track construction cared for is about 130 miles, not including the car-house mileage.

The line department has emergency wagons at central points of the eight sections into which the city is divided, as shown in the map on page 935. The emergency crews are made up

of men who have had considerable experience not only in the work of the line department, but who also have a thorough knowledge of the feeder and power systems and are acquainted with all the car equipments. The wagons are equipped with wrecking materials of all kinds, including devices for making temporary repairs on cars, removing broken-down horse trucks or other obstacles blocking the tracks. Among the troubles which the emergency wagons handle are: Collisions between cars or between cars and horse trucks; car trucks off tracks; contact plows jammed in tight slots; broken plow suspensions or broken trucks caused by the plows taking the wrong slot at



Metropolitan Electrical Department—Division Into Line Sections

switches; parts of equipment of cars falling on pavement; grounded plows; taking horses out of excavations and manholes; short-circuits across the rails which are frequently caused by boys putting a wire or other metal in the slots, or by rail burnouts, grounded plows, and tubing; feeder trouble; and the closing of switch boxes. Extra assistance may be obtained by calling through the report clerk upon emergency wagons from other sections, upon the different gangs of the line department, or upon men from any of the other departments as may be necessary. Where fire hose is run across the tracks, the emergency wagons clear the lines by raising the hose on tripods to permit the cars to pass. When the snow schedule is in effect during snowstorms, extra emergency wagons are put into service to take care of the increased number of calls. The average number of emergency wagon calls during the last six months was about 550 per month.

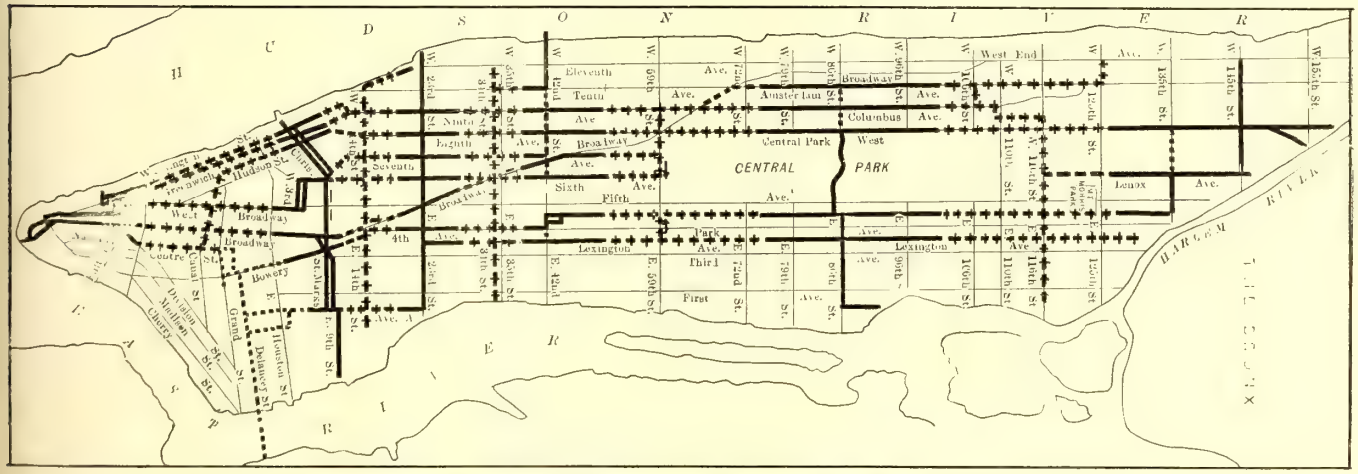
As shown on one of the accompanying maps, the city is divided into eight line sections. One gang is assigned to each section to maintain conductor rails and handle all troubles within the section. During snowstorms these section gangs do extra duty in inspecting and keeping the lines clear of snow troubles. An additional feature is that of dividing the city into 19 patrol sections during snowstorms, as shown on another map, and which was first put into use a year ago. One man patrols each section to report all troubles occurring within his beat.

The line department has charge of the electric track switches, of which 32 are installed at present. The operation and maintenance of the two private telephone switchboards located at the Ninety-sixth Street power house and at the Lexington building come under this department, also all telephones on the private system, except those located in the Fiftieth Street building. Several miscellaneous items are handled by the line department, such as the supply and maintenance of stand lights. These stand lights are used temporarily for lighting where required on repair or other work of the different departments.

CONDUCTOR RAILS, INSULATORS, ETC.

All conductor rails, insulators, and other equipment are ordered in accordance with standard specifications and are tested and inspected at the mills and upon delivery. Changes have been made within the last two years in the composition of the conductor rails; they are harder than the old rails. During this interval the conductor rail renewals have approximated 47 miles of single track, or about 36 per cent of the total trackage of the system. Before the close of 1910 approximately 74 miles of single track, or 60 per cent of the entire system, will have been thus renewed.

The general method by which the upkeep of the line has been carried on in the past two years is a combination of re-



Metropolitan Electrical Department—Division Into Patrol Sections

construction and maintenance. Rails taken from a reconstructed section are re-used where possible.

LIGHTING DEPARTMENT

The lighting department maintains the lighting systems throughout all the company's properties, and all the telephones in the Fiftieth Street building. Considerable work has been done in improving the lighting of the different buildings and in several properties entirely new systems have been installed.

GENERAL ENGINEERING DEPARTMENT

The general engineering department handles engineering

matters pertaining not only to the electrical department but also in certain instances to other departments of the system. It makes detail plans for all reconstruction and new construction, tabulates data, prepares estimates and tests most of the material and apparatus installed by the electrical department. In this connection it might be said that the investment made in conducting tests has proved well invested. Impact and absorption tests are made of all insulators. This work was started over two years ago, and has been carried on steadily since that time. It will be understood from the foregoing that this department, in addition to handling general engineering work, has also been developed into a testing bureau.

SPECIAL INVESTIGATIONS

In addition to testing material purchased the department often conducts special tests to obtain certain data. Thus, after a change in the operating schedule, readings were taken at the different substations on the various feeders to obtain the amount of current delivered to the various feeders every minute. At the same time voltage readings were made at the station and along different points on the line, and simultaneously records were made of the number of cars and approximate passenger loading on the sections under observation.

On other occasions tests were made on different types of cars and equipment to obtain the following information: Power consumption in kw-hours per car-mile, per ton-mile, per passenger-mile; total passengers per car during the day of test; total passenger-miles during day of test; average travel of each passenger in miles; weight of car per passenger carried; total number of stops per mile; total time of stops; average time per stop in seconds; average speed. Tests were also made of different types of cars with different styles of trucks and equipment, the car being loaded with sand equal to various passenger loads. These trials were conducted on both dry and wet tracks, as follows: First, the cars were operated as in regular service, and determinations made of the acceleration, deceleration and shortest emergency braking distance without spinning and skidding of wheels when operating at various speeds up to maximum. Tests were conducted on different types of equipment to find the temperature rise of the several parts of the motor after operating under regular conditions for 10 hours.

The equipment tests mentioned were made to ascertain the relative power consumption of the different weights of cars per passenger carried. They showed that the "weight per passenger carried" was greater in the long than in the shorter cars and that if power consumption and track maintenance are taken into consideration the cost of operation per car increases very rapidly with the weight of the car.

PRIVATE TELEPHONE SYSTEM

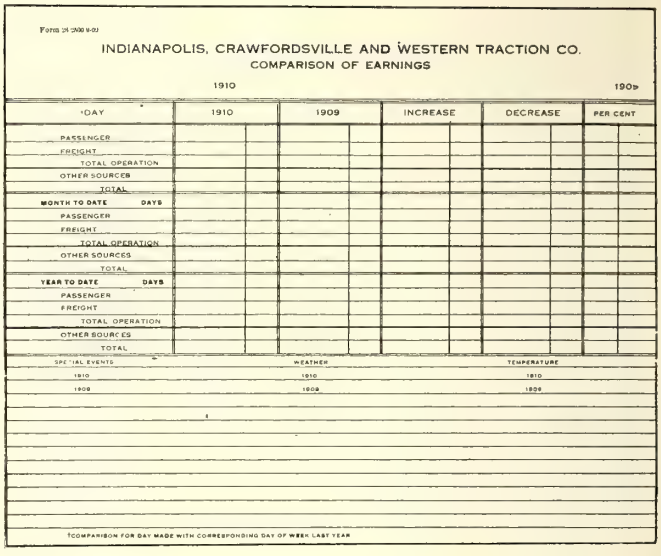
Plans have been prepared and an installation is under way for the centralizing of the private telephone system at Fiftieth Street and Seventh Avenue, thus eliminating the private telephone switchboards at Twenty-fifth and Ninety-sixth Streets. The new board will be in the same room with the public telephone switchboard, and connected to it by the tie lines. Hereafter all calls on the private system will pass through but one board, so no time will be lost in connecting the different exchanges. All substations will have a direct line to the high-tension gallery at Ninety-sixth Street and First Avenue. When the new system is complete one chief operator will have charge of all the operators.

MISCELLANEOUS

Many miscellaneous improvements have been made such as designing metal boxes to replace wooden lockers for the storage of tools and material and the publication of a book of general rules for the guidance of the men handling the electrical apparatus and feeders. In conclusion mention should be made of the chemist whose chief work is the analysis of coal, ashes, flue gases, etc. Other analyses conducted by the chemist have been of rubber used on insulated wire solder, babbitt metal, etc., to ascertain if they are in accordance with the specifications.

SOME INTERESTING BLANK FORMS OF SMALL INTERURBAN RAILWAY COMPANY

The Indianapolis, Crawfordsville & Western Traction Company connects the cities included in its name with a well-built interurban line. The company owns 10 large interurban cars which make the 45-mile run between the terminal cities in 1 hour and 35 minutes on limited schedule, and in 1 hour and 50 minutes on local schedule. This road, locally known as the "Ben Hur Route," is under the management of C. E. Morgan whose offices are located in Crawfordsville, Ind.



INDIANAPOLIS, CRAWFORDSVILLE AND WESTERN TRACTION CO.
COMPARISON OF EARNINGS

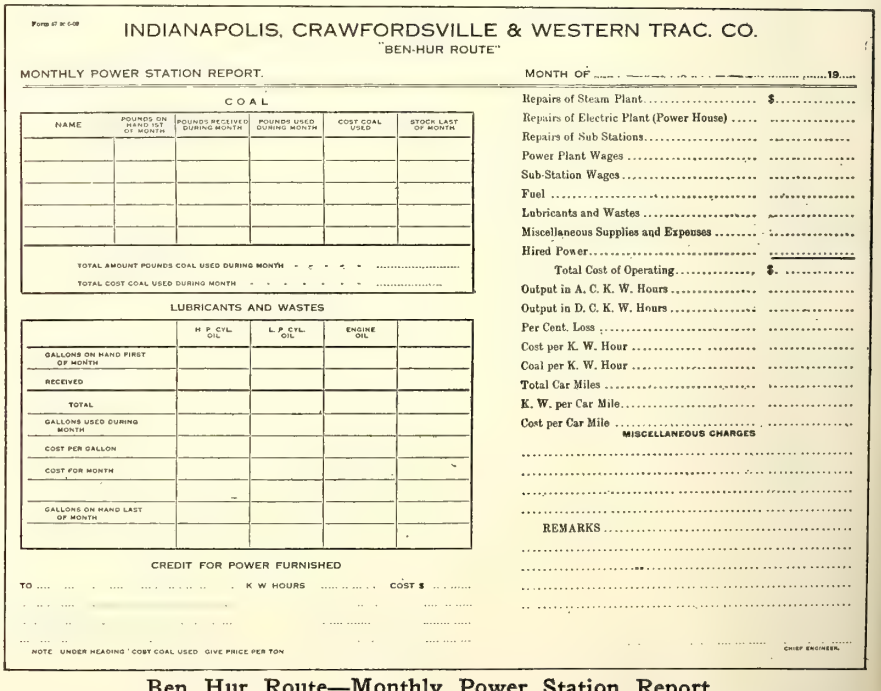
1910 1909

DAY	1910	1909	INCREASE	DECREASE	PER CENT
PASSENGER					
FREIGHT					
TOTAL OPERATION					
OTHER SOURCES					
TOTAL					
MONTH TO DATE DAYS					
PASSENGER					
FREIGHT					
TOTAL OPERATION					
OTHER SOURCES					
TOTAL					
YEAR TO DATE DAYS					
PASSENGER					
FREIGHT					
TOTAL OPERATION					
OTHER SOURCES					
TOTAL					

SPECIAL EVENTS — WEATHER — TEMPERATURE
1910 1910 1910
1909 1909 1909

COMPARISON FOR DAY MADE WITH CORRESPONDING DAY OF WEEK LAST YEAR

Ben Hur Route—Daily Comparison of Earnings



INDIANAPOLIS, CRAWFORDSVILLE & WESTERN TRAC. CO.
"BEN-HUR ROUTE"

MONTHLY POWER STATION REPORT. MONTH OF ..... 19....

COAL

NAME	POUNDS ON HAND 1ST OF MONTH	POUNDS RECEIVED DURING MONTH	POUNDS USED DURING MONTH	COST COAL USED	STOCK LAST OF MONTH

TOTAL AMOUNT POUNDS COAL USED DURING MONTH .....
TOTAL COST COAL USED DURING MONTH .....

LUBRICANTS AND WASTES

	H. P. CYL. OIL	L. P. CYL. OIL	ENGINE OIL	
GALLONS ON HAND FIRST OF MONTH				
RECEIVED				
TOTAL				
GALLONS USED DURING MONTH				
COST PER GALLON				
COST FOR MONTH				
GALLONS ON HAND LAST OF MONTH				

CREDIT FOR POWER FURNISHED

TO ..... K W HOURS ..... COST $ .....

NOTE UNDER HEADING "COST COAL USED" GIVE PRICE PER TON

Repairs of Steam Plant	$.....
Repairs of Electric Plant (Power House)	.....
Repairs of Sub Stations	.....
Power Plant Wages	.....
Sub-Station Wages	.....
Fuel	.....
Lubricants and Wastes	.....
Miscellaneous Supplies and Expenses	.....
Hired Power	.....
Total Cost of Operating	$.....
Output in A. C. K. W. Hours	.....
Output in D. C. K. W. Hours	.....
Per Cent. Loss	.....
Cost per K. W. Hour	.....
Coal per K. W. Hour	.....
Total Car Miles	.....
K. W. per Car Mile	.....
Cost per Car Mile	.....

MISCELLANEOUS CHARGES

REMARKS

CHIEF ENGINEER.

Ben Hur Route—Monthly Power Station Report

The reproduced blank forms here shown are presented because they satisfactorily fill the needs on the Ben Hur property, and because their arrangement may be of value elsewhere on properties of similar size.

The comparison of earnings form in the original is printed on thin linen paper 8¼ x 7¼ in. in size, bound in pads. Two date lines are provided, one for the day of the week of the present year and one for the corresponding day of the week of a year ago. The daily comparisons tabulated in the upper section of the report, show the amount of increase and decrease in each general source of revenue and the per cent of increase. The second section of the blank gives a comparison of the earnings for that part of the month which has passed, regardless of the day of the week and shows the increases and decreases in amount and in per cent. The third section shows the comparison of the earnings for the current year as against the earnings for the year previous, regardless of the day of the week or month. Ample space is provided below for noting special events, weather and temperature for the day of the current year and the previous year.

The monthly power station report is 13 x 10¼ in. in size, printed on white paper and bound in blocks. At the end of each month the chief engineer compiles one of these reports and forwards it to the general manager. The report presents an inventory of the coal and lubricating material; also a tabulation of the costs of these materials for the month. The operating charges are presented under nine subheads and are shown in total. From this gross figure and the statement of output the more detailed figures are derived.

The records of trainmen are kept in a loose-leaf book with pages 13¾ x 11¾ in. These pages are ruled on both sides. The rulings on the obverse side give the trainman's records so far as discipline is concerned and present the identification numbers of the keys, tools and other supplies given him. Space also is provided for presenting the results of examinations on rules and equipment. It is stated that all trainmen are examined periodically and must have a grading of 85 per cent on operating rules, care of electrical equipment and air brakes. The reverse side of each page is ruled suitably for recording the location, description, date, report number and action taken on each accident in which the trainman has participated.

NEW SHOP AND CAR HOUSE BUILDINGS AT MINNEAPOLIS

The Twin City Rapid Transit Company now has under way the erection of a car house and repair shop at Lake Street in Minneapolis, the fitting up of a new general car repair building at the large Snelling Avenue shops, and the installation of a small part of the equipment of a new steel and gray iron foundry. A general storehouse of fireproof construction has recently been completed for occupancy. The new car house and repair shop in Minneapolis is located on Lake Street. This building will have exterior dimensions of 128 ft. x 302 ft. and will have track room for 36 large cars. The station, however, is intended to take care of 300 cars and be the operating headquarters for a division employing 1,000 trainmen. A section of the building, 80 ft. wide by 302 ft. long, will provide car storage. The remaining section, 48 ft. x 302 ft., will be two stories high and will have a basement. This portion of the building is being built of reinforced concrete. The car house will have a steel framework and both sections will have paving brick walls for the first story and brick covered with stucco for the second story and gables.

The two-story portion of the station will be subdivided into quarters for the station foreman, trainmen, a restaurant and kitchen on the first floor and provision for sleeping quarters on the second floor. The basement will provide storage space for 1800 tons of hard coal and 800 tons of soft coal, which are about the quantities needed for heating the cars and building during one season. This large storage space will thus prevent embarrassment in the event of strikes. Provision for handling the coal and other heavy supplies will be afforded by a freight elevator which will serve the basement and two floors of the building. Coal will be brought into the car house over the electric railway tracks and unloaded through the car house floor into industrial railway coal cars operating on tracks in a tunnel underneath the car house floor and in the basement. The new car house will be provided with hot and cold running water and compressed-air outlets.

ACCIDENT RECORD

REPORT NO	DATE	LOCATION	DESCRIPTION	ACTION	

Ben Hur Route—Back of Trainman's Sheet, with Accident Record

Name *Address* *Telephone No.* *File No.*

Date Employed *Date Leaving Service* *Cause*

Recommended by

Approved by *Assigned to* *Badge*

Rule Book No. *Switch Key No.* *Vestibule Key No.* *Register Key No.*

Locker No. *Tool Box and Tools No.* *No. of Lanterns, Red* *White* *Die of Punch*

Examined: Rules, Etc., Date % Grade Date % Grade Date % Grade Date % Grade

Equipment

	DATE	RECORD OF DISCIPLINE, CAUSE.	ACTION

Ben Hur Route—Front of Trainman's Sheet, with Discipline Record

The large Snelling Avenue repair shops of the Twin City Rapid Transit Company were illustrated and described in the *Electric Railway Review* for Oct. 14, 1907, and the Electric Railway Journal for Oct. 10, 1908. The buildings first erected included a machine shop 200 x 150 ft., a smith shop and boiler house 50 x 300 ft., a foundry 60 x 200 ft., mill shop 75 x 200 ft., paint shop 126 x 300 ft., and a dry kiln. Since the time of the first description a storehouse 300 x 120 ft. has been completed and now a shop for repair work on all equipments, except passenger cars, is under construction. In erecting this structure it is planned to provide a shop building in which repair work of all kinds can be done on all of the special rolling stock equipment owned by the company. This will provide against taking miscellaneous equipment into the regular car houses and thus will not permit delaying work on the regular passenger cars. After the completion of the new shop it will be possible to keep all miscellaneous equipments out of the paint shop. This so-called "general" repair shop is 90 x 122 ft. in size and, like all the other buildings in this large shop group, is of fireproof construction and is designed for extension.

The track capacity of the new shop will be sufficient for 11 large cars, and in designing the structure special attention has been given to the provision of ample drainage and heat, so that snow and ice may quickly be removed from sweepers and other special equipments. The interior of the building is lighted from the north by skylights. The tracks, for one-half their length from the entrance doors, will be provided with pits; the other half of the track space is floored over and will be used for carpentry, painting, etc. The building will have two overhead cranes of 15 tons capacity each, so arranged that they can be used to raise the bodies of any of eight cars. A small store room and an oil room are being built in connection with this structure. It is planned to install a waste-reclaiming apparatus.

The earlier description of the Snelling Avenue shops included floor plans of the steel and gray iron foundry, which is now being made ready for use. This building is 200 ft. long by 91 ft. wide and is subdivided into two sections; one 60 ft. wide, which is open to the roof and serves as a general molding and pouring floor; the other 31 ft. wide, which is two stories high and contains the storage spaces and miscellaneous foundry equipment. A single track enters the main section of the building, terminating under a 10-ton traveling crane which spans the entire foundry floor.

The principal equipment on the first floor of the new foundry will include two size 3½ cupolas and a 2-ton open-hearth steel converter manufactured by the Whiting Foundry Equipment Company, Harvey, Ill. The cupolas and converter will deliver hot metal into large ladles which in turn will be handled by the overhead crane serving the molding floor. The ground floor of the two-story section of the foundry is made up of a row of rooms interconnected by an industrial railway track and all opening onto the main room of the building. With the industrial railway it will be possible to transfer heavy parts and foundry supplies such as sand, iron, etc., to any part of the building and to storage yards located outside. The industrial track leads over the platform on an elevator by which a car may be raised to the charging floor.

The row of smaller rooms opening off from the main foundry room includes a brass foundry with four crucibles sunk below the floor level, and a large air-blast crucible. Storage space is provided for sand, coke and pig-iron, both inside the building and outside. The sand room is reached by the industrial railway and its equipment includes a motor-driven sand mill. The core room and its oven will be served by a steel car which will expedite the handling of cores between the molding tables and the oven. A cleaning room is to be equipped with grinders, a tumbler and a cold saw, all driven by electric motors. On the second floor is a large pattern room and the charging room for the cupolas. A motor-driven rotary blower serves the two cupolas and another similar blower driven by a 70-hp motor furnishes air for the converter. When this foundry equipment has been installed it will be possible for the Twin City Company to manufacture all of the brass, iron and steel castings required for construction and maintenance use.

NEW STORE HOUSE

The new storehouse shown in the original plans of the Snelling Avenue shops, has recently been completed. This is a fireproof building 120 x 300 ft. in ground dimensions, having three floors. The construction of the building required 600 tons of structural-steel columns, girders, beams, etc., all of which was fabricated in the nearby car-building shops of this company. The steel window frames and the steel shelving and storage boxes also were built by the railway company. The new structure provides fireproof storage for the supplies of the entire railway system. The building may be reached by a steam railroad track along one side and by two trolley tracks leading to the shop transfer table.

COMPLAINT SLIPS

As the conductors are the only employees of an electric railway company with whom passengers have direct dealings, many of them thoughtlessly are held by the public responsible for the adoption of every rule of the company. It often requires considerable explanation on the part of the conductor, especially when a new transfer system or other regulation is introduced on a line, to make it clear to passengers that the conductor has to comply with the rule and is powerless to change it. To assist conductors in their dealings with argumentative passengers, the Utica & Mohawk Valley Railway Company has recently supplied its conductors with small blank books containing slips which can be torn out and handed to the passengers. The wording on these slips is reproduced in the first of the accompanying engravings and is self-explanatory. The second engraving is a reproduction of the form which the conductor himself fills out, in case of a dispute with a passenger, and files at the main office.

TO OUR PATRONS

THIS CONDUCTOR IS

Governed by Rules he is NOT Authorized to Change

In case of dispute KINDLY PAY FARE and send complaint with this card to the Superintendent for adjustment, Utica, N. Y. Phone 1978.

U. & M. V. RY. CO.

This Conductor's No. is.... ... .

Date_____

_____ passenger on

_____ car

gave me transfer No._____ issued

by Conductor No._____ from

_____ line

to_____ line,

punched_____ M. I refused to accept same and passenger paid fare.

Passenger's name

_____

Witnesses

_____

_____

_____

Conductor No._____

As the wording on the slip handed the passenger is politely expressed and as it gives the patrons tangible evidence of the fact that the company is willing to consider all complaints the slips have been very favorably received by the public. The records of the company show that over half of these slips issued by conductors are never returned to the main office, indicating that the passengers in one-half of the cases, on thinking the matter over, have concluded that their complaints were unjustified. The first blank has been in force since Jan. 1, and the second since Feb. 1 of this year.

New Orleans is making a vigorous campaign for selection as the site of the World's Panama Exposition in 1915. It claims to be much nearer the Panama Canal than San Francisco, to have nine times as many people within 500 miles, 10 times as many people within 1000 miles and over five times as many within 1500, and to be able to accommodate a large number of visitors.

CONVENTION OF THE SOUTHWESTERN GAS AND ELECTRICAL ASSOCIATION

The annual convention of the Southwestern Gas & Electrical Association, was held at Beaumont, Texas, May 12-14, and was attended by about 200 representatives of the central station, electric railway and gas interests in the Southwest. The convention headquarters were at the Crosby Hotel, the meetings were held in the rooms of the local B. P. O. E. Club, and the manufacturers' exhibits were installed in the Kyle Opera House Building. The city and citizens of Beaumont welcomed the visitors in characteristic Southern fashion, decorating the streets with festoons of lights in their honor, and plying them with entertainment when not engaged in convention business.

The first day's session, Thursday, was opened with an address of welcome by Hon. D. P. Wheat in behalf of Mayor E. F. Fletcher, of Beaumont. President W. B. Head, in the chair, called for a response by H. S. Cooper, of Galveston, Tex.

In his presidential address, which followed, Mr. Head called attention to the phenomenal growth in the membership and in the efficiency of the association in developing its objects and purposes. In referring to the educational work the members can yet do, the president declared that public-service corporations are not properly understood by the people, and are, therefore, subject to criticism and distrust, more than any other kind of business. Referring to the advantages of mutual discussion among public-utility operators, Mr. Head said: "In this electrical age in which we live the successful man must acquaint himself with what the world is doing. The man who stays at home will never develop a very high 'potential'; he will have chronic hysteresis all of his days; he is lacking in synchronism; he cannot keep step with his fellow workers; he is inefficient, hard to regulate and some of these days he will burn out and a modern generator will be found in his place." President Head then referred to the volume of valuable material and information supplied by the Southwestern Association's publications and proceedings. He also mentioned the establishment of definite headquarters at Dallas, and said the employment of a permanent paid secretary to give all or a large part of his time to the work, had been one of the best steps made by the association. The expenses of this secretary's office and salary are defrayed by assessments among the member companies, each contributing an amount proportional to its gross receipts. Mr. Head said that this plan of payment had proved a great success, and few members were in arrears.

The president also referred to the importance of establishing a standard classification of accounts for central stations, to the interest in the internal combustion engine and producer plants, to gasoline lighting competition and to the possibility of the establishment in coming years by the legislature of a public service commission. On this point he said that he recognized no valid reason for such a commission but if there was to be one it should be composed of experienced men. Hence he urged that the members should meet the public half way if there should be a demand for such a commission. The address closed with a reference to the need for tact, courtesy and capability on the part of company employees, pointing out that honesty in a company's policy is always essential.

O. Bracker, superintendent of meters of the Brush Electric Light & Power Company, Galveston, Tex., next read a paper on "The Watt-Hour Meter in Actual Operation." This was followed by a paper by H. S. Cooper, manager of the Galveston Electric Company, entitled, "Some Suggestions for a Standard Rule Book for Operation of City Cars." This paper is published elsewhere in this issue.

RULES FOR CITY RAILWAYS.

The discussion on Mr. Cooper's paper was opened by W. B. Tuttle, general manager, San Antonio Traction Company, who described the method by which the train men in that city were instructed in the application of the rules. As soon as a man is accepted for employment in the company he is given a copy of the rule book and told of the importance of the rules as a guide in his work. After he has had a chance to study the book for a week or 10 days he is catechised at random on the rules. He is also questioned at intervals during the period of his employment, and lectures and discussions are given by the officers of the company in regard to the provisions of the rules. The company has also followed the practice of posting bulletins calling attention to some rule in the book, even though there has been no recent infraction of it. By thus bringing the rules frequently to the attention of the men they realize that the company is interested in their becoming conversant with the rules. In the debate which followed considerable stress was laid by some speakers on the importance of exercising prudence as to allowing the book to get into the hands of outside persons. Others who took part in the discussion were: W. L. Wood, of Texarkana, Ark.; E. T. Moore, of Dallas, Tex.; David Daly, of Houston, Tex.; T. C. Brown, of San Antonio, Tex.; H. S. Potter, of El Paso, Tex.; W. W. Loomis, of Dallas, Tex., and M. J. Lofties, of Sherman, Tex.

QUESTION BOX

Dr. A. C. Scott, professor of electrical engineering in the University of Texas, at Austin, was called to the chair to preside at a discussion relating to the Question Box of the association. In the solicitation of this material hereafter, he announced, the plan will be followed of asking that each answer be sent in directly to the editor of the Question Box. instead of accompanying the original inquiry on its trip around to other members.

FIRE INSURANCE

David Daly, of Houston, Tex., asked for the experience of other companies with the new State rating board which confirms insurance rates. H. S. Cooper pointed out the unfairness of charging a basic rate of 50-cents or more, for theoretically non-destructible plant buildings of perfect construction. If investigation proves that this enormous rate, he said, is totaled by the simple charges of accounting and overhead expenses on the part of the insurance companies, it would be cheaper for the properties to carry their own insurance. S. C. Trimble, of Orange, Tex., doubted whether any rate had yet been fixed by the insurance board, and quoted several conflicting rates given on his combination plant. Mr. Cooper went on to show that the higher rates charged by the incorporated companies probably result from carelessness in the operation of their business, and in their failure to inspect as closely as the mutual companies. If properly carried out, such inspection would enable the old-line companies to duplicate the latter rates he believed. Mr. Reed, an insurance inspector present, declared that on the whole, he believed that the work of the State insurance board had lowered the rates, and had improved inspection. J. E. Carroll, of Beaumont, Tex., testified that after receiving a reduction in rates from $2.50 to $1.50, the State board had instructed this to be raised to $1.75, but had allowed, through the correction of minor defects, such as closing of oil cans, removal of transformers, installation of fire extinguishers, etc., the final reduction of the rate to $1.01.

PAY-AS-YOU-ENTER CARS

A paper entitled "Observations on Pay-as-You-Enter Cars," was presented during the session on Friday morning by David Murdoch, special representative of the Pay-as-You-Enter Car Corporation, New York. Mr. Murdoch first reviewed the history of these cars in Montreal, Chicago, Buffalo, New York and Washington. Texas was the first Southern State to use pay-as-you-enter cars and now seven of its cities were operating them. This number of "prepayment" cities exceeded that of any other State. Houston, Texas, was the first city of its size to operate "Pay-as-You-Enter" cars. Considerable credit was due the officials of the Stone & Webster properties for the success of this car in the Southern States. The best evidence of the satisfaction this type of car had given on the different properties managed by this corporation was the fact that they were now remodeling old cars and had ordered "pay-as-you-enter" cars for practically all of these properties even

as far West as Tacoma and Seattle, Washington. Out of 50 cities operating such cars 15 were in the South.

Some managers were under the impression that these cars were intended only for large cities, but that was not the case. Pay-as-you-enter cars were being successfully operated in towns of less than 10,000 population and in one town where it took only two cars to equip the system. The pay-as-you-enter cars were being operated under practically all conditions. Any type of car could be made to incorporate the prepayment feature, as in a "one-man car," center-entrance car, open car, single-truck car and double-truck car.

It was originally supposed to be necessary to have an extremely long platform to operate this type successfully, but now it has been found that a 6-ft. platform can be used satisfactorily. Even cars with a smaller size platform have given good results. From his company's experience in watching the operation of cars in the larger cities it was noted that the passengers after paying their fare passed into the body of the car and moved forward much more rapidly than was the case with the old type of car.

Mr. Murdoch also presented some data on the reduction of platform accidents attained in Montreal and Chicago by using these cars. Other cities have not published definite figures, but all reported a decided decrease in such accidents. It was particularly hard to get figures relating to the effect of these cars on receipts, owing to the reluctance of the railways in giving them out and the difficulty of estimating just how much of the increase was due to natural growth, faster schedules, etc. A careful record made by the Montreal Street Railway showed an increase of 10 per cent when the factors mentioned were eliminated. As to improvements in running time, the 6-mile Niagara-Grace and Niagara-O'Neil lines of Buffalo showed a decrease of almost 6 minutes, while the Cottage Grove line in Chicago showed a decrease of 5 to 10 minutes.

In reply to a question by H. S. Cooper, of Galveston, Texas, covering the application of the pay-as-you-enter principle to an open car, Mr. Murdoch explained that the cross seats would have to be removed or an aisle cut down the center, the running board taken off and the whole car enclosed in wire netting. Mr. Cooper objected to this arrangement as robbing the standard "open" car of its inherent advantage of quick loading and unloading, as well as losing at least two seats on each cross bench, or about one-third of the car's original seating capacity. The so-called "open" car described by Mr. Murdoch would not be suitable on the Galveston lines, thought Mr. Cooper, where in a city of 35,000 the street car system had handled 45,000 fares in a day, of which 3500 were carried in four hours without an accident. Mr. Cooper also said he had observed difficulty in handling the trolley pole of cars which were equipped with a conductor's rail. That class of accidents caused by infirm or careless persons stepping from the car will not be prevented by the system considered, continued Mr. Cooper, who advocated the personal attention of the conductor. "Two burning questions before street railway men," said Mr. Cooper, are those of the proper point, near or far crossing—for stopping a car, and of allowing passengers to enter by the front door."

CONDENSERS

Harry Pennington, of the Pennington Company, of Houston, Tex., next read an excellent paper on "Condensers for Small Central Stations" in which he discussed the results obtained with the new rectangular jet-type condensers manufactured by several companies. The paper described the fuel saving and other advantages of condensing operation, and compared tests of the old and new types of jet condensers. The discussion closed with advice on the arrangement and layout of plants, and the use of cooling towers.

BUSINESS SESSION

The convention sessions closed Saturday morning with a business meeting at which the reports of officers and committees were read. Treasurer A. E. Judge, of Tyler, Tex., showed by his report that the finances of the association are in a healthy condition. Secretary D. G. Fisher, of Dallas, Tex., outlined the work of his office during the year, and reported a total membership of 315 in the association, the 1910 convention registration being 244.

In the selection of officers for the coming year, W. B. Tuttle, of San Antonio, Tex., was made president; J. E. Carroll, Beaumont, first vice-president; E. T. Moore, Dallas, Tex., second vice-president, and D. G. Fisher, of Dallas, Tex., third vice-president. A. E. Judge, of Tyler, Tex., was returned as treasurer, and W. B. Head, of Stephensville, Tex., was elected secretary. The finance committee is made up of A. T. Lloyd, Shreveport, La.; W. A. Guthrie, San Angelo, Tex., and H. S. Potter, El Paso, Tex. The advisory committee comprises: E. S. Fletcher, Temple, Tex.; Oscar Pearson, Ballinger, Tex.; F. J. Storm, Amarillo, Tex.; M. T. Walker, Beaumont, Tex.; T. Cook, Waxahachie, Tex.; W. W. Loomis, Dallas, Tex.; J. B. Earl, Waco, Tex.; W. S. Rathell, Waco, Tex., and W. C. Torbess, Ft. Worth, Tex. The executive committee comprises President Tuttle, ex-President Head, Vice-Presidents Carroll, Moore and Fisher, and F. B. Johnson, Stamford, Tex.; W. L. Wood, Texarkana, Ark.; C. H. Dunbar, Houston, Tex., and L. L. Stephenson, Big Spring, Tex.

SOCIAL FEATURES

Beaumont entertained its visitors with proverbial Southern hospitality. The city streets and buildings were festooned with hundreds of incandescent lamps, and decorated with flags in their honor. On Thursday afternoon following the convention session, the guests were taken in a procession of 50 automobiles to visit the great irrigation pumping plant, 6 miles from Beaumont, which renders 32,000 acres of land fertile for rice growing. Returning, the parties viewed the oil fields and visited the Country Club where refreshments were served. In the evening there was a theatre party. On Friday, two pleasure yachts took the visitors on a cruise down the beautiful Neeches River. Entertainment of the visiting ladies was taken in charge by a committee of local ladies. J. E. Carroll, of the Beaumont Ice, Light & Refrigerator Company, was in charge of the matters of entertainment of the convention.

Friday evening the Sons of Jove of the Southwest held their annual rejuvenation, and initiated 42 novices into the order, the class being the largest ever inducted into this division where the Sons of Jove was first founded a number of years ago. Following the initiation ceremonies, an elaborate banquet was served.

The Southwestern convention would not be complete without its annual badger fight. The 1910 ceremony was given Saturday morning for the benefit of a gas-appliance salesman, who later left the city on the first train.

A NEW GYROSCOPE SYSTEM

A demonstration was given on May 4, at the Westminster Palace Hotel, London, Eng., of a mono-rail system with gyroscope control, invented by P. Schilowsky, the Governor of Kostroma, on the Volga, Russia. In this system the single gyroscope is carried on a special car, and one such car is needed between every two vehicles. The leading vehicle is a mono-rail steam locomotive, whose boiler supplies steam to the small auxiliaries on the gyroscope car. The single gyroscope is mounted with its spindle vertical, in a frame carried on trunnions of which the axis is across the car. A small single-cylinder steam-engine drives this gyrostat direct. Towards the other end of the car is a very heavy pendulum, hung with its axis parallel to the rail, so that, on the car tilting, it swings outwards or inwards. If this pendulum moves, a connection causes a quadrant to swing in a direction parallel to the rail. This quadrant carries for part of its length a radial rack which, if the quadrant swings far enough, engages with a constantly revolving pinion driven by another small steam-engine. The engagement of this pinion hastens the forward movement of the quadrant, and this, by means of a rod having spring stops, pushes over the gyroscope on the trunnions of the table. The two auxiliaries are steam-driven. The models were made by Messrs. Bassett-Lowke & Co., Limited, High Holborn, W. C., London.

SUGGESTIONS WITH REFERENCE TO THE STANDARD CITY RULE-BOOK*

BY H. S. COOPER, MANAGER, GALVESTON ELECTRIC CO.

The mere "rules" are not the whole, nor—in some matters—the most important portion of a rule book. Besides the "rules," a rule book should contain quite a number of other cognate matters if it is to be a complete disciplinary guide and mentor to the employees to whom it is directed. This point has been partially realized by the committee in the statement regarding the issuance of the Rule Book to the employee, on page 4; the notice on page 6 as to the rules, and the "general notice" on page 7; but none of these is complete for the purpose desired. Rules are simply "specific instructions or commands for specific causes or emergencies." They govern only *specifically,* and must not contain, within themselves, advice, suggestions, or counsel, nor must they contain announcements, statements, nor even certain explanations. All of these should be placed in another part of the rule book where they can be grouped and arranged for convenience or better understanding, or they should be appended as "notes" or "exceptions" to the rule to which they apply.

A complete Rule Book should contain first the title page—which is also often duplicated on the outside of the cover.

The title page in the present standard rule book reads:

RULES AND REGULATIONS
For the Government
of Employees of
The ———— Company.

I would suggest:

RULE BOOK
for
Trainmen
(Or Conductors & Motormen)
on the
CITY LINES
of
The ———— Company.
In effect.....19...

"Rules and Regulations" is an archaic and stereotyped form and is a repetition. Many rules are regulations and many regulations are rules. The book is a Rule Book.

"For the government of" is not necessary, and is not complete even if necessary. Rules instruct in many cases as much as they govern.

"Employees" is not correct. The rules are not for the employees, they are only for a portion of the employees of one (the transportation) department, viz.: for the conductors and motormen (now technically grouped as trainmen), and only for those trainmen who operate city-service cars.

There should also be a separate notice in regard to the book itself and this should form a part of the title page or—better still—be printed on the inside of the cover where it is less liable to be torn out or mutilated. I would suggest the following:

NOTICE
In regard to Rule Book

This book is the exclusive and perpetual property of the [Name of Company] and cannot be given, lent nor sold to any person whatsoever, nor has anyone finding it, or receiving it, any title to it. In case of this Rule Book being found, a reward [or a reward of $... or ..cts.] will be paid on its return to [The office or car barn of the Company].

For many reasons, well understood by those connected with the management or the claim department of a street railway company, it is very undesirable to have any of the rule books of the company in other hands than those of the actual employees of the company who are affected by it and of such officials or officers as need to use it. I have found the above notice—or a similar one—a considerable deterrent as to outside parties obtaining copies, and I have also found that a liberal reward nearly always brings the return of any book lost.

STATEMENT OF ISSUANCE

The "statement of issuance" of the book to an employee, on page 4, which gives the number of the book and (although this is not stated) apparently bears the signature of the recipient, is not necessary nor proper. This number—identifying any particular rule book and its recipient or holder—should be embossed or stamped into the cover, back and front, and also printed or stamped indelibly in other portions of the book, so that the number of the book, which is the only certain means of identification of itself and its proper recipient or holder, cannot be obliterated without marring the book and its contents.

If the blanks left after "name," "position" and "division" on this page 4, are intended as a receipt or as a means of identification, they are useless as either or both, for being merely printed the number may be removed, thus destroying the record absolutely. Moreover, as there is only one such page in the book, it is only good for one recipient. If it is taken up from a man leaving the service and the company desires to issue it to another man, either the information written in must be erased or another leaf must be pasted in. Leaving out the notice as to whose property the book is, which, as shown, belongs to another place, there is no need whatever for the matter on this page. No receipt from, nor any identification of, the holder of the book should be attempted in the book itself. The receipt for the book should be on a separate form, filed in the proper records in the office, this receipt giving all the necessary information as to the recipient or holder, the dates of issuance and return, etc., etc. This receipt should also contain an agreement notice by which the holder obligates himself not to lend, give or sell the book to anyone; to return it when leaving the employ of the company, when requested to return it by the company, or at some fixed time and to pay the company for any reward paid in case of loss and return.

It will be seen, therefore, that, by handling this matter of identification of book and holder in the above way, better results will be obtained than by using the form on page 4, and that the form there suggested by the committee is unnecessary and can be eliminated.

INTRODUCTION

The next matter is the "Introduction" or "General Notice" in regard to the general relations between the company and the employee, the equitable rights of both, advice, suggestions, counsel, requirements, etc., etc. This is a most important section of the rule book and should not be slighted by giving it only a few trite sentences. It is the one opportunity that an impersonal employer (such as a corporation), has to address the individual employee on the subject of the broad principles of duty, loyalty and discipline. Unlike the rules, it should be addressed to the individual employee, the recipient of the rule book, and should therefore be addressed to the "second person"—"*you*"—whenever the subject admits of it. While its language should never be familiar, it can be less formal than that of the rules and may even be colloquial. Its statements should be absolutely incontrovertible and its spirit should be just and equitable. In it should be incorporated such notices, announcements or explanations as the committee has placed in the first part of the third sentence of the first paragraph of Rule 1; the first sentence of first paragraph of Rule 4; all of Rule 19, and the last sentence of Rule 34. I would suggest the following, which is a digest of "Introductions" or "General Notices" as are used in the rule books of some of the best managed companies:

"The Trainmen, on account of their coming into *direct* personal contact with the patrons of the road and the general public, are the *personal* representatives of the company to its patrons and the public. In one sense the trainmen *are* the company; for whatever the Company can do, or is required to do, *through them,* they *must* do, and whatever the Company cannot do, or is forbidden to do, *through them,* they *must* refrain from doing.

"The success and good reputation of the service depends, to a large extent, on *you,* and your good personal character and habits, on your loyalty to the Company, on your industry, on your attention to duty, on your willing, cheerful and exact obedience to rules and orders, on your neatness, accuracy, and *especially* on your common sense, and good judgment and ability to "get along" with the officials in authority over you, with your fellow employees in *any* department of the Com-

*Paper presented at meeting of Southwestern Electrical & Gas Association, Beaumont, Texas, May 12-14.

pany and with the patrons of the Company and the general public.

"While the road of this Company belongs to and is intended and expected to be a source of profit to the Company, it was built and is operated for the accommodation and convenience of the public, and while riding on the cars and obeying the rules of the Company, the public has the right to expect every accommodation on the part of the Company and its employees that is consistent with a paying service. It should, therefore, be the special effort of *every* employee to do his part towards making the service so excellent that the public will find the road specially worthy of patronage.

"In doing this the employee subserves his own interests as well as those of the Company, as an efficient employee of a successful Company will always be in better and more secure position than if either the Company or he were *not* a success.

"In the treatment of passengers, universal politeness is required. The temper should always be controlled, and a "wordy war" never engaged in. In case of difficulty or dispute with a passenger neither conductor nor motorman should get angry and use uncivil language even under the greatest provocation, as no excuse could be conceived for insult, rudeness, impudence or sarcasm to passengers under *any* circumstances. It takes two to make a quarrel, and a passenger—no matter how abusive—should not be replied to in the same way. A firm insistance on proper behavior and obedience to the Company's rules—if carried out in a quiet, pleasant way—will always win against any amount of bluster and abuse.

"Avoid *arguments* in regard to the Company's rules with *anyone* not in the employ of the Company and especially with passengers. Inform the person arguing or protesting, that you have nothing to do with the *making* of the rules, that your duty is simply to obey them yourself and to enforce such of them as are entrusted to you to enforce, and that your neglect to do either may be the cause of loss of time or position to yourself.

"Never criticise a rule of the Company to *anyone* until you have proved—or have seen it proved—that such criticism is just. If at any time you find, or feel certain, that any rule, regulation or order of the Company is erroneous in its intention or effect, that it is unjust, unwise or unnecessary, present the reasons for your so thinking to [the proper officer] and *you* and the *reasons* will have courteous consideration.

"Report of anything that any employee considers as a defect of the service, or suggestions as to any betterment in it are always welcomed by the Company. From their close contact with the public and their constant practical experience in the minute details of operation of the cars, the trainmen are in the position to offer valuable suggestions to the management and they are assured that such suggestions will always be courteously considered and greatly appreciated.

"The rules of the Company together with its orders, bulletins, notices and general practice have only been made, adopted and put in force after the most thorough and careful consideration of *all* the circumstances and persons in each case and they must be obeyed and enforced until they are officially annulled, changed or superseded. Their implicit obeyance and enforcement is essential for the safety, convenience and comfort of the patrons of the road and the general public; for the protection of property both of the Company and of others; for the well being and efficiency of all employees and for a proper return to the Company for its investment and risk.

"The *safety* of passengers, of the general public, of fellow-employees and of property, is *the first* and *greatest consideration*. In the transportation of passengers the object is to carry the largest number with the greatest *safety*, convenience and comfort to them and to the general public. You will notice that in everything the Company does, or requires you or the public to do, the intention is to provide *safety*—first, last, and all the time. While convenience and comfort are portions of the service due to all patrons of the road, *general safety* is the one paramount consideration that must forever be in the minds and actions of *every* employe. In *every* case of *doubt*—Take the *Safe* Side!

"Remember, that in accepting the pay of the Company, you bind yourself to obey *all* its rules,—and that when you continue to take the Company's pay and do not obey them—in spirit as well as in letter—those that are *not* agreeable to you as well as those that *are* agreeable to you—you break contract with the Company, and are not honestly earning the pay you accept.

"Remember, that the Company pays you to think as well as to act! Therefore, "I didn't think" is not only no excuse, but it is an aggravation of the offense, as it shows carelessness—and *that* is criminal in this business.

"Remember, that no rule made for the benefit of the many, but may bear hard on a few.

"Remember, that on *you* probably depends the safety to life and limb of every passenger you carry.

"Remember, that on *you* depends greatly the convenience and comfort of the passengers.

"Remember, that the property of the Company, with which you are entrusted, is costly to buy, repair and maintain.

"Remember, that the profitable business of the Company depends very greatly on the way in which you conduct yourself toward passengers, and the exactness with which you perform your duties and obey the rules.

"Therefore, you will continually bear in mind the fact that carelessness, negligence or inattention on your part—even in very small and, to you—apparently trivial matters—may lead to very grave results to you and others and to great loss to the Company."

PROPOSED SPECIAL NOTICE.

Following this "Introduction" should be a positive and formal statement of certain *specific* obligations which the employee assumes when he takes service with the company. This statement should also contain an equally positive and formal declaration of certain rights of self-protection of the company, as an employer responsible under the law for certain acts of the employee. It should also contain a positive and specific statement of the reserved rights of the company regarding dismissal, suspension or other punishment. This might be called a "Special Notice." It must be carefully written, for it is, in a certain sense, a "legal" notice. It must be just and equitable, not encroaching on the moral and legal rights of the employee, nor transcending the moral and legal rights of the employer. It must cover in full detail those points that may cause dispute or even litigation if they are not clearly stated, defined and understood before the employee takes actual service with the company.

This "Special Notice" should have nothing to do with the requirements of applicants for service; those vary so in different localities at the present time that any attempt to "standardize" them, even in a few vital particulars, would be impossible. Besides that, such requirements for applicants are out of place in the rule-book, they are fully stated, or inferred by interrogatories, in the "application blanks" which every well managed company should compel an applicant to fill out and swear to before even considering him as an employe. This Special Notice is for a special purpose, a warning in effect, and every manager, superintendent or official whose duty it is to punish or discharge employees will recognize in every portion of it the fact that it covers cases of everyday occurrence, and those who have had no such—or no similar notice and warning in their rule-book or other "governing" literature, will recognize the fact that such or similar notice in use by them would have saved them trouble, dispute, annoyance or even litigation.

The suggested matter follows:

SPECIAL NOTICE.

"This company does not, either directly or indirectly, assume any responsibility for any act committed by an employee, nor for the results of same, where such act is a violation of the published rules, orders, notices, etc., of this company, and it especially does not assume, either directly or indirectly, any responsibility for any *illegal* act, nor the results of same, when committed by *any* employee engaged in his duty in the service

of this company, or even though such act is committed under the sanction of, permission by or orders of any superior officer or official, or any employee in authority, of this company. The company hereby gives formal notice that every officer, official and employee in its service at any time, is expressly prohibited from authorizing, ordering, permitting or committing *any* illegal act while engaged in his duties in the service of this company.

"Commission of any of the following offenses carries its own penalty of *summary* dismissal without privilege of reference or re-employment:

"Wilful infraction of any safety rule.

"Dishonesty.

"Untruthfulness.

"Disloyalty.

"Insubordination.

"*Habitual* intoxication.

"Sprees.

"Habitual drinking of intoxicating liquors.

"Habitual use of deleterious drugs.

"Drinking intoxicating liquors while on duty.

"Drinking intoxicating liquors *before* going on duty.

"Bringing intoxicating liquors on the cars or on or into the carbarns or *any* of the property or premises of the company.

"Gross immorality.

"Gambling, in *any* form.

"For any violation by an employee of any published rules, orders, notices, etc., of this company or of any law or ordinance governing his duties or responsibilities; whether the violation be ignorant, negligent, or wilful; the company reserves the right to suspend such employee for any length of time, without pay and with loss of any or all privileges usually allowed "employees in good standing," and, where the company deems that the occasion or circumstance warrants it, to discharge such employee without notice and without privilege of reference or re-employment in *any* department.

"No employee shall be held to have 'resigned' from the service of this company who shall have been suspended for fault, and who, upon investigation of the matter, is afterward discharged for such fault; even should he have 'quit' or tendered his resignation at the time of, or at any time after the commission of the fault for which he was suspended and discharged.

"No employee shall be held to have 'resigned' from the service of this company who has not given the proper notice of his intention to resign or has not been excused from giving such notice.

"In all cases of 'suspension' or of other penalty for fault, except discharge, the company will post upon [regular notice-board or boards], a notice of same, stating the name of the employee, the rules, orders, notices, etc., transgressed and the penalty given.

"In case of discharge a similar notice will be posted and it will also state, by dates, the period or periods of service with this company, and the positions held. It will give the rules, orders, notices, etc., transgressed and causing the discharge and it will state whether the discharge carries with it the further penalty of the loss of 'privilege of reference.'

"In case of accepted resignation or 'honorable discharge' a notice of same will also be posted as above, giving the fact of the resignation or honorable discharge, the period or periods of employment with the company and whether it allows him the privilege of reference or re-employment.

"In the case of any employee performing any meritorious act or service worthy of special mention, commendation or reward; the company will post a notice of such act or service, giving the name and position of the employee, the act or service performed and the commendation or reward given.

"Every employee affected by any of such above notices will be given a verbatim copy of same on personal application at [the proper office].

"In case of promotion; seniority, length of service, good record and loyalty will all be given their full value, but in every case *capacity for the higher position* must have been previously shown.

"Any employee having what he believes to be just cause of complaint against any fellow employee, inspector or other minor official may bring the matter before [the officer or official having the power to discharge him] and will in all cases receive a hearing, and, if the complaint is justified in the [above officer's] opinion the matter will be thoroughly investigated at once.

"Any employee believing himself unjustly discharged may bring the matter before [the local officer or final authority] who will investigate the matter if he deems the complaint warrants it and his decision in such matter will be final.

"When any damage or loss to the Company, or to others, is caused by any such above stated violations of rules, orders, notices, laws, ordinances, etc., the Company will hold responsible for such damage or loss the employee or employees guilty of such violation, and it reserves the right to retain from the wages due to or deposit received from such employee or employees the amount necessary to reimburse it, or the others, for the damage or loss occasioned by such violation.

"In consideration of all the above conditions of this 'Special Notice' it will be held by the company that any and every person who enters or remains in the service of this company hereafter, accepts all the conditions thereof and binds himself to willingly and implicitly obey those published rules, orders, notices, etc., of the company which, either directly or indirectly, apply to him."

The next matter should be a "special notice in regard to the promulgation of the rules, etc., contained in the rule book." It is suggested as follows:

SPECIAL NOTICE IN REGARD TO RULES

"The rules, notices, etc., contained in this rule book are for the government and instruction of all trainmen operating cars on the city lines of the————————Company, and become effective ————————19——, superseding all previous rules, orders, bulletins, notices, announcements, etc., which in any way conflict with the contents of this rule book.

"Each of the above trainmen and all officers and officials in authority over them will be furnished with a copy of this rule book, which copy is to be receipted for and used as ordered in Rule 1.

"The rules, notices, etc., contained in this rule book may at any time be temporarily or permanently changed, amended, superseded, annulled or added to. In case of a *permanent* change in any rule, notice, etc., contained in this rule book, a 'pasting slip' containing such changes will be immediately furnished to all employees properly holding a copy of the book, such 'pasting slip' to be used as ordered in Rule 1.

"In case of *temporary* or *'time limited'* changes, etc., of the rules, notices, etc., contained in this rule book, official notice of same will be posted in the 'bulletin' [or other 'information'] boards at [carbarn or elsewhere]."

The rules themselves naturally follow such a notice concerning them.

LAWS

Immediately following the rules must come an abstract of every law and ordinance directly affecting the duties or responsibilities of the employees who are governed by the rule book. It may be necessary to place in the book only the certain sections of each of these laws directly affecting the trainmen or it may be necessary to print them in full, but enough should be printed to inform and warn the trainmen fully as to any legal liability, while on duty, of themselves either as individuals or as employees of the company.

Under this head will come laws or ordinances in regard to legal speed of cars, legal or illegal stopping places, any rules of the Board of Health, or any ordinances in regard to smoking or spitting in the cars, any ordinance or franchise contractual-obligation as to the free riding of police, firemen or other city employees, officials, etc., any laws or ordinances governing fares, tickets, transfers, age of children riding free

or at a cut fare; any laws or ordinances as to the right of way of fire apparatus, police wagons, ambulances, funerals, processions, parades, etc., any ordinances as to the sounding or non-sounding of gongs or whistles at certain points or in certain places, any ordinances as to crossings at grade of other electric or of steam roads, ordinances regulating the crossing of bridges, viaducts, etc. As a matter of fact the employee must in some way be informed of all such things or he cannot, either disciplinarily or legally, be held liable for their infraction. It is true that he will be instructed in some of them verbally by the shop or barn instructors, and practically by the "platform" instructor, but the opportunity of these instructors may not cover all of such legal requirements and the best and simplest way is to give the employee, in his rule book, as much of the original law, ordinance or legal order as fully informs, instructs, or warns him as to the legal requirements and the penalties of infraction, if any.

SIGNALS

Following this, or at least somewhere by itself and outside of the rules should be placed the "signals." This section should give every signal authorized by the company for the use of the trainmen themselves or those liable to be "given them" by other employees or by outside persons. The signals should be fully detailed, their meaning thoroughly explained, and the limits of their use, if any, exactly defined. Besides the signal bell signals there should be given any signals permitted or ordered on the foot or hand gong used by the trainmen, and as some companies allow on their open cars the use of a mouth whistle or a vocal signal such as "all aboard" or "go ahead" or "right," these should also be included.

The signal section should also include air-whistle signals, for many suburban city cars using air-brakes also carry air whistles for use for caution, alarm or communication with other cars or other employees. It should also contain all cautionary danger or special signals used by inspectors, linemen, contractors, the municipality or the general public, viz.: such as lanterns, lights, flags, or any sort or color torpedoes, etc. It should also contain any manual signals in use such as the waving of the arms in particular ways. It must, in fact, fully inform the trainmen as to all signals in use, not only for his information, but for his instruction and guidance. If this is not done, definitely, positively and thoroughly, it leaves loop-holes for irregularity in the use of signals, for the introduction of non-standard, unnecessary and misleading signals by the trainmen or others and opens up the way for accidents, errors and delays.

CROSS INDEX

Last of all should be a complete and thorough cross index of everything contained in the rule book, by subject, by heading and by division. To a comparatively new employee the rule book should be one of constant reference until he becomes as familiar with it as almost to have memorized it. He should be encouraged to refer to it until it does become so familiar and nothing tends to such familiarity as easy and accurate reference to its every division, heading and subject.

ELECTRIC RAILWAY EXHIBITS AT SOUTHWESTERN CONVENTION

Manufacturers and dealers in electric railway supplies were well represented among the exhibitors and associate members present at the sixth annual convention of the Southwestern Gas and Electrical Association, at Beaumont, Texas, May 12 to 14. The following companies had exhibition booths in the Kyle opera house building where the convention sessions were held:

American Car Co., St. Louis, Mo.; Edward Bronenkamp, car seats, fare boxes, etc.; Atlas Railway Supply Co., Chicago, Ill.; J. G. McMichael, rail joints; C.-A. Wood Preserver Co., Austin, Texas; H. F. Gerhard, wood preservatives; Crocker-Wheeler Co., Ampere, N. J., photographs of large machinery installations; Duncan Electric Manufacturing Co., Lafayette, Ind.; C. M. Welsh, meters and transformers; Electric Traction Supply Co., St. Louis, Mo.; O. W. Uthoff, fenders, fare boxes, registers and couplers; Electric Service Supplies Co., W. P. Hall, St. Louis, Mo., insulators, pins, bonds, lamp guards, lightning arresters, and cutouts; Goldschmidt Thermit Co., New York, N. Y., H. S. Mann, rail, pipe and solid section welding appliances; W. N. Matthews & Bro., St. Louis, Mo., guy anchors and lamp guards; Moloney Electric Co., St. Louis, Mo., J. J. Mullen, transformers; Westinghouse Electric and Manufacturing Co., Pittsburgh, Pa., H. B. Chamberlin, J. R. Cox, A. Ashley, L. Jolesby, and G. W. Foote; Wagner Electric Manufacturing Co., St. Louis, Mo., J. A. Gelzer; Westinghouse Machine Co., Pittsburgh, Pa., A. B. Johnson; Western Electric Co., Chicago, Ill., N. S. Arnold, R. D. Cummings, J. C. Mow, W. J. Thompson and Paul Joyslin; Weston Electrical Instrument Co., Newark, N. J.; Wheeler Condenser & Engineering Co., Carteret, N. J., condensers and pumps, Harry Pennington.

Other manufacturers represented at the convention were:

American Diesel Engine Co., G. E. D. Fouge; Allis-Chalmers Co., W. H. Yates, F. G. Bolles, H. R. Sewell; Bonner Oil Co., J. S. Bonner; Buckeye Electric Co., J. Lee Norman; Buda Foundry & Machine Co., H. R. Taylor; Columbia Incandescent Lamp Co., Charles L. Martin; Dickson Car Wheel Company, George C. Dickson; Detroit Stove Works, J. A. Kerr; General Electric Company, S. Harvey, J. W. Thorne, O. A. Jennings, H. W. Kilkenny; General Incandescent Light Co., Harry C. Rice, W. S. McFarland; Harrisburg Foundry & Machine Co., Walter Castenado; Houston Armature Works, Fred E. Ward; H. W. Johns-Manville Co., Edward A. Paetschow, R. B. Autry; Lorain Steel Co., William W. Kingston; Ohio Brass Co., F. L. Cook; Pay-As-You-Enter Car Co., David Murdoch; St. Louis Car Wheel Co., F. O. Grayson; Standard Underground Cable Co., E. J. Pirtzker; Tool Steel Gear & Pinion Co., C. E. Sawtelle; Wesco Supply Co., Thos. H. Harris, W. C. McIlheran, R. A. Warfield.

THE RELATIONS BETWEEN THE ACCOUNTING AND OPERATING DEPARTMENTS *

BY A. F. ELKINS, AUDITOR, COLUMBUS, DELAWARE & MARION RAILWAY COMPANY.

If I were to sum up the entire question which has been assigned to me I would not hesitate to say that the cardinal requisite to a successful organization of an electric railway property is co-operation. Every official should be given a responsibility, and he should understand that his own success or failure depends entirely upon his own efforts, and the judge must be the official to whom he is directly responsible. The official family should be made up and all sub-departments so arranged that each may operate independently of the other, though so closely allied that complete harmony may obtain. Where this system exists the accounting department will find no obstacles in the way of furnishing prompt and correct reports to the executives. The lack of this system makes it quite impossible for the auditor to assemble the necessary data to compile his general reports. The successful auditor desires no authority. He has no time to exercise authority, if he would keep up with his work. He simply demands that sub-departments shall furnish the kind of information he wants and when he wants it. In this he should have the cordial support of the general manager.

"A unit of service" was framed into a bill passed by the Ohio House of Representatives, to create a utilities commission. Had this bill been enacted into law, complete revolution would have resulted among the railroads, and especially in their accounting departments, but the bill met its death in the Senate. The author of this bill attempted to require us to furnish a unit of service. He could not say what constituted a unit of service, neither could the committee. I be-

* Abstract of paper read at meeting of the Central Electric Railway Association, Toledo, O., May 26-27.

lieve it would be a difficult matter for each of you to say just what constitutes a unit of service on your railroad, but I can tell you about a unit of service in the accounting department, if that department is placed in the proper division, and the auditor clothed with sufficient power to accomplish the results expected and demanded of him.

Andrew Carnegie once said: "There is not a science or class of men on whom the business world is more dependent than the science of accounts and accountants." During the early history of steam railroads the auditing department was given little, if any, official standing. Executive officials, however, were able to see, finally, the inconsistency of this system, and the net result was the creation of executive departments, completely divorced one from the other, and in charge of vice-presidents. Directly under one of these executives you will find the auditing department, when not under the president or chairman of the board. The organization of one large railroad places the auditor under the board itself.

A railroad corporation owes its existence to the suffrage of the people. It is public property, subject to public control. Its securities are sold to the people, who make the laws that govern its operation. Upon the shoulders of the auditor rests the burden of responsibility to disclose by means of carefully worked out reports that the corporation, in its struggle for life, is keeping within the law. There is no term such as "moral evasion or mental reservation" that could be truthfully applied to the auditor to-day. He prepares his reports from his records, which are prescribed by the Interstate Commerce Commission and the various State commissions. He knows that the same law which applies to the executive applies to him personally. He must not make a false statement. He must keep his accounts in strict compliance with the laws, in the fulfillment of which he must act diversely to the executive who desires a better showing for the sake of the securities, or the general manager, who would make a better showing than the records disclose. Wood, in his "Modern Business Methods," written from the standpoint of a lawyer, says, in connection with the auditor of a corporation, "He should not be a partisan of any stockholder or group of stockholders, and should be the most independent employee of the corporation."

The multiplicity of laws designed to govern corporations in this State have so increased in number as to make the position of the auditor most discouraging. In keeping with the laws he gets his books in shape to render comparative annual reports, and the first thing he is up against is another set of laws which completely upsets his system and further burdens him with statistical requirements which are utterly worthless to the Government or corporation. With this fact in view, the Central Electric Accounting Conference came into existence, for the interchange of ideas, and the promotion and adoption of a uniform system of accounts. One of the recent valuable papers presented before this association was upon the accounting features of the corporation tax law, which contains some knotty problems that the auditor must work out. The Langdon tax law is another accounting hotchpotch, and requires the auditor to segregate his accounts between State and interstate, so as properly to apply the earnings. No operating official has the time to delve into the detail work of the proper classification of these accounts. It must, of necessity, be undertaken by the accounting department. Take, for instance, the classification prescribed by the Interstate Commerce Commission and adopted by many of the State commissions. Accounting Bulletin No. 5, issued by the Interstate Commerce Commission and effective May 1, 1910, contains 75 pages of questions raised under these classifications.

Uniformity in accounting methods and forms has been the watch-word with the accountants, and when this applies more fully within the actual operation of the interurban railroad, the auditor may find his labors less burdensome. We are coming gradually to the point where we may find uniform methods in use on all lines, in every department, and I know of no other medium to which more credit can be given for this fact than to the electric railway publications. Their careful collection and distribution of the reports touching operation of electric railway properties deserves our commendation and support.

The man behind the machine in the accounting department stands for everything that makes for advancement in every other department. "The supreme mark of wisdom is the willingness to replace an excellent thing with a better one." He is constantly thinking along this line.

He is supposed to take the initiative, and usually does the right thing without being told. The accounting department touches all of the other departments, thus occupying a peculiar position. The department is important to individual companies to the extent of furnishing records of the highest order, and the auditor, by his training and personality, may command the respect and esteem of those in charge of every branch of the service.

VALUATION OF OPERATING PROPERTIES *

BY EDGAR S. NETHERCUT, CIVIL ENGINEER, CHICAGO.

While it is by no means new, the rather recent use of an appraisal by the various State commissions, as well as by certain municipalities, commends this subject to our consideration.

Various uses have been made of the valuations thus obtained, among them may be mentioned the determination of rates, bond issue, sale or transfer of property, total capitalization, establishment of maintenance or reserve funds, establishment of uniform accounting.

I shall consider as briefly as possible the various divisions of this subject, namely:

The present demand on the part of the public for regulation of public service corporations.

Determination of the total cost to reproduce new the tangible property.

Determination of intangible values entering into the cost of the property.

Determination of franchise value.

Determination of present value.

Certain methods are indicated briefly. Local conditions, the uses to which the appraisal is to be put, and the availability of records will modify the method of procedure.

Experience has shown that totals may be obtained by an appraisal, which are fair to the corporation and to the public, and will represent within a small percentage the actual value of the property as a going concern. Manufacturing companies find it necessary to have appraisals made at certain intervals, so that the exact condition of their business may be determined. It is equally important that a traction company should have this information. Especially is this true as the relation between the public and the public service corporation is now undergoing a change. In order that this relation may become less political and of a more business relation, a full knowledge on the part of the traction company of its exact condition will enable it to protect its rights.

It is not necessary in this presence, to recite the conditions which have brought about the present situation. It is in evidence in more or less degree throughout the entire country, and may be stated in the following manner. The public is entitled to and demand adequate service at a low cost. The corporation is, however, entitled to a reasonable return on a fair investment.

Outside of some Eastern States we have been used to a determinate franchise, which has given the corporation more or less of a monopoly for a term of years, without much regulation on the part of the municipality. At the present time many of these franchises are expiring. Preliminary to their renewal, the foregoing relation is being recognized. The Federal Government and many States have organized boards

* Paper read at meeting of Central Electric Railway Association, Toledo, May 28-29.

of supervision. Some western States have adopted indeterminate franchises or permits, which are subject to revocation upon the failure by the corporation to comply with the conditions. New grants which may be made on this basis will involve in some form the valuation of the property, in order to determine the investment. Settlements of this form practically amount to a determination of the rate. Reduction in the rate below a certain point will result in reduction of the service, or the return on the investment, unless the municipality assume part of the construction cost. What is then saved in fare is made up in taxation. The man who has no property but patronizes the public service corporation does so cheaply at the expense of the man who has taxable property.

It has been customary in the past to value properties by various methods. These have served their purpose. They have failed to convince the public, however, that the results obtained should form a basis of new franchises.

A valuation in order to be complete must consider the property as a going concern. A value must be given to all the parts of the property which represent investment and earning power. These values should be determined in their order.

Considering the value of the tangible physical property, the appraisal is an estimate of the cost to reproduce new at the present day. All expenses which would be incurred in the construction of the property shall be considered. They are (1) the estimated cost of material and labor on the basis of a subcontract; (2) reasonable contractor's profits; (3) engineering and supervision cost; (4) real estate; (5) overhead charges; (6) development charges.

The tangible property is deemed to be reproduced in its exact present form, whether obsolete or not, and its value determined as of new material of like kind, purchased at present-day prices, except that the value of material in obsolete form shall not be greater than that of like material in improved form.

The appraisal, then, of the physical property involves, first, an inventory. This is a difficult and expensive part of the appraisal. While it should be complete and with much detail, it should be on the basis of units of equipment. To inventory the bolts or springs in a truck would entail considerable expense and cause confusion. Additions to or omissions from certain typical units can be noted without going into unnecessary detail. Satisfactory results may be obtained by classifying track, for instance, so as to note the major distinctions while small distinctions would involve only expense and liability to error.

There must be applied to items of the inventory prices which will represent the fair market value. Where, because of a fluctuating market such price would be unreasonable and unfair, a price should be taken which will represent average conditions.

Labor charges for the delivery of material and the installation of the same will form a large element in a proper appraisal. The labor costs should be based on the fair rate of the present day. The labor charge should, however, involve the use of such mechanical devices as are employed at the present time and as may be included in the inventory. For instance, it would not be proper to use the labor cost for the erection of a large generator by means of main strength when there is included in the inventory of the same power house a traveling crane of ample proportions.

The priced inventory obtained in the above manner will be on the basis of a sub-contract, and represents only the cost of material and the actual labor of installation or erection. To this sum there must be added a percentage which will represent contractor's profits. This percentage should, however, only be applied to items of a construction nature. An additional percentage should be added to all items except real estate to cover the cost of engineering and supervision.

I think that there is one assumption which must be made in determining the cost of track which does not apply to other items of street railway property. While the type of the track, including the pavement, is considered as reproduced in its exact present form, the charge for excavation should be based on the type of pavements outside the track. In other words, the excavation is considered as though the streets were at the present grade and free from tracks. It is conceived to be paved or unpaved from curb to curb with the same type of pavement, both wearing surface and base, as is now found between the curb and the tracks.

The real estate holdings of the company can generally be determined by comparative value of corresponding real estate. Proper allowance should be given to the extra value represented by the right-of-way over and above the value of adjacent real estate.

INTANGIBLE VALUES

Consideration must now be given to the overhead charges, which are, in general: Legal expenses, carrying charges, brokerage, contingencies.

In certain instances an exact charge can be added as a lump sum to cover these items, or they may be added in the form of a percentage of the construction and engineering cost. Having added these overhead charges, the sum of the foregoing will represent the total cost new of the tangible property.

The history of any going property will disclose certain expenditures known as development charges, which are not evidenced by the property itself. A change in the art has rendered obsolete expensive construction. Shifting population may have rendered inadequate certain parts of the property before the full right of this property has expired. City requirements may have necessitated a change of grade or the removal of overhead wires and placing the same under ground, without the addition of any earning power to the plant. These charges should be listed and classified, and such items of expenditure as are definite should be added to the total cost new of the property, provided they are of comparatively recent date and the character of the business has been such that these expenditures could not be absorbed and reasonable profits be earned.

FRANCHISE VALUES

It is recognized that unexpired franchises have a value. This value may be computed for a street railway by using the excess earnings of the route covered by the franchise over and above a normal dividend rate as applied to the appraised value of such a route. It will be noted that with a fixed income the franchise value will vary inversely with the physical valuation.

PRESENT VALUE

No sooner is the property completed and put into operation than it begins to depreciate. This lessening of value is the result of several natural causes, among them may be mentioned, normal wear and tear, neglect, obsolescence, inadequacy. On certain parts maintenance and adjustment may be applied at short intervals and at small expense. Other parts of the property, however, can only be economically maintained at long intervals in the form of major renewals. The bearings on the motors are frequently renewed at small expense, while the rail can only be economically renewed when the wear has continued for a longer period and its wearing value extinguished. Maintenance, however well applied, cannot keep the property up to the full 100 per cent of its original value; while one part is being renewed another is wearing out.

The greatest possible depreciation will reduce the value of the property only to scrap. The scrap value is the net proceeds which may be realized by the sale of all removable materials from the property, after deducting the cost of removing and placing this material on the market. The difference between the total cost of an article and the scrap value will represent the wearing value. Depreciation can conveniently be computed as a function of this value.

Depreciation of certain parts may be determined by mechanical measurements, like the wear on the rail. Depreciation of other parts may be determined by consideration of the age of the part. The depreciation of still other parts can be determined only by expert inspection and a computation of the maintenance now due. Careful inspection will in nearly all instances reveal conditions that will modify the determination of depreciation by measurements either mechanical or by age.

Whether depreciation should be subtracted for obsolescence

is a much-discussed question. In some appraisals depreciation has been recognized as being due to obsolescence, when the improvement in the art indicates that a new type of apparatus will soon supplant the present one. The charge for obsolescence is computed by using the age of the device; thus, if a certain machine is considered to be obsolete in 40 years from its date of installation, and it has now been installed 10 years, it would be depreciated 25 per cent of its service value for obsolescence.

It has been argued that obsolescence should not be considered at all, or until it is an actual fact, on the theory that an apparatus is either obsolete now or it is not obsolete, and cannot be partly obsolete. As a statement of fact this probably is true, but in the determination of the present value of a property it does not seem to apply.

Judgment should be exercised in the consideration of depreciation, each class of construction will present its peculiar problem. It may be noted, however, that the total deduction for depreciation is not the sum of that due to obsolescence, wear and tear, inadequacy or age, but only the particular class of depreciation which represents the greatest impairment of the value of the apparatus.

The efficiency of the property is not a safe basis for the determination of the present value. It may under certain conditions give an inflated present value, while the property itself may be in a seriously neglected condition. A system of tracks, cars and power houses may be installed to serve a certain population. By means of crowding the cars or placing additional cars in service a much larger population can be served without additions to the track. This does not increase the value of the tracks. The increase in traffic will only shorten the time before which extraordinary repairs must be undertaken.

In conclusion I may say that recent experience clearly shows the necessity for full information as to the costs of every part of the property and the value of each item of expenditure. As a basis of such information an appraisal to determine the value new and the present value is of the greatest assistance. Such an appraisal can, by a proper system of accounting, be brought forward to any reasonable date. The value new should form a basis of capitalization, bond issue, or the establishment of a rate. The present value will serve as a guide for the establishment of reserve or maintenance funds and for a sale or transfer of the property.

REPORT OF COMMITTEE ON INSURANCE*

BY H. N. STAATS (CHAIRMAN), F. W. COEN, H. P. CLEGG

In the year 1904, the first important step was taken by thirty big traction companies in an organized effort to get reduced rates of insurance through reduced hazard. The American Railway Insurance Company was chartered by individual members of these traction companies, and is still in existence, being maintained by these companies. In the same year, plans and specifications for the protection of traction properties against loss by fire were originated in the office of the American Railway Insurance Company. These plans and specifications were submitted to and approved by the National Fire Protection Association, an organization of leading insurance companies in the United States. The object of this association is to promote the science and improve the methods of fire protection and prevention, to obtain and circulate information on these subjects and to secure the co-operation of its members in establishing proper safeguards against loss of life and property by fire. This was the first step taken as an organized movement to protect traction properties with the most modern and scientific means to prevent loss by fire. No small credit should be given the American Railway Insurance Company and those identified with it in this very important movement.

Henry J. Davies, secretary of the Cleveland Electric Railway Company was appointed chairman of the Committee on Insurance and Fire Protection of the American Street & Interurban Railway Association, and has been re-appointed from year to year, and at the present time is serving as chairman of that committee.

In 1906 your chairman was honored by the Central Electric Railway Association in being appointed chairman of its Committee on Insurance and Fire Protection, and has been re-appointed and served in this capacity during the past four years. There have been associated with him at various times in this work Henry J. Davies, secretary and treasurer of the Cleveland Railway Company, F. W. Coen, vice-president and general manager of the Lake Shore Electric Railway Company, Harry P. Clegg, president of the Dayton & Troy Electric Railway Company, H. A. Nichol, general manager of the Indiana Union Traction Company and F. D. Carpenter, general manager of the Western Ohio Railway Company.

We will now attempt to prove to you conclusively that insurance agents and insurance brokers do not make your rates of insurance, but that every traction company establishes the rate of insurance applicable to its property by first protecting its own interests irrespective of any or all insurance companies and by observing the following rules:

First.—Erect buildings of slow burning or non-combustible materials.

Second.—Protect same with complete automatic sprinkler equipment.

Third.—Separate the risks by fire walls to reduce the danger of heavy loss to rolling stock.

Fourth.—Give careful attention to wiring and electrical supervision.

Fifth.—Appoint inspectors whose main duty is to watch and reduce the fire hazard.

There is another old adage that we would like to make use of at this time—"the proof of the pudding is in the eating thereof," and we submit herewith attached letters from traction companies, who have during the past four years followed out in some instances all of the above rules, and in others the major number. Study these letters and learn how to make your own rates of insurance.

The work of your chairman during the past five years has been along educational lines with the prime object always in view of helping traction companies to protect their valuable interests against the fire fiend. The work has been one of pleasure. The results of his labors in conjunction with the insurance committees of the several associations are now apparent in the very large reductions in the rates of insurance on traction properties. Briefly, the rates on traction properties to-day are less than one-half of the average rates charged in 1905, and in some instances the rates have been reduced 90 per cent from the rates charged in 1905.

Permit us to say there is a safe point to which the insurance rates can be reduced. If they are forced below that point, it is only a matter of time when there will be a rebound, and the insurance companies must increase the rates to a point where they can secure a fair and reasonable profit.

Your committee strongly urges upon every traction company to protect its valuable interests with the most modern and scientific means to prevent and to extinguish fire. Equip your properties so that you feel that you can safely carry your own insurance, and then we are confident that the regular established insurance companies will freely offer you a rate lower than you can afford to carry the insurance yourselves.

We recommend that your committee on insurance and fire protection be continued and the committee suggests that you consider the advisability of employing an insurance expert to aid it and to represent the association, or any member company that may call for his services in any negotiation or dispute with insurers, as well as to advise members on the subject of insurance and the better protection of their property against loss by fire. A recommendation of this kind was approved by the Executive Committee of the American Street & Interurban Railway Association at their meeting held in New York on May 11, 1910.

*Abstract of report read at meeting of Central Electric Railway Association, Toledo, May 26-27.

RECORDS OF INSTALLATIONS

J. J. Stanley, president and general manager of the Cleveland Railway Company, writes under date of April 7, 1910: "We have 11 car houses equipped with automatic sprinklers, and the sprinklers have put out at least three incipient fires. In one case the fire started in our storeroom at our car shops from contact of an electric lamp with our stock of celluloid. An explosion followed, and a disastrous fire was prevented by the opening of six sprinkler heads in the ceiling of the room. In another case that occurred in February last, a fire that started in a car from an overheated stove in one of our car houses was extinguished by four sprinklers in the aisles between cars, without aid from the city fire department, which had been called, and without the opening of any ceiling sprinklers. We believe that every car house should be equipped with automatic sprinklers distributed along the ceiling and in the aisles between cars."

J. C. Hutchins, president, Detroit United Railway, writes under date of March 31, 1910: "We have installed automatic sprinkler equipment in some of our car houses and car shops according to the plans and specifications originated in the office of the American Railway Insurance Company. The result of such installation has been most satisfactory, for the reason that it furnishes a substantial degree of protection against destruction of the property by fire, and at the same time makes it possible to buy insurance at rates that are not prohibitive. It is our policy to eventually protect all of our large storage plants with such equipment."

T. A. Cross, general manager, United Railways & Electric Company, of Baltimore, writes under date of May 10, 1910: "Our recent fireproof concrete structures embody every improvement known to safeguard the building and its contents against fire. The building itself, therefore, is fire resistive to a very high degree. The only cause for concern arises with the rolling stock or other contents that the building may contain, and it is for protection against fire arising in the contents themselves that sprinklers are being used in these properties. Automatic sprinkler equipments, as designed by a number of the leading sprinkler concerns, represent the highest type of fire protection that is obtainable at the present time. I, therefore, feel assured that a building, if designed to resist a fire at every point, and in addition to this is equipped with automatic sprinklers to protect the contents of the building, the possibility of serious fire is totally removed. As railway companies do not possess rolling stock greatly in excess of that which is in daily operation, any large fire which removes from service a large number of equipments must necessarily cause a serious situation."

F. J. Spaulding, Brooklyn Rapid Transit Company, writes under date of March 23, 1910: "We have two buildings which are sprinkled, viz., the car depot at Fifty-eighth Street and Second Avenue and the repair shop at Fifty-second Street and Second Avenue. The equipment in the Fifty-eighth Street depot was installed when the building was constructed, I believe, in 1892, and the installation of sprinklers in the repair shop was made in 1903. There have been two instances of the sprinkler equipment in the repair shops operating and probably preventing serious damage by extinguishing fires."

W. E. Moore, operating manager, West Penn Railways Company, Pittsburgh, Pa., writes: "We have had no trouble with our sprinkler equipment. The same is entirely satisfactory and, of course, the reduction in the insurance rate is very satisfactory to us."

Edgar S. Fassett, general manager, United Traction Company, Albany, N. Y., writes under date of March 30, 1910: "The United Traction Company installed the sprinkler system, both overhead and aisle, in all of its car houses about five years ago. Aside from the very large reduction in our insurance rate, we have since been satisfied that we have the best possible protection for our rolling stock and buildings."

L. D. Mathes, general manager, Union Electric Company, Dubuque, Ia., writes under date of March 30, 1910: "There is no property more deserving of the highest class of fire protection that the equipment of street railway companies. A suspension of service due to loss of equipment involves not only a financial loss to the company, but inconvenience and hardship to the entire community. The introduction of a sprinkler system reduces the possibility of a loss by fire to practically the zero mark, as properties protected by an approved sprinkler system do not burn. Aside from the absolute protection afforded by the system there is the material economy resulting through lowering of the yearly insurance premium account. We should be very glad to invest more money in our plant which would bring a smaller rate of insurance. Aside from the economy mentioned, there is a state of composure of mind which is of itself worth something."

W. S. Kirkpatrick, vice-president and treasurer, Kansas City Railway & Light Company, writes under date of March 30, 1910: "This company stores its cars in open yards and in car houses. The yards are equipped with modern fire apparatus, and with the exception of two, all the car houses are equipped with automatic sprinklers. We hope before long to have all our car houses so equipped. We consider automatic sprinklers the best means of safe-guarding our cars against loss by fire while contained in car houses."

D. A. Hegarty, general manager, Little Rock Railway & Electric Company, writes under date of March 30, 1910: "We have an automatic sprinkler system installed in our car barn and it is not only the means of giving us valuable fire protection, but also greatly reduced our insurance cost on account of making the risk being less hazardous. We are very well satisfied with having installed it and would not want to have a car barn or building in which we were interested without the protection of the sprinkler system."

J. H. Hanna, chief engineer, The Capital Traction Company, Washington, D. C., writes under date of March 31, 1910: "We have installed automatic sprinkler equipments in two of our car barns. Both of these car barns are new and are of reinforced concrete fireproof construction. The sprinkler equipment consists of aisle sprinklers only and is installed with the idea of taking care of fire originating in the cars themselves, as these constitute the only inflammable material in the buildings. We fortunately have had no opportunity to try the efficiency of the apparatus, but believe it is of much value for this service."

John N. Shannahan, general manager, Washington, Baltimore & Annapolis Electric Railway Company, Baltimore, Md., writes under date of March 30, 1910: "Our car shops at Naval Academy Junction are equipped with a complete automatic sprinkler equipment. We regard this as a wise and proper investment, and since that time, on one occasion, are convinced that it saved us from very serious conflagration."

L. L. Dagron, engineer, Utah Light & Railway Company, Salt Lake City, Utah, writes under date of April 5, 1910: "Our car barn is as nearly fireproof as possible with a concrete-brick-steel building. With the additional safeguard of the sprinkler system in aisles and roof, the cars are given the best protection possible. This practically eliminates the possibility of a tie-up on system from lack of cars in case of fire. As yet we have had no fire to give a demonstration of what the system will do, but from tests we have made everything works to satisfaction. The equipment gives a feeling to all that in case of fire with the barn full of cars, the damage would only be slight. The reduction of insurance from the sprinklers is alone sufficient cause for installation."

REDUCTIONS IN RATES

The following are some of the reductions secured in rates by the introduction of sprinkler systems, correct methods of building and other means to reduce loss by fire:

Albany, United Traction Company.—Reduction from $1.10 to 35 cents.

Little Rock, Ark., Little Rock Railway & Electric Company.—Reduction from $1.50 to 44 cents.

East St. Louis, Ill., East St. Louis & Suburban Railway Company, Winstanley shops and barns.—Reduction from $1.45 to 25 cents.

Sandusky, Ohio, The Lake Shore Electric Railway Company.—Reduction from $1.65 to 30 cents.

Spokane, Wash., The Washington Water-Power Company.—

Reduction in car-barn building from $1.56 to 50 cents; in machinery and supplies from $1.65 to 75 cents, and in rolling stock from $1 to $38 cents.

Willoughby, Ohio., The Cleveland, Painesville & Eastern Railroad Company.—Reduction at Willoughby in buildings and contents from $1.74 to 30 cents; at Nottingham from $2.29 to 30 cents.

THE NATIONAL ELECTRIC LIGHT CONVENTION

The St. Louis convention of the National Electric Light Association, the thirty-third in number and marking the twenty-fifth anniversary of the organization, began May 23 with the opening of exhibits of associated members. The special convention trains bearing delegates from the East, West and North arrived on time and without mishap. Following the opening of the exhibits, there was a reception by the officers of the association to delegates and visitors, on the stage back of the exhibition hall. The reception was followed by a dance.

The first general session was opened Tuesday morning, May 24, with an address of welcome by Hon. Frederick H. Kreismann, Mayor of St. Louis, who referred briefly to the past history of the electrical industry and touched upon important work done by electricity in upbuilding St. Louis. He concluded by presenting to President Frueauff the key of the city. W. W. Freeman, of the Brooklyn Edison Company, then took the chair while Mr. Frueauff delivered his presidential address.

Mr. Frueauff first reviewed the history of the association, stating that at the end of the first year there were 62 members in good standing; at present the association has 823 company members and a total of more than 6000 members of all classes. He recommended the grouping of membership into several classes according to the population of the cities served by member companies, one class corresponding to 25,000 population, another to a population of from 25,000 to 100,000, and a third to a population in excess of 100,000. According to this plan, a topic, of which the importance has a bearing on the size of the plant, may be discussed in one group, and the various committees may so arrange their work as to serve each of the several groups. In referring to the conservation of natural resources, he said that much which has been appearing in the public press on the subject would appear to indicate a belief in some quarters that steps should be taken to curtail the development of the natural resources of the country. By the development of water-power, resources which may otherwise be dissipated never to return, such as coal, wood and oil, are necessarily saved; but even more important is the conservation of time, the conservation of effort and the conservation of thought, in all of which electricity has played an important part. He referred to the constant downward trend in the rates charged for electric service, which service is the one cheaper thing enjoyed by the public in these days of high cost of living. The central-station man has been satisfied with an increase in gross earnings from an increase in sales, and has given to the public the greater part of the benefit from this policy. Mr. Frueauff said that we stand appalled at the tremendous amount of capital necessary to develop the opportunities which yet lie before us. The arid lands of the West and South will be made fertile, and unproductive lands in other sections will be made productive through fertilization electrically produced. Some of the steam roads of the country are now changing to electric power, others are considering the advisability of such a change, and in the city streets the future is only for the electric vehicle.

The address was referred to the following committee, who will suggest such action on the recommendations of the president as may be called for: Samuel Insull, Chicago; C. L. Edgar, Boston, and M. C. Osborn, Spokane.

H. O. Stewart, of Rochester, N. Y., then presented the report of John C. Parker, of the Rochester Railway & Light Company, editor of the Question Box. Mr. Parker reported that the work on the Question Box has now attained such proportions that a permanent editor should be engaged with headquarters at the offices of the association. The report on Question Box Revision by Paul Lupke and Alex. J. Campbell, former editors, was presented by Mr. Campbell. The report states that the task of the revision of the Question Box is becoming less and less a mere revision, and more and more the development and production of a central-station operators' handbook, which should be to the whole field of central-station work what the solicitors' handbook is to the "new business" department.

T. C. Martin presented his report as committee on progress, which, as printed, comprises 74 pages, and gives an excellent résumé covering every phase of central-station activity. The aggregate of present investment in the central-station business is stated to be $1,500,000,000, with an income of $300,000,000 gross. Referring to the great proposition of small central stations, he said that the entire State of New York, which has now 358 stations, could easily be covered by 25 plants having a distributing radius of 50 miles each. The report of the Public Service Commission of New York indicated that a large part of the small companies show a deficit each year. Commenting on the present status of water-power conservation policy, he said that the realities of the situation are serious, for a definite policy of restriction is rapidly shaping up that bids fair to check development. Referring to the electric automobile, it was stated that 20,000 electric vehicles are now in use in this country, the annual energy consumed by them being valued at over $2,000,000.

Mr. Martin then presented, in the absence of the author, a paper by Paul Lupke, which dealt in a witty manner with some of the faults of superspecialization. While admitting the necessity under modern industrialism of the benefits of intense specialization, one's back should not be bent forever in one narrow furrow; and any employee who puts the interests of the department to which he belongs above the interest of the company as a whole, makes it impossible for himself to be a good employee. Such a condition tends to diminish service toward the company as a whole, and also to develop an exaggerated ego and produce little men. There are, he said, more little jobs than little men and always more big jobs than big men, while in the very nature of things big jobs must be above any one single department. The fact, he said, that corporations have no souls imposes upon every employee, high or low, the duty to demonstrate clearly on every occasion that he has one.

H. H. Scott, of the Doherty Operating Company, and chairman of the membership committee, presented a report showing an expansion in 10 years from 200 to 5523 members, and a net gain for last year of 2386 members of various classes. The report closed with a résumé of the methods used in the successful membership campaign of last year. The committee recommends aggressive methods toward the formation of additional geographic sections, following out the plan outlined by the committee on State and company branches last year.

Dudley Farrand, past-president and the official representative of the association on the National Conservation Commission, was unable to be present owing to an accident confining him to bed. His report, read by W. B. Robbins, of St. Louis, stated that owing to the fact that the National Conservation Commission lost its legal existence by act of Congress, the association's representative was left with empty title. During the year no national meetings were held, but the National Conservation Association has been organized with headquarters in Washington, which will carry on its work through voluntary contributions, this work consisting largely of a series of bulletins calling attention to particular phases of conservation. Agents are delegated to watch bills in Congress, and at the present time the association is trying to prevent the passage of the Senate bill giving the control of water-powers on public domains to the States in which they are located. No action being demanded of the association at the present time, Mr. Farrand reported progress, and the report was referred to the executive committee.

John R. Bailey, of the Consolidated Gas, Electric Light & Power Company, Baltimore, chairman of the accounting com-

mittee, submitted a report summarizing the work done last year and reserving other matters for discussion in the accounting sessions. The classifications adopted at the 1908 and 1909 conventions are now published in book form by the association for $1.

Upon the conclusion of Mr. Bailey's report the convention adjourned to 2:30 p. m., May 24, when in a general session the following report and papers were to be presented: Report of lamp committee, W. F. Wells, Brooklyn Edison Company, chairman; periodic lamp renewals and customers' service inspection, by A. G. Strickrott, Schenectady Illuminating Company; magnetite and flaming arcs vs. open and enclosed carbon arcs for street illumination, by M. W. D'A. Ryan, General Electric Company; new form of tungsten lamp, by C. F. Scott, Westinghouse Electric & Manufacturing Company; high-efficiency lamps, by S. E. Doane, chief engineer, National Electric Lamp Association.

SUCCESSFUL COMPLETION OF THE UTICA ELECTRIC RAILWAY TRIP

The 2000-mile all-electric excursion of the committee of Utica (N. Y.) business men, which was referred to in the Electric Railway Journal of May 21 and earlier issues, was successfully completed according to schedule in Utica on Monday, May 23. The delegation was met at Syracuse by two cars of the Oneida Railway in charge of C. Loomis Allen, general manager, and C. R. Gowen, the general passenger agent of the Oneida Railway. Mr. Allen acted as motorman of the excursion car on the homeward trip between Syracuse and Oneida, bringing the car into the city in record time. At Oneida, a band and automobile parade escorted the tourists to Bagg's Hotel, where a banquet was served. The menu card showed a photograph of the car and the party just as both appeared when the start from Utica was made. Underneath this was the inscription, "Dinner and Reception Tendered to the Members of the Utica Electric Railway Tour, May 10, 23, 1910, by the Citizens of Utica, New York, May 23, 1910, Bagg's Hotel." The entire trip was made without mishap of any kind, either to the car or its occupants. The tourists were well received throughout this novel trip, which so effectively advertised their home city.

COST OF ESTABLISHING AN ELEVATED STATION IN BOSTON

In connection with a recent hearing before the Massachusetts Railroad Commission upon facilities provided on the Forest Hill extension of the Boston Elevated Railway Company, Frederic E. Snow, counsel for the company, submitted the following estimate of the cost of establishing and maintaining an elevated station at Green Street, Jamaica Plain, the total annual expenditure, including fixed charges, being $45,031.46.

CAPITAL INVESTMENT.		FIXED CHARGES.	
Station	$ 50,000	Int. and taxes, 6%	$ 3,000
8 Sectional Cars	88,000	Depreciation, 3.3%	1,650
Power Station Capacity, 65 kw per car, at $125	65,000	Int. and taxes 6%	5,280
		Depreciation, 5%	4,400
Transmission Expense, 65 kw per car; $45 per kw	23,400	Int. and taxes, 6%	3,900
		Depreciation, 4.8%	3,120
Yard and Structure	16,000	Int. and taxes, 6%	1,404
		Depreciation, 2.5%	585
Totals	$242,400	Int. and taxes, 6%	960
		Depreciation, 2.5%	400
		Totals	$24,699

OPERATING EXPENSES.	
Care, repair and lighting of station	$2,118.63
Manning station	3,686.50
Cost of stopping trains, wear, tear and power	11,789.83
Additional train wage cost	2,737.50
	$20,332.46
	24,699.00
	$45,031.46

Care and maintenance of additional cars was not included for the reason that such expense is based on the mileage, and additional mileage is not entailed.

INSTRUCTIONS ON LIGHTNING TO DENVER ELECTRIC RAILWAY MEN

The approach of the summer season has had the superintendent of overhead wires, and the trainmaster of the Denver City Tramway Co. to offer suggestions through the "Tramway Bulletin," to the employees of that company in regard to lighting. The trainmaster tells the men to let their cars coast as much as possible, during a thunder storm, with the overhead switch off. This will save the electrical apparatus.

Continuing he says in part: "Try also to remember where the controller handle stood when the car was struck. It may help to locate disabled parts quickly. For instance if controller was on the off point when struck, the chances are that the lightning discharge did not get beyond the controller. In that case you will find that when you apply the current, the controller will blow up. The blow magnet has probably become grounded. If on a hand brake car, quickly cut out the controller, by detaching the trolley lead to the blow magnet, carefully taping the end of the wire. Then go to the rear and operate the car from that end to the Loop. If on an air brake car, throw off overhead circuit breaker, which will cut out the controller on that end of the car. This course can also be followed to advantage when the controller is grounded from other causes.

"If the car is struck while the current is on, the lightning may disable one of the motors, although this does not always happen. In some cases the discharge goes to the ground before reaching the motor. The trolley wire is sometimes burned off at the base of the trolley on the roof. When this happens there is very little to do but to have the car pushed to the Loop. Otherwise, if the motors do not take current when it is applied through the controller, examine the overhead circuit breaker or the fuse, if on a hand brake car. If they are O. K., cut out the disabled motor and proceed to the Loop, as cases are very rare where both motors have been disabled by one discharge. Field coils are also very rarely damaged. If, however, you find the overhead circuit breaker damaged, promptly go to the rear platform and take the car to the repair shop. If the fuse of a hand brake car is blown, replace it, unless box is badly damaged as sometimes occurs. In that instance get a jumper and connect the wires across the box, carefully taping exposed parts of wire, cut out disabled motor, if there is one and take the car to the repair shop."

EDWARD W. BEMIS ON THE CLEVELAND TRACTION SETTLEMENT

Edward W. Bemis, who was connected with the Johnson administration in Cleveland, has contributed to the department "Notes and Memoranda" in the *Quarterly Journal of Economics* for May, 1910, an article entitled "The Cleveland Street Railway Settlement," which in a measure supplements an article by him in the same publication in August, 1908. Mr. Bemis says that the Tayler ordinance, under which the Cleveland Railway took over the management of the lines in Cleveland, "is an attempt to apply through a city commission the principles and theories of regulation which have underlain the State public service commissions of Massachusetts, New York and Wisconsin." According to Mr. Bemis, the attempt to provide more definitely for municipal ownership in the grant is unique in the world's experiments. He gives the principal provisions of the grant in their order in the franchise. Mr. Bemis refers to questions which have come up for settlement recently, such as the fare to Collingwood, and whether the Council can, with the consent of the company, extend the limits of 3-cent fare by mere amendment, or whether it will be necessary to have a new ordinance approved by referendum. Two questions, Mr. Bemis says, confront the people of Cleveland to-day: first, is the settlement really a settlement; and second, will the fare, after the first eight or ten months, remain at the present point?

PAY-AS-YOU-ENTER CARS FOR THE McKINLEY BRIDGE SERVICE OF THE ILLINOIS TRACTION SYSTEM

The Illinois Traction System has recently received 30 cars from the American Car Company, St. Louis, Mo., to form the initial equipment for service over the new McKinley Bridge across the Mississippi River above St. Louis. Twenty of the cars are motor cars of the pay-as-you-enter type mounted on Brill No. 27-M. C. B. 2 trucks and the other ten are cars of the same type for trail service. All were built under license of the Pay-As-You-Enter Car Corporation. The trail cars have the same dimensions as the motor cars and are alike in every respect except that the platform arrangement on the rear of the trail cars is the same as the front platform on the motor car and the pay-as-you-enter feature of the trail cars is embodied in the front platform instead of the rear. Both motor and trail cars are of the single-end type with full vestibules at both ends.



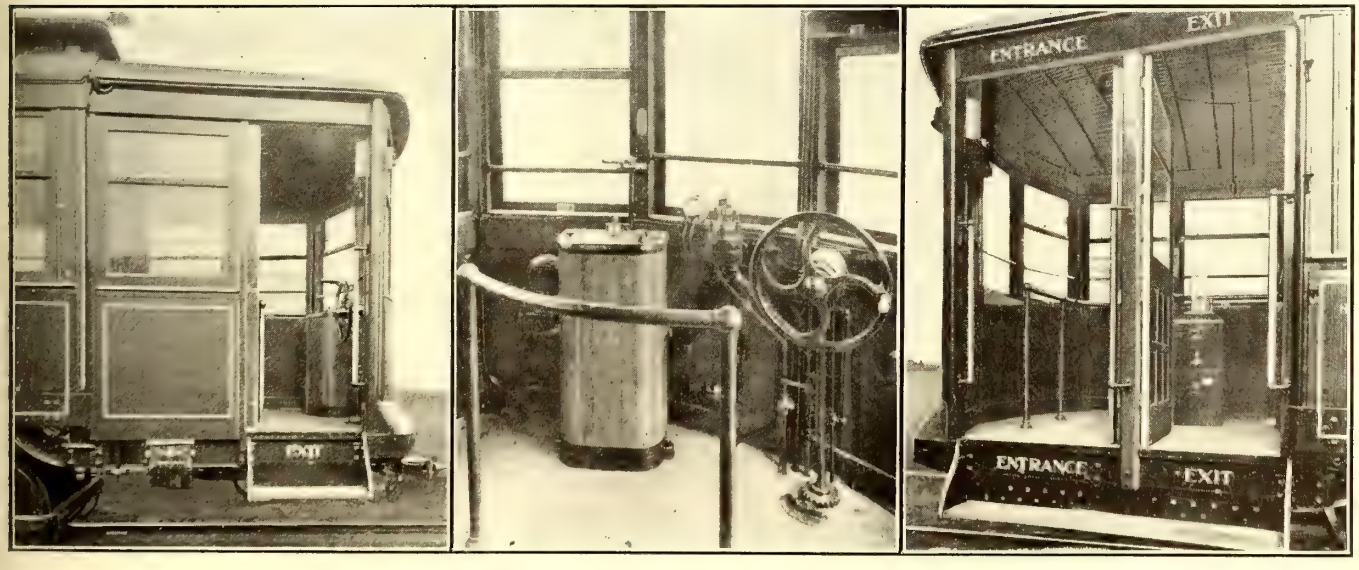
Pay-As-You-Enter Car for Train Service on the Illinois Traction System

The rear platform of the motor car and the front platform of the trail car are provided with doors for winter and gates for summer. The cars have straight sides and straight topped window sash which are made in two parts, both in the body of the cars and in the vestibules, except the center end vestibule sash. The cars are covered on the outside with 13/16-in. matched yellow pine boards and over this is placed a sheathing of No. 14 sheet steel. Where the steel siding terminates just below the window sill joint it is covered by an iron molding 1¾ by ¼-in. extending the full length of the car body in one piece.

The rear vestibule of the motor car and the front vestibule of the trail car have standard pay-as-you-enter features. The railings are arranged with vertical members running through the floor and secured to the platform knees. Both the folding doors for use in winter and the folding gates for summer operation are operated by the conductor without leaving his usual position. The front vestibule has two sliding doors entering the end of the car and one sliding exit door at the right hand corner of the vestibule. There is a railing to protect the motorman from interference from passengers and the sliding exit door is under the control of the motorman.

The interior finish of the cars is mahogany with three-ply poplar veneer headlining and ceilings. There are 16 transverse seats, upholstered in rattan, which have stationary backs with brass corner grab handles. These seats are 37-in. long and the aisle width is 27¼ in. There are two longitudinal seats each 7 ft. 6 in. long. The lower portion of each window sash drops into a pocket, the upper half is fixed.

The principal members of the underframing are the four sills. The side sills consist of two pieces of long leaf yellow pine filled in between with an 18-in. x ⅜-in. plate the full length of the car body and bent at right angles at the end sill and securely bolted to the end sill. The outer member of the side sill is 4 11/16 x 8-in. and the inner member is 2¾-in. x 7⅛-in. This composite sill is bolted together independently of tie rod bolts and angle iron bolts. The center sills consist of 6-in. I-beams, 12¼ lb. per ft., which are filled in on each side with 2⅜-in. x 6 3/16-in. long leaf yellow pine. The fillers rise 3/16-in. above the top flange of the I-beam to make up the bottom framing members at the end sills and to provide nailing strips for the floor. The cross framing consists of 3½ in. x 6 3/16-in. oak tenoned into the center sills and side sill



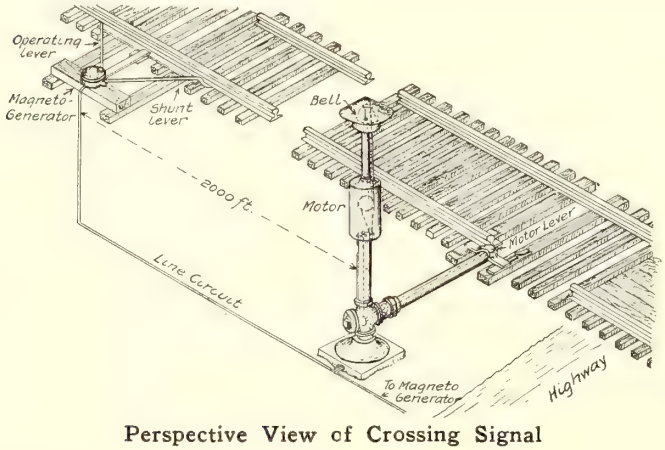
Front Exit, Motorman's Platform and Conductor's Platform of Pay-As-You-Enter Car

fillers. At each crossing there are two 1¾-in. tie rods, one on each side, with the heads countersunk in the side sill under the sheathing and the other end of the rod terminating in a malleable iron casting between the center sills. In addition, the cross framing is secured to the side sills by 4-in. x ½-in. angle irons. The platform framing consists of 6-in. Z-bars reinforced at the turn with gusset plates. The Z-bars are filled under the platform with oak fillers and are snugly fitted to the center sills and extend back beyond the bolster plate. The outside knees consist of 3-in. oak plated with 12-in. x ½-in. steel plates. The following are a few dimensions of the cars: Length over bumpers, 50 ft.; length over vestibules, 48 ft. 8 in.; length over end panels, 33 ft. 8 in.; width over sheathing, 9 ft. 3 in.; height from top of rail to roof, 12 ft. 1 in.; truck centers, 21 ft. 0 in.

A NOVEL HIGHWAY CROSSING BELL

The Omaha & Council Bluffs Street Railway Company recently has installed a new highway crossing bell made by the Hoeschen Manufacturing Company, Omaha, Neb. The most striking feature of this signal is its operation by electro-mechanical means which are entirely independent of storage batteries, track circuits or other methods requiring delicate apparatus. The main element of this device is a unique magneto-mechanical generator which is placed at the desired distance each way from the crossing.

As shown in the drawing the mechanical portion consists of one operating and one shunt lever, each having its inner ends resting against the underside of the rail and fulcrumed close to it. The outer ends of the lever terminate next to a releasing rod used in connection with an armature resting on the cores of a pair of induction coils. These coils in turn are fastened to the poles of a group of permanent magnets. When a train moves toward the crossing a slight depression of the rail above the operating lever causes the outer end of this lever to lift the armature from the induction coils. This action induces a momentary current which is transmitted by a metallic circuit to releasing magnets which control the bell motor, thus causing the bell to ring until the train reaches the crossing. A train passing in the opposite direction will depress the rail above the shunt lever first, thereby making



Perspective View of Crossing Signal

the outer end of this lever shift the releasing rod away from the armature so that the immediately following depression of the operating lever has no actuating effect.

The spring motor used to operate the bell is completely enclosed in a metal cylinder as shown in the same drawing. This motor is compactly built; the few parts required for its construction consist of a simple gear movement of three wheels used in connection with three motor springs. These springs are secured to the main driving shaft of the motor and are wound by a rod connected directly with the lever resting against the underside of the rail at a point opposite the motor. When the rail at that point is depressed by the wheel of each car of a passing train, a reciprocating motion of the winding rod (motor lever) is obtained, thus winding the springs and restoring the releasing lever which controls the motor. The connecting rods, extending from the winding rod to the pawl plates on which are carried the dogs for turning the ratchet wheel, are arranged to wind the ratchet wheel on both the upward and downward stroke of the winding rod. The passing of one car will wind the ratchet more than 4 in. The motor gearing is so arranged that less than this amount of winding is needed to ring the bell for the passing



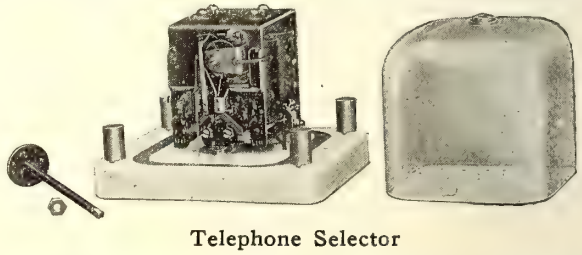
Crossing Signal Installed

of two following cars. In general the motor stores sufficient energy to ring the bell for say 100 cars before rewinding is necessary. Means are provided to prevent overwinding.

It will be understood that the bell does not ring until the motor is released by an approaching train passing over the generator levers as hereinbefore mentioned. The bell gives 200 strokes per minute until the train reaches the crossing. Any number of tracks may be protected by placing additional magneto generators with shunt and operating levers in connection with the bell motor releasing circuit.

A NEW TELEPHONE SELECTOR

For a year or more the engineers of the Western Electric Company, New York, have been working in conjunction with some prominent railway operators to develop a selector which, with its standard "Bell" telephone apparatus, would enable the company to offer a complete installation to railways which use



Telephone Selector

the telephone for train dispatching or messages. It is reported that the final model of this selector was made several months ago and since then a complete installation has been undergoing a successful service test on one of the busiest railroad divisions in the United States. Orders have already been placed for the new selector by three large railway systems.

The new selector is a step-by-step mechanism with but three moving parts, bridged directly across the line. A most desirable simplicity is attained because there is only one contact to make, while all relays and other complicated parts are eliminated. Central-battery ringing is provided, thus doing away with the necessity for installing dry batteries at the way stations. The selector is also arranged for local-battery ringing if desired.

News of Electric Railways

Mr. Whitridge and the New York Commission at Odds Again

On May 12, 1910, shortly after the suit had been dismissed which had been instituted against him for $860,000 by the Public Service Commission of the First District of New York for failure to equip cars of the Third Avenue Railroad and the Union Railway with wheel guards in a specified time in accordance with an order of the commission, Frederick W. Whitridge, receiver of these companies, addressed the following letter to Travis H. Whitney, secretary of the commission:

"The suit of the commission against me for the recovery of a penalty amounting to $860,000 for an alleged disobedience of an order having been dismissed, I feel bound to say to the commission what I may say about them.

"I am indignant that such a suit should have been brought upon what is, at the worst, the merest technicality, and I cannot imagine how the commission could fail to perceive that any jury and the public generally would be certain to find—the circumstances in the case being what they were—that the action was, as several of the jurors volunteered to say to my counsel, perfectly ridiculous.

"I think it is a possible explanation that the commission is continually being misled by its inspectors. It appeared on the trial, as I previously suspected, that your inspectors are given a roving commission to wander through your jurisdiction in search of violations of laws and regulations, and a system of petty espionage is thus established which I do not think was contemplated by the statute, and which I am sure the American people will not in the long run tolerate.

"Whether as an abstract proposition it is a good thing for the public I am not prepared to say, but I wish the members of your commission could get out of their heads the idea that the United States receivers of these roads, who are public officials and as responsible as the commissioners themselves, have any desire on earth except to comply with all the laws and legal regulations affecting them, and in every way to accept anybody's suggestions for the improvement of the service.

"If, however, the commission persists in holding their present views, I feel justified in warning them against giving their inspectors too much credence. You already know that in the case of the repairs of the Forty-second Street cars two years ago your inspectors reported to you an absolute falsehood; in the case of the service on the Southern Boulevard they later suppressed the obvious cause of the delays of which they complained, and they have repeatedly been guilty during the past year of the most colossal absurdities in their blue-prints.

"In the litigation just dismissed they put your chairman in the position of making oath that for 160 days I have disobeyed your orders, whereas their evidence showed only two days, and I hope that it is the inspectors alone who are responsible for having put the commission in the position of collecting what they suppose to be evidence, keeping it secret, and bringing an action against me for an enormous and ruinous sum of money, without any notice of warning, contrary to the recognized principles of law, justice, common sense, and good manners.

"I may add that I have lately been having your inspectors inspected, and the results would convince anybody that their labors are generally of the most trivial character. I inclose two or three of the reports on their movements, and I regret that the evident dislike and even terror of your observers to being observed put the expense of continuing my observations beyond my means.

"I cannot but believe that the commission has been misled in all of these matters, and I know that their whole attitute toward the receivers of these properties is mistaken. I really believe that the members of the commission can be persuaded to change their mental attitude as well as the course of their procedure in some particulars.

"I should be very happy, and I think it would be in the public interest, if the commission should feel disposed to meet me for a candid talk upon the whole subject. If they are so disposed I will endeavor to find some day within a week or 10 days when they, together with their counsel, their transportation engineer, and you yourself can come and lunch or dine with me."

The following letter was sent by the commission to Mr. Whitridge in reply to his letter of May 12, 1910:

"Receipt is acknowledged of the letter of May 12 from you as receiver for the Federal Court of the property of the Union Railway. In your letter you embody anonymous charges against a certain class of employees of the commission, who, under the provisions of the Public Service Commissions law, are public officers. Accordingly I am directed to ask that you furnish the names of the employees to whom you refer and also the names and addresses of those making the reports to you, or that you have such persons call at this office in order that they may identify the employees watched by them.

"The commission is ready to deal summarily with any of its employees who fail in the performance of their duties, but it is impossible to take any action upon anonymous charges. At the same time it is unfair and not straightforward to have an entire class of public officers condemned without notice being taken of such charges, and I therefore ask that you furnish as speedily as possible information showing the dereliction of employees of the commission which you, as an officer of the court, have secured through detectives whom you say you employed."

Cleveland Traction Situation

A difference in the accounts between the city and the Cleveland Railway developed when the city presented bills amounting to $86,000 on May 17. Officers of the company supposed that $43,586.97 was due the city, but City Auditor Wright, after examining the books of the company, said that he found $42,870.61 in bills which had been marked as outlawed, uncollectable and disputed. The oldest of these alleged claims was dated June 30, 1892. The largest one, $15,644.80, for stone on Euclid Avenue, was dated Dec. 5, 1900. At a conference attended by Mr. Wright, City Solicitor Baker, Col. C. X. Zimmerman and H. J. Davies, secretary of the Cleveland Railway, the company presented bills against the city which amounted to $47,598.15. As a result another meeting will be held. Of the bills recognized by the company, $23,092.16 is on account of the Cleveland Electric Railway; $19,330.69, obligations of the Municipal Traction Company, and $1,104.12, debts of the Forest City Railway. All of the recent claims are against the Cleveland Electric Railway.

At the regular meeting of the City Council on May 16, 1910, improvements to the Cleveland Railway which will involve the expenditure of $250,000 were authorized. Of this amount, $196,468 will be used for converting 230 cars into cars of the pay-as-you-enter type. The report of the company for April was received by the Council. G. M. Dahl, street railway commissioner, reported the expenses of his office for March as $733 and for April, $1,565. It was shown that $270 was expended in April for secret service. Mr. Dahl said that some things in connection with his office could not be made public, and he did not explain the import of this item.

Councilman Schwarzer introduced a resolution at this meeting to prohibit the operation of cars which are equipped only with hand brakes. The company is now using small cars not equipped with power brakes on Lorain Avenue to maintain the service which has been demanded, but these cars will be retired later. An ordinance introduced by Councilman Laferty would grant the company permission to extend the Superior Avenue line to 125th Street at the East Cleveland village line. The street railway committee reported adversely on the Menning resolution which would have effectually killed the no smoking rule of Mr. Dahl. This action was followed by the introduction of a resolution which would require all rules formulated by the company to be filed with Mr. Dahl.

As a result of the refusal of J. J. Stanley, president of the company, to comply with the request that he should discharge 250 conductors and motormen who did not take part in the strike after the Municipal Traction Company took over the property, these men have been invited to become members of the union. Mr. Stanley told the committee that he would assist in any reasonable way in having the men become members of their organization, but that the men were under contract with him before the Municipal Traction Company took over the property of the Cleveland Electric Railway, and that he could not discharge them. It is said that the men will become affiliated with the union provided their membership in that body will not require them to relinquish any of the advantages which have accrued to them through their fealty to the company.

Program of Meeting of Engineers' Society of Pennsylvania

All the space provided for the exhibit in connection with the second annual convention of the Engineers' Society of Pennsylvania in Harrisburg, Pa., on June 1, 2, 3 and 4, has been taken. The question of a code governing the practice of engineering in Pennsylvania, will be one of the important matters to be discussed at the convention, and the committee of twelve, appointed at the last convention and consisting of three members from each of the four large engineering organizations of the State, will submit its report and recommendations for discussion by the convention. The program of the business sessions of the convention follows:

JUNE 1, MORNING SESSION, 9:30 A. M.

Opening of the Manufacturers' exhibition, at Exhibition Hall, Cameron Street, above State Street.

Address by the Mayor of Harrisburg.

Convention called to order in the House of Representatives. Address by Chairman Jackson, of the convention.

Meeting of the county chairmen, Senate Caucus Room, State Capitol.

Illustrated lecture, entitled "The Improvement of the Highways of America," by Logan Waller Page, director Bureau of Highways, Agricultural Department, Washington, D. C.

JUNE 1, AFTERNOON SESSION, 2:30 P. M.

Address by President Reynders, of the Engineers' Society of Pennsylvania.

Address by Governor Edwin S. Stuart.

Business meeting of the convention. Report of code committee.

JUNE 2, MORNING SESSION, 9 A. M.

Paper, "Road Work in Pennsylvania and Some of Its Problems," by J. W. Hunter, Pennsylvania State Highway Commissioner.

Paper, "Melleville-MacAlpine Reduction Gear," by J. A. MacMurchie.

JUNE 3, MORNING SESSION, 9 A. M.

Paper, "Power Engineering and Producer Gas," by Nisbet Latta.

Paper, "Illumination," by Clayton H. Sharpe, director of the Electrical Testing Laboratories, New York, N. Y.

JUNE 3, AFTERNOON SESSION, 1:30 P. M.

Paper, "Aviation."

Paper, "Sanitation," by Samuel G. Dixon, M.D., LL.D., State Commissioner of Health.

On June 4, at 9:30 a. m., there will be an excursion by special train on the Pennsylvania Railroad to the Pennsylvania Water & Power Company's McCall Ferry 135,000-hp hydroelectric plant, 50 miles below Harrisburg, on the Susquehanna River.

Transit Affairs in New York

Attorney-General O'Malley, of New York, has announced the closing of all the special franchise tax cases which have been pending for several years in the Borough of Manhattan, with the exception of the Manhattan Elevated Railway and the New York Central & Hudson River Railroad. Among the cases disposed of was the agreement by the Metropolitan Street Railway to pay about $4,000,000 of special franchise taxes held against it.

The Public Service Commission has sent a letter to the Board of Estimate asking for authority to make a deviation in the route of the Fourth Avenue subway, Brooklyn, so as to prevent interference with the Academy of Music. In connection with this matter a dissenting opinion was filed by Commissioners Bassett and Maltbie, who originally opposed the Fourth Avenue subway. Commissioners Bassett and Maltbie recorded their opinion in favor of abandoning the route of the Fourth Avenue subway north of Atlantic Avenue and continuing it instead to Atlantic Avenue to the East River, with a tunnel connecting with Manhattan. The letter to the Board of Estimate states that it has deemed advisable to shift the subway in Ashland Place about 10 ft. to the west because of the presence and character of building of the Brooklyn Academy of Music.

The Court of Appeals has sustained the decision of the Appellate Division of the Supreme Court in favor of the Third Avenue Railroad in its suit for a reduction in the valuation placed on its special franchise in the Borough of Manhattan for the year of 1901 by the State Board of Tax Commissioners. The company was assessed by the State board at $10,525,605, and began an action to review the board's decision as illegal and erroneous by reason of alleged over-valuation by $9,000,000. The company's contention is now upheld by the Court of Appeals.

Justice O'Gorman, in the Supreme Court, has handed down a decision in which he refuses to reduce the amount of the special tax on the franchise of the Manhattan Railway for 1906, 1908 and 1909. The Justice holds the assessment in The Bronx has been underestimated, and must be increased. He says 6 per cent is a fair rate of return and a fair rate of capitalization, and 4 per cent compound interest is a proper basis for the depreciation fund. The Justice finds the value of the easements is $12,182.652, the amount of their cost, and says they are included properly in the company's assets, and that the company is entitled to a 6 per cent return thereon. He holds further these easements must be taken into consideration in ascertaining the value of the tangible property in the streets. Dealing with a similar application by the company for 1909, Justice O'Gorman says the equalized value of its special franchise in The Bronx is clearly in excess of the assessment under review, and the objections thereto are overruled. As to the assessment in Manhattan, he finds the tangible property to be worth $48,412,015 and the earnings $6,115,242.59, the net earnings being $3,091,768.12. Computed on the basis indicated in the 1906 and 1908 cases, he says, the assessment as made seems to be slightly excessive, and a comparative reduction is to be made accordingly.

On May 24, 1910, the Public Service Commission sold at auction three plots of real estate in Centre Street subject to easements for the Centre Street line of the Brooklyn loop subway. This property was purchased by the city to secure land for stations and other purposes for the loop subway, and after taking such parts as were necessary for the subway the commission decided to sell off the rest subject to perpetual easements for the subway. Six plots were offered, but only three were sold. The sale of these three brought a total of $536,000, against an aggregate upset price of $370,000.

Reservations for the New York Convention.—Reservations for accommodations at the Hotel Otesaga, Cooperstown, N. Y., at which the annual convention of the Street Railway Association of the State of New York will be held on June 28 and 29, 1910, can be secured by writing direct to J. D. Price, manager of the Hotel Otesaga, care of Bretton Hall, Eighty-sixth Street and Broadway, New York, N. Y., any time prior to June 23, 1910, and after that date by applying direct to the hotel at Cooperstown, N. Y.

Decision in Favor of Chicago & Oak Park Elevated Railroad.—Judge Windes in the Circuit Court at Chicago has held that the city cannot collect back car license fees from the Chicago & Oak Park Elevated Railroad, which amount to $40,000. The decision was rendered after the matter had been transferred to a master in chancery. The suit was brought by the city in 1906 to compel the company to pay car license fees under an ordinance which was passed in 1890.

Interurban Railway Wins in Injunction Suit.—Judge Baldwin, of the Common Pleas Court at Bowling Green,

Ohio, has denied the Cincinnati, Hamilton & Dayton Railroad an injunction to prevent the Lake Erie, Bowling Green & Napoleon Railway from crossing the tracks of the Cincinnati, Hamilton & Dayton Railroad at Tontogany. About four months ago a temporary restraining order was issued, and the cars of the Lake Erie, Bowling Green & Napoleon Railway were not able to reach the depot of the company at Tontogany.

Report on Transit Matters in Toronto.—The Board of Control of Toronto has recommended that Jacobs & Davies, New York and London, should be employed to consider and report upon the traffic situation in Toronto, particularly the present street railway system and the city's rights to construct underground lines in the central part of the city and surface lines in the outlying districts and the likelihood of such an undertaking being self-sustaining. Charles M. Jacobs and James Forgie, members of the firm, were in Toronto on May 18 and 19. The dispute between the Toronto (Ont.) Railway Company and the city of Toronto in regard to the rights of the company to construct lines in Toronto has been disposed of by the Imperial Privy Council in England which has rendered judgment in favor of the company. The company maintained that it had the right under its franchises, granted in 1892, to determine new routes and construct new lines without reference to the municipal authorities. This contention has been opposed by the city. As soon as the case was decided the company applied to the Ontario Railway & Municipal Board for an order confirming its right to construct the new lines. On May 19 the board granted the company's application, stating in its order that the lines selected by the company were chosen in the public interest and that construction was necessary on account of the traffic to be carried in the territory selected. The extensions granted by the board cover about 26 miles of line.

Spring Meeting of the A. S. M. E.—The regular semi-annual meeting of the American Society of Mechanical Engineers will be held at Atlantic City, N. J., on May 31, June 1, 2 and 3. The joint meeting to be held in England in July is an additional meeting. The headquarters of the association at Atlantic City will be at the Marlborough-Blenheim. On May 31 there will be an informal reunion of members in the parlors of the hotel. The regular sessions will be begun on June 1 at 10 a. m., when the business meetings will be held and reports of the committee and of the tellers of election will be received. On June 1 at 10 a. m. a number of papers on machine construction and operation will be presented. The afternoon of June 1 has been left unassigned to give those in attendance an opportunity for sight-seeing. On June 2 there will be a business meeting of the gas power section and reports of committees will be presented. At this session the following papers will be presented: "A Regenerator Cycle for Gas Engines Using Sub-Adiabatic Expansion," by Prof. A. J. Frith; "Gas Engines for Driving Alternating-Current Generators," by H. G. Reist; "Two Proposed Units of Power," by Prof. William T. Magruder; "Some Operating Experiences with a Blast Furnace Gas Power Plant," by H. J. Freyn. A number of miscellaneous papers will also be presented on June 2, among them "The Resistance of Freight Trains," by Prof. Edward C. Schmidt. At 9 p. m. on June 2 there will be a reception, following which Rear Admiral George W. Melville, U. S. N., retired, will have honorary membership in the society conferred upon him. On June 3 the following papers will be presented: "Improvements in Lineshaft Hangers and Bearings," by Henry Hess; "Experimental Analysis of a Friction Clutch Coupling," by Prof. William T. Magruder; "An Improved Absorption Dynamometer," by Prof. C. M. Garland; "Critical Speed Calculation," by S. H. Weaver.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The Boston Transit Commission and the Railroad Commission have been requested by the committee on metropolitan affairs to frame a bill to give the Boston & Eastern Electric Railroad the right to build a tunnel under Boston Harbor. The measure to extend the authority of the Railroad Commission over street railway bond issues has been passed to be engrossed. The House has passed the bill which provides for an investigation by the Boston Transit Commission of the cost and feasibility of subways to Milton, Dorchester and South Boston. The bill which authorizes the Shelburne Falls & Colraine Street Railway to fund its indebtedness has been laid before Governor Draper. A resolution has been introduced into the House which provides for an investigation of the advisability of a tunnel between the North and South Stations. A resolution has also been introduced into the House to require an investigation of the common control of lighting and transportation companies by a voluntary organization.

The bill which extends the authority of the Railroad Commission in connection with the issue of street railway bonds has been passed, to be enacted by the Senate. An attempt was made last week in the Senate to secure a reconsideration of the bill which provides for the transportation of pupils of normal schools at half fare by street and elevated railways, but without success. The bill, which provides for a half fare for pupils of industrial schools, however, has been passed to be engrossed. The attempt was lost which was made to secure reconsideration of the bill to limit the hours of street railway employees to nine hours in 11 consecutive hours per day. The committees on railroads and street railways, sitting jointly, have voted to report favorably a bill to permit the New York, New Haven & Hartford Railroad to purchase the stock of the Berkshire Street Railway and develop the territory west of the Connecticut River. The committee on street railways will report favorably the bill to permit the Boston Elevated Railway to acquire control of other street railways, but the form which the bill will take is uncertain. The resolution relative to the electrification of railroads within the metropolitan district of Boston has been passed to be engrossed. This provides for an investigation by the railroads during the present summer and fall, and a report by Nov. 1, 1910, to the joint commission on metropolitan improvements, with a report by the latter to the Legislature of 1911, in which a bill is to be presented providing for electrification by a definite date. The bill which limits the time of construction of electric railways after certificates of exigency are granted has been ordered to a third reading.

New York.—At the request of the Public Service Commission for the First District, Senator Agnew has introduced a bill to permit the Public Service Commission, in any future subway contracts, to rent trackage rights to others than the persons who may obtain the contract for operation of the subway. Owing to the approaching end of the session Senator Agnew sought to have the bill advanced to a third reading. The measure, however, was referred to the cities committee. The Senate has passed the Steinway tunnel bill, which provides that the tunnel may be operated by some company which in the future may receive a franchise. The Senate has passed the Frawley bill amending the Rapid Transit act by allowing the construction of a third track on elevated railroads. In the Assembly the Senate amendments to the Public Service Commission bill making the law more effective have been concurred in by a vote of 100 to 8. The bill will now go to the Governor. One of the amendments by the Senate was for the supervision of commutation and mileage rates.

Ohio.—The Langdon tax bill was approved by both branches of the General Assembly and signed by the officers on May 10, 1910, the last day of the session. This bill provides for a State tax commission of three members to supersede all the small taxing bodies that have heretofore had charge of the appraisal of properties for taxing purposes, and abolishes the State board of equalization and gives the commission supervisory authority over local taxing officials. Governor Harmon has vetoed the Calvey bill, which would have made obligatory the full vestibuling of cars of street railways. The Governor said that the measure was loosely drawn and that the provision which would have made it necessary to keep the temperature in the vestibules not less than 60 deg. Fahr. was impracticable, particularly as the months during which the vestibules were to be heated were not stipulated. The Governor has signed the bill giving the interurban electric railways the right to appropriate property for right of way purposes. This measure will be of great assistance, both in the construction of new lines, and in building extensions to existing electric railways.

Financial and Corporate

New York Stock and Money Market

May 24, 1910.

There was little of interest in the stock market last week. Although prices were strong the trading was apathetic. There was no news of sufficient importance to give direction to the market and no influence to stimulate enthusiasm. The commission houses were almost entirely without business, as outsiders were not buying and traders were conservative. The bond market was fully as dull as that for stocks, and money for investment was not in evidence.

The money market was easier than at any period for several months, but the demands of borrowers were light. Quotations to-day were: Call, 2¾ to 3½ per cent; 90 days, 4 per cent.

Other Markets

In the limited trading in Philadelphia prices have been fairly well sustained, although there have been no advances. The selling pressure directed against Rapid Transit has been removed, but buyers are few.

The feature of the Chicago market during the past week was the sudden demoralization in price for Chicago Railways Series 2, following the unexpected appointment of a receiver. On May 23 this issue sold as low as 14. The issue closed to-day at 17.

Massachusetts Electric and Boston Elevated were the only traction shares dealt in on the Boston Exchange. These were moderately active at unchanged prices.

In Baltimore there were no transactions in traction stocks and the bonds of the United Railways Company were much less active.

Quotations of various traction securities as compared with last week follow:

	May 17.	May 24.
American Railways Company	a45	a45
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a128½	128
Boston & Suburban Electric Companies	a16	*16
Boston & Suburban Electric Companies (preferred)	a74½	*74½
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a43	*43
Brooklyn Rapid Transit Company	a81¼	*81¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	85	*85
Capital Traction Company, Washington	a130½	a132
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a100	*75
Chicago Railways, ptcptg., ctf. 2	a29	a18
Chicago Railways, ptcptg., ctf. 3	a12	a9
Chicago Railways, ptcptg., ctf. 4s	a7½	a4
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104	a104
Detroit United Railway	*59½	*59½
General Electric Company	a150	150¼
Georgia Railway & Electric Company (common)	110	*110
Georgia Railway & Electric Company (preferred)	a87	*87
Interborough-Metropolitan Company (common)	20⅜	20⅝
Interborough-Metropolitan Company (preferred)	55	56¼
Interborough-Metropolitan Company (4½s)	80½	80⅞
Kansas City Railway & Light Company (common)	a27½	a26
Kansas City Railway & Light Company (preferred)	a77	a76
Manhattan Railway	a138	135
Massachusetts Electric Companies (common)	a18½	17½
Massachusetts Electric Companies (preferred)	a87	86
Metropolitan West Side, Chicago (common)	a18½	a17
Metropolitan West Side, Chicago (preferred)	a57¾	a58
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*73¾	74⅜
Northwestern Elevated Railroad (common)	a19	a18
Northwestern Elevated Railroad (preferred)	a70	a60
Philadelphia Company, Pittsburg (common)	*49½	a49½
Philadelphia Company, Pittsburg (preferred)	*44	a44
Philadelphia Rapid Transit Company	a18¾	a19
Philadelphia Traction Company	*85¼	*85¼
Public Service Corporation, 5 per cent col. notes	*96½	*96½
Public Service Corporation, ctfs.	a102½	103½
Seattle Electric Company (common)	a112½	111¼
Seattle Electric Company (preferred)	a102	103
South Side Elevated Railroad (Chicago)	a59	a59
Third Avenue Railroad, New York	a7¼	6½
Toledo Railways & Light Company	*9⅜	9
Twin City Rapid Transit, Minneapolis (common)	*112¾	111
Union Traction Company, Philadelphia	a48¾	a48
United Rys. & Electric Company, Baltimore	*12¼	*12¼
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	35½	a38
Washington Ry. & Electric Company (preferred)	a91	a89
West End Street Railway, Boston (common)	88	88
West End Street Railway, Boston (preferred)	102	102½
Westinghouse Elec. & Mfg. Company	64½	65
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Voluntary Receivership for Chicago Railways

On May 23, 1910, directly after a judgment for $1,344,000 had been entered against the Chicago (Ill.) Railways Company by Judge Tarlin Q. Ball, of the Superior Court, Federal Judge Peter S. Grosscup placed the company in the hands of John M. Roach, general manager, and Henry A. Blair, chairman of the board of directors, as receivers. W. W. Gurley, counsel for the company, in a statement which he made public about the affairs of the company, said in part:

"The representatives of the Chicago Railways Company were entirely unprepared for the decision of Judge Ball on May 18, 1910. The amount involved was so large as to make it impossible to secure a stay of execution by giving an appeal bond. Without such appeal bond the plaintiffs could levy execution on the receipts or other property of the company or could move for a receiver under the corporation act.

"Any action of the plaintiffs in that behalf would have effectually prevented compliance by the company with the covenants and conditions of the ordinance of Feb. 11, 1907 (the rehabilitation ordinance), and in addition would have compelled a suspension of rehabilitation. Recently a non-resident creditor of the Chicago Railways filed a bill in the United States Court asking that the court take over the property of the company and that the company continue service for the public and for the benefit of the city of Chicago.

"There was due upon the bonds upon which recovery was had $1,344,684.78, and in another suit of the same character, wherein it was stipulated that judgment should be entered according to the determination of the first-mentioned case, a judgment is due to be entered for approximately $100,000. It was simply impossible to carry such a burden or to face it, and the company was compelled to acquiesce in the views of the creditors, who were such creditors through contracts for supplies and materials, and were forced to consent to the appointment of receivers for the protection of its property and its bona-fide creditors, and for the protection also of its patrons and of the city of Chicago. That consent was given with a full realization of the embarrassments and difficulties it would necessarily entail, but no other alternative presented itself consistent with the safety of the interests of all concerned. The assertion and enforcement of the claims presented to Judge Ball involved consequences which were inequitable and unjust to other parties in interest.

"The Chicago Railways was carrying out the plan of reorganization required by the terms of its ordinance. It acquired title to its property through decrees and orders of the Circuit Court of the United States and had supposed that it owned this property absolutely free and clear of all claims and demands whatsoever except the obligations issued by it pursuant to said plan of reorganization.

"The causes of action presented to Judge Ball were claims by bondholders of the Chicago Consolidated Traction Company, which bonds were alleged to have been guaranteed by the Chicago Union Traction Company. The Chicago Traction Company was a mere lessee, directly or remotely, of the properties of the Chicago West Division Railway, the Chicago Passenger Railway, the West Chicago Street Railroad Tunnel Company, the West Chicago Street Railroad, the North Chicago City Railroad and the North Chicago Street Railroad. It had no railroad tracks of its own except an unimportant piece of railway on North Avenue, about 1 mile in length, and was utterly insolvent and unable to pay more than a very small part of its debts.

"The practical result of the judgment rendered by Judge Ball is that although none of the companies above named except the Chicago Union Traction Company were parties to the said guaranty, and although their properties constituted practically all of the property which the Chicago Railways acquired through decrees and orders of the United States Circuit Court, yet these judgments in their enforcement would destroy or greatly impair the value of the securities which the representatives and creditors of these old companies had received for properties which were not in any way responsible for the debts of the Chicago Union Traction Company."

It was explained that the receivership is in the nature of a friendly proceeding and that the bonds of the Chicago Railways are not prejudiced thereby nor by the judgment claims which induced it, since they constitute a prior lien on the $50,000,000 property. It was also stated that physical improvements undertaken under the ordinances of 1907 will proceed as before under the Board of Supervising Engineers, Chicago Traction.

Quarterly Earnings of New York City Companies

The Public Service Commission of the First District of New York has issued a statement in which the earnings of the railways in New York City are compared for the quarter ended Dec. 31, 1908 and 1909 (*a*). Following are the principal operating figures for several of the large properties:

System or company and year.	Railway operating revenue.	Railway operating expenses.	Net revenue railway operations.	Revenue car-mileage.
Hudson & Manhattan (*b*):				
1909	$572,902	$277,323	$295,579	1,599,369
1908	198,144	137,239	60,905	459,707
Interborough Rapid Transit:				
Elevated division—1909	3,897,469	1,651,734	2,245,735	28,498,918
Subway division—1909	3,730,773	1,195,678	2,535,095	
Both divisions—1908	6,978,511	2,691,804	4,286,707	27,428,188
Brooklyn Rapid Transit:				
1909	5,135,907	3,148,360	1,987,547	18,831,586
1908	4,664,324	3,034,263	1,630,061	17,964,721
Metropolitan Street Railway:				
1909	3,802,649	2,655,805	1,146,844	10,962,104
1908	3,608,097	2,727,606	880,491	10,421,809
Third Avenue Railroad (exclusive of Yonkers R. R.):				
1909	1,908,884	1,190,248	718 636	5,968,468
1908	1,792,207	1,116,162	676,046	6,122,308
Minor companies:				
1909	878,812	731.407	147,405	4,095,139
1908	824,035	714,586	109,449	3,880,252
Coney Island & Brooklyn:				
1909	318,332	*c* 223,779	*c* 94,552	1,314,406
1908	314,077	227,740	86,336	1,349,137
New York & Queens:				
1909	232,011	214,890	17,121	1,198,343
1908	215,907	201,831	14,076	1,006,571
Richmond Light & Railroad:				
1909	71.013	76,293	*D* 5,280	348,877
1908	70,367	84,347	*D* 13,981	358,837
Staten Island Midland:				
1909	50,766	49,562	1,204	314,038
1908	48,682	48,847	*D* 166	314,427

N. B.—Deficits and losses are designated by the prefix *D*. (*a*) The statements of the receivers do not include capital stock, funded debt or fixed capital Dec. 31, 1908, save those capital expenditures which have been made within the receivership. (*b*) Bonds temporarily in the treasury, which were sold in February. (*c*) Includes construction plant. (*d*) Reserve for special franchise tax, $1,004,513.53; $160,760.64 contingent liabilities ($12,500, interest on funded debt of roads operated under agreement; $148,260.64, rent of leased lines permanently defaulted).

Atchison Railway, Light & Power Company, Atchison, Kan.—W. B. McKinley, Champaign, Ill., and some of his associates in the Illinois Traction System are said to be negotiating to purchase the property of the Atchison Railway, Light & Power Company.

Burlington County Railway, Mt. Holly, N. J.—The property of the Burlington County Railway will be sold under foreclosure at the court house in Mt. Holly, on June 16, 1910.

Camden & Trenton Traction Company, Camden, N. J.—The Camden & Trenton Traction Company has been incorporated in New Jersey with a capital stock of $675,000 as successor to the Camden & Trenton Railway, the property of which was sold under foreclosure on March 18, 1910. The incorporators of the Camden & Trenton Traction Company are: Freysinger Evans, Eugene A. Martin and Chas. R. Rens.

Denver, Greeley & Northwestern Railroad, Greeley, Col.—The Denver, Greeley & Northwestern Railroad has been incorporated with a capital stock of $2,700,000 by A. W. Trenholm, Otto Bremer, C. McC. Reeve, J. R. Hutchison, Ralph Hartzell, Edward W. Genter, George L. Nye, George J. Spear, C. H. Ramsay and H. E. Churchill, to take over the Denver, Greeley & Fort Collins Railway and the Northern Colorado Railway & Utility Company.

Elizabeth & Trenton Railroad, Trenton, N. J.—The Elizabeth & Trenton Railroad has been incorporated with a capital stock of $1,200,000, of which $300,000 is 5 per cent cumulative stock and $900,000 common stock, to take over the Trenton & New Brunswick Railroad and the New Jersey Short Line Railroad, which were sold under foreclosure on May 4, 1910. The incorporators of the Elizabeth & Trenton Railroad are: Irvin Shupp, Jr., and Claud L. Rihl, Philadelphia; Charles Sinnickson, Rosemont, Pa.; H. Hays Aikens, John W. Kelly and A. E. Garwood, Llanerch, Pa.; Chester A. Entrekin, Ardmore, Pa.; John R. Turner, Basking Ridge, N. J., and H. O. Coughlan, Brooklyn.

Frederick (Md.) Railway.—The Public Service Commission of Maryland has authorized the Frederick Railway to issue $557,000 of bonds to retire bonds of companies which were recently taken over by the Frederick Railway.

Lehigh Valley Transit Company, Allentown, Pa.—On May 19, 1910, the stockholders of the Lehigh Valley Transit Company voted to authorize a mortgage to secure an issue of $10,000,000 of bonds with the right to increase the issue to $15,000,000, to retire $5,000,000 of first mortgage bonds due in 1935 and for other purposes.

London & Lake Erie Railway & Transportation Company, London, Ont.—The London & Lake Erie Railway & Transportation Company proposes to issue $700,000 of first mortgage 5 per cent gold bonds, to be used in connection with the purchase of the property of the Southwestern Traction Company. The bonds will be dated June 1, 1910, and mature in 1950, without option of earlier redemption.

Los Angeles-Pacific Company, Los Angeles, Cal.—The Southern Pacific Railroad is reported to have purchased from E. P. Clark, president of the Los Angeles-Pacific Company, and M. H. Sherman, vice-president and treasurer of the company, their minority interest in the stock of the Los Angeles-Pacific Company. The Southern Pacific Railroad is now said to own all the stock of the Los Angeles-Pacific Company.

Mahoning & Shenango Railway & Light Company, New Castle, Pa.—The stockholders of the Mahoning & Shenango Railway & Light Company have voted to increase the capital stock of the company from $10,000,000 to $11,000,000 by increasing the cumulative preferred stock from $4,000,000 to $5,000,000.

Metropolitan Street Railway, New York, N. Y.—In referring to the offer of the property of the Metropolitan Street Railway for sale on May 12, 1910, the statement was made that "protests against the sale were offered by Adrian H. Joline, one of the receivers of the Metropolitan Street Railway." The facts in the case are that it was Julien T. Davies, counsel for the Guaranty Trust Company, trustee of the mortgage under foreclosure, who protested against the sale. G. E. Tripp, chairman of the joint committee on reorganization of the Metropolitan Street Railway, has authorized the following announcement regarding the plans for reorganizing the company: "It is proper, in order to avoid false impressions, to say that all publications which have thus far appeared concerning a plan for the reorganization of the Metropolitan Street Railway have been and are unauthorized and without foundation in fact."

New York State Railways, Rochester, N. Y.—The Public Service Commission of the Second District of New York has approved a first consolidated and refunding mortgage to the Security Trust Company, Rochester, N. Y., by the New York State Railways to secure $35,000,000 of 5 per cent 50-year gold bonds.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—Middendorf, Williams & Company, Baltimore, Md., have proposed a plan for refinancing the Norfolk & Portsmouth Traction Company so as to care for unfunded debt and to make $1,800,000 available for improvements under which it is proposed that the $6,000,000 common stock of the company shall be surrendered and in lieu thereof new stock shall be issued of an aggregate par value of $6,000,000, of which $3,000,000 par value shall be 5 per cent cumulative preferred stock and $3,000,000 par value common stock. A letter to the stockholders of the company says in part: "Negotiable certificates will be issued for stock deposited, one of said certificates entitling the holder, if said plan becomes effective, upon surrender of said certificate to 50 per cent of the par value of the stock deposited in new common stock, and the other entitling the holder to receive 50 per cent of the par value of the stock deposited in new 5 per cent cumulative preferred stock, upon surrender of the certificate, and the payment of 60 per cent of the par

value of such preferred stock in cash. In effect, this plan gives to the present stockholders the privilege of subscribing to the new preferred stock on the basis of $60 per share of $100 par value, upon surrender of 50 per cent of the present common stock. The present common stock is thereby reduced 50 per cent in amount, but as the aggregate par value of the outstanding common stock equity is reduced from $6,000,000 to $3,000,000, the pro rata interest of stockholders in the common stock equity remains the same."

Owensboro (Ky.) City Railroad.—W. H. McCurdy, president of the Evansville Railways; A. F. Karges, Charles Hartmetz, Albert Funkhouser, Arthur Funkhouser and W. A. Koch, Evansville, and C. C. Tennis, of the Tennis Construction Company, are reported to have secured control of the Owensboro City Railroad and the Henderson Traction Company.

Pacific Coast Power Company, Seattle, Wash.—Stone & Webster, Boston, Mass., offer for subscription at 100 to yield 6 per cent, an initial issue of $675,000 of 6 per cent cumulative preferred stock of the Pacific Coast Power Company, which owns more than 66 per cent of the common stock of the Seattle Electric Company, and proposes to develop water power on the White River within 20 miles of Seattle and 15 miles of Tacoma.

Pensacola (Fla.) Electric Company.—Stone & Webster, Boston, Mass., announce that a regular semi-annual dividend of $3 per share in final payment of deferred dividends has been declared payable on June 1, 1910, on the preferred stock of the Pensacola Electric Company to stockholders of record on May 23, 1910.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company has sold to Drexel & Company, Philadelphia, Pa.; Lee Higginson & Company, Boston, Mass., and Estabrook & Company, Boston, Mass., $5,000,000 of its 5 per cent bonds to finance the purchase of a majority of the $5,000,000 of stock of the Indianapolis Traction & Terminal Company, the basis of which purchase was mentioned in the Electric Railway Journal of April 30, 1910, page 800.

West Penn Railways, Connellsville, Pa.—The plan under which the American Water Works & Guarantee Company acquires control of the West Penn Railways has been declared operative, and the stockholders of the West Penn Railways have voted to increase the bonded debt of the company from $6,000,000 to $12,000,000. Notice of the increase in indebtedness has already been filed with the Secretary of State of Pennsylvania at Harrisburg. The terms under which the merger was effected were given in the Electric Railway Journal of Feb. 19, 1910, page 330.

Youngstown & Ohio River Railroad, Salem, Ohio.—Announcements will soon be issued of the distribution of the securities of the Youngstown & Ohio River Railroad, the affairs of which have been in the hands of Will Christy, Warren Bicknell and George A. Stanley as syndicate managers. Each holder of $1,000 will receive $100, or 10 per cent in cash; participation certificates entitling him to $200 or 20 per cent in cash when the unsold portion of the bonds are sold; 12.125 shares of 5 per cent preferred stock of the company, or 10 shares of common stock. The capital of the company for the present will be $2,000,000, of which $1,000,000 will be preferred stock and $1,000,000 common stock. The authorized bond issue is $2,500,000, but only $1,000,000 of 5 per cent bonds will be issued at this time under the present authorization. Cleveland bankers have agreed to take the entire issue of bonds. The earnings of the company for the 11 months ended April 30, 1910, follow: Gross receipts, $175,388; operating expenses, $94,289; net earnings, $81,099; taxes, $11,015; surplus, $70,084.

Youngstown & Sharon Railway & Light Company, Youngstown, Ohio.—It was proposed to resume on May 26, 1910, the hearings which were begun on April 27, 1910, before D. Cady Herrick, New York, N. Y., as referee in an action against the New York Trust Company as successor to the New York Security & Trust Company, in which E. Clarence Jones seeks an accounting in behalf of the stockholders of the Mahoning Valley Railway, which has been merged with the Youngstown & Sharon Railway & Light Company.

Traffic and Transportation

Full Vestibules Hereafter in Brooklyn and Queens

The Public Service Commission of the First District of New York adopted on May 16, 1910, the following order, which requires that all street cars hereafter placed in service in the Boroughs of Brooklyn and Queens shall be equipped with full vestibules:

"Ordered, that the Brooklyn Heights Railroad, Nassau Electric Railroad, Coney Island & Gravesend Railway, Queens County & Suburban Railroad, South Brooklyn Railroad, Sea Beach Railway, Coney Island & Brooklyn Railroad, Van Brunt Street & Erie Basin Railroad, Bush Terminal Railroad and the New York & Queens County Railway, respectively, equip with full vestibules, enclosing both platforms of each car, all new or additional cars or car bodies of the closed, convertible or semi-convertible type acquired by said companies respectively by purchase, lease, operating agreement or otherwise, after the date of this order, May 16, 1910, and it is

"Further ordered, that this order shall take effect immediately and continue in force until modified by further order or orders of this commission; and it is

"Further ordered, that each of said companies * * * notify the Public Service Commission for the First District within 10 days after the service of this order upon it, whether the terms of this order are accepted and will be obeyed."

The proceedings before the commission were instituted on Aug. 15, 1909. The complainant alleged that the so-called one-third vestibule cars on the street railways in Brooklyn and Queens afforded insufficient protection against inclement weather, and asked that the platforms of all such cars be completely enclosed. It appeared at the hearing that all cars of the New York & Long Island Traction Company, the Long Island Electric Railway and the Ocean Electric Railway were equipped with full vestibules, and the complaint was accordingly dismissed as to them on consent. The platforms of a considerable number of cars in the Borough of Queens were also enclosed with full vestibules, but practically all closed cars in Brooklyn were fitted with one-third vestibules, consisting of screens or wind shields inserted between the dashboard and the roof at each end of the car which extend across the full width of the platform, but do not enclose the sides of the platform. The commission deems it unreasonable to require the reconstruction of cars now in service.

The hearings on the complaint were held before Edward M. Bassett of the commission, and were reported in the Electric Railway Journal of Oct. 16, 1909, page 889; Nov. 20, 1909, page 1083; Dec. 4, 1909, page 1138; Feb. 26, 1910, page 353. In his opinion, Mr. Bassett said:

"The evidence at the hearing shows that these one-third vestibules do not afford sufficient protection to the motormen and conductors, and establishes that full vestibules ought reasonably to be installed on all cars used in winter service, in order to promote the security and convenience of the public and the employees, and to bring the equipment of the several companies up to a proper standard. This improvement of equipment ought to be effected as soon as it can reasonably be done, but it would be unjust and unreasonable to require the reconstruction of cars now in service upon the statement of facts shown in this proceeding.

"It is conceded that the one-third vestibules fully comply with the requirements prescribed by the Legislature. Those requirements were enacted by Chapter 453 of the Laws of 1905, which is section 112 of the Railroad Law. In compliance with that section the several defendants commenced in the summer of 1905 to equip their cars with one-third vestibules and completed such equipment in December, 1907, which was the time set by the statute. This change of equipment involved a heavy expenditure on the part of the companies. The cost to the Brooklyn Heights Railroad was $156,700; to the Nassau Electric Railroad, $45,500; to the Brooklyn, Queens County & Suburban Railroad, $19,700; to the New York & Queens County Railway, $5,000; to the Coney Island & Gravesend Railway, $3,500. The installation of full vestibules on cars now in use would in-

volve discarding most of the expensive wind-shield equipment thus installed under the direction of the State Legislature. It would involve a substantial reconstruction of the platforms of most of the cars affected and would require a very heavy additional expenditure. The evidence indicates that the cost to the Brooklyn Heights Railroad alone would amount to between $150,000 and $200,000. In view of the large expenditures already made by the companies in bringing their equipment up to the standard recently prescribed by the State, the commission would not be warranted in compelling the companies to reconstruct existing car equipment without some urgent reasons being shown for immediate action. Such reason has not been shown. The correct disposition of the proceeding would seem to lie in an order requiring future equipment to conform to the standard which has been shown to be reasonable and proper. I accordingly recommend that an order be made requiring that all closed cars hereafter acquired shall be equipped with full vestibule on each platform."

Accidents in New York in April

The Public Service Commission of the First District of New York has issued the following comparative summary of accidents which occurred during April, 1908; April, 1909, and April, 1910, on the railways in the territory under its jurisdiction:

April	1908	1909	1910
Car collisions	140	88	99
Persons and vehicles struck by cars	930	994	963
Boarding	562	563	690
Alighting	544	557	625
Contact electricity	36	21	26
Other accidents	2498	1947	1920
Totals	4710	4170	4323
INJURIES			
Passengers	1681	1610	1828
Not passengers	662	484	487
Employees	503	400	490
Totals	2846	2494	2805
SERIOUS (Inc. in above)			
Killed	30	28	36
Fractured skulls	24	8	9
Amputated limbs	5	3	8
Broken limbs	30	18	38
Other serious	102	120	133
Totals	191	177	224

In explanation, the commission says that the increase in the number of persons killed is accounted for partly by the fact that two of the deaths were from suicide and six from employees working on tracks, and 10 from stealing rides, falling from structures, trespassing, contact with electricity and deaths from natural causes. No one was killed in collisions between cars, and only one person was killed from collisions between cars and vehicles. Nine persons were killed by being struck by cars this year, as against 12 last year.

Prizes for Garden Displays Along Elevated Line

The Northwestern Elevated Railroad, Chicago, Ill., has offered prizes for the best garden or window-box displays facing its structure. The announcement, which was made by distributing handbills in the elevated cars, follows:

"With a sincere wish to improve the appearance of the property abutting upon its right of way, and thereby to make the use of its cars more pleasing to its patrons, the Northwestern Elevated Railroad will offer a series of cash prizes for the best-kept yards, gardens and fences and for the best window-box and porch displays fronting its structure.

"It offers three prizes of each grade for each of the following territorial divisions:

"(a) Fronting its structure from Michigan Street to and including Wilson Avenue.

"(b) Fronting its structure from Wilson Avenue to Howard Avenue.

"(c) Fronting its structure from Clark Street to Kimball Avenue.

"These prizes are as follows:

FOR BEST YARD AND GARDEN

"First prize for each of the above sections, $50

"Second prize for each of the above sections, $25.

"Third prize for each of the above sections, $10.

FOR BEST WINDOW-BOX OR PORCH DISPLAY

"First prize for each of the above sections, $25.

"Second prize for each of the above sections, $15.

"Third prize for each of the above sections, $10.

"All entries must be in by June 15, 1910."

A coupon is attached to each announcement, and these are to be filled out by those who wish to enter the contest and deposited with any ticket agent north of Kinzie Street.

New Agreement Asked in Toronto.—The employees of the Toronto Railway have suggested new terms of service to govern their employment after May 31, 1910, when the agreement now in force between the company and the men expires. A proposal which they have submitted for an increase in wages would involve an additional yearly outlay of $239,077 by the company for help.

Pacific Electric Railway Time Card.—A new time card has been published by the Pacific Electric Railway in the form of the regulation railway folder. The tables give the time each car leaves the end of the line and show the time of every car at every station. Heretofore there has been no way of telling when a car would pass any particular station. The new cards also give much other information of value to patrons of the company.

Hearing on Commutation Rates.—The Public Service Commission of the Second District of New York decided to hold a hearing at Albany on May 26, 1910, on the complaint of W. P. Hickok and B. G. Tallman against the New York, New Haven & Hartford Railroad in the matter of increased commutation rates which the company proposed to put in effect on June 1, 1910, as mentioned in the ELECTRIC RAILWAY JOURNAL of May 14, 1910, page 886, and May 21, page 923.

New Electric Railway Terminal in Hoboken.—The Public Service Railway of New Jersey placed in service on May 22, 1910, the large terminal in Hoboken adjacent to the new passenger terminal and ferry house of the Delaware, Lackawanna & Western Railroad and directly over the station of the Hudson & Manhattan Railroad, which operates the tunnels under the Hudson River to New York. The plans for the terminal were described in the ELECTRIC RAILWAY JOURNAL of Aug. 7, 1909, page 204, by Martin Schreiber, engineer of maintenance of way of the Public Service Railway.

Interurban Loop in Denver Completed.—The new loop of the Denver (Col.) City Tramway on Thirteenth Avenue, Arapahoe Street and Curtis Street, and the alley between Arapahoe Street and Curtis Street, Fourteenth Street and Fifteenth Street, for the cars of the interurban lines has been completed. The old loop for cars of the city lines is retained. The interurban lines are all standard gage, while the city lines are narrow gage. The Denver & Interurban Railroad, the Denver & Inter-Mountain Railroad and the Denver and Barnum line of the Denver City Tramway will use the interurban loop. The interurban loop and the city loops are only one block apart, and each is within one block of the passenger station and the car house of the Denver City Tramway being erected.

Air Brakes and Hand Brakes in Canada.—In the matter of air brake equipment on the Hamilton & Brantford Railway and the Hamilton & Radial Electric Railway, and the proposed order of the Board of Railway Commissioners for Canada requiring all electric railways subject to the jurisdiction of the board to equip their cars with automatic air brakes as well as hand brakes, the board has adopted the following order: "1. On or before June 1, 1911, all electric railways under the jurisdiction of the board shall equip all rolling stock in use by them 37 ft. or more in length, or weighing 35,000 lb. or more, with power brakes, to be approved by the board, in addition to hand brakes and proper sandjng appliances. 2. Immediately upon the completion of said equipment the said railways shall notify the board thereof and furnish a detailed account of the rolling stock so equipped."

Fare Changes on the Buffalo, Lockport & Rochester Railway.—On May 17, 1910, with the permission of the Public Service Commission of the Second District of New

York, the Buffalo, Lockport & Rochester Railway effected reductions in one-way fares in either direction between Rochester and Car House, 4 cents; Lees, 1 cent; Lockport, 5 cents; and on round-trip fare between Rochester and Lockport, 10 cents; also between agency stations intermediate between Rochester and Lockport various reductions. Rates for the sale of 46-trip school and 54-trip commutation ticket books for distances from 3 miles to 54 miles inclusive are provided; heretofore rates for such tickets covered distances from 3 miles to 35 miles inclusive on 46-trip school and from 3 miles to 26 miles on 54-trip commutation. Changes were also made in chartered car rates between agency stations.

Tour of Indiana by Trolley to Boom Indianapolis.—Plans have been completed by the Indianapolis Trade Association to tour Northern Indiana by trolley on May 31, June 1 and 2, in the interest of Indianapolis, using the lines of the Indiana Union Traction Company, the Fort Wayne & Wabash Valley Traction Company, the Winona Interurban Railway and the Chicago, South Bend & Northern Indiana Railway. The firms, manufacturers and corporations holding membership in the Indianapolis Trade Association will be represented with a view to extending trade and renewing acquaintances particularly within territory made accessible by the opening of the Peru division of the Winona Interurban Railway. Thirty-two towns and cities will be visited. Stops over night will be made at Warsaw and South Bend. Local merchants in the towns and cities which are to be visited will be invited to Indianapolis from June 14 to 16, the dates of the aviation meet and races, during "Buyers' Week." John N. Cary, president of the Trade Association, will manage the tour.

Detroit, Monroe & Toledo Short Line Folder.—The Detroit, Monroe & Toledo Short Line Railway has issued a folder descriptive of its line. The burden of the text is "Some Outing Suggestions for the Strangers Within Our Gates." Under this caption are included the itinerary of trips that can be made on the city lines, a trip across the river to Windsor, Ont.; special excursion trips and places that can be visited along the Rapid Railway; the Flint division of the Detroit United Railways; the Detroit, Jackson & Chicago Railway; the Detroit, Monroe & Toledo Short Line and along other railways. A feature of the folder which the traveler will find particularly useful is a table in which the distance is given between Toledo and Detroit and towns in Michigan, Ohio, Pennsylvania and Indiana, arranged alphabetically, together with the one-way and round-trip fares from Detroit and the one-way and round-trip fares from Toledo. The name of the line is also given on which the towns mentioned are situated. The routes of the various lines mentioned in the publication are shown in a panoramic view printed in colors.

NEW PUBLICATION

The Corrosion and Preservation of Iron and Steel. By Allerton S. Cushman and Henry A. Gardner. New York, 1910: McGraw-Hill Book Company. Cloth, 373 pages, Illus., including bibliography and index. Price, $4.00 net.

Every electric railway manager and engineer has reason to know the practical effects of corrosion, whether they have occurred on buildings, on the line or on the rolling stock. Aside from the corrosion of rails, the subject is so closely allied to painting that the authors might well have been justified in calling their book "A Painter's Guide." The work which Messrs. Cushman and Gardner have prepared is certainly a most practical one on the subject of metal corrosion and preservation. The authors have combined their own experiences with those of other investigators and have digested the whole into a series of most interesting and valuable chapters on the problem of corrosion; the theories of solution, corrosion and electrolytic action; the technical properties of iron and steel, including the different methods of galvanizing; the relation of pigments to the corrosion of iron; tests on protective coating for iron and steel; the properties and selection of paints for certain purposes; properties of pigments and paint vehicles. These references are sufficient to indicate the scope of the work, but they cannot give a fair idea of the thoroughness with which each chapter has been handled.

Personal Mention

Mr. W. W. Abell has declined the appointment as a member of the Public Service Commission of Maryland. Mr. Abell is at present abroad.

Mr. L. B. Wickersham has been elected vice-president and general manager of the United Railways, Portland, Ore., to succeed Mr. Charles D. Pullen.

Mr. John F. Stevens, who resigned about a year ago as vice-president of the New York, New Haven & Hartford Railroad to become connected with the Great Northern Railroad, has been elected president of the United Railways, Portland, Ore., to succeed Mr. T. L. Greenough.

Mr. George H. Earle, Jr., has resigned as a representative of the City of Philadelphia on the board of directors of the Philadelphia (Pa.) Rapid Transit Company because he is no longer able to give the attention to the affairs of the company which he feels that the position of city director demands.

Mr. F. G. Kelley, who has been secretary-treasurer of the Topeka (Kan.) Railway for the last eight years, has resigned from the company to become connected with a syndicate headed by the Arkansas Valley Town & Land Company, Topeka, Kan., which will dispose of large tracts of land to settlers and investors.

Mr. Guy W. Talbot, whose resignation as vice-president and general manager of the Oregon Electric Railway, Portland, Ore., to become president of the Portland Gas & Coke Company, Portland, Ore., was announced in the Electric Railway Journal of May 14, 1910, has been presented a silver loving cup by the employees of the Oregon Electric Railway as a token of esteem.

Mr. William Myers, superintendent of overhead construction of the Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., has been appointed master mechanic of the company to succeed Mr. S. W. Shelton, who has been appointed master mechanic of the Fort Dodge, Des Moines & Southern Railroad.

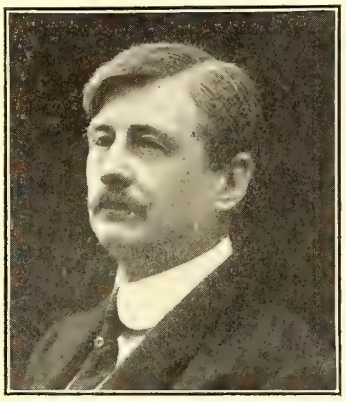
Mr. T. W. Shelton has resigned as master mechanic of the Indianapolis, Columbus & Southern Traction Company, at Greenwood, Ind., to become master mechanic of the Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Ia. Mr. Shelton was formerly with the Northern Ohio Traction & Light Company, Akron, Ohio. Later he became connected with the Fort Wayne & Springfield Railway, Decatur, Ind., as electrical engineer and subsequently with the Indianapolis, Columbus & Southern Traction Company.

Mr. Emil G. Schmidt, who will retire on July 1, 1910, as vice-president of the Rockford & Interurban Railway, Rockford, Ill.; vice-president and manager of the Peoria Gas & Electric Company, Peoria, Ill.; vice-president of the Evansville Gas & Electric Company, Evansville, Ind., and as vice-president and general manager of the Springfield Gas Light Company, Springfield Consolidated Railway and Springfield Light, Heat & Power Company, Springfield, Ill., entertained the heads of the departments of the various companies from which he will soon retire at a farewell dinner at the St. Nicholas Hotel, Springfield, on May 16, 1910. Mr. Schmidt was presented a Swiss striking watch by the officers and employees of the companies as a token of esteem.

Mr. L. C. Bradley has resigned as general manager of the Eastern Pennsylvania Railways, Pottsville, Pa.; the Pottsville Union Traction Company and the Eastern Pennsylvania Light, Heat & Power Company, which are controlled and operated by J. G. White & Company, Inc., New York, N. Y., to accept a position with Stone & Webster, Boston, Mass., as manager of the Galveston (Tex.) Electric Company, effective on June 15, 1910. Prior to his connection with the companies at Pottsville, Mr. Bradley was general manager of the Scioto Valley Traction Company, Columbus, Ohio; superintendent of the Puget Sound Electric Railway, Seattle, Wash.; general manager of the Key West Mining & Railway Company, Salt Lake City, Utah, and superintendent of the Tennessee Northern Railway, Knoxville, Tenn. He was formerly connected with the

Seattle properties of Stone & Webster. Mr. Bradley has been connected with the properties at Pottsville for three years.

Mr. William S. Twining, chief engineer of the Philadelphia (Pa.) Rapid Transit Company, has tendered his resignation, to take effect on July 1, 1910. After that date he will be associated with Ford, Bacon & Davis, New York, N. Y., for whom he will take up important work on heavy electric traction and power development in the neighborhood of large cities. Mr. Twining has been chief engineer of the Philadelphia Rapid Transit Company and of its predecessor, the Union Traction Company of Philadelphia, since the organization of the latter company in 1895 and is one of the best known electrical and mechanical engineers in this country. It was under his direction and supervision that the Market Street subway and elevated railway in Philadelphia were built. Both of these undertakings, especially the subway, presented extraordinary engineering problems, but all were satisfactorily solved and Mr. Twining introduced into each a number of novel features which will undoubtedly be standard for future railways of their type. Mr. Twining was born on Feb. 20, 1865, and was graduated from Allegheny College with the degree of C.E. in 1887. He acted as instructor in physics and engineering in Allegheny College for three years following his graduation and then entered the employ of the railway engineering department of the Thomson-Houston Company, Boston, Mass., for which he had charge of electric railway construction in Indianapolis and Toledo.. In the latter part of 1891 he assisted in equipping the Harlem Bridge, Morrisania & Fordham Railway, now a part of the Union Railway, New York, N. Y., with electricity, and in the following year was one of the engineers in charge of the electrical equipment of the Atlantic Avenue Railway, now a part of the Brooklyn Rapid Transit system. In 1893 he was appointed assistant to the chief engineer of the People's Traction Company, Philadelphia, and while connected with that road was largely responsible for the design of the Delaware Avenue power station, which is still one of the principal railway power stations in Philadelphia. All of the important electric railway work undertaken in Philadelphia during the last 17 years has been under Mr. Twining's direct supervision. Mr. Twining is a member of the Cornell Club, University Club and Engineers' Club of Philadelphia, of the American Society of Mechanical Engineers, and is an associate member of the American Institute of Electrical Engineers.



W. S. Twining

OBITUARY

J. J. King, general superintendent of the San Antonio (Tex.) Traction Company, is dead. Mr. King was 38 years old and entered street railway service in San Antonio 17 years ago in a subordinate capacity with one of the street railways which were subsequently merged into the San Antonio Traction Company. He is survived by a widow and two brothers, one of whom, Mr. Perry King, is auditor of the San Antonio Traction Company.

A. B. R. Sprague, president of the Worcester (Mass.) Electric Light Company, died recently in the eighty-fourth year of his age, after an illness of nine days. Mr. Sprague was a native of Ware, Mass. He was appointed city marshal of Worcester in 1867, and later in that year became collector of internal revenue of the Eighth Massachusetts District, remaining in that office five years. Mr. Sprague was sheriff of Worcester County from 1871 to 1890, having been elected for six successive terms of three years each. He served in both branches of the City Council, and in 1895 was elected Mayor of Worcester, and re-elected the following year. He was at one time president of the Worcester & Holden Street Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Camden & Trenton Traction Company, Trenton, N. J.—Incorporated in New Jersey to succeed the Camden & Trenton Street Railway, whose property was sold some time ago under mortgage foreclosure proceedings. The line will connect Trenton and Camden. Capital stock, $675,000. Incorporators: Frensinger Evans, Eugene A. Martin and Charles R. Renz.

***Elizabeth & Trenton Railroad, Trenton, N. J.**—Incorporated in New Jersey to take over and operate the line of the Trenton & New Brunswick Railroad, which was sold May 4 under mortgage foreclosure proceedings. This new company will also take over the property and franchise of the New Jersey Short Line Railroad, which is the extension of the main line from Milltown through New Brunswick to Elizabeth. Capital stock, authorized, $1,200,000; common stock, $900,000; preferred stock, $300,000. Incorporators: Irvin Shupp, Jr., and Claude L. Rihl, Philadelphia, Pa.; Charles Sinnickson, Rosemont, Pa.; H. Hay Aikens, John W. Kelly, John Turner and H. O. Coughlan.

***Alliance-Akron Railroad, Alliance, Ohio.**—Incorporated in Ohio to build a 26-mile electric railway between Alliance and Akron. Incorporators: M. B. Keith, R. M. Scranton, Arthur Wright and B. F. Smyth.

FRANCHISES

Birmingham, Ala.—George Kelley and associates have been granted a franchise by the Council to build an electric railway over certain streets in Birmingham. [E. R. J., Aug. 7, '09.]

Hope, Ark.—The Texarkana Gas & Electric Company, Texarkana, has asked the City Council for a franchise to build a railway in Hope.

Stockton, Cal.—The Stockton Terminal & Eastern Railroad has been granted a franchise to build a railway over the revised route in Stockton. The line will extend from Stockton Channel to Jenny Lind. R. N. Griffith, president. [E. R. J., Nov. 20, '10.]

Marion, Ill.—The Marion Railroad has asked the Council for a franchise to build an electric railway in Marion. S. E. Harper is interested. [E. R. J., May 14, '10.]

Indianapolis, Ind.—The Council has ratified a franchise granted by the Board of Public Works to the Indianapolis, New Castle & Toledo Traction Company to build a railway in Indianapolis.

***Anaconda, Mont.**—John A. Connelly, Muskogee, Okla., has been granted a franchise by the Council to build a railway in Anaconda. The franchise stipulates that construction must begin within 30 days after the ordinance is accepted by the applicant, and at least 4 miles of track must be completed within 13 months.

St. Charles, Mo.—R. E. Race, representing the St. Louis, St. Charles & Northern Traction Company, Mexico, has asked the Council for a franchise for a railway over certain streets in St. Charles. C. B. Duncan, manager. [E. R. J., May 14, '10.]

Morristown, N. J.—The Morris Traction Company has asked the Aldermen for a 35-year franchise to extend its tracks in Morristown.

Fremont, Ohio.—The Fremont City Street Railway has been granted a 25-year franchise for the use of certain streets in Fremont, and this, in turn, will be assigned to the Fostoria & Fremont Railway, which will build its line this summer.

Marshfield, Ore.—The Coos Bay Rapid Transit Company, North Bend, has been granted a franchise to build a railway over certain streets in Marshfield. A similar franchise has been granted the company in North Bend. W. P. Evans, North Bend, president. [E. R. J., May 14, '10.]

Philadelphia, Pa.—The Philadelphia & Suburban Railroad has asked the City Council for a franchise to build an elec-

tric railway over certain streets in Philadelphia. S. S. Neff, president. [E. R. J., May 7, '10.]

Phœnixville, Pa.—The Montgomery & Chester Electric Railway has been granted a franchise to extend its lines in Phœnixville.

Phœnixville, Pa.—The Phœnixville, Valley Forge & Stafford Street Railway has been granted a street railway franchise in Phœnixville. This is part of a plan to connect Phœnixville, Valley Forge and Stafford. [E. R. J., April 30, '10.]

Vancouver, Wash.—The Vancouver Traction Company has been granted a franchise by the Council to construct an electric railway over certain streets in Vancouver.

Weston, W. Va.—J. O. Watson, representing the Clarksburg & Weston Electric Railway, Clarksburg, has been granted a franchise for an electric railway in Weston. [E. R. J., May 21, '10.]

TRACK AND ROADWAY

San Francisco, Oakland & San José Railway, Oakland, Cal.—The company has completed surveys and rights of way have been secured for its Key Route extension through East Oakland, Dimond, Allendale, Melrose Heights, Elmcrest and East San Leandro. As soon as franchises have been granted construction will begin. The central station will be at Allendale.

Connecticut Company, Bridgeport, Conn.—This company, which is planning an extension of its railway to Stratford, has secured the approval of the Railroad Commissioners and the town of Stratford for the construction of the proposed plan.

Savannah (Ga.) Electric Company.—This company is rebuilding about 1¼ miles of double track with 70-lb. rails in Savannah. All material is at hand.

Vincennes & Washington Transit Company, Washington, Ind.—This company will soon place the contract for building 1 mile of new track to East Side Park.

***Frankfort, Ky.**—Charles E. Hage, Frankfort, and associates are said to be preparing plans to form a preliminary organization for the construction of an electric railway between Owenton and Frankfort.

***Hammond (La.) Interurban Railway.**—This company is reported to have been organized to build a railway in Hammond. Capital stock, $1,000,000. Directors: L. D. Spencer, B. H. Brooks, T. W. Cate, D. H. Taylor, B. M. Morrison and E. R. Moore.

Boston & Eastern Electric Railroad, Boston, Mass.—This company has secured the approval of the legislative committee to build soon its proposed electric railway from Beverly, Darius and Boston. MacArthur Brothers, New York, will build the line, which will be double-tracked all the way with 90-lb. rails. Some of the incorporators are: Melville Woodbury, Beverly; Arthur E. Jenks and Andrew McKinney, New York; Fred A. Norton and John H. Bickford, Salem; Arthur Sturgis, Brookline, and George H. Young, Taftville, Conn. [E. R. J., July 4, '08.]

Baltimore & Pennsylvania Railway & Power Company, Annapolis, Md.—This company has awarded the contract to the Maryland Construction Company for building its proposed railway to connect Baltimore, Hanover and Reisterstown. Temporary office, 1209 Calvert Building, Baltimore. [E. R. J., May 7, '10.]

Detroit United Railway, Detroit, Mich.—This company is reported to be considering plans for building a line to connect Muskegon, Flint, Bailey, Belding and Owosso. F. W. Brook, general manager.

***Grosse Isle Railway, Detroit, Mich.**—This company has been organized to build a new bridge three-fifths of a mile below Wyandotte and an electric railway around the islands in Detroit. Rights of way are being secured. Frank Whitehall and P. N. Jacobsen are interested.

***Valentine, Neb.**—C. H. Cornell, Valentine, is promoting a 128-mile interurban railway to extend from Valentine to Spencer via Lincoln, Pierre and Sioux City. Power is to be obtained from the Niobrara River. Right of way has nearly been secured and surveys have been completed.

New Jersey & Hudson River Railway & Ferry Company, Edgewater, N. J.—This company reports it expects to build a 1-mile extension to Highwood and contemplates building 1½ miles further to Tenafly. F. W. Bacon, Edgewater, general manager.

Utica & Mohawk Valley Railway, Utica, N. Y.—This company is reported to be considering a plan to build several extensions to its lines in Rome.

***General Traction Development Company, Cleveland, Ohio.**—This company is organizing, financing and constructing a system of interurban railways in Ohio connecting Mount Gilead, Mansfield, Mount Vernon, Delaware, Marion and Galion. The Roberts & Abbott Company is making preliminary investigations. The General Traction Development Company is also taking up the financing and construction of an electric railway proposition in the Georgian Bay District of Canada.

Dayton, Springfield & Xenia Southern Railway, Dayton, Ohio.—This company has completed preliminary surveys for its proposed extension between Xenia and Washington.

Oakwood Street Railway, Dayton, Ohio.—This company expects to place the contract for rebuilding 1½ miles of double track within the next two months. Henry Gebhart, Dayton, superintendent.

Jennings, Okla.—A bonus of $10,000 has been raised in Jennings for an interurban railway to connect Morrison, Glencoe, Stillwater and Perkins. Surveyors are in the field. L. J. Lampke is interested. [E. R. J., April 2, '10.]

Grand Valley Railway, Brantford, Ont.—This company has awarded contracts to the Warren Bituminous Paving Company and to P. H. Secord & Sons, Ltd., for the construction of 11 miles of single track in Brantford. It is intended to use 80-lb. T-rails and white oak ties laid in 12 in. of concrete. It is expected that this work will be completed by Oct. 15. William P. Kellett, chief engineer. [E. R. J., Feb. 12, '10.]

Toronto (Ont.) Railway.—This company has been granted permission by the Ontario Railway Municipal Board to build 15 miles of track on certain streets in Toronto. Construction will begin in a few days. R. J. Flemming, manager.

Portland, Eugene & Eastern Railway, Eugene, Ore.—This company has made a proposition to the Northwestern Eugene Improvement Club to build a 6-mile loop to the western end of Eugene for a bonus of $12,000.

Philadelphia & Suburban Elevated Railroad, Philadelphia, Pa.—This company advises that it will start construction in the fall on its proposed 20-mile railway to connect Roxborough, Philadelphia and suburbs of Frankford, Germantown, Chestnut Hill and Tiogo. Franchise has been applied for and the matter is now pending. It will operate 125 cars. Capital stock, $1,000,000. Headquarters, 416 Franklin Bank Building, Philadelphia. Officers: S. S. Neff, president; Caspar W. Haines, vice-president; F. F. Finch, secretary, and Coates Coleman, treasurer. [E. R. J., May 7, '10.]

West Penn Railway, Pittsburgh, Pa.—This company is said to have completed plans for the building of a 10-mile extension from Greensburg to the Jamison Coke Works, and thence to Latrobe. W. E. Moore, Connellsville, general manager.

***Abbeville, S. C.**—J. S. Stark and R. E. Cox, Abbeville, and R. C. Brownlee and J. Bell, Due West, are promoting the building of a 15-mile electric railway to extend from Abbeville to Greenville.

***Trinity Valley Traction Company, Dallas, Tex.**—This company has been organized for the purpose of building the proposed 119-mile railway to connect Waxahachie, Dallas, Corsicana and Palestine. Preliminary matters have been completed and construction will be started this summer. J. V. Watkins, Dallas, president.

***Lynchburg, Amherst & Northern Railway, Lynchburg, Va.**—This company has been organized to build a railway from Lynchburg through Amherst County and into Nelson County. Preliminary survey will soon be started. H. L. Page, president, and J. T. Bonny, secretary.

Western Washington Railway, Aberdeen, Wash.—Preliminary surveys are being made by this company for its 77-mile railway from Grays Harbor toward Seattle. C. C. Quackenbush, president, and W. B. Sammons, chief engineer, Aberdeen. [E. R. J., April 16, '10.]

Parkersburg & Ohio Valley Electric Railway, Parkersburg, W. Va.—This company has started work rebuilding its line between Friendly and Sisterville. It also expects to extend its railway down the Ohio River to connect with the Parkersburg, Marietta & Interurban Railway at Williamstown.

Buckhannon & Clarksburg Traction Company, Clarksburg, W. Va.—This company has completed the final survey and grading will soon be started on its proposed 30-mile railway between Clarksburg and Buckhannon, via Quiet Dell, Craigmoor, Romines Mills, Pildtree and Hodgesville. [E. R. J., April 2, '10.]

SHOPS AND BUILDINGS

Gallatin Valley Electric Railway, Bozeman, Mont.—It is stated that this company will soon begin work on a depot and terminal yards in Bozeman.

Public Service Corporation, Hoboken, N. J.—This company has opened to the public its new terminal station at Hoboken. It is a two-story building and cost $250,000. It will accommodate passengers for sub-surface, elevated or steam railroad cars or ferry boats for New York. [E. R. J., May 29, '09.]

Cincinnati Union Depot Terminal Company, Cincinnati, Ohio.—This company has been incorporated with a capital stock of $1,000,000 by Archibald S. White, Louis G. Hauck, F. R. Williams, Lewis Seasongood and C. B. Matthews, for the purpose, it is said, of erecting a union depot for both steam and interurban railroads in the southern portion of the city. This plan contemplates terminals, buildings and other properties that will entail an outlay of about $25,000,000. The City Council will soon be asked for a franchise for the depot, the General Assembly having enacted a law recently that makes it possible to construct terminals, as property may be condemned for that purpose.

Du Bois Electric & Traction Company, Du Bois, Pa.—This company is considering plans for the erection of a new car house this summer at Du Bois.

Twin City Light & Traction Company, Centralia, Wash.—This company will build a depot at the fair grounds in Centralia.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—This company has made arrangements with the Milwaukee Northern Railway to use a part of its new terminal station and yards in Sheboygan for the purpose of loading and unloading its freight. A temporary frame building will be erected for a station and a permanent building later.

POWER HOUSES AND SUBSTATIONS

Urbania & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company expects to purchase a 1000-kw, 2300-volt, 60-cycle alternator, a 1500-hp boiler and a 1500-hp Corliss engine. H. J. Pepper, Champaign, general superintendent.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company is receiving bids for the erection of a one-story brick, 47 ft. x 66 ft., addition to its boiler house in Batavia. It also plans to build a one-story brick, 24 ft. x 36 ft., addition to its substation at Clintonville. E. F. Gould, engineer, Wheaton, Ill.

Elkton, Fair Hill & Oxford Electric Railway, Elkton, Md.—This company is considering plans for building a power plant in Elkton. Heister Hess is interested. [E. R. J., April 30, '10.]

Marquette County Gas & Electric Company, Ishpeming, Mich.—This company expects to purchase a 500-hp water-tube boiler, boiler feed pumps, barometers and condenser. W. J. McCorkindale, general manager.

Portland Railway, Light & Power Company, Portland, Ore.—This company has let a contract to the Puget Sound Bridge & Dredge Company, western representative for the Ambursen Hydraulic Construction Company, for the construction of a dam 86 ft. high in the rollway, 100 ft. high in the bulkhead and 680 ft. long, across the Clackamas River, 3 miles below the Cazadero plant.

Philadelphia (Pa.) Rapid Transit Company.—This company will erect a transformer station at Germantown Avenue and Erie Avenue.

Manufactures & Supplies

ROLLING STOCK

Sheffield (Ala.) Company is in the market for a car for hauling cinders and ashes.

Lexington (Ky.) Railway expects to purchase one-single or double-truck snow sweeper within the next 60 days.

West Jersey & Sea Shore Railroad, Camden, N. J., is receiving bids for eight new cars, complete with motors,, air brakes, etc.

Cleveland (Ohio) Railway has been authorized by the city to spend $196,468 in converting 230 cars into the pay-as-you-enter type.

Marquette County Gas & Electric Company, Ishpeming, Mich., is in the market for two 40-hp street railway motors. W. J. McCorkindale, general manager.

Illinois Traction System, Peoria, Ill., has asked for bids on 21 single-truck cars of the pay-as-you-enter type, which are to be distributed among several of its city systems.

Hutchinson Inter-Urban Railway, Hutchinson, Kans., expects to purchase two new pay-as-you-enter cars, and will also convert its other cars to the pay-as-you-enter type.

Portsmouth (N. H.) Electric Railway expects to place contracts during the next five weeks for four AA-6 motor-driven air compressors for Christensen straight-air brake equipment.

New York & North Shore Traction Company, Mineola, N. Y., expects to purchase four 40-hp motor equipments for its regular cars, two 75-hp equipments for a sweeper and two 75-hp equipments for a sprinkler.

Morgantown & Dunkard Valley Railroad, Morgantown, W. Va., is considering the purchase of several new or second-hand cars, complete with motors, etc., with bodies about 28 ft. long. J. A. Martin, general manager.

Slippery Rock & Grove City Railway, Grove City, Pa., which expects to complete its 10-mile railway between Slippery Rock and Grove City by Oct. 1, is considering the purchase of several cars. S. L. McClure, Grove City, general manager.

Homestead & Mifflin Street Railway, Homestead, Pa., expects to buy one open and one closed car, either new or second hand, this fall. The company wants the cars to be equipped with McGuire-Cummings single trucks and No. 56 Westinghouse motors. C. H. Kapp, general superintendent.

Cumberland Railway, Carlisle, Pa., which was mentioned in the ELECTRIC RAILWAY JOURNAL of April 9, 1910, as having purchased two combination baggage and vestibuled passenger cars from the J. G. Brill Company, has included the following details for this equipment:

Length of body	29 ft.	Gongs	Brill Dedenda
Over vestibule	38 ft. 5 in.	Heaters	Cooper
Width over sills	7 ft. 11½ in.	Motors	West. 101-B
Over posts at belt	8 ft. 2 in.	Registers	International
Interior trim	cherry	Sanders	Brill Dumpit
Air brakes	West.	Seats	Winner
Bumpers	Brill angle iron	Springs	Brill
Couplers	Brill-Hovey	Trolley base	Nuttall
Curtain fixtures	Cur. S. Co.	Trucks	Brill No. 27-G1

Puget Sound Electric Railway, Tacoma, Wash., noted in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, as having ordered two cars from the Cincinnati Car Company, has drawn the following details for one of the cars which is to be of the closed motor type:

Length of body	44 ft. 11 in.	Hand brakes	frt. end, 18 ft.
Over vestibule	54 ft		brz handle
Width over sills	9 ft. ½ in.	Headlights	Imperial
Height from top of rail to trol. base	13 ft.	Motors	4 G.E. No. 66
Body	wood	Paint	Pull. std. body color
Interior trim	mahogany	Roofs	monitor deck
Underframe	composite	Sanders	air sanders, front end
Air brakes	West. A. M. M.	Sash fixtures	drop sash
Bolsters, body	built-up steel	Seats	Heywood 54-AC
Car trimmings	solid bronze	Seating material	Smok. rattan, pass. plush

Couplers..... Tomlinson Step treads.....Mason
Curtain fixtures.....Keeler Trolley retrievers...Knutson
Curtain material...pantasote Trucks, type.....Baldwin
Destination sign.Std cur. sign Ventilators....ordinary deck
Heaters..... Consolidated sash

TRADE NOTES

A. L. Prentiss & Company, Buffalo, N. Y., have moved their office from 749 Eagle Street to 227 White Building.

Waclark Wire Company, Elizabeth, N. J., has moved its New York office from 49 Wall Street to 20 Exchange Place.

Economy Switchboard & Manufacturing Company, Cleveland, Ohio, has been incorporated with a capital stock of $5,000 by A. Tucker, A. D. Levy, S. S. Levy, H. C. Dowds and G. P. Ziebot.

A. R. Sutter, formerly with the Consolidated Car Heating Company, New York, in the Chicago sales office, is now in the employ of the Railway Specialty & Supply Company, Monadnock Block, Chicago.

S. T. Fulton, formerly assistant to B. L. Winchell, president of the St. Louis & San Francisco Railroad, has accepted a position in the sales department of the Railway Steel Spring Company, New York. Mr. Fulton will have offices at Chicago, succeeding J. L. Woods, resigned.

Lindsley Brothers Company, Spokane, Wash., has appointed R. L. Bayne, formerly connected with the Valentine-Clark Company, as Eastern sales manager, with offices in the Monadnock Building, Chicago, Ill. Mr. Bayne succeeds G. L. Lindsley, who was forced to resign on account of ill-health.

Western Electric Roofing Company, Denver, Colo., is building an addition to its factory to enable the output to be increased to meet the growing demand for elaterite roofing. The paint department will also be enlarged and an elaterite floor covering will be added to the list of the company's products.

E. S. Marshall, sales agent of the American Car & Foundry Company, St. Louis, Mo., who was formerly general master mechanic of the St. Louis Southwestern Railroad, has been placed in charge of the railway lubricating department of the Pierce Fordyce Oil Association, Dallas, Tex., successors in Texas to the Waters Pierce Oil Company.

General Electric Company, Schenectady, N. Y., has placed a contract with the Aberthaw Construction Company for a new reinforced concrete building in Lynn, Mass. The building is to be fireproof, 130 ft. x 51 ft., and three stories high. The exterior walls are to be reinforced concrete frame, paneled with brick, and large window area.

National Electrical Manufacturing Company, Elgin, Ill., reports that it has made from one to 40 installations of its electric visible and audible highway crossing signals on the following electric railways: Aurora, Elgin & Chicago Railroad; Chicago & Milwaukee Electric Railway; Indiana Union Traction Company; Fort Wayne & Wabash Valley Traction Company; Louisville & Southern Indiana Traction Company; Lehigh Valley Transit Company; Water, Light & Transit Company; Evansville & Suburban & Newburgh Railway; Ottawa Electric Railway, and Elgin & Belvidere Electric Railway. The company has also recently made several successful installations in Canada.

Automatic Ventilator Company, New York, N. Y., has recently applied its ventilating equipment to cars of the following companies: Lehigh Valley Traction Company, 10 cars; Schenectady Railway, 5 cars; Oneida Railway, 2 cars; Terre Haute, Indianapolis & Eastern Traction Company, 14 cars; Aurora, Elgin & Chicago Railroad, 10 cars; Indiana Union Traction Company, 10 cars. The Automatic Ventilator Company also reports the receipt of the following orders for the installation of its equipment on cars for steam railroad service: Lehigh Valley Railroad, 18 steel coaches and 15 steel diners; New York, New Haven & Hartford Railroad, 127 coaches and 8 sleepers; Maine Central Railroad, 8 cars; Delaware, Lackawanna & Western Railroad, 20 cars; Boston & Maine Railroad, 125 cars; Delaware & Hudson Company, 1 car; Central Railroad of New Jersey, 15 cars.

ADVERTISING LITERATURE

Automatic Ventilator Company, New York, N. Y., has issued a new edition of its catalog on car ventilation.

National Brake & Electric Company, Milwaukee, Wis., has issued Bulletin No. 390, in which Types N, R and A of National governors are described and illustrated.

Ohmer Fare Register Company, Dayton, Ohio, has issued a small booklet entitled "What There Is in It for You," which deals with its system of collecting and recording fares.

Burton W. Mudge & Company, Chicago, Ill., have issued a folder calling attention to the merits for passenger service of Garland ventilators which they are now handling exclusively.

Peter Smith Heater Company, Detroit, Mich., has issued two circulars containing data compiled from actual tests showing comparative costs of heating 45-ft. and 32-ft. interurban cars with Nos. 1C and 2C, Peter Smith magazine hot-water heaters and modern electric heater equipment.

R. Woodman Manufacturing & Supply Company, Boston, Mass., has printed a 50-page catalog and price list in which its principal products are listed and illustrated. Special attention is called to the company's line of ticket punches, many of which are illustrated in full size. They are accompanied by lists of designs for the dies, which this company makes in great variety.

Barrett Manufacturing Company, New York, N. Y., has printed a 40-page catalog which contains a description of Tarvia, and information regarding the construction of roads with this product. Numerous illustrations are shown of thoroughfares in different parts of the country which have been built with Tarvia. Several letters, from town and city authorities, indorsing the use of Tarvia, are reproduced.

Aberthaw Construction Company, Boston, Mass., has published a report on the wearing surfaces for factory floors. It is the result of an extended investigation and presents the experience of many engineers, builders and manufacturers. The discussion has been concerned mainly with granolithic and wood floors, and it is concluded with specifications for the two types, representing the practice of the Aberthaw Construction Company in concrete, and that of Lockwood, Greene & Company and F. W. Dean in wood floors. In addition there are some brief notes on other types of floor finish that appear to have valuable qualities.

National Electric Lamp Association, Cleveland, Ohio, has issued bulletin 7B entitled "Data on Illumination," in which the requirements and methods of good illumination, direct and indirect lighting and calculation of illumination are discussed. It contains illustrations of Mazda lamps equipped with high-efficiency, extensive, intensive and focusing holophane reflectors; characteristic light distribution curves of these units and other illumination data from which the intensity of illumination can be found for the regular sizes of the Mazda lamps. Several pages are devoted to wiring tables, rules, formulas, etc., which are convenient in laying out lighting installations.

J. G. Brill Company, Philadelphia, Pa., in the *Brill Magazine* for May prints the fifth of a series of biographical sketches of well-known street railway officials in the United States. The subject in the present issue is R. D. Apperson, president of the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company. The sketch is accompanied with an excellent portrait of Mr. Apperson as a supplement. The magazine also contains the seventeenth of the series of articles on the type of car adopted for use in the large cities of the world. The city considered is Winnipeg, Man. The following articles also appear: "Cars for the Rochester Lines of the New York State Railways," "Private Car for the Illinois Traction System," "Cars of the Staten Island Rapid Transit Railway," "A Brake Rigging Improvement in Brill Truck No. 21-E," "Cars for the Zacatlan Branch of the Mexican Railway," "Pay-As-You-Enter Cars for the Illinois Traction System" and "Summer Equipment for the Boston & Northern Street Railway."

Electric Railway Journal

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Atlantic City for the 1910 Convention

General satisfaction, we believe, will be expressed at the selection by the executive committee of the American Street & Interurban Railway Association of Atlantic City for the 1910 convention. Its merits are well known and it is undeniably the best location in this country, all things considered, for an electric railway convention. Atlantic City has an exhibit hall of ample size, it has good hotel accommodations and it is fairly easy of access. Moreover, the climatic conditions at Atlantic City, during the regular time for holding the convention in October, can reasonably be expected to be good. The principal objection to Atlantic City is that the hotels are rather scattered, and being spread along the boardwalk, some necessarily have to be at a distance from the exhibit hall. We do not mean, by reciting these advantages, to express the belief that Atlantic City should be selected as a permanent meeting place or even that the association should meet there whenever the conventions of the association are held in the East. Any other city with equal accommodations in the way of hotels, exhibit hall and meeting places should receive equal consideration, and if any can show better facilities in any of these respects on any subsequent year when the convention has to be held in the East, its claims should receive careful attention by the executive committee. But at least the question is settled for this year, and if the plan is followed next year of meeting in some place other than in the East no other Eastern city will have to be seriously considered until 1912.

A Picayune Strike

Strikes for more wages or union recognition are no novelty, but petty jealousies among microcephalic labor leaders can cause a strike, even when the more common reasons mentioned above are absent. This statement is borne out by the recent strike of some carmen of the United Traction Company, Albany, N. Y. This company operates in the towns of Albany, Troy, Cohoes, Watervliet, Rensselaer and the territory between them. The system is divided into operating divisions which correspond to the normal traffic conditions, but, of course, extraordinary attractions require radical changes in routing. This was exactly the condition which the company had to meet when a circus came to Albany on May 27. Several days in advance, new timetables were prepared whereby cars of the Rensselaer division would not stop at the usual Albany terminus, but would proceed over the tracks of the Albany division to the circus grounds. This temporary change was solely for the public convenience, since it avoided the transfer of large numbers of women and children especially. Instead of loyally aiding the company to carry out this sensible program for circus day, the employees of the Albany division deserted the cars, stating that they would never countenance any such invasion of "their" territory. It did not take many hours for these men and their sympathizers in Troy to learn that the public

was disgusted at their folly and ere the day was over their picayune strike came to an inglorious end.

The Chicago Receivership

The appointment of protective receivers for the Chicago Railways Company appears to have been the only course that was open for those who are responsible for the property. It is an unfortunate development in that it returns the old cloud of receivership to the detriment of the Chicago traction situation, but it in no way indicates a change in the business situation or in the power of the company to meet the obligations that were recognized when the reorganization was perfected. The principal concern of the public in the receivership was in the possible effect upon the rehabilitation which is now in progress but anxiety on this account was dissipated by the prompt statement on the part of all in authority that this work should be expedited. Assurance has been given to the holders of bonds of the Chicago Railways Company that interest on those securities will be met during the receivership. Apart from these two questions, the point about which interest is aroused is as to the consolidation of the Chicago Railways Company and the Chicago Consolidated Traction Company. The statement of Judge Grosscup, of the United States Circuit Court, who appointed the receivers in the present case and in whose court the Consolidated Traction receivers were also appointed, gives assurance that the merger of the two companies is now probable. Without a merger of the two properties or other speedy readjustment of the claims of owners of the Consolidated Traction bonds who conducted the litigation, the alternative is a continuation of the court proceedings, which would be a tedious process of reaching a final legal determination of the rights at issue.

Rates of Wages

It is sometimes instructive to compare the relative financial returns secured in different industries in the way of salaries or wages paid. This opportunity is afforded, so far as the ministerial and electric railway professions are concerned, by some recent statistics published by the census department of the United States Government. According to these figures the average minister of the Gospel in 1906 received an annual salary of $663, whereas the average electric railway wage earner, not including those who are termed salaried employees, earned in the same year $659. There are no complete statistics available since 1907 of the wages paid in what we might call each kind of industry, so that an exact comparison of the present incomes of both classes of workers cannot be made. We believe, however, judging from isolated reports and printed appeals, that during the past three years railway companies have been more liberal in the way of increased pay than congregations, and that if the statistics for 1910 were at hand it would be found that the average motorman and conductor is earning practically as much, if not more, salary than not only the average clergyman, but the average teacher as well. It is true that the average salary in the ministerial profession, as shown by the census report, applies to the entire country and that if only the cities "of the first class," as they are termed in the census report, are considered the average salary would be somewhat more, or to be exact, $1,223. But the same is true of the electric railway statistics and when the difference in time required in preliminary training to qualify for the work involved in each case is concerned we doubt whether the difference in monetary returns received in the two cases would be material. Finally, we are convinced that if the comparison should be carried further so as to include the most closely allied consideration to salary, that is, permanency of employment, the electric railway industry, so far as the trainmen are concerned, would be found superior to the Church.

INCREASING FREIGHT TRAFFIC

Electric railways are successful in competition with steam lines because they offer more frequent service from more accessible points. These favorable features are shared by both the freight and passenger departments. Within their limits of territory the electric railways are better prepared to pick up freight traffic than are the steam roads. Their stations usually are more accessible and the train service can generally be made more frequent without interruption of the passenger schedules. As to the ability of electric roads to transport goods and deliver them at destination points, these services depend on connections and interchange arrangements. It is a pleasure to note that the hostile attitude toward electric roads exhibited by some of the steam lines is steadily lessening and that the freight-handling facilities of the former are being regarded in the more welcome light of feeders by the steam roads.

Interchange arrangements are essential to the success of some properties, and while an electrically operated railway will draw to its service traffic which never before existed, it scarcely could be expected that this unique feature alone will originate sufficient traffic for the sustenance of a property. Like any other business, an electric railway, and especially one which handles freight, must lay comprehensive plans for getting traffic and must spend money to induce new business. The three principal ways to encourage traffic are (1) good service, (2) active solicitation and (3) attractive advertising. The former and latter ways will not be discussed here, but we should like to emphasize the need and value of personal solicitation of traffic for those roads prepared to handle all classes of freight.

Two electric railway systems of central Iowa furnish excellent examples of the results that may be accomplished by intensive traffic solicitation. These are the Inter-Urban Railway, of Des Moines, and the Fort Dodge, Des Moines & Southern Railroad. The former was built primarily as an electric line in competition with steam roads and the latter is an electrified steam road. Each has its main terminus at Des Moines and neither is in competition with the other, but both have to meet steam competition. The plans for encouraging traffic followed by both roads are similar and have been successful or this comment would not be made.

All classes of traffic are solicited for shipment to any destination over connecting steam lines. Steam railroad methods are used by steam railroad men now interested in electric service, and though the fundamental plan of operation is not new, its application requires pioneer work. Because of the strong steam railroad competition the solicitors of the electric roads find it profitable to argue that on account of their interchange arrangements with several steam trunk lines the shipper has available more open markets by delivering his freight first to the electric road than by shipping on a steam road which would favor a final destination on its own system. The rates to a

shipper from a point of intersection of steam and electric lines are the same and business for the electric roads is only obtainable by more frequent service, better shipping accommodations and more aggressive solicitation.

The principal bulk of traffic in the central Iowa territory is coal, grain stock and clay products, but other revenue-producing business is not neglected and each of the electric roads has been successful in locating on its lines industries which are originators of regular shipments. While the amount of passenger business that can be had is limited it is held that there is no limit, comparatively speaking, to the freight development if the road can offer suitable locations for industrial concerns. One of the two roads mentioned has located 15 grain elevators on one of its divisions. The other road has been the means of encouraging two grain buyers and five elevator companies to establish headquarters on its interurban line since November of last year. On this same interurban division the traffic department has also succeeded in inducing local capital to build two new factories, and three other manufacturing plants have been encouraged to move to locations along the electric line. Other traffic producers which have been located along this electric line are a country club of 500 members, a State military encampment grounds and the winter home of a large circus. The latter sources of traffic, however, are largely of benefit to the passenger department.

Live stock is often considered not to constitute an ideal kind of traffic, but if a road wishes to succeed it must make every mile of its track produce some freight business, so both of the interurban lines operating out of Des Moines offer excellent facilities at all way stations for the collection and shipment of livestock. One of the traffic men of the interurban railway annually visits every farmer and stock raiser within 5 miles of the line. Thus he learns where the stock is, when it is going to move and has an opportunity personally to solicit the shipment for his road. These shipments average 15 carloads of stock per week, sent from some points on the Inter-Urban line to Chicago. Both of the electric roads serving Des Moines are interested in handling mail to the country towns, not alone from the revenue standpoint, but also, and principally, because it is a means toward improving the towns and making it possible for business along the route to be conducted more promptly.

Steam railroad methods have been applied wherever possible. The accounting methods of the traffic departments of both roads are founded on steam railroad principles and use the general types of blank forms. Both roads are interstate carriers and operate under the regulations of the American Railway Association and the Freight Claims Association. The steam railroad methods of investigating freight claims are followed, particular care being taken to give prompt attention to the settlement of claims. In this way the smaller electric roads have the advantage of the large steam railroad systems and they can frequently gain the dissatisfied customer of their competitor.

These two railroads do not have track or equipment which is better than that of many other roads similarly situated. They have, however, given the subject of traffic up-building a thorough study and only by aggressively applying their best efforts toward inducing new business have they succeeded in bringing about a continued growth in the community and of their own gross receipts.

ANNUAL REPORT OF THE PUBLIC SERVICE CORPORATION

Although the Public Service Corporation of New Jersey began its business operations in 1903, its first annual report was not issued until this year. The information presented in the report relates therefore to the results of operations in the last fiscal year and in the preceding years, when the property was undergoing preparation for the present standard of service and earnings.

Under the comprehensive plan of organization which has been developed, the corporation now operates directly only the electric lighting and power properties, while the railway system and the gas properties are operated respectively by the Public Service Railway Company and the Public Service Gas Company. The three classes of business are further subdivided into divisions and a detailed comparison of the gross revenue by divisions in 1908 and 1909 indicates the districts where the greatest development in each utility occurred.

The relative importance of the various classes of utilities operated is shown by the fact that in 1909 the railway system contributed 45.6 per cent of the total gross revenue, the gas company 29.6 per cent and the corporation 19.3 per cent from operation and 5.5 per cent from miscellaneous sources. The proportion secured by the railway has been getting smaller. During the seven months ended Dec. 31, 1903, the first fiscal period of operation, the railway furnished 47.3 per cent of the total gross.

Only one total for operating expenses and taxes is given in the report so that no analysis of the costs of operation can be made. Gross earnings and miscellaneous income aggregated $26,560,451, and operating expenses and taxes were 50.2 per cent of this sum or $13,331,228. It appears that the corporation and its controlled companies paid in taxes in 1909 a total of $1,225,583 and the deduction of this amount indicates net operating expenses of 45.6 per cent of the gross. The aggregate sum paid last year for bond interest and rentals of leased and controlled lines and for fixed charges of the Public Service Corporation was $11,800,775, equivalent to 44.4 per cent of the gross earnings and miscellaneous income.

In the development of the property large additions were made to the capital investment from June 1, 1903, to Dec. 31, 1909, divided as follows: Railway, $20,004,341; corporation, $7,073,247; gas company, $8,772,907; total, $35,850,495.

The president's report discusses many details of the company's operation, and among them none is perhaps of more interest than the experience recounted in regard to fire protection. The improvements introduced in this department have effected a material saving in insurance costs for the company. According to Mr. McCarter, the amount of insurance in force on July 1, 1903, was $9,455,000, with an annual premium of $122,400, while the total now carried is $20,273,000 at an annual premium of $122,909, that is to say, the amount of protection has been more than doubled with substantially the same premium. The investment for improvements which was a necessary antecedent of so notable a reduction in insurance rates as this change implies is given as approximately $200,000. At 5 per cent this indicates an addition to fixed charges of $10,000 annually. Mr. McCarter adds that he expects additional substantial economies will be obtained in the near future, either through the further lowering of rates by the insurance companies, or by the establishment of a self-insurance fund.

PROGRESS IN CATENARY CONSTRUCTION.

The paper on "Electric Railway Catenary Trolley Construction," contributed by W. N. Smith, before the American Institute of Electrical Engineers on May 27 is a valuable engineering summary of the principal types of this construction and their merits under certain conditions. Since the first catenary installation made in this country about six years ago, there has been such a remarkable development that sometimes it seems as if new designs were invented before the earlier ones are given a reasonable time to show their merits. We are inclined to believe that designers of catenary systems in their desire to make a novel construction absolutely perfect, have gone further than necessary to make the apparatus self-adjustable for all conditions. This applies particularly to hangers, which not only show a remarkable range from the simple to the complex in their make-up, but also vary greatly in the length and number specified for the same spans.

In comparing bow pantographs and wheels for current collection, Mr. Smith says that the drawback of the former is its sluggishness in responding to irregularities in the height of the trolley wire. This objection holds true where the bow is carried directly on the main frame in which event the neglect to respond immediately even to minor variations is likely to cause sparking and burning of the wire and collector; it does not apply, however, where the collector is mounted on a light auxiliary structure which takes care at once of any minor movements, while the main frame is raised to care for the larger changes in clearance, due to bridges, tunnels, etc. It is very interesting to note the author's experience that the staggering of the trolley wire is not necessarily inevitable where bow collectors are used. The fact is that the average interurban car does all the "staggering" necessary to prevent the sawing through of the collector at any one point. Even the more rigid conditions involved in steam operation would seem to indicate that staggering of the contact wire is quite needless. After all, the roller pantograph appears to be a good all-round solution of the current collection problem. It has certainly demonstrated its worth, both on the Valtellina line in Italy and the California interurban line mentioned by Mr. Smith.

The mooted question of regulating the tension of the overhead wires of catenary systems is made the subject of interesting comparisons between European and American practice, On such lines as that of the Heysham, Morecambe, Lancaster division of the Midland Railway in England, the contact wire is run in lengths of 2400 ft. to 3000 ft., anchored at one end, while the other is attached to poles carrying a weight of about 1200 lb. The train always enters at the fixed end of a section and leaves at the weighted end so that the collector bow tends to strengthen the wire. Mr. Smith believes that without the upwardly yielding hangers used on foreign lines it would be necessary to maintain a minimum tension of at least 2000 lb. and that the only excuse for maintaining a lower tension is the ability of the trolley wire to yield at the hangers. Such hangers are not employed in this country where it has been found that by using phono-electric, copper-clad or steel wire for the trolley, tensions up to 5000 lb. can be cared for without automatic devices. It might not be economically desirable to use a low conductivity wire on low voltage lines, but there appears to be no objection to its use on a high voltage line. Judging from the experience of the New Haven Railroad with steel contact wires, little trouble need be expected from arcing at the current collectors. Lack of space forbids consideration of other points brought up by Mr. Smith, but his paper leads the reader to the general conclusion that the main problems of catenary work are being effectively solved. It is worth noting, too, that despite the fact that so much catenary work is being done abroad, the American engineers are not slavishly following foreign designs, but have originated many features to reduce the complications and make the line automatic throughout.

SUBSTATION DESIGN AND OPERATION.

So long as direct-current motors are used on long electric railway lines, and that is likely to be for a considerable time, the question of substation design and operation is one of fundamental importance. In modern railway plants the rotary converter is generally the backbone of the system and on the successful and economical operation in substations with rotaries the economy of the power supply directly depends. The substation motor presents itself in two aspects. First, in the very large railway systems there are substations of great output coupled with relatively short transmission lines. Power is generated in polyphase machines and practically the whole working load of the system is passed out to the working conductors through the rotaries. In the second place, on the longer electric lines distribution is similarly accomplished, but with the difference that the transmission lines are relatively long, and the substations of moderate capacity usually suffer from too low load factor. We recently published a discussion of the conditions in some of these substations of the latter class and suggested the necessity of certain economies in their operation. Additional figures on cost of operation on the Boston & Worcester and Third Avenue railroads are presented in another column. As substations increase in output and improve in load factor the cost of operation per unit converted naturally grows less, but on the other hand, the fixed charges for real estate are apt to be greater because a large substation usually implies a large city and higher prices for ground. Hence a reduction in the cost of conversion is of importance to both the large and the small road. In seeking a way to better conditions it is practically necessary to do so outside of the efficiency of the rotaries themselves because that is usually so good that it cannot be materially improved save by increasing the load factor.

The most material improvement which has been made recently is in the development of some of specially compact types of high-output rotary converters, such as are beginning to find their way into the service of the larger railway systems. The labor costs of a substation do not vary greatly with its output. The same staff required for two or three small rotaries can equally well handle two or three big ones with a proportionate reduction in the operating charge against the output. Recently converters of 2,000 kw or 3,000 kw have become fairly common, machines costing less per unit of output and occupying far less space per unit than the small rotaries in more general use. By using such big machines it is quite within bounds to say that the operating expense per unit can be almost cut in halves. As to the fixed charges the situation, while less favorable, is encouraging. In city work for which alone these great substations are easily applicable the cost of real estate is a very serious matter. This cost can be very greatly reduced by the employment of larger converting units. There is no reason, indeed, why several units may not be

superimposed in successive stories if land chances to be exceedingly valuable, and it is altogether certain that the cost of space for the substation can thus be kept far below anything now usual. Furthermore, upon the whole the big units perform rather better at low loads than do the small ones at relatively low loads and for a given load factor yield somewhat more economical results. The main thing to be considered in such substation buildings is, of course, the value of the real estate, but the mere fact of low cost per kilowatt output gained by increase in the size of the machines is also a factor not to be neglected in the costs. It would be an extremely valuable exhibit from the standpoint of costs to collect data from some of the most recent substations, using the big rotaries, to which we have referred. Not only are the costs important to ascertain in themselves, but they also have a very important bearing on the development of alternating-current traction. If the transmission and transformation charges rise beyond a certain amount, the balance swings in favor of a.c. at the motors. Every reduction of cost in the transmission and transformation on the other hand increases the economic value of the system at present employed. The transformation balance sheet, therefor, is daily growing in importance and recent improvements in practice should be followed up with the closest attention.

PROFIT IN PARK OPERATION

During the last few years there has been some change in the general sentiment in regard to the profit to be derived from the transportation of passengers to street railway parks. We can hardly say that there has been a similar change in regard to the operation of the parks themselves, because few railway managers have ever been able to derive a profit directly from a park. They have been content if it paid its operating expenses. The decrease in enthusiasm as to the profits from riders to parks is not due to the fact that people have no desire for outdoor entertainment and will no longer patronize trolley parks. It is because of the increased cost of conducting transportation on most city systems which has reduced to almost nothing the profit on a long-haul 5-cent ride. Park traffic is chiefly one-way travel with heavy peaks, requiring more or less extra equipment and crews to be available during the summer months. The outbound cars in the afternoon and early evening return practically empty and usually make one or more round trips without taking in enough in fares to pay the cost of power. Under the most favorable conditions it is difficult to-day for some companies to make money on a 5-cent fare. They cannot afford to continue encouraging park traffic if it is carried at a loss.

There are some ideally located parks, of course, which are and will continue to be sources of profit to the railway companies owning them because a fare high enough to yield a reasonable return can be charged without affecting the patronage. Big Island Park, 20 miles out of Mineapolis, is an example of a successful summer resort to which people flock in large numbers despite a round-trip fare of 50 cents. Union Park, near Dubuque, Ia., is another resort near a small city which has been developed into a profitable venture. The situation of the park at the head of a gorge, about 5 miles from the center of the city, is such that it is accessible only by the street cars. A round-trip fare of 15 cents is charged by the company. In this instance also the transportation revenue is sufficient to show a balance on the right side of the ledger, but it is doubtful if any profit could be made with a straight 5-cent fare out and back. The temptation in promoting traffic too often is to get the business without counting the cost of handling it. The cost of handling park traffic should not be overshadowed by the prospects of the season's revenue from this source.

IMPROVING TELEPHONE DISCIPLINE

Better telephone discipline may be difficult of attainment, but surely it is worth striving for. Since the safety of train operation is entrusted to a railway telephone circuit the use of the instruments employed in this service should be restricted absolutely to those who, as a matter of duty, are interested in train movement. Safety is the most important object sought in successful train operation and should not be sacrificed for economy. When the use of telephone line is limited in the way mentioned, a certain respect is attached to the messages transmitted and the tendency for small talk and discussion which weaken discipline is counteracted. Some electric railways may justly be criticised for laxity in allowing trainmen to talk upon all sorts of subjects over the dispatching wire.

When the telephone was first proposed for use in handling steam railroad trains the fear was expressed that a train order transmitted by word of mouth would not command the respect necessary for good service. That criticism has largely been overthrown by two means: First, the heads of the transportation departments have enforced rules forbidding the use of the telephone except for necessary railway business, and, second, a type of telephone equipment with selectors has been installed and is so arranged that the dispatching office is the center of authority as to those who are permitted to use the telephone at any time. A railway has the best available means for transmitting its messages when it has separate lines for commercial and train-operating departments, and when the telephone stations are equipped with some type of selector or cut-out so that only those instruments which are in use are bridged across the wires at any one time. Not all roads can afford to remodel their telephone systems or install separate lines, but no road can afford not to instill into the users of its telephones the idea that small talk on an operating line is worse than a waste of time; it not only prevents someone else from getting in touch with the dispatcher, but it breaks down the wall of respect which should surround a dispatching office. A means for preventing the growth of the practice of indulging in idle conversation over dispatching wires can be provided by furnishing the manager or superintendent with a telephone instrument which is always connected with the operating wires. A rather complete system of branch-office telephones recently was installed in the general office of a new high-speed interurban railway. In addition to the regular office equipment the general manager had a switch placed close to his desk so that he could connect his telephone directly with the dispatching wire over a pair of leads which did not pass through the office switchboard. This permitted him at any time to learn what was said over the wire. We are not acquainted with the exact results accomplished in this instance, but such a means for frequently listening to the business carried on over the dispatcher's wire should assist in enforcing a better attitude on the part of those responsible for the safe movement of traffic.

ROLLING STOCK MAINTENANCE ORGANIZATION OF THE MASSACHUSETTS ELECTRIC COMPANIES

The system of the Massachusetts Electric Companies includes the lines of the Boston & Northern Street Railway and the Old Colony Street Railway, extending from Nashua, N. H., on the north to Newport, R. I., on the south, and comprising about 1000 miles of track. The executive offices of the combined systems are located at 84 State Street, Boston. As a result of the consolidation of numerous systems of varying size and strength and diversified administrative practice, the organization illustrates the benefits of centralized control for a wide operating area. These advantages have been realized by the public in improved service, reduced rates and greater financial stability.

In no department have the advantages of a single administration been more apparent than in the maintenance of equipment. Associated with this work has been the development of an organization for the care of rolling stock. With nearly 50 operating car houses scattered over the system and about 30 storage car houses on the company's list, the successful administration of equipment repairs and inspection requires a comprehensive division and location of responsibility. All rolling stock and shop maintenance on the lines north and south of Boston is handled by the equipment department, whose head, with the title of superintendent of equipment, maintains offices at the headquarters in Boston, reporting to the superintendent of motive power and machinery.

The diagram on the opposite page shows the general organization of the equipment department. At the Boston headquarters the superintendent of equipment has an office force consisting of a clerical staff headed by a chief clerk, an assistant engineer with a testing force, drafting force, and an inspector of equipment. The Boston & Northern lines are divided into two divisions with maintenance headquarters at Chelsea and Lowell, Mass., and the Old Colony lines are similarly sectionalized, with headquarters at Campello (Brockton) and Fall River, Mass. At Chelsea and at Campello quarters are provided for a superintendent of car repairs. One of these officers is scheduled for the lines north and the other for the lines south. Reporting directly to the superintendent of equipment, the incumbents of these two positions will be able, when the plans of the department are further advanced, to relieve the Boston office of much investigation and scrutiny of routine matters.

Immediately responsible for the maintenance and condition of the rolling stock and shops on the two systems are four general foremen, having quarters at Chelsea, Lowell, Campello and Fall River. Under these officials are clerical forces, inspecting staffs and foremen of individual car houses. The greater portion of all routine business centers upon the general foremen, who are in immediate control of the shop practice at their respective headquarters as well as of the management of the numerous car house maintenance and inspection forces scattered over the systems. Minor shops are directly under the general foremen, but the storage car houses are placed under the subordinate jurisdiction of the nearest car house foremen. In general, only summaries of routine matters are forwarded to Boston from the general foremen's offices, but the latter are in constant touch with the head of the department, and in many exceptional cases the most minute details concerning questions at issue are furnished the officer in charge of the entire work. All the operating centers of the systems are connected by a private telephone service, and in addition many important points are provided with the regular service of the New England Telephone & Telegraph Company.

MONTHLY STATEMENT OF CRIPPLED CARS FOR JULY, 1909

	Car-miles per car pulled in— 1909.	1908.	1907.	1906.	Principal troubles.
Essex	23,745	5,675	3,003	2,530	Scattered
Maplewood	21,252	3,497	2,469	6,212	Scattered
Nashua	19,908	4,997	6,616	1,300	
Myrtle St.	19,281	6,303	13,485	4,060	Scattered
Byfield	16,196	8,232	4,383	....	Scattered
Gloucester	10,209	3,064	2,171	4,560	Scattered
New Port.	8,180	1,567	12,805	1,180	Armatures
Campello	8,069	3,699	3,887	3,700	Brakes, controllers, armatures
Quincy	7,721	5,919	7,608	3,040	Controllers, brakes and rigging
Westwood	6,801	4,592	5,184	2,415	Scattered
Reading	6,405	1,354	1,410	2,820	Scattered
Hyde Park	5,543	5,803	35,195	2,360	Armatures
Fall River	5,424	4,119	2,211	1,690	Armatures, brush-holders
Danvers	4,968	8,011	3,761	1,850	Armatures, brakes
N. Abington	4,585	2,394	1,570	1,150	Brakes and rigging
Lakeville	4,566	3,559	3,359	1,660	Air brakes, leads
Taunton	4,091	2,731	803	1,180	Brakes, air brakes, armatures
Haverhill	3,763	2,112	1,733	1,210	Armatures, brakes, trolleys
Washing'n Av	3,580	3,306	3,524	4,850	Armatures
Melrose	3,427	3,645	2,050	2,010	Miscellaneous, motors and controllers
Wyoma	3,404	5,484	2,018	1,150	Fields
E. Weymouth	3,363	2,208	2,738	1,685	Controllers, brakes and rig., trolley
Webb St.	3,210	2,327	3,463	1,250	Armatures, brush-holders
Wakefield	2,973	1,783	1,308	2,080	Armatures
Woburn	2,859	2,705	3,093	1,820	Controllers, armatures
Broadway	2,597	2,189	4,475	1,570	Armatures, leads, brush holders
Lawrence	2,489	3,113	2,021	1,780	Brakes and rigging
Lowell	2,310	2,527	2,426	2,540	Controllers, armatures, brakes
W. Lynn.	1,506	3,274	2,036	3,330	Armatures, fields, brush-holders
Div. 1, O. C.	5,974	3,672	3,766	2,480	Brakes, armatures, controllers
Div. 2, O. C.	5,108	2,660	1,532	1,440	Armatures, air brakes
Div. 1, B. & N.	3,178	2,741	2,510	2,190	Armatures, fields, brush-holders
Div. 2, B. & N.	2,864	2,724	2,369	1,840	Brakes, armatures, controllers

Old Colony Street Railway Company, Division No. 1:
109 defective cars. Average mileage, 5,974 (July, 1908—3,672).
Previous months—5,863, 4,857, 7,208.

Old Colony Street Railway Company, Division No. 2:
83 defective cars. Average mileage, 5,108 (July, 1908—2,660).
Previous months—5,162, 3,959, 3,973.

Boston & Northern Street Railway Company, Division No. 1:
334 defective cars. Average mileage, 3,178 (July, 1908—2,741).
Previous months—2,436, 1,994, 1,713.

Boston & Northern Street Railway Company, Division No. 2:
238 defective cars. Average mileage, 2,864 (July, 1908—2,724).
Previous months—2,616, 2,556, 2,538.

On each system one afternoon per month is devoted to a meeting of car house foremen, their superiors and the superintendent of equipment, in which a general subject of interest is discussed, followed by an analysis of experiences. These meetings have been productive of great good, and aside from the information and instruction offered, have improved the friendly relations existing between the subordinate employees of each system.

Form C 82. 2-10-1m. A. T. H.

STREET RAILWAY COMPANY

REPORT OF DEFECTIVE CARS REMOVED FROM LINES FOR ENDING

Car House	Car Body									Trucks						Motors & Controllers									Trolley & Wiring				Total	
	SEATS	STEPS AND RUNNING BOARDS	REGISTERS	WINDOWS	CURTAINS	GRAB HANDLES	FENDERS	SAND BOXES	HEATERS	MISCELLANEOUS	BRAKES AND RIGGING	AIR BRAKE EQUIPMENT	HOT JOURNALS	FRAMES AND SPRINGS	WHEEL DEFECTS	AXLES	MISCELLANEOUS	CONTROLLERS	ARMATURES	FIELDS	BRUSH HOLDERS	GEARING AND CASES	OVERHEAD SWITCHES OR CIRCUIT BREAKERS	BEARINGS	LIGHTING	MISCELLANEOUS	TROLLEYS	LEADS AND CABLES	LAMPS AND WIRING	RESISTANCE	MISCELLANEOUS	FALSE	OPERATING AND INSPECTION

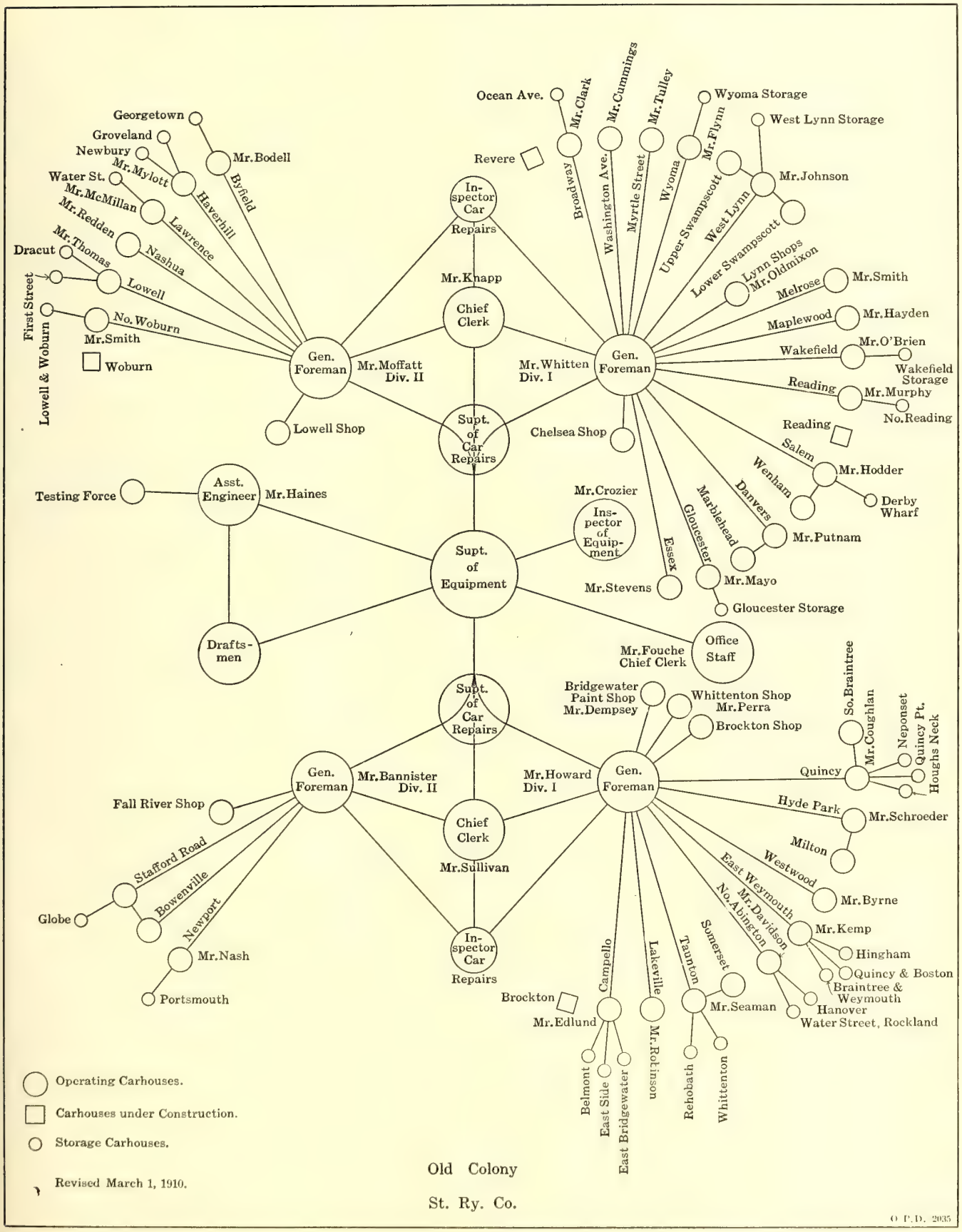
Massachusetts Electric Companies—Report of Defective Cars Removed from Service

STANDARDIZATION OF FORMS

In order to avoid confusion in an organization of such scope it is necessary to make use of a number of printed forms relating to internal business. The forms have been standardized with the object of avoiding complications and providing the necessary detailed information with a minimum expenditure of time and thought. The forms in use, some of which are illustrated herewith, are those pertaining to the work of the car

house, the shop and general foremen's offices and the records of the Boston office.

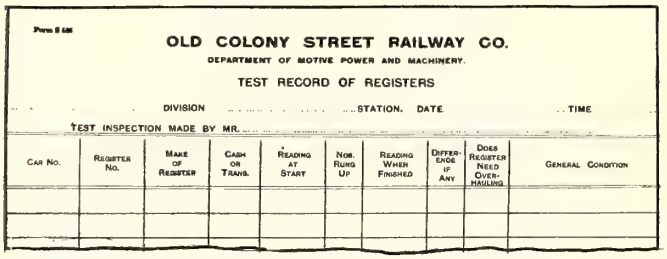
At all car houses a daily log book is kept with duplicate sheets. This shows details relating to the leaving times and numbers of cars operating on the different routes, armature and wheel changes, bearing and field changes (the latter being shown under coil numbers top or bottom), cars put up for the night or otherwise at foreign stations and the reverse, cars inspected as to body, trucks, brake rigging, motors, controllers, wiring, etc., and cars out of service on account of defects. Any accident or occurrence which causes a car to be withdrawn from its regular duties is noted, whether caused by employees, outsiders, or by circumstances beyond control of the company. The original log sheet is forwarded to the office of the superin-



Massachusetts Electric Companies—General Organization Chart of Equipment Department.

tendent of car repairs daily, and a duplicate is kept at the car house for the information of the car house foreman.

In addition to the notation made on the car house log book, a form is sent daily by the car house foreman to the general foreman, in case of a defect or failure in service, to show the car number, route, direction of transit, trouble, amount of delay, pole number, action taken in regard to withdrawing the car from service, time of withdrawal if any and motorman's number. If the trouble causing the delay is due to an accident the fact is shown, as well as any trouble due to an inherent failure of the equipment. The general foreman notes this information and then forwards the form as filled out to the office at Boston, so that the head of the department is informed regarding withdrawals from service, their cause and results.



OLD COLONY STREET RAILWAY CO.

DEPARTMENT OF MOTIVE POWER AND MACHINERY.

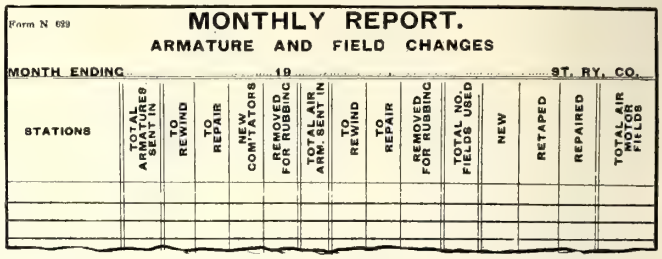
TEST RECORD OF REGISTERS

DIVISION ... STATION. DATE ... TIME

TEST INSPECTION MADE BY MR. ...

Car No.	Register No.	Make of Register	Cash or Trans.	Reading at Start	Nos. Runs Up	Reading When Finished	Difference if Any	Does Register Need Overhauling	General Condition

Massachusetts Electric Companies—Test Record of Registers



Form N 629

MONTHLY REPORT.

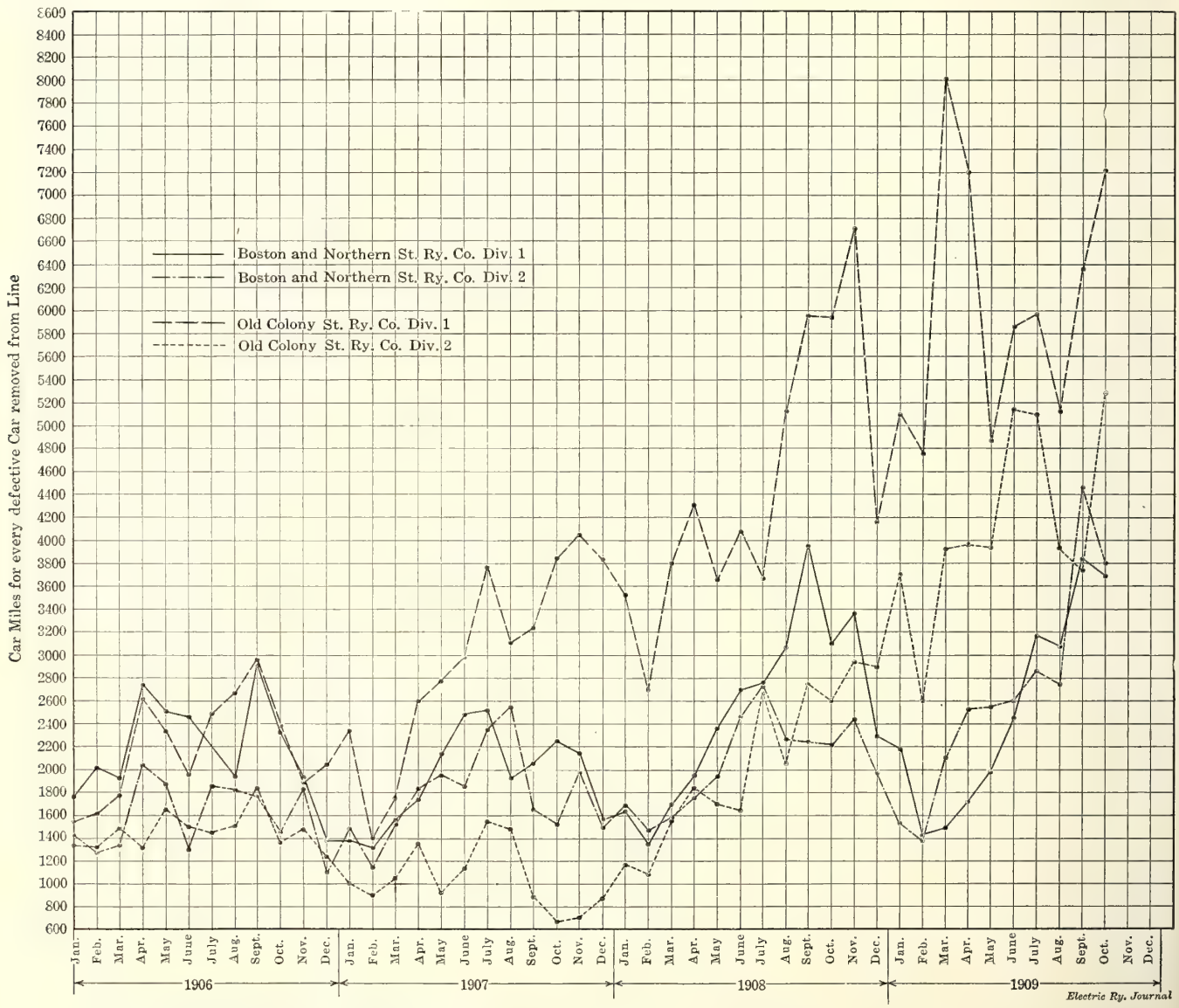
ARMATURE AND FIELD CHANGES

MONTH ENDING ... 19 ... ST. RY. CO.

STATIONS	TOTAL ARMATURES SENT IN	TO REWIND	TO REPAIR	NEW COMMUTATORS	REMOVED FOR RUBBING	TOTAL AIR ARM. SENT IN	TO REWIND	TO REPAIR	REMOVED FOR RUBBING	TOTAL NO. FIELDS USED	NEW	RETAPED	REPAIRED	TOTAL AIR FIELDS

Massachusetts Electric Companies—Monthly Report of Miscellaneous Car Service Expense

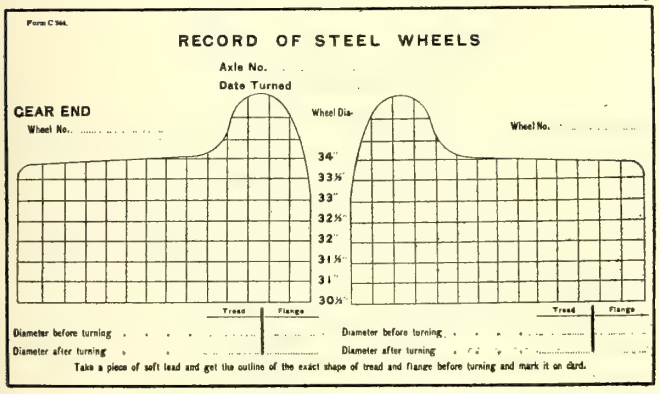
From these forms the Boston office prepares a monthly tabulation of defects occurring at all the car houses on each division. This tabulation, shown on page 970, provides for over 30 subdivisions of defects classified under car body, trucks, motors and controllers, trolley and wiring troubles. The number of cars damaged in service is indicated, and the report also shows the average mileage at each car house per shift-over or pull-in for a defect, the same figure for the corresponding month of a year back and for the three preceding months. Thus, in the report for July, 1909, the Campello car house had a total mileage of 217,863 car-miles. One car was damaged in service. One miscellaneous, six brake and rigging, seven air brake, four controller, three armature, one field, two brush holder, two lightning, two lead and cables and one miscellaneous defects occurred, or a total of 27 for the car house. The average mileage per defect was 8069, compared with 3699 the year before in the same month. The mileages per defect in the three preceding months were 9478, 4560 and 5098.

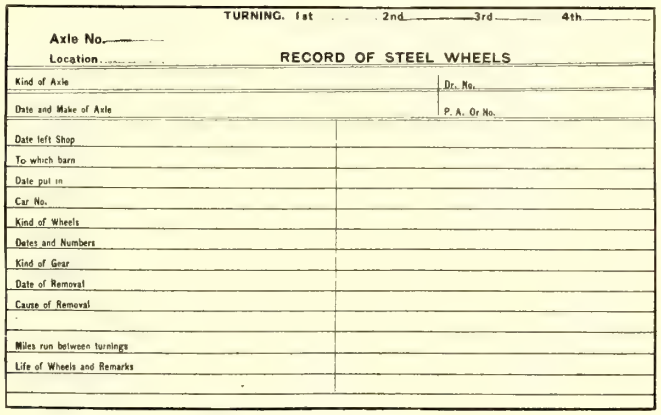


Massachusetts Electric Companies—Chart Showing Car Miles of Defective Cars Removed from Service

CAR-MILES RUN PER DEFECT

Each month a table is prepared of the troubles at the individual car houses. The summary for July, 1909, is shown on page 970. The table illustrates how the number of car-miles run per defect causing a pull-in has increased in the past four years. About two to three times more mileage is now obtained per pull-in than in 1906, when the system of recording defects was inaugurated. In 1906 the Campello car house, for instance, was getting only 3700 car-miles per defect, whereas in the month shown 8069 miles was the record. In a few instances four times as much mileage is now obtained. A chart showing the results since January, 1906, is given on page 972. Scientific analysis of the causes of equipment failures and steps taken to prevent the occurrence of troubles have accomplished these results.

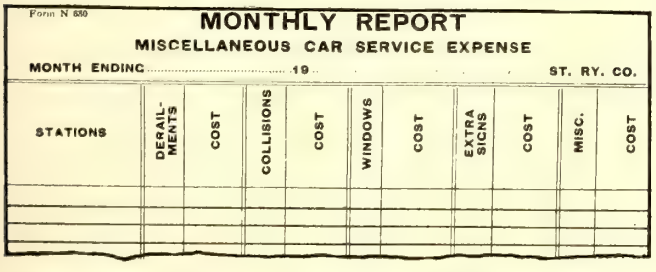




Massachusetts Electric Companies—Obverse and Reverse Side of Steel Wheel Record Card

At all car houses a weekly statement of changes in equipment and cars equipped is made out in triplicate. Changes in equipment, such as motors, controllers, trucks and air compressors, are recorded by kind and numbers. Two of the sheets are forwarded to the office of the superintendent of car repairs for each system, one copy remaining at the car house. Another car house record is a change of location sheet, also in triplicate. This covers the transfer of all vehicles, either sent away or received, and also includes registers changed from one car or place of storage to another. Two sheets are sent to the office of the superintendent of car repairs, and of these one is sent to Boston, to facilitate posting the card catalog record maintained there of each piece of rolling stock on the two systems. One copy remains at the car house.

Thorough reports are made in regard to the car equipment in cases of accident. At each car house is provided an accident report book with triplicate record. This report covers the nature of the accident in detail giving the particulars as to time, location, condition of car, date and extent of last inspection and name of inspector of the car as a whole and the part involved in the accident, type of motor, gearing details, type of controller, kind of truck and brake details, as well as the style of resistance. The name of the man who makes reports is required. The original sheet is given to the car house foreman and filed in an accident report folder, the duplicates being forwarded to the office of the superintendent of car repairs. This form has been found of great value in connection with the work of the claim department.



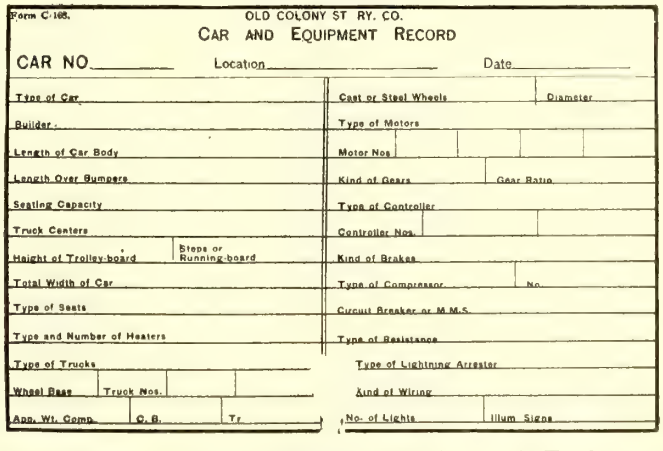
Massachusetts Electric Companies—Monthly Report of Armature and Field Changes

ACCIDENT REPORTS

On the morning following any car accident the division foreman or superintendent of the operating department makes out a request to the foreman of car repairs regarding the car accident reports wanted. The accident report request asks the foreman to inspect and furnish a complete report on specified car accidents, stating the dates and car numbers, the location of the accident, brief description and time of request. The operating foreman is expected in addition to notify the foreman of car repairs verbally immediately after an accident, so that inspections can be made in due time. The accident report request book is made up with the sheets consecutively numbered and is so kept on file by the foreman of car repairs. Responsibility for prompt inspections after accidents is fixed by this form.

The forms for defective material, material used, daily record and time cards, time books and requisitions are designed in conformity with the usual practice. The car inspection card is in the form of an original record, signed by the man who does the work, and this is classified under car bodies, fenders, motors, controllers, car wiring, trucks, brakes, air brakes and heaters. In this signed record the claim department finds evidence of proper care of the equipment.

Special care is taken in testing car registers to maintain an accurate record as to the numbers rung up, the place and date of test. These tests are usually made quarterly and each form gives the car number, register number, make, readings before and after tests, need of overhauling and action taken. The management does not favor testing registers by removing them from the cars and sending them around the system in a more or less haphazard manner. The original of the test record is sent to the cashier at the division headquarters, one copy is sent to the general foreman and superintendent of equipment and the third remains in the test book.



Massachusetts Electric Companies—Car and Equipment Record

A special report is used at car houses in connection with work done on rolling stock that has been crippled on account

of such accidents as collisions, derailments, split switches, etc. This is a simple form covering labor and material, but it is advantageous in enabling the equipment department to charge unusually heavy repairs to accidents, when they are the cause of extra expenses. Where such a form is not used, it is often difficult to separate the cost of ordinary maintenance from that due to accidents, and the showing of a group of shops or car houses for a given period may be seriously handicapped if the influence of troubles beyond the control of the maintenance organization is not determined.

Among the shop forms in use the record of steel wheels is interesting. This is an index card, 5 in. x 8 in. in dimensions, both sides being used. One side carries a developed wheel tread and flange, with cross lines ¼ in. apart. The wheel outline is taken with a piece of soft lead and the card is then marked with the calipered dimensions, giving the wear of the wheel between inspections. The reverse side of the card gives data as to the turning of wheels, life of wheels, gear and axle fits, etc. This record is kept in the general foreman's office. A summary of material used at given car houses is useful. This is made up from the daily reports of material used sent by car house foremen to the general foreman. This record shows the precise amount of material used on each day of the month for trucks, motors, controllers, trolleys and miscellaneous, over 60 items being covered. A summary for all car houses on the lines north or south is made monthly by the office of the general foreman and sent to the headquarters at Boston.

Among the card records maintained at the general foreman's office are pattern card, wheel and axle record, made up from a postal card report of changing wheels, which is sent from car houses to the office of the superintendent of car repairs, a car and equipment record card made up from measurements and data taken in the shops, an accident and defective card, records of fields and armatures received at the shops, report of cars repaired and returned to service during each day, construction time sheet used in making up new car equipments, according to the classification of the Interstate Commerce Commission, employment slips and foreman's daily time slip used between internal parts of the system to avoid recording labor in two time books.

Whenever a car passes through Boston from one system to the other a report of the transfer is made to the superintendent of equipment on a special form. The use of this form records the condition of the car on passing between the systems.

At all car houses a large inspection record is posted near the pits, with space showing the character of inspection performed on each car on the different days of the month, special symbols being used for motors, controllers, trucks and general inspection. The use of this form has been found to increase materially the facility with which the foremen follow the work and keep the inspection up to a high standard.

RECORDS AT BOSTON OFFICE

Among the records kept at the Boston office are monthly reports of wheel changes, armature and field changes, miscellaneous car service expense and a car and equipment record. The latter gives the details of the fittings of each car on the lines north and south of Boston, one card per car being allowed. A form has been worked out recently by the office of the superintendent of equipment to show the operating details of the different routes at the various car houses, including the schedule speeds of the routes, running time, character of car service, distance of round trips, ton-miles per car per day, etc. A column will ultimately be added to give the energy consumption in watt-hours per ton-mile for the different routes, and it is anticipated that valuable comparisons will be effected when this is done. Provision is made for a tabulation of regular and extra car mileage per day, and the mileage per employee.

Form C 52. 4-30 09-500. A.T.H

STATION ..... St. Ry. Co.

YEAR .....

CAR ROUTES AND MILEAGE.

NAME AND NUMBER OF ROUTE	REGULAR OR EXTRA	SINGLE OR DOUBLE TRACK	NAME OF STATION CAR AT SCHEDULE TIME PUTS UP NIGHTS	TIME CAR LEAVES STATION	TIME CAR PUTS UP	SCHEDULE TIME ROUND TRIP hr. min.	NO. OF ROUND TRIPS PER DAY	MILES PER ROUND TRIP	MILES PER CAR PER DAY	MOTOR MILES PER CAR PER DAY	SCHEDULE SPEED M. P. H.	AVERAGE MILES PER DAY FOR EACH ROUTE	TON MILES PER CAR PER DAY	TOTAL TIME OUT	
															Regular Car Mileage per day
															Extra Car Mileage per day
															Total Car Mileage per day
															Motor Miles per Car per day
															No. of Regulars
															No. of Extras
															Total
															No. of Cars at Station
															No. of Motors " "
															No. of Men " "
															Regular Miles per Man
															Total " " "
															Motor " " "
															Ton " " "
															Motors per Man
															Cars per Man
															Average miles per Regular Car per day
															Track Miles Operated.
															CAR NOS. BY ROUTE

Massachusetts Electric Companies—Table of Car Routes and Mileage

All cars operated over 200 miles per day are given a daily inspection, and in general all rolling stock, except certain extra cars, is given an inspection at least once in three days.

The work of the equipment department is in charge of E. W. Holst, superintendent, who has extended many courtesies in connection with the preparation of this article.

A writer in a monthly magazine describes the successful use of cambric pinions. In making these pinions, the muslin is cut out in disks which are assembled and pressed between two steel washers, the whole then being securely fastened with rivets or tag bolts as in the manufacture of rawhide pinions. The blank is next turned to the proper diameter and the teeth cut in a gear cutter. The gear is finally soaked in machine oil. The oil thus absorbed keeps the pinion teeth lubricated indefinitely. Over 700 of these cambric pinions are in service.

TOLEDO MEETING OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

The Central Electric Railway Association held its last meeting before the summer recess at Toledo, Ohio, on May 26 and 27. About 75 railway and supplymen attended the session. The convention was welcomed to Toledo by Mayor Brand Whitlock who, in speaking, classed the problem of municipal government as one of the greatest questions of the age. Electric railways, by bringing about closer contact between cities and the country, were helping in the solution of this problem. John F. Ohmer, president of the Ohmer Fare Register Company, replied in a pleasing speech.

DISCUSSION OF PRESIDENT'S SPEECH

The committee appointed to discuss suggestions made in the inaugural speech of President Whysall reported, in part, as follows:

"Paragraph 3. Lack of Mutual Confidence.—Your committee regrets that any necessity exists for the president to bring this matter to the attention of the association, and suggests that a special committee be appointed to consider the advisability of, and if advisable, suggest a plan for an association arbitration board, before which serious differences of opinion may be brought and adjusted. In addition, it suggests that each member constitute himself a committee of one, whose special duty is to try and smooth out insignificant differences that may exist between the various member companies, so that in a short time they all may work together for the common good.

"Paragraphs 4 and 5. Difficulty in Securing Information from Employees with Reference to Connections at Junction Points and the General Bearing of our Employees Toward the Traveling Public.—Your committee appreciates the good work done by the Traffic Association and heartily joins the president in his congratulations, but suggests that this work still be continued by the Traffic Association to the extent of publishing an official time-table covering the lines in the association district. This publication might possibly be made a source of income to the association. This time-table, with the necessary instructions as to its use, put in the hands of those dealing directly with our patrons, and in connection with stringent rules regarding their courtesy, politeness and encouragement of and attention to inquiries, would, we feel sure, in a very short time result in an increase in business due to the traveling public's appreciation of our very apparent efforts to serve them to the best of our ability.

"Paragraph 6. Dirty Stations and Cars.—Your committee regrets that these conditions exist, but feels that no concerted action can be taken by the association as this is a matter of the discipline employed by each individual company.

"Paragraph 10. Claim Index Bureau.—It has occurred to your committee that the reason quite a number of the roads have not sent in their reports is solely because they have been overlooked. Now that the president has given it the prominence it deserves the various managers will undoubtedly see that reports from their roads are sent in the future.

"Paragraphs 11 and 13. Lack of Interest in the Work of Special Committees and of the Secretaries of the Various Associations.—With many regrets your committee reports that a very large portion of us will have to plead guilty to the president's charge. We, however, ask for a suspension of sentence for a reasonable time so as to enable us to show how much help we can and will give the committees and the secretaries in the future. We all recognize the immense benefit of the work and we should, therefore, whenever we can, contribute all the information we have bearing on the subjects under investigation.

"Paragraph 12. Closer Affiliation of Our Association With the American Street & Interurban Railway Association.—In view of the fact that 65 per cent of the members of this association are members of the National Association your committee assumes that the sentiment of this association is in favor of a closer affiliation and, therefore, recommends the appointment of a committee to bring about such closer affiliation.

"Paragraphs 14, 15 and 16. The Relation of Cost of Handling United States Mail, Freight, Express and Package Business to the Income Derived Therefrom.—So far as the United States mail is concerned, your committee suggests that this be referred to the standing committee, which was appointed to cooperate with a similar committee of the American association for the purpose of securing more equitable rates for the handling of United States mail. As there seems to be a great difference of opinion among interurban managers as to the profits to be derived from the freight, express and package business, your committee would suggest that a special committee be appointed to investigate and report to the association its findings on the following questions: (1) Can interurban lines, in general, handle freight business at steam railroad rates at a profit? (2) How can the express and package business be made most profitable for interurban lines in general?

"Paragraph 17. Discussion of Papers and the Advisability of Having One or Two Two-Day Sessions Each Year.—Your committee respectfully recommends that the regular papers read before the association be printed and distributed so that the members can have the papers before them during the discussions. The committee suggests that the advisibility of having one or two two-day sessions each year be referred to the executive committee for decision.

"Respectfully submitted, Martin J. Insull, chairman, C. H. Warren, S. D. Hutchins."

The report was accepted, without discussion, and ordered placed on file.

PREVENTION OF ACCIDENTS

The paper on the "Prevention of Accidents," as presented by E. F. Schneider, general manager, Cleveland, Southwestern & Columbus, and read at the South Bend meeting, was next discussed. This paper appeared in the ELECTRIC RAILWAY JOURNAL April 2, 1910.

F. D. Carpenter, Western Ohio Railway, had found Mr. Schneider's paper worthy of very careful reading. He had a warm personal acquaintance with the author and so had read between the lines and could understand the true humanitarian spirit in which the paper had been written. He believed the paper to be one of the best ever presented before the association. Its keynote, sympathy, was a feature not frequently employed. During the past four years the standard of efficiency of employees had been raised, and the public attitude had changed so that operating conditions could not be settled as in years past. Thus it was more than doubly incumbent upon the representatives of the public service corporations that they should set an example for the people by handling their employees and properties rightly. He thought that if all men who administered the affairs of railway properties would carefully consider the plans outlined by Mr. Schneider, and would put them into effect, so far as could consistently be done, the number of accidents materially would be decreased.

In addition, Mr. Carpenter said that a railway company should put into use as many good mechanical devices as practicable to relieve the men from brain-tiring work.

C. L. Henry, Indianapolis & Cincinnati, had read the paper on "Prevention of Accidents" several times and felt that the author was recommending that operation be carried on by the sentiment of the heart rather than the judgment of the mind. Mr. Henry, in disciplining men, maintained a principle that it should always be his privilege to change his mind; therefore, he might be convinced later that, as Mr. Schneider had suggested, a road could be properly operated without inflicting punishment on the employees for disobedience. When he returned from the meeting at which the paper on accidents was read, Mr. Henry obtained copies of the paper, and gave one to every motorman and conductor on the Indianapolis & Cincinnati Traction line. Within 30 days thereafter it had been necessary for Mr. Henry to violate a life-time principle, and for the first time put into effect a suspension of employees for disregard of rules.

Mr. Henry felt that operating problems were so complicated that no definite rules for handling all manner of infractions of discipline could be laid down. The general suggestions made in the paper would be of great value in lessening accidents. The plans for educating the public to assist in avoiding accidents were most important, and the holding of meetings for school children and others should surely bring good results. Whenever the railways teach people to think at the right time then the troublesome accidents will disappear. Mr. Henry had an incontrollable impulse to hurry across the street in front of moving vehicles, and he was no more rash than the ordinary person. Now that the Railroad Commission of Indiana had recommended a peculiar and striking crossing sign he thought that it would be the cause of making people more attentive and thoughtful, and thus would lessen the number of accidents.

Referring again to Mr. Schneider's suggestions for the greatest possible elimination of discipline, Mr. Henry said that he thought this ideal condition would only come about when someone learned to combine a sympathetic heart with an iron hand that knew the right time to strike.

H. C. Warren, Toledo & Indiana Railway, thought that there could be no fixed rule regarding discipline, all cases could not be handled alike. The proper way was to apply the discipline that in the judgment of the management seemed best to meet the needs of each case.

Mr. Schneider said that the discussion of his paper had centered around what to do after an accident had occurred. In his opinion it was best to know what to do beforehand. Referring to his suggested method of handling employees and its reception by other railway men, Mr. Schneider said he knew that with the introduction of any new method there would follow many rebuffs. It was not possible to educate the men in a few days. Neither did he intend to convey the idea that it was best to do away with discipline immediately; rather the course would be that the men should be educated from the humanitarian and social standpoints and then when the men understood the need for greater care and better operation the need for discipline would disappear.

Mr. Schneider then presented some statements regarding the accident records of his road for the last one and a half years which to him showed that his plan was working rightly. During the past year not a single school child had been injured, and this clear record could be credited to the fact that more than 42,000 children had been addressed on the subject of taking particular care when about car lines. Formerly there had been some distressing accidents, and he had notified the school teachers to instruct their pupils how to take care of themselves. This method had not been successful and so he had resolved to make the talks himself. The cost of damage claims on the Cleveland, Southwestern & Columbus had decreased to 1.25 per cent of the receipts, and if the present ratio of decrease continued they would fall below 1 per cent for the coming year.

With a view to finding out what various men thought of his ideas as presented in the paper read at South Bend, Mr. Schneider had sent copies of that paper to James O. Fagan, and to Edgar J. Rich, general solicitor, Boston & Maine Railroad. Mr. Fagan, who had written many articles and books on the prevention of accidents and the relations between railroads and their employees, replied, in part, as follows: "I look upon your pamphlet as the most practical word on the subject from any quarter that I have yet come across. While your ideas on discipline are my own theoretically, and while it may be the only possible method in the management of the future, I have not yet persuaded myself that the interest of all concerned can safely be confided to your system yet awhile, until the personally responsible spirit among employees has had time to develop. Otherwise, I am heartily with you and your views in this pamphlet from beginning to end."

Edgar J. Rich had written Mr. Schneider in part as follows: "Your address on the prevention of accidents read before the Central Electric Railway Association is the best thing of the kind that I have ever read. It is sound, sympathetic and fearless. You have collected in it practically all the wisdom on the subject. When you say that the cause of accidents primarily is the failure properly to teach the human element its obligation, you put your finger on the sore spot in our railway organizations. What you say about your method of holding meetings is most interesting. I have believed that that is the only effective way to educate the men. Discipline counts for little; the men have got to be taught. I wish your address could be in the hands of every operating officer and every employee on the railroads in the United States."

Mr. Schneider had received these complimentary letters and many others gratefully, and considered that he had had good confirmation that he was on the right track. Careful education of the public and employees required a great amount of work on the part of a railway manager and for this reason he thought many managers had not been inclined to do as much educational work as was needed to show the great results possible by broader application of the principles laid down in the paper. He knew that to succeed in his plan of education he must first get close to the men. He had just finished a series of meetings which had been attended by all of the men of his road except the trainmen. At one of the sessions 120 laboring men listened attentively to his suggestions, and showed willingness to co-operate heartily toward stopping the great waste of life and property caused by accidents. When such a body responded so feelingly he said it made him think that his plan was sure to bring the desired results.

Mr. Henry restated that he had a high opinion of the paper and did not question the fact that Mr. Schneider was attacking the accident problem correctly. Mr. Henry did not mean to criticise Mr. Schneider's plan of education, but nevertheless he did feel that discipline must still be retained. There were certain offenses that needed strong punishment, and an appeal to moral sense of right would not always suffice. He was doubtful as to how to act toward men who had violated rules so that the next time a similar violation would not occur.

Mr. Schneider replied that he did not mean to imply that after an accident the men who had disobeyed should not be punished. He still did some disciplining on his road, but the need for it was gradually disappearing.

Referring to Mr. Henry's mention of strong punishment, Mr. Schneider stated that men had been disciplined severely in railway work for 50 years and still the need for discipline existed.

VALUATION OF OPERATING PROPERTIES

A paper on the "Valuation of Operating Properties" was next read by Edgar S. Nethercut, C.E., Chicago, Ill. This paper will be found in the Electric Railway Journal for May 28, on page 945.

Mr. Whysall called attention to the need for more general knowledge among railway men of the subject of valuations. It was well worth studying because within the next few years considerable such work would be done in the central territory. The railways especially should be prepared to handle the problem when it confronted them.

M. J. Riggs, of Riggs & Sherman, Toledo, Ohio, had taken part in the valuation of several large steam railway properties. While Mr. Nethercut's subject was a broad one Mr. Riggs did not think that he should have so lightly passed over the question of real estate valuation. Mr. Riggs had done considerable work of this kind for State railway commissions and was familiar with the valuations of railway real estate made in the States of Michigan, Wisconsin, Minnesota, Nebraska and New Jersey. In Michigan, the railway real estate had been valued and its purchase price had been found to have been from three to five times that for adjacent farm lands. The average farmer knew how to take good care of himself in a real estate deal with a railway company. As a result of the determinations made in Michigan a ratio of 3 to 1 had been determined as proper for the relative values of railway property and adjacent farm lands. The valuations made in Wisconsin had established the correctness of the ratio which applied in Michigan. In Minnesota a ratio of 4 to 1 had been accepted.

Mr. Riggs said that when it was the purpose of an appraisal

to determine the amount of property that a company had it manifestly would be unfair to neglect such ratios of real estate values. However, he did not think that such high ratios would apply to the real estate of a city property, because in an urban district a company's holdings were usually disconnected and the company need not purchase any particular parcel that might be held at an excessive value.

Speaking of unit prices, Mr. Riggs agreed fully with Mr. Nethercut that the basing price should be the present day price, and that an extremely high or low unit brought about, for example, by extraordinary market conditions, should not be accepted. Also he was afraid of the results that might come about when accounting for depreciation caused by age, unless the appraisal was made by careful, experienced men. In some work in which he had been interested in the South, stone buildings had been found to be in good condition so far as their desired use was concerned after 50 years had elapsed, and when, according to a determination of depreciation proportionate to age, they should have had no value.

When questioned, Mr. Riggs said that the Michigan appraisals in which he had taken part had been made for the legislature so that it could learn the value of the railroad property for purposes of taxation. This also was the reason for the Wisconsin valuations. In Minnesota the valuation had been made for use in the determination of rates.

Mr. Henry thought it interesting to know for what reason a valuation was being made. He had heard the following dialogue:

"How much is that brown mare of yours worth?"

"Why do you ask that? Are you the tax assessor or has the railroad killed her?"

For purposes of taxation Mr. Henry strongly favored basing the valuation on the earning power of a railroad, while if the value was being found for the purpose of determining rates it should include the entire cost for development, as well as all intangible values.

Mr. Nethercut, referring to Mr. Riggs' criticism that he had not devoted enough attention in his paper to the appraisal of real estate, said that the subject which he had tried to cover was so broad that he had been forced to pass over some of these details lightly even though they were of great importance. Appreciation of real estate values went a great way toward bringing the present value of a railway property up to its capitalization. Sometimes a valuation was useful in proving that the railway had little water in its capitalization. All costs for development should be included carefully and every bit of value should be claimed. These points were of interest to railway men because sooner or later they would all be directly interested in valuation work. A full and complete knowledge of the value of a property would enable its representatives to stand before municipal bodies and gain rights that otherwise might not be obtained. Satisfactory valuations only could be made after carefully planning the work for each property.

Regarding valuations for rate-making, Mr. Nethercut said that the Wisconsin Railroad Commission had allowed the traction companies to include the cost new of all pavement between tracks in their total capitalization. Now, the question arises, shall the traction companies be taxed on that value?

UNIVERSAL STOP SIGNS

A paper entitled "Universal Standard Car Stop Sign vs. Present Method of Indicating Car Stops" was read by R. M. Hemming, assistant superintendent, Ohio & Southern Traction Company, Columbus, Ohio. Mr. Hemming began by stating that there seemed no possible chance of solving the question of where to stop cars as was indicated by the article on "Near vs Far-Side Stopping in Chicago and Other Cities," published in the March 19 issue of the ELECTRIC RAILWAY JOURNAL. After quoting from this article a list of the various stop signs or marks used in different cities, Mr. Hemming took up the question of a standard sign. A great deal of confusion and many accidents would be prevented if some common stop-sign system were used throughout the country. Mr. Hemming presented four designs, of which two were reproduced on page 880 of the ELECTRIC RAILWAY JOURNAL of May 14. He said that these forms were offered merely as suggestions so that the association might use them as a starting point in any consideration of this subject. He thought that if any particular design were chosen it should be copyrighted by the association, but that the manufacturing rights should be given to anyone in order to minimize the cost. Such a design might be made of two metal sheets, the front sheet with punched or stenciled letters and painted white, the back sheet to be of the same type but solid and painted black so that the black background would show through the front sheet. Thus the repainting could be done by unskilled labor at a small cost compared to the expense that would be entailed by having signs relettered. The signs could be made removable for painting by mounting them on poles in flat sockets such as are used for tail-end signal lamps. Mr. Hemming also suggested the possibility of using a white metal or wood sign with black lettering to afford the most readable combination both night and day.

A general discussion followed the reading of this paper, and the inconsistency and incompleteness of many schemes for indicating the stopping points of cars were pointed out. As a result of the discussion, which emphasized the need for standard signs, the association instructed the president to appoint a committee to study and recommend signs which would be satisfactory for general adoption.

H. A. Nicholl, Indiana Union Traction, said that at the request of the Indiana State Board of Railroad Commissioners he desired to announce that the commission had on hand 10,000 red cross signs which it was anxious to have placed in the cars throughout the State. These signs in sufficient number could be obtained by any railroad at practically no cost. They were of correct size to fit in the city car sign racks or to place in a neat frame at the end of an interurban car.

Mr. Schneider said that his company had obtained from the Red Cross Society, at Washington, 500 cards, two of which had been placed in each car, and one in each depot and waiting station over the entire road. The cost of these signs was about 1 cent each.

On motion of F. D. Carpenter the association voted its approval of the generous use of the Red Cross signs and recommended that they be put in all cars and stations in the central territory.

REPORT OF THE STANDARDIZATION COMMITTEE

The report of the standardization committee was read by H. H. Buckman, chairman, who stated that at the final meeting of the committee, held on April 28, all members were in attendance and had agreed unanimously upon the following recommendations:

(1) The self-centering feature of couplers should be dispensed with.

(2) Couplers must be made to couple and uncouple automatically with M.C.B. and all other types of M.C.B. contour couplers, whether used by steam or traction roads.

(3) A device should be adopted for holding couplers on center when intercoupling with steam railroads.

(4) An open knuckle for shackle bar connection should be used.

(5) The draft rigging should meet M.C.B. requirements, and the draw-bar anchorages should be equivalent in strength to M.C.B. equipment and requirements.

(6) Couplers must not uncouple when cars are being pushed around a curve of 35-ft. center radius.

(7) There should be an arrangement to open and release the knuckle without requiring the operator to pass between cars.

(8) The face of the knuckle vertically should be 11 in. minimum and 15 in. maximum, a flexible drawbar carrier should be installed and there should be a locking device in the coupler head to keep the couplers from becoming uncoupled vertically.

(9) The height of drawbar center should be 31½ in. minimum and 34½ in. maximum above the head of the rail.

(10) The coupling center of the coupler should be at least 11 1/16 in. from the nearest point of the buffer face.

(11) The air hose angle fitting should be placed with its

coupling center 12 in. from the face of the angle air brake hose fitting, and all hose and hose couplings should be M.C.B. standard.

(12) Whenever possible the radii of the bumper should be 5 ft. to permit a uniformity in couplers and to maintain a uniform distance between bumper faces and the coupling centers of couplers.

(13) Adjustable continuous tie rods should be installed from coupler to coupler passing from the base, or extreme bottom of anchorage, of the coupler, thence over the bolster to the coupler on the other end of the car.

(14) Couplers should be placed on both ends of the cars.

(15) The association should purchase and have on file at the secretary's office the dictionary and the proceedings of the M. C. B. Association.

(16) The standards should be published after adoption.

President Whysall spoke of the importance of the standardization problem and suggested the advisability of having the report of the standardization committee distributed to each member company so that the recommendations might be considered before the next meeting at which the report should be discussed thoroughly.

Mr. Hemming, calling especial attention to the second recommendation, pointed out that while each of the so-called M.C.B. traction couplers might operate satisfactorily when coupled with a steam railroad car they would not automatically couple with other M.C.B. contour traction couplers, because the particular feature which had been added to make the couplers rigid when united, varied with different manufacturers. The committee had no device to suggest for holding couplers rigidly on centers when coupled to steam railroad cars. It felt that such an attachment was necessary, however, or an electric railway car equipped with a radial drawbar would not be accepted by a steam railroad.

C. F. Franklin, Toledo & Western, emphasized the need for careful standardization. Formerly he was connected with a steam railroad that had 47 different kinds of couplers which met the M.C.B. requirements and would intercouple. This variety had now been reduced to six. Mr. Franklin stated that the sharpest curve on the Toledo & Western was 13 deg. and that all of the freight equipment had M.C.B. couplers and attachments which operated satisfactorily.

After a general discussion of many of the details in the report the secretary was instructed to have it printed and forward a copy of it, together with the illustrations in blueprint form, to each member company.

STANDARD FILING METHODS

The following report suggesting standard methods for filing clippings from the electric railway papers and manufacturers' publications was submitted by the committee on this subject. The report was accepted and the recommendations were adopted.

"Your committee was instructed to consider carefully the subject of filing all printed matter, which ordinarily is received in a railway man's office. The need for a carefully thought-out system of filing was first presented to this association last fall in an able and comprehensive paper by R. N. Hemming, assistant superintendent, Ohio & Southern Traction Company, Columbus, Ohio. Mr. Hemming made a number of novel suggestions, which could be summarized in the statement that every railway office should be prepared properly to classify and file the valuable matter received in technical papers, and in the advertising catalogs, pamphlets and similar publications distributed by manufacturers.

"After the reading of Mr. Hemming's paper, a committee was appointed to consider his suggestions. This committee reported to you at the November meeting and among other things suggested that, as the publishers of the technical papers were vitally interested in ideas presented by Mr. Hemming, they should therefore be given opportunity to present their side of the case. Accordingly, at the South Bend meeting the report on the subject of 'Loose Leaf Filing of Matter Contained in Technical Publications,' was presented by L. E. Gould, Western Editor, Electric Railway Journal. In accepting this report the association instructed its president to appoint the present committee, which is composed of railway and manufacturers' representatives.

"Your committee has carefully reviewed the subject as presented by Mr. Hemming, and as discussed in the reports subsequently made. At a meeting held yesterday your committee agreed upon the following ideas, which are presented for consideration at this time:

"The committee recommends the adoption by railway companies of a vertical filing system to hold matter not larger than 9 in. x 12 in.

"This method of filing in vertical cases or drawers is now in general use, and has become so because of its flexibility, general utility and possibility of expansion. The vertical filing system should be found satisfactory for the use proposed because it may readily be adapted for filing catalogs, circulars and clippings of various sizes. Wiith a vertical file a railway man may effectively group published matter into sections and subdivisions, so that it will be possible at any time to pick out all the data received on any one subject that may be under consideration. The vertical filing system is also thought to be most satisfactory because at a small additional cost it may be expanded indefinitely. If a railway man wishes to file blueprints with his catalogs and printed matter he can best do so by the use of the vertical filing case.

"We recommend to the publishers of the technical papers that no periodical shall be larger than 9 in. x 12 in. in size.

"This size will not interfere with the filing of full unfolded pages from the electric railway papers.

"With regard to all classes of advertising matter circulated by manufacturers, it is recommended that no publication be larger than 9 in. x 12 in., as this matter will fit in the vertical filing system earlier recommended.

"It is suggested that the manufacturing companies should consider the subject of uniform sizes and establish standard sizes to which all companies could limit their publications. It is most desirable to have not more than three standard sizes for catalogs that might be published by different companies; none of these, however, should exceed 9 in. x 12 in. It is also suggested that when a manufacturer has established a catalog or pamphlet size he should use this as a standard for all other publications circulated among railway men.

"Thus, the general catalog of any one firm, the price lists and other pamphlet publications of this firm would be of uniform size and could conveniently be grouped by the railway man, who received them, into one section of his filing case, which might also contain clippings from the electric railway publications.

"Respectfully submitted, R. H. Bloss, chairman, S. D. Hutchins, H. C. Marsh, S. R. Dunbar, C. Burckmyer, T. D. Sheerin."

In discussing the report on the recommended standards for filing Messrs. Hutchins and Dunbar spoke of the need for bringing the recommendations to the attention of the American Street & Interurban Railway Association and the American Street & Interurban Railway Manufacturers' Association. Thus a considerable reduction in the number of sizes of electric railway association and advertising publications might be effected. This would considerably reduce the work of filing such publications for future reference.

L. E. Gould, Electric Railway Journal, suggested that the Central Electric Railway Association and other sectional bodies could greatly assist the American association by promptly furnishing the secretary of that association with copies of their standards and recommended practices.

SUBJECTS FOR CONSIDERATION

R. M. Hemming, assistant superintendent, Ohio & Southern, presented a list of topics and subjects of a mechanical nature for future discussion by the association or the standardization committee. Some of these were as follows:

Illumination of car signs, so that they can be read just as easily by day as by night.

Uniformity of tail-end signals, regardless of whether railroad

employs an electric tail-end signal system or uses oil lamps. If the electric system is used pockets should be provided on the cars to permit hanging standard tail-end lamps.

A standard trailer connection should be put on all cars so that plugs and receptacles will be interchangeable.

Look into the feasibility of conductor's control pipe for signal system, when operating two or more cars in train.

Adopt a uniform plug and receptacle and hanging devices for headlights.

Some insignia should be adopted to identify traction material that might be lost or stolen.

S. D. Hutchins related the circumstances surrounding the theft of a large amount of high-priced metal fittings, including triple valve parts, which had taken place near Buffalo some years before. The thieves were apprehended and the stolen goods were located, but when the case was presented at court it was lost bcause the railroads interested could not identify any particular piece of standard apparatus as belonging to one company; therefore, Mr. Hutchins pointed out the need for electric railway companies having some identifying mark on all material having a relatively high value.

E. C. Spring, past president, referring to the address of acceptance of President Whysall, complimented the association on not only having approved Mr. Whysall's suggestions as an organized body, but on having acted upon many of them as individual companies. Mr. Spring agreed with Mr. Whysall that there were many features of electric railway service which should be improved and he said that such improvements should be fostered by the association. The Central Electric Railway Association contained a considerable proportion of the interurban railway mileage of the country and therefore the unified action of its members has considerable weight. Mr. Spring called attention to the good work which the Iowa association had done at its last meeting and urged every member company to support the Central Electric Association willingly and to fulfill any assignments made by its officers during the summer recess.

ELECTRIC RAILWAY INSURANCE

The report of the insurance committee as published in this paper last week was read by Henry N. Staats, chairman, vice-president, American Railway Insurance Company. Mr. Staats announced that copies of his remarks would be distributed to each member company.

F. W. Coen, general manager, Lake Shore Electric Railway, recited the experience of that company in improving its insurance conditions. He did this with a view to urging that insurance matters be given more careful consideration. Two or three years ago the railway company had prepared plans and specifications for equipping its buildings with sprinklers. These were submitted to the Ohio inspection bureaus and later, after revision of the plans, the company purchased a sprinkler equipment. Before the installation of the sprinklers the insurance rate had been $1.68 and the premiums were between $10,000 and $11,000. The sprinkler equipment cost $18,000 and was the means of obtaining a 30-cent rate. Now the amount of insurance has been increased by $1,000,000 and the premiums were less than half. In addition the company had its property in full operating condition and under better protection than before.

When questioned Mr. Staats stated that the American Railway Insurance Company was not writing policies because, by reason of its improvement work, the old line companies had greatly reduced their rates. It was hoped that it would not be necessary to write policies, but the company was prepared to do so at any time. Mr. Staats had furnished plans and specifications to 50 railway companies which had improved their insurance conditions.

THE ACCOUNTING DEPARTMENT

A. F. Elkins, auditor, Columbus, Delaware & Marion Railway, read a paper on "The Relation Between the Accounting and Operating Departments," as presented on page 944 of last week's issue.

W. E. Rolston, Cleveland, Southwestern & Columbus, spoke a word against making frequent changes in the classification of accounts. He realized that the important changes in the general classifications made during the last two years had been desirable and necessary, but he urged the accounting officers to favor just as few changes in the future as they could and yet meet the requirements of the law. The operating department was at a disadvantage when frequent changes of account numbers were made because of the difficulty of making comparisons with the results from former years. Several officials expressed their satisfaction with the system of accounts as introduced in January, 1909.

A paper on "Track Bonding" had been prepared by T. W. Shelton, but because of his absence and a lack of time for consideration it was not presented.

The committee appointed to consider the advisability of amalgamating the Central Electric Accounting Conference with the Central Electric Railway Association was instructed to report at the next meeting. President Whysall announced that the convention committee favored holding the next meeting at Indianapolis on Sept. 23, but that that announcement was subject to the findings of the hotel committee.

EXHIBITS

The Toledo meeting was attended by about 50 manufacturers' representatives and exhibits of apparatus were made by the General Electric Company, the Automatic Ventilator Company, Chicago, and the National Electric Specialty Company, Toledo. The exhibit of the General Electric Company included the following: New design 15-ft. capacity, CP-27, motor-driven air compressor in operation. The top of the compressor case had been replaced with plate glass and the operation of the new method of oiling was clearly shown. This company also exhibited a K-34 controller with individual blow-out coils, Sheradized line material and samples of new brush-holder construction for electric railway motors. The Automatic Ventilator Company showed its system for ventilation of car bodies. The National Electric Specialty Company exhibited the VAC-M lightning arrester for telephone circuits and line fittings.

MEETING OF COMMITTEE ON EXPRESS AND FREIGHT, TRANSPORTATION AND TRAFFIC ASSOCIATION

A meeting of the committee on freight and express traffic of the American Street & Interurban Railway Transportation & Traffic Association was held at Toledo, Ohio, on May 26. P. P. Crafts, chairman, general manager Iowa & Illinois Railway Company, Charles Floyd, general passenger and freight agent Grand Rapids, Holland & Chicago Railway, and M. H. Hyman, Electric Package Agency, Cleveland, Ohio, were in attendance. The committee met for the purpose of discussing the proposed data sheet which will be circulated prior to formulating the report. It is the idea of the committee to take special care in formulating the questions for the data sheet so that answers may easily be made. The intention is to determine as nearly as possible how each road is accounting for the earnings and expenses due to its freight traffic. A majority of the questions will have to do with the methods accounting and record keeping of the freight and express departments. Thus it is hoped to learn what each road has done during the past year toward working out various units of cost and expenses. With replies to the data sheet in hand the committee anticipates that it will be able to make a clear statement as to the relative value of freight and express and other traffic handled by electric railways.

Schemes have been sanctioned for the construction of underground electric railways at Buenos Ayres, the concessions having been secured by or with the co-operation of the Anglo-Argentine Tramway Company and the Compagnie Générale de Tramways de Buenos Ayres, of Brussels, Belgium.

It is stated that the Padua-Fusina Railway, Italy, proposes to electrify that section of its line between Malcontenta and Mestre.

THE MONTREUX-GLION ELECTRIC RACK RAILWAY

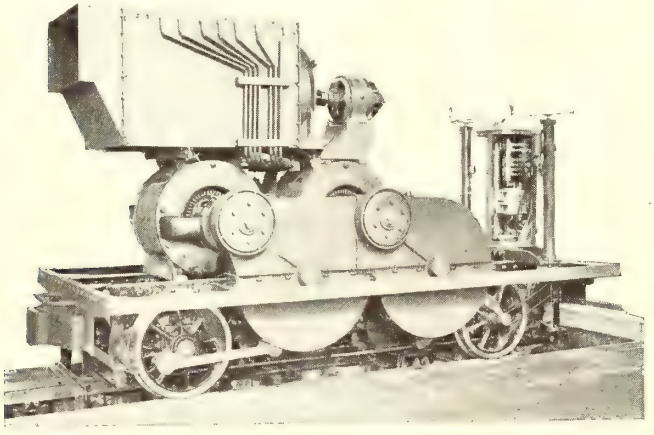
The practice of Switzerland of combining a rack railway with one of the ordinary type is exemplified in a striking way by an electric line in Switzerland built between Montreux and Glion by the Oerlikon Machine Works and put in operation about a year ago. Montreux is situated on Lake Geneva, the shores of which at this point rise precipitously so that the

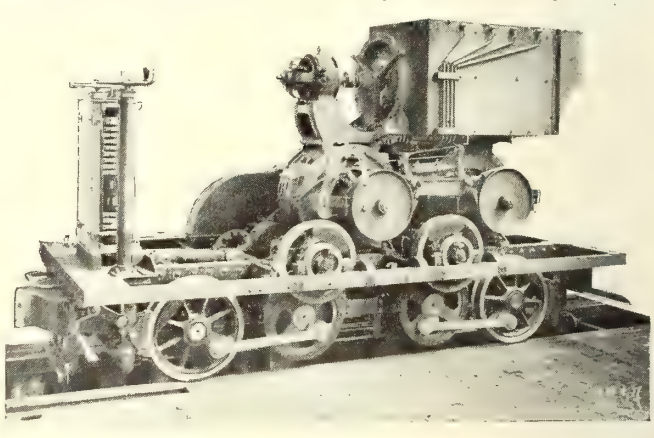


Station at Montreux

town of Glion which is but a little distance in a direct line from Montreux is much higher in altitude.

The line is only 1¾ miles in length and in this distance ascends a height of 964 ft. The track is laid with two gages so that the locomotives can haul as trailers the cars of either one of two steam railways which reach its terminals. On the line there are several tunnels, one of which is 1260 ft. in length and traverses three-quarters of a circle in the rock, 260





Side Views of Locomotive with Cab Removed

ft. in radius. The grade in this tunnel is 13 per cent so that one end of the tunnel is 160 ft. higher than the other. The average grade on the entire line is 10½ per cent and the maximum grade is 13 per cent.

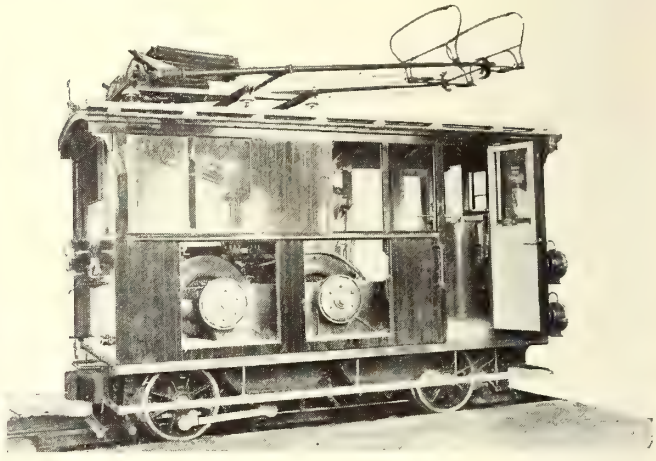
The rack which is not carried the entire distance of the line is of the Abt type. It differs from previous rack constructions in one particular. To provide for the easy entrance of the teeth of the locomotive gear, the usual plan has been to make the teeth in the rack at the beginning of a rack section, shorter than normal. In the Montreux-Glion line, the entrance teeth of the rack are of standard height but are reduced in thickness so that the gear on the locomotive slides into engagement with them easily.

OVERHEAD CONSTRUCTION

The line is operated by direct current at 800 volts with a double trolley wire, designed for use with a bow collector. Where the cars operate for a short distance over the steam railroad tracks at Glion, the trolley wire is of steel and is placed out of center so as to be out of the way of the fumes from the steam locomotives.

SUBSTATION

Three-phase power is purchased from an hydroelectric power plant. The rotary converter substation owned by the company is equipped with two sets of 110 kw converters which are arranged so that they can be connected in parallel with those in the substations of the Montreux-Bernese-Oberland Railway. In



Side View of Locomotive

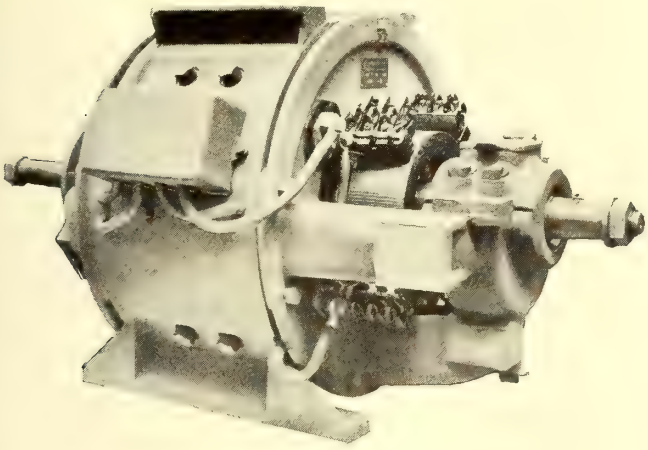
this way, the different substations can be used to supplement each other and the batteries in one substation even could be charged with current from the other.

The batteries, which are made by the Oerlikon Company have a new type of plate, designed especially for power station and substation auxiliary use. Instead of separating the plates by the usual glass tubes, their spacing is maintained by plates of wood which better prevent the buckling of the plates. While the interior resistance of the battery is increased by the employment of these plates, this increase is largely compensated by the ability to put the plates closer together.

LOCOMOTIVES

There are three locomotives, each equipped with two 110 hp motors. These motors are arranged to drive the gear meshing into the rack, or the ordinary wheels of the locomotive, or both together. Each motor is geared to an intermediate shaft and a friction coupling between the motor shaft and its pinion reduces any excessive strain at starting and also at stopping, so that there is no danger of the rack gear wheel of the locomotive climbing over the rack when the car is stopped. When the pressure exceeds 15,000 to 16,000 lb. the friction coupling slips.

By means of a set of helical gears the intermediate shaft transmits the energy which it receives to either the rack wheels which are mounted on a loose sleeve, or, by means of a clutch, to the shaft on which the rack wheel is carried. This shaft is connected by connecting rods to the driving wheels of the locomotive. The pitch circle of the rack wheel is of slightly less diameter than that of the driving wheels of the locomotive to compensate for the wear of the latter. This difference in diameters, however, it is thought, will occasion no trouble.

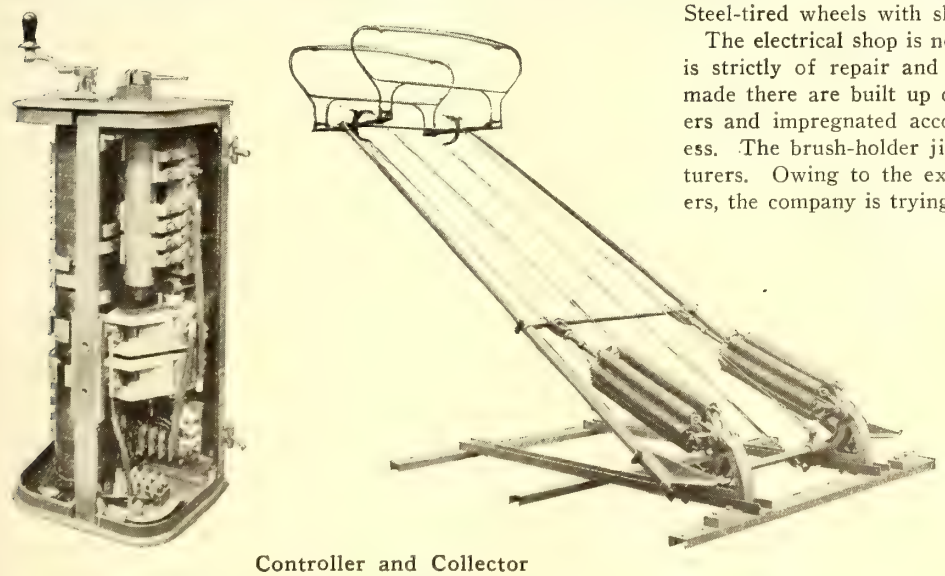


110-Hp Motor

An important feature of locomotives of the rack type, especially when they are of narrow gage, is that the four wheels should rest firmly on the rails so as to avoid derailing. To accomplish this in spite of the unavoidable inequalities of the track, the forward axle is supported on springs which produce the effect of a bolster, so that the locomotive body rests on three points only.

BRAKES

The locomotive is equipped with three brakes, one operating on the drum of the rack wheel and one on the ordinary wheels of the locomotive and also on the gear mounted on the driving



Controller and Collector

axle of the rack. The third brake works automatically on the motor shaft. This brake is thrown into action when the speed exceeds a certain amount. The motors are connected in series and their speed is controlled by a rheostat. The controller also allows the motors to be connected up as generators for braking purposes. The resistances are artificially cooled.

The current collector is of the double bow style operative in either direction.

The locomotive weighs 31,240 lb. of which 19,230 lb. is for the mechanical and 12,010 for the electrical equipment. Each locomotive has a capacity for hauling a train weighing 46 metric tons. The speed of descent is 12 m.p.h.

NOTES ON THE CAR EQUIPMENT AND SHOPS OF THE GROSSE BERLINER STRASSENBAHN

The Grosse Berliner Strassenbahn, which operates about 2650 motor cars and 900 trailers in Berlin and its suburbs, has its car maintenance problem greatly simplified by at least three important factors, namely: A highly efficient class of motormen, whose methods of running are under strict control; well-kept roadbeds, often semi-private, laid in clean, level streets, and contiguity to the principal electrical concerns, thereby eliminating the need for the home manufacture of many items. The motor and trail cars are overhauled and painted in rotation about every two years, when they go into the central shop for four or five weeks. Usually these shops take care of 18 motor cars and 8 to 10 trailers at one time, although 50 cars could be handled.

The company is not troubled by a great variety of cars and equipment. Its two main body types are single-truck cars, weighing about 18,700 lb., and double-truck cars, weighing about 28,600 lb. The latter cars are quite American in appearance, as they are furnished with individual car windows instead of three large sash of which only the center frame is adjustable. A number of the double-truck cars are mounted on St. Louis trucks. All cars carry two-motor equipments distributed among three chief types, as follows: GE-52 and GE-800 motors for single and double truck cars, with 67:14 gear ratio, and GE-67 motors for double-truck cars, with 67:18 gear ratio. The controllers are B-8, K-8, K-19 and B-3B. All motor cars except 800, which have air compressors, are furnished with the Sperry electric brake.

All gears are bolted. Experiments have been made with removable rim gears and rawhide gears and pinions, but they were not satisfactory. The Ambroin insulation hitherto used for the end pieces of resistance grids is being supplanted by glass and porcelain. During the summer of 1909 the company installed 50 nickel-steel motor axles of the following diameters: 90 mm (3.54 in.) for No. 67 motors; 78 mm (3.07 in.) for No. 52 motors; 75 mm (2.95 in.) for No. 800 motors. Worn down axles are afterwards placed under the trailers. Steel-tired wheels with shrunk-on rims are in common use.

The electrical shop is not very elaborate, as most of the work is strictly of repair and testing character. Such coils as are made there are built up on the manufacturers' standard formers and impregnated according to the Passberg vacuum process. The brush-holder jigs are also from the motor manufacturers. Owing to the expense from burned brass brush-holders, the company is trying a zinc composition which costs about one-half of the original article. The standard brush-holder tensions (two springs per holder) are as follows: 8 lb. for No. 800 motors; 4 lb. for No. 67 motors, and 3 lb. for No. 52 motors. The use of so low a tension as 3 lb. to 4 lb. is ample evidence of the satisfactory track conditions in Berlin. No mileage records are kept of individual armatures, but from calculating the mileage between repair dates it has been found that the armatures of the No. 52 motors give the best service, running as high as 53,320 miles.

The motor and truck assembly shop contains a tank which is used for the rapid cleaning of large brass and steel parts, like bearings, gears, etc. The tank contains a solution of caustic soda, which is kept boiling by a live steam coil at the bottom. The objects put in to be cleaned are pulled out with tongs after an immersion of 30 to 45 minutes. An oxy-acetylene outfit is installed in an isolated building, for welding broken pieces of steel, gray iron and malleable iron. The attention given to protecting the workmen is shown in the provision of screens and rails around all pulleys and belting, caps for the circular

saws of woodworking tools, etc. The parts of the machines which must be protected are usually painted red. Luncheon, including the inevitable beer, is supplied to the employees at cost prices by the company.

POWER STATION ADDITIONS OF THE TWIN CITY RAPID TRANSIT COMPANY

The main generating station of the Twin City Rapid Transit Company originally was built to accommodate five marine type engines driving generators with a combined maximum capacity of 22,000 kw. This station has been described in these columns and as previously stated, in place of installing the fifth vertical engine, two 5000-kw Curtis turbines were installed. Now additions are under way and a 14,000-kw Curtis turbine is on order and will replace one of the present vertical units. The company plans ultimately to replace all four of the engine units with large turbines. These changes in generating units have required additions to the boiler plant and these changes are now being made. In addition, the two 5000-kw Curtis turbines are being equipped with forced ventilation which will raise their capacity to 8000 kw. each. Air will be taken from outside of the power house and circulated by a Sirocco blower driven by a Kerr turbine supplying 55,000 cu. ft. of fresh air per minute. Two circulating ducts are built around each generator frame and by means of these ducts cooling air is forced into the top and bottom openings in the sides of the frames. The heated air will escape through the series of openings around the middle of the frame. It is planned to furnish cooling air on the basis of 3 cu. ft. per minute per kilowatt. This change and the replacement of the engines by large turbines will give this station an electrical generating capacity of 58,000 kw in contrast with a maximum capacity of 22,000 kw for which the plant was originally designed.

In the boiler plant four new boilers with new feed pumps are being installed. All the boilers are being equipped with B. & W. chain grates and four steel stacks are being erected. The two old stacks were located at the center of the boiler house; the four new stacks will be located at the quarters of the building and supported on structural steel work spanning two boilers. Each new stack is to be 265 ft. high above the floor of the boiler-room and have an internal diameter of 14 ft. The supporting steel work has for its main members all four structural steel columns which are carried on foundations with a spread of 22 ft. x 30 ft. built upon solid rock. The two old stacks will be taken down and thus room will be afforded in the center of the boiler house for four more boilers. The present smoke flues which lead from the ends of the rows of the boilers to the old stacks in the center will be utilized, but the direction of flow of the gases will be reversed and the passage will be only half of its former length.

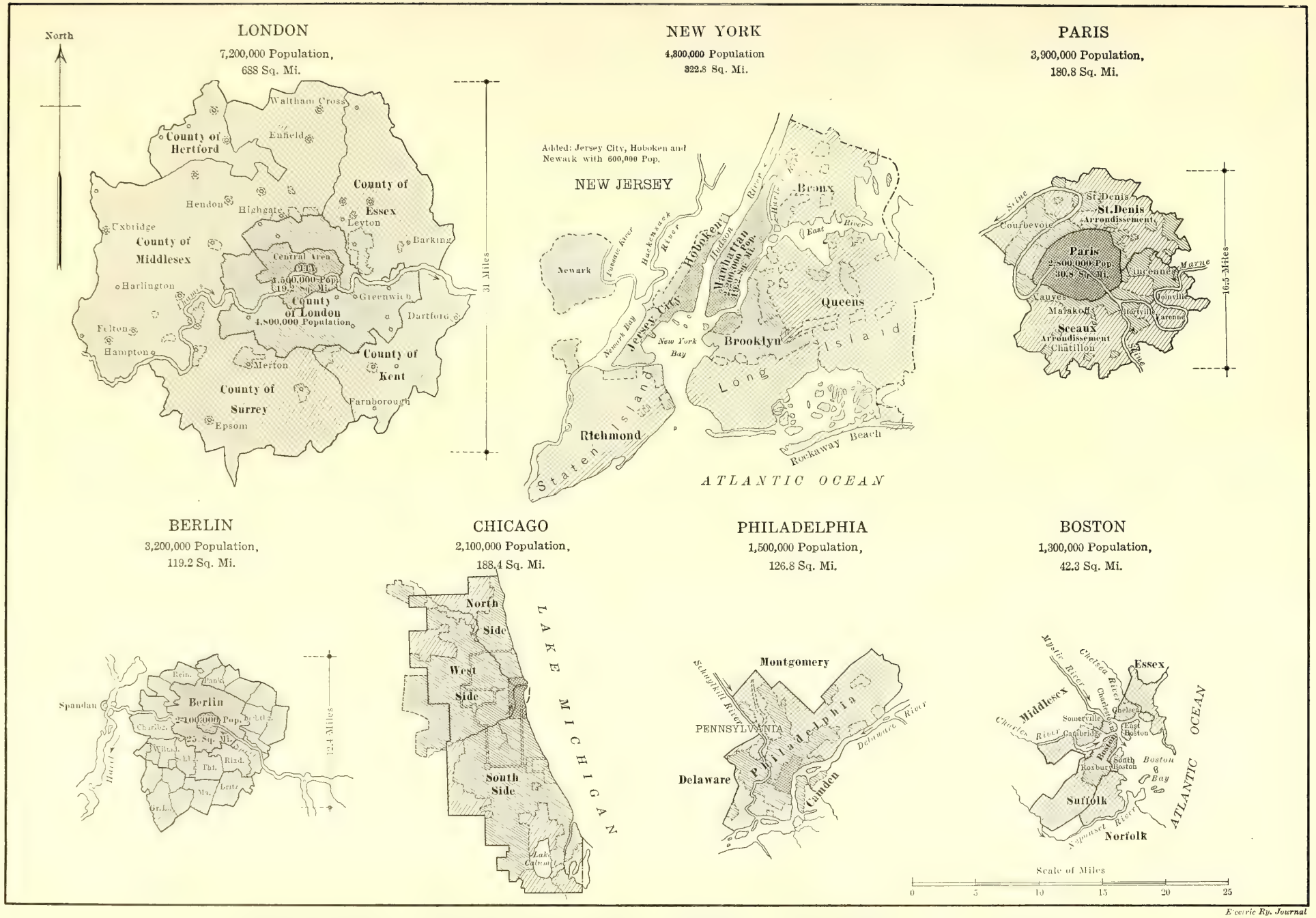
TRAFFIC IN METROPOLITAN CITIES

P. Wittig, director of the Berlin elevated-subway system and royal building councillor to the Prussian government has printed in book form an elaboration of a lecture given March 13, 1909, before the Berlin Architects' Society on transit conditions in London, Paris, Berlin, New York, Chicago, Philadelphia and Boston. Among the many interesting features of Mr. Wittig's thesis are two colored maps and a table showing the comparative areas, population, traffic density and traffic means of the different cities mentioned. As reproduced herewith, the first map shows the areas of each city and its dependent suburbs all drawn to the same scale for the purpose of comparison. The section lines (colors in the original), denote the boundaries of the heavy, medium and light traffic areas. The second map consists of sectored circles and of curves which show respectively the division of the total number of annual trips between the different means of transportation and the comparative ratios of city and suburban zone travel. The second map strikingly illustrates how large a proportion of the travel in large European cities is handled by omnibuses and cabs. A feature of the New York and Boston travel for the year of 1907 as illustrated was the large ferry traffic, which must have greatly decreased since then because of the opening of the Brooklyn subway extension and the Hudson River tunnels to New York and of the East Boston subway in Boston. In New York, the traffic carried by the elevated and subway lines is shown to approach very closely that handled by the surface cars. In Chicago the elevated traffic was less than one-tenth of the surface car traffic.

According to the figures given in the accompanying table, covering the year 1907, the average number of rides per inhabitant was greatest in Boston with the figure 494 and least in Paris with the figure 268. Mr. Wittig estimates that 365

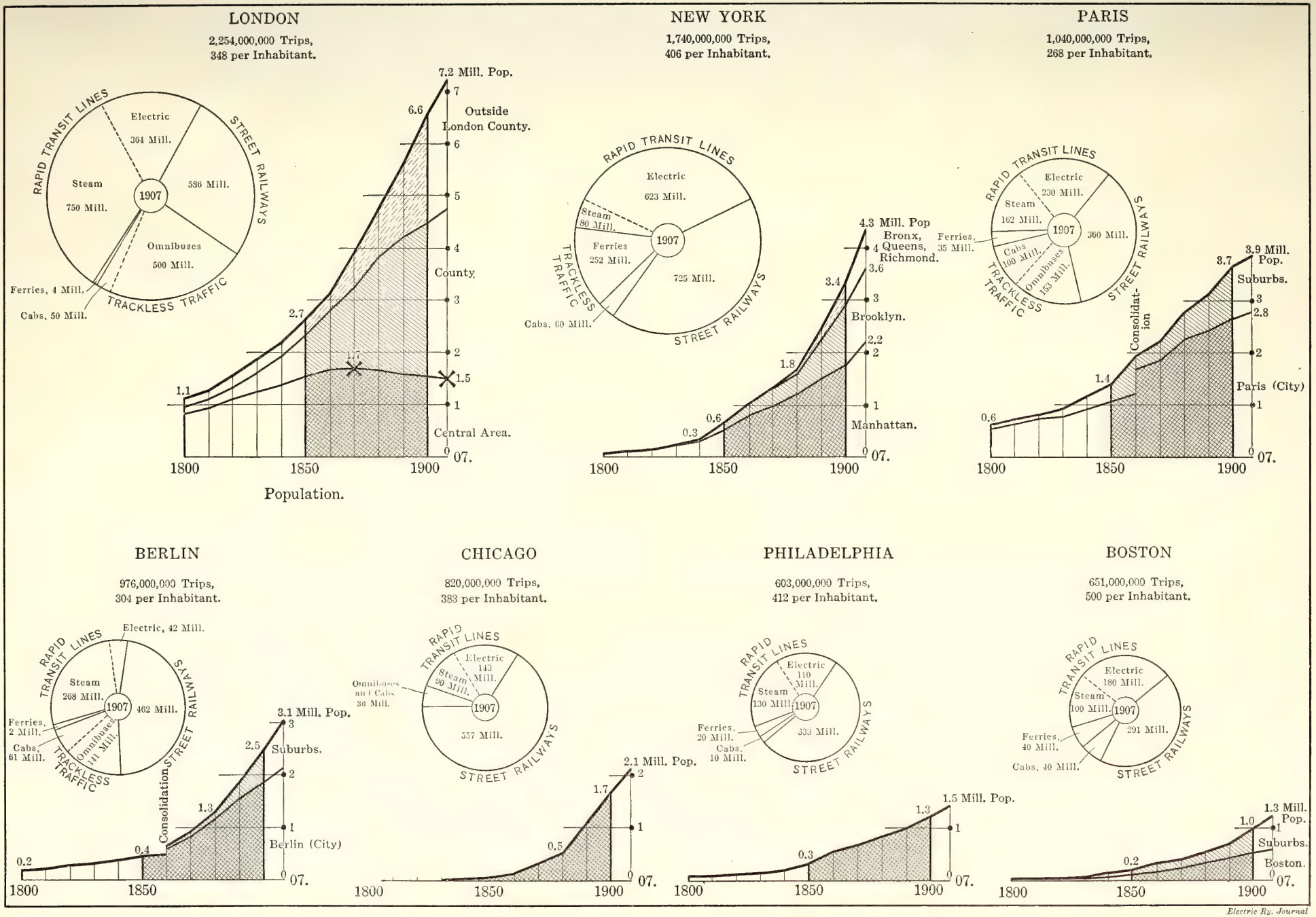
POPULATION, AREA AND PASSENGER TRAFFIC OF SEVEN EUROPEAN AND AMERICAN CITIES IN THE YEAR 1907

Cities.	Population	Area Sq. Miles	Population per Sq. Mile	Passengers in Millions					Annual Number of Trips per Inhabitant
				Total Traffic	Suburban and City Steam Railroads	Elevated and Subway Electric Railways	Street Railways	Omnibuses, Cabs, Ferries	
London (Metropolitan Police Limits):									
County {City	1,500,000	19.2	78,125	} (2254)					(474)
County {Elsewhere	3,260,000	98.0	33,265						
Outside of County	2,460,000	570.8	4,308						
Total	7,220,000	688.0	10,494	2254	750	364	586	554	312
New York (All Boroughs):									
Manhattan	2,220,000	19.2	115,729						
Brooklyn	1,400,000	48.0	29,166						
Queens, Bronx, Richmond	720,000	255.6	2,817						
Total	4,340,000	322.8	13,444	1740	80	623	725	312	403
Paris (Seine Department):									
Paris (City)	2,775,000	30.8	90,097	(1040)					(376)
Arrondissements St. Denis and Sceaux	1,110,000	150.0	7,400						
Total	3,885,000	180.8	21,488	1040	162	230	360	288	268
Berlin (Postal District):									
Berlin (13 wards)	2,130,000	25.0	85,200						
20 Suburbs	970,000	73.0	13,288						
6 Distant Southern Suburbs	110,000	21.2	5,188						
Total	3,210,000	119.2	26,930	976	268	42	462	204	312
Chicago	2,140,000	188.4	11,358	820	90	143	557	30	383
Philadelphia	1,470,000	126.8	11,593	603	130	110	333	30	412
Boston (Old Boston, South Boston, Roxbury, Charlestown, Chelsea)	1,320,000	42.3	31,205	651	100	180	291	80	494



Traffic in Metropolitan Cities—Comparative Density of Population in Three European and Four American Cities

Electric Ry. Journal



Electric Ry. Journal

Traffic in Metropolitan Cities—Comparisons of Trips per Inhabitant, Modes of Transportation and Relative Growth

trips a year or one trip a day would fairly represent the average travel per inhabitant of the seven cities considered as one population. In discussing the subway question Mr. Wittig points out that while underground electric railways have been very successful from the engineering standpoint, their financial return has usually been small. Hence projects for future subway lines should be considered with extreme caution.

ABSTRACT OF PAPERS PRESENTED BEFORE THE NATIONAL ELECTRIC LIGHT ASSOCIATION

The following paragraphs are abstracts of papers of electric railway interest which were presented before the National Electric Light Association at its twenty-third convention, held at St. Louis, Mo., May 23 to May 27, inclusive:

PROBLEMS IN POWER TRANSMISSION

H. W. Buck's paper on "Some Problems in Power Transmission" discussed changes in construction and equipment standards. The rise in the price of wood and the reduction in the cost of structural steel has led to the frequent substitution of steel towers for wooden poles. Steel construction enables higher supports to be used and consequently permits longer spans. The question of depreciation in a steel tower, due to corrosion, even if galvanized, has not yet been determined. If the legs are concreted in the ground, the tower is greatly strengthened and corrosion is practically eliminated but the cost of such a tower may be twice as great as one with legs set directly in the ground. Unless the amount of power transmitted is very large the cost of steel towers is almost prohibitive.

The use of steel towers has permitted the lengthening of the span and thus reduced insulator troubles; on the other hand, the conductors must be drawn up to maximum tension in order to reduce the height of the towers. This has eliminated soft drawn metal for conductors in favor of hard-drawn copper and aluminum of very high elastic limit. The high working stress in the conductors affects the mechanical construction of the insulators and joint cross-arm designs. Another difficulty in the case of very long spans has resulted from vibration of the conductor and its crystallization and ultimate breakage at the point of attachment. In such cases it has been found necessary to make the attachment more or less flexible. The suspension type of insulator is specially favorable for this reason. The economical span length for steel construction under present conditions ranges from about 300 ft. as a minimum to 750 ft. maximum.

Up to about 60,000 volts the standard type of pin insulator construction gives very satisfactory results. Above this figure, however, mechanical difficulties are encountered due to the large size of pin insulator required. Probably the most important and radical improvement which has taken place in recent years in power transmission has been the so-called suspension insulator construction. It superseded the pin type almost immediately for the very high voltage lines and now is standard for voltages above about 80,000. The suspension insulator requires a higher tower than the equivalent pin insulator. This is a disadvantage but it is offset by the simplification of the cross-arm possible with the suspension insulator and the elimination of torsion on the arms and head of the tower. The suspension insulator is at a disadvantage in cost of construction. There are possibilities for improvement here as well as in the hardware used. Suspension insulators on the recent 100,000 volt lines have actually given less insulator trouble than the early 20,000-volt lines when they were first installed. Since the degree of insulation with suspension insulators can be increased to almost any desired extent without involving prohibitive difficulties, there seems to be no reason in the insulator itself why much higher voltages should not give satisfactory results. There are, however, other considerations which will probably limit line voltage to approximately 100,000 volts for some time to come. The insulation of the line itself is a much easier problem than that of transformers, lightning arresters and substation equipment.

While 60 cycles do not compare favorably with 25 cycles for line conditions alone, on account of its increased charging current and inductive drop the higher frequency is coming into more general use on the large transmission systems. This is due somewhat to the necessity of operating in conjunction with existing plants; but there is justification for it in the reduced cost and size of the transformers. One of the strong arguments formerly used in favor of 25 cycles for transmission is its desirability in rotary converter operation. On account of poor voltage regulation, however, it is no longer usual practice to install converters on long lines, since the independent voltage control of the motor-generator set is required. Furthermore, the general adoption of 25 cycles for single-phase railway operation does not look as probable as it did a few years ago.

Good progress has been made in lightning arresters through the development of the electrolytic type. Arresters are really more for protection from so-called surges than from lightning. Even these should be reduced as line voltages go up, since the reaction due to any sudden change in line current is proportional to the square of the line current. The higher the voltage, of course, the less the current for a given power, so that the tendency should be to lessen disturbances. The steel guard wire installed along the top of many recent transmission lines has given promising results, and the general opinion is that it is a benefit as a protection from lightning. It has an additional mechanical advantage in tying all the towers together and an added electrical use in connecting all the towers so that all must be at the same potential.

One of the most important elements in case of trouble is effective telephonic communications between the various parts of the transmission system. The practice lately has been to remove telephone wires entirely from transmission towers, so that they will not be subject to trouble from the high-tension conductors. This is especially necessary on the very high voltage lines because of static induction. The latter is more difficult to eliminate satisfactorily than magnetic induction, which can usually be overcome by transposition.

FAULTS IN UNDERGROUND HIGH-TENSION CABLES

William A. Durgin presented a paper on "Location of Faults in Underground High-Tension Power Cables." Prompt location by test requires that each terminus of high tension lines should be provided with a device for short-circuiting the phases of a faulted cable. For a three-phase line, three short lengths of flexible cable, joined at one end and provided at the other with spring clips adapted to clamping the phase terminals firmly, answer admirably. The addition of a longer cable from the common junction increases the usefulness of the device by making a convenient arrangement for grounding, which is further facilitated by installing a permanent ground wire with wing-nut connectors near each cable terminus. A 100 to 200 volt source of direct current should also be available at each terminus. With these devices available, fault location by test resolves itself into four main divisions: A. Analysis of original fault; B. Reduction of fault resistance; C. Approximate location by predictive tests. D. Final location by exploration tests.

Much time may be saved and many errors avoided in predicting locations by analyzing the original fault thoroughly. A sensitive voltmeter, a lead from one side of the d.c. source with a lamp socket in series, and some form of bridge for measuring resistances from 0.1 to 300 ohms, are all the apparatus necessary in addition to that noted above. The voltmeter is used to measure insulation resistance by the well-known series method and should preferably have a resistance of at least 500 ohms per volt, although satisfactory results can generally be obtained with instruments of 200 ohms per volt. The procedure is as follows:

(1) With both ends of all phases clear, measure the insulation of each phase by reading the deflection of the voltmeter when one terminal is connected to the phase conductor and the other to the ungrounded side of the d.c. source through a 32-cp lamp.

If E_2 = Voltmeter deflection.
E_1 = Pressure of direct-current source.
R = Voltmeter resistance.

$$\text{Insulation resistance} = \frac{E_1 - E_2}{E_2} R$$

(2) If a fault on either phase has low resistance, apply the lead from the lamp directly to this phase, and if the lamp glows measure the fault resistance with the bridge, reverse the battery and remeasure, taking the mean of the two bridge measurements as the true resistance.

(3) Test for crosses between such phases as show the same insulation by grounding one and remeasuring the insulation of the other, using first the voltmeter and then, if a low cross exists, the bridge.

(4) Have the short-circuiting device applied at the distant end of the line, caution being used to make firm low-resistance contacts on all phases.

(5) Measure the resistance of all uncrossed loops with the bridge, checking the result against the resistance computed from the known size and length of line.

(6) If either loop shows high resistance, determine the insulation on the far side of the "open" over a clear phase, and unless that is much lower than the insulation on the test side of the "open" proceed with No. 7.

(7) Measure the insulation of the test side of the open phase when the far side is grounded over a clear phase, thus getting a minimum limit for the resistance of the path across the "open." If in No. 6 the insulation resistance of the far side is low, No. 7 is practically covered by No. 6.

(8) If all the loops show "open," check continuity by having the short-circuiting device grounded at the distant end of the line and applying the voltmeter to each phase. If one phase is then shown continuous and has fair insulation apply No. 7 to the other two phases.

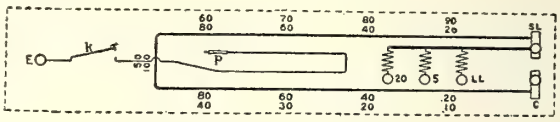
This procedure gives a clear picture of fault conditions. If the analysis shows all faults or crosses of more than 100 ohms resistance, the next step is to reduce one to this or preferably to a lower magnitude. The apparatus for "breaking down" faults depends largely on the size of the system concerned. In any system pressures from twice that of the normal transmission to a few volts and current of at least 5 amp will be required at the fault, while for long lines excess current capacity must be provided to supply charging current at the higher pressures. When special apparatus is to be provided for a moderate-sized system, the most satisfactory results will probably be obtained from a single-phase testing transformer of ample capacity supplied from the regular low tension system and controlled through a water rheostat. Provision should be made for following fault conditions with ammeter, voltmeter and wattmeter connected to the transformer, and for quickly checking the fault resistance at frequent intervals during the reduction process by series direct current voltmeter readings.

The procedure in this reduction process varies with the conditions at the fault. The object is always to carbonize a sufficient amount of paper to carry a current of 1 amp to 2 amp for several hours, as it is practically impossible to produce any form of metallic path from sheath to conductor in the presence of paper. If the paper at the fault is dry, a current of 1 amp continued for 5 to 10 minutes will generally produce a carbon path of less than 10 ohms resistance, which is stable for currents of a few amperes; but with damp paper a 3 amp to 5 amp current is required for about 10 minutes for drying, followed by a 1 amp current for 5 minutes for carbonizing. With a fault submerged in water, no manipulation will produce carbonization. These fault conditions can frequently be deduced from the behavior of the voltmeter and ammeter. Thus a submerged fault has a resistance to direct current of from 1000 ohms to 3000 ohms and requires 2000 volts for any alternating current from 1 amp to 5 amp. Furthermore, the frequent interruption of the arc at the fault by water gives both meters a peculiar kicking swing. A similar swing is also observed at first with a damp fault, but lessens perceptibly after 1 or 2 minutes; and when the arc is once established, the pressure required rapidly diminishes. With a dry fault very little swinging occurs, and if the current is held constant the pressure drops very rapidly to zero.

The lower the resistance produced the easier it will be to make accurate locations, but, unless the reduction is carried below 100 ohms, a 1000-ohm fault is nearly as satisfactory as one of intermediate resistance. It is important to work always on a single-phase or loop, for if two or more phases are grounded, or more than one cross exists, a successful exploration test depends on reducing the resistance of one fault much below that of the others, and on the other hand, a successful predictive test depends on preserving the unfaulted phases intact for use as normal standards.

Resistance forms the basis of most predictive tests, for this quantity is easily measured to an accuracy of one-tenth of 1 per cent, and proportionality to length is approximately realized. Of the many resistance methods only two are generally applicable to power cables—the Murray and the Varley loop tests. Both these tests are special applications of the Wheatstone bridge principle, and in consequence a modified bridge is required. The essential features can be shown by describing the apparatus illustrated which although apparently crude has been found to answer all requirements.

This consists of a slide wire C-SL, mounted over a paper scale divided into 100 parts, numbered in two ways, the inner scale 0-100-0 and the outer 0-50-100. Between SL and the



Simplified Slide Wire Bridge

posts LL, 5 and 20 are mounted three coils, the first having a resistance exactly equal to the slide wire (about 0.75 ohms) and the second and third, 5 ohms and 20 ohms respectively. The key K serves to control the connection between the binding post E and the chisel blade P, which is used as contact on the slide wire. Connections to the cable under test are made through 6 ft. lengths of large flexible leads, equipped with clamps capable of gripping firmly any form of switch part which may serve as the cable terminal; the resistance of these leads in terms of equivalent lengths of the various-sized cable conductors is tabulated for use in correcting measurements. A portable galvanometer, having a resistance of about 30 ohms and a sensibility of 0.4 millivolt per division, and a box containing eight dry battery cells, complete the equipment.

The resistance to be measured is connected between posts 20 and C the galvanometer between posts SL and C and two or three cells of battery between posts 20 and E. The point of zero galvanometer deflection is found with P on the slide wire, when if S = reading on the outer scale the resistance = $\frac{S}{100 - S} \times 20$ ohms. If the resistance is less than 7 ohms the connections are transferred to post 5 from post 20 and the measurement repeated, 5 ohms being substituted for 20 in the formula. In practice the values of $\frac{20\,S}{100 - S}$ and $\frac{5\,S}{100 - S}$ are plotted against S in the form of curves, so that resistances are read off directly for any given value of S. For values between 0.1 and 200 ohms the apparatus gives sufficient accuracy to check the continuity of conductors or to provide the data for a Varley loop location. The loop tests are applicable only when the faulted conductor is continuous, that is, when its resistance from terminus to terminus is entirely unaffected by the fault, and when at least one unfaulted conductor is available in the same or a parallel cable. For either test, the phase which has the lowest resistance fault is

joined to a clear conductor at the distant terminus with the short-circuiting device described above, using every precaution to make the connection of negligible resistance to insulate it well from the ground.

In the Murray loop test the two ends of the cable loop thus formed are then connected to the ends of the slide wire at the posts SL and C, the galvanometer also being connected between these posts. When a "ground" is to be located, the lead from the grounded direct-current source used for insulation measurements with the 32-cp lamp still in series is connected to post E, and the point of balance is found with P. If the galvanometer is not sufficiently sensitive, a second 32-cp lamp may be connected in parallel with the first, care being taken to make and break contact at K rather than P.

If S = Slide wire reading on inner scale expressed as decimal part of 1.00,
L = Cable length,
= Equivalent length of single connecting lead from slide wire to cable terminus,

then S (L + 1) — 1 = distance of fault from testing end of cable. A check measurement is next made by reversing the connections to the cables when the point of balance is found on the opposite side of slide wire, and a second check by transferring connections from post SL to post LL. With this latter connection the slide wire is one-half of the measuring loop, and S is read on the outer scale with twice the precision of the former measurements. No check reversal can be made with this connection, as the faulted phase must be connected to C in order that the balance point may fall on the slide wire. The mean of the three measurements is taken as the Murray loop location.

The standard Varley loop test differs from the Murray loop merely in using a fixed ratio for the balance arms of the bridge, represented by the slide wire, and in inserting between one end of the balance arms and the faulted side of the cable loop a variable resistance which is adjusted until zero galvanometer deflection is obtained; that is, until the inserted resistance plus the resistance of the cable up to the fault bears the same ratio to the resistance of the remainder of the cable loop as one balance arm of the bridge bears to the other. The true Varley test cannot be made, with the slide wire bridge, but a modification which combines features of both loop tests can be performed by connecting the cable loop between posts five and C—the faulted side to five—with galvanometer between posts SL and C. This places the 5-ohm coil in series with the faulted side of loop and leads to a new point of balance on the slide wire.

Then, if,
S = Slide wire reading on outer scale expressed as decimal part of 1.00,
Lr = Resistance of one conductor of cable,
lr = Resistance of one connecting lead from slide wire to cable terminus,
2 Lr + 2 lr = Therefore, resistance measured by loop bridge
and X = Location of fault in per cent of cable length from testing end.

$$X = \frac{(2\,Lr + lr) - S\,(5.00 + 2\,Lr + 2\,lr)}{Lr}$$

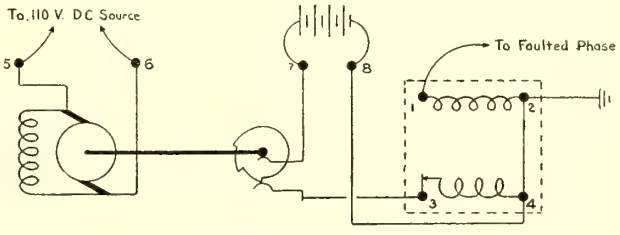
It has been assumed throughout that the faulted cable is made up of a single-sized conductor and that a clear phase in this cable is used to complete the loop. If, however, the line is composed of known lengths of different-sized conductors, or if a clear conductor of known length and size in a parallel cable is used, it is only necessary to remember that the percentage length obtained by either test is in reality a percentage of total resistance and to make the necessary computations to reduce this resistance measurement to percentage length.

The procedure has been outlined as applying to a "ground" fault, but the only change necessary to adapt it to the location of crosses is to treat one of the crossed conductors as "ground" connecting the d.c. source between it and the contact blade of bridge, the other conductor being considered the faulted phase.

The essential points in any satisfactory exploration test are to produce a large difference in some electrical condition on the near and far sides of the fault, and to provide a detector which shall only be affected by this condition. With sheaths bonded at frequent intervals to prevent electrolysis, the path of a signalling current from a ground to the sending station will divide first at the fault and further subdivide at each bonding point. A similar effect will result, even though the sheath is unbonded, if the duct line is damp or any other form of distributed earth connection exists. Hence, a continually diminishing portion of current will return over the sheath toward the sending station, while another continually diminishing portion will continue along the sheath to more distant bonds. Any detector, therefore, which responds equally well to current flowing in a conductor or in the sheath, will continue to indicate beyond the fault until the point is passed, where the last trace of signalling current leaves the sheath. Furthermore, any detector which responds at all to sheath currents will give most confusing signals due to railway and other stray currents.

These considerations lead to the development of a longitudinal exploring coil to be used with a telephone receiver. When the magnetic circuit of the coil is parallel to the axis of the sheath, and the winding, therefore, at right angles thereto, no effect is produced by sheath currents alone, but with conductors spiraled as in all high-tension cables a loud signal is produced by current flowing over the loop circuit formed by the conductor up to the fault and the sheath back toward the sending station.

When the fault resistance can be reduced to a few ohms, so that curents of 8 amp and 10 amp can be produced with a 115-



Vibrating Interrupter

volt d. c. source, very satisfactory signals may be obtained by using such a current sharply interrupted from 50 to 100 times a minute. Any form of "flasher" is adapted to the purpose, which gives a quick break and is capable of operating with certainty for a sufficient period to permit the exploration of the entire length of the longest line should location by the explorer method alone be necessary. In many cases, however, it is extremely difficult to reduce the fault resistance below 50 ohms or 100 ohms, and in some instances even when so reduced the ground quickly burns off under currents of more than 2 amp or 3 amp.

Such conditions are well met by an interrupting vibrator. This, as indicated, consists of a small 110-volt shunt-wound motor, which, through reduction gearing, drives a three-point cam-switch controlling the battery connection to the primary of an induction coil. The vibrating spring of the coil breaks contact about 200 times a second, and as the cam-switch makes irregularly spaced interruptions of the vibration increase the words "Hur-ry—up," repeated once a second, result. These irregularly spaced interruptions of the vibration increase the life of the vibrator contacts and battery and give a distinctive signal. With eight cells of dry battery connected to the primary, currents from 0.4 amp to 0.2 amp can be forced through resistances from 0 ohm to 100 ohms. Direct currents of this magnitude interrupted at low frequencies produce no sensible sound in the detecting apparatus, but the exploring coil and receiver are so much more sensitive to high-frequency currents that the signal from the 0.2-amp current of the vibrating interrupter is quite as loud as that

which would be obtained from a 15-amp "flasher" current.

The sensitiveness of the explorer and receiver are such that with high-frequency currents the displacement of the conductor due to spiraling is sufficient to cause a signal when the explorer is parallel to the sheath axis, even though the sheath carries no return current. For complete silence, the explorer must be absolutely parallel to the conductor axis, and, when used on a cable, to the sheath axis as well. This condition may be attained by connecting the vibrator between ground and all cable conductors in parallel. Charging current then flows out over all conductors, but as these are disposed symmetrically about the cable axis the combined effect is strictly equivalent to that of charging current flowing along a single straight conductor at the centre, the sheath also being equivalent to such a central conductor. The signal from charging current then is entirely eliminated by adjusting the explorer accurately along the cable axis, if the charging currents are approximately equal for all phases. Such approximate equality will exist unless the resistance of the faulted phase up to the fault is a considerable per cent. of the fault resistance, that is, in general power work, unless the fault resistance is less than about 10 ohms. As no interference from charging current is experienced with the single-conductor connection on very low resistance faults, the entire range from 0 ohms to 100 ohms is covered by using the multiple-conductor connection from 100 ohms to 10 ohms, and the single-conductor connection below 10 ohms.

D. C. TURBO-GENERATORS.

W. L. Waters, who presented a paper on d. c. turbo-generators, said that they have been built in Europe for the past fifteen years, but their design and operation have not until recently been sufficiently satisfactory to recommend them for use under American conditions. Lately, several European manufacturers have been turning out direct-current turbo-generators in sizes up to 1250 kw. In some instances these turbo-generators, which were originally built to operate with metallic brushes have been modified after installation to operate with carbon brushes. American manufacturers realized early that the d. c. turbo-generator would never be satisfactory until it could be built with carbon brushes, but it is only within the last five years that it has been found possible to construct d. c. generators to operate satisfactorily with carbon brushes at speeds materially higher than those of standard belt-driver generators. Such turbo-generators have now been developed in sizes from 10 kw to 300 kw at 125 volts and from 50 kw to 500 kw at 250 volts. Although 600-volt generators do not seem to be in great demand for this type of unit several have been in satisfactory operation for some time, notably a 1000 kw unit (consisting of two 500-kw generators coupled to one steam turbine) operating at 1500 r.p.m. in use by the North Shore Railway Company, California, in 1907. The two factors which limit the design of d. c. turbo-generators are the commutation and the collection of large currents at high speeds. The commutating difficulties can be satisfactorily met if a properly designed interpole construction is used. For generators of larger ratings than 500 kw a complete system of distributed compensating winding in the pole faces should be used. Good operation with carbon brushes requires a commutator which runs absolutely true under all conditions and at all times. The peripheral commutation speed usually adopted at the present time in America is from 4500 ft. to 6000 ft. per minute, although peripheral speeds 40 per cent higher than this have been used by European manufacturers with a special grade of brush.

At present the d. c. turbo-generator can hardly be considered commercial above 500 kw at 250 volts, and the probability is that in larger sizes it will be necessary to use an a. c. turbo-generator and rotary converter as a substitute. This substitute may, however, be only temporary in the 750-kw and possibly the 1,000-kw sizes. Considerably larger sizes are at present in use in Europe, but it should be remembered that operating conditions there are by no means as severe as in the United States.

GAS ENGINES.

The report of the committee on gas engines contained a list of 171 public service and private gas engine installations, including the following electric railway properties: Boston (Mass.) Elevated Railway Company; Charlotte (N. C.) Consolidated Construction Company; Milwaukee (Wis.) Northern Railway Company; Parsons (Kan.) Railway & Lighting Company; Missouri & Kansas Interurban Railway, Lenexa, Kan.; Philadelphia (Pa.) Rapid Transit Company; Western New York & Pennsylvania Traction Company, Olean, N. Y.; Warren (Pa.) & Jamestown (N. Y.) Street Railway Company. The correspondence of the committee brought out the fact that there are many more gas engines run by illuminating or natural gas supplying power to line shafting or direct to power-consuming apparatus than of gas engines driving electric generators. The list of installations given in the report includes the names of the manufacturers, names and addresses of users, horse-power in units and total, duty, kind of gas and kind of producer fuel.

The engine manufacturers informed the gas engine committee that they were steadily making improvements tending to increased reliability, better efficiency and lower weight. The report also mentions the fact that the lignite coals of the southwestern and northwestern states which are not suitable for steam generation are being successfully used in gas producers. In conclusion, reference is made to the Gary (Ind.) plant of the United States Steel Corporation, where there are installed 42,500 kw in gas-electric sets and 64,000 indicated-hp in blowing engines. Since starting the electric plant, some modifications have been made in the piston rings, piston rod packings and the circulation of cooling water, but apparently there has been no serious error in design or construction.

TIMBER PRESERVATION

A lengthy report was presented by the committee on preservative treatment of poles and cross-arms. The average life of an untreated, unseasoned pole throughout the country was given as follows: Cedar, 13½ years; chestnut, 12 years; cypress, 9 years; pine, 6½ years; juniper, 8½ years. Limitation of pole supply could be effected only to a very small extent by using metal and concrete structures or by placing wires underground. The only remaining method was to use preservatives which promised relief in two ways—first, by decreasing the drain on the present supply, and second by increasing the number of species available for pole construction. During 1907, 12.4 per cent and in 1908, 14.7 per cent of poles purchased by electric light and railway companies were treated with some preservative.

Answers to the committee's question box elicited the information that most of the reporting companies were favorably impressed with the use of creosotes or carbolineums for poles. Practically all the companies paint or preserve their cross-arms at an average cost of 14½ cents per arm. Quite a number of companies dip their pins in oil or other preservatives before setting.

The report also includes much data from the Forest Bureau's reports, and a paper on the history of German telegraph poles, which are chiefly of fir. It appears that up to the close of 1903, 2,560,412 standing poles equal to 89.9 per cent of the total, were treated with copper sulphate.

The economic value for different treatments is given as follows:

Kind of treatment.	Average life (years).	Manufacture. Mark.	Pf.	Cost per cu. m for freight and erection. Mark.	Pf.	Total. Mark.	Pf.	Cost per cu. m per year. Mark.	Pf.
Copper sulphate....	11.7	28	96	20	..	48	96	4	19
Zinc chloride.....	11.9	28	12	20	..	48	12	4	5
Dead oil coal tar...	20.6	36	93	25	..	61	93	3	1
Corrosive sublimate.	13.7	32	89	20	..	52	89	3	86
Untreated	7.7	20	80	20	..	40	80	5	30

Note: Mark (100 pf.) equals 24.3 cents.

The average annual cost in the last column is evidently only an approximate value, because, while the estimated lives extend over a series of years, the estimated costs only relate to the last year of observation. In general, however, the or-

der of the treatments as regards their economical value is the same as the order of the average lives. Dead oil of coal-tar stands first. Corrosive sublimate stands second and its superiority over zinc chloride and copper sulphate treatments can no longer be doubted. The most unfavorable position is held by untreated poles, the annual cost of which is nearly twice as much as the best treated pole.

Another appendix of the report contains German costs of zinc chloride and creosoted ties, while another gives the standard specifications of the American Bell Telephone Company for treating poles by the full-cell straight creosote or Bethell process.

REPORT ON INSURANCE AT ST. LOUIS

The report of the insurance committee was presented by W. H. Blood, Jr., insurance expert of the association. He analyzed the ratio of premiums to losses in the electric light and power plants of the country and estimated that in 1907 there were in the United States a total of 2,642,403 kw capacity of such stations. Assuming the insurable property as $170 per kw, and that 75 per cent is insured, the companies in 1907 were paying premiums on $330,500,000. At an average rate of 1 per cent this would amount to $3,305,000. Mr. Blood said that it was commonly conceded that the Underwriters use 45 per cent of the premiums for expenses of management, commission, profit, etc., which would leave 55 per cent with which to pay losses. Fifty-five per cent of $3,305,000 was $1,817,750.

The records show that the worst year that the Underwriters ever had was 1909, when they paid out in losses on electric light and power plants some $619,000. Compared with the premium received, $1,817,500, the ratio is three to one. Even if the estimate is reduced by 33 1-3 per cent, the companies are paying fully twice as much as they should for the insurance of their electric light and power plants.

Mr. Blood then recommended the passage of the following resolutions:

"Whereas, in the thirty-third annual convention of the National Electric Association, convened in St. Louis, May 24, 1910, certain figures were presented by our insurance expert, which tend to show that the fire insurance premium rates paid by the electric lighting companies of the country at large are fully twice as high as the low ratio warrants.

"Be it resolved, that this convention makes notes of this fact and directs that the matter be called to the attention of the fire insurance companies throughout the country, and that a demand be made for an investigation by them of existing rates, and that a reduction be made commensurate with the premiums received and the risks involved.

"Be it further resolved, that copies of these resolutions be furnished every member company of this Association and that through them the insurance companies writing the various risks be informed of the action of this meeting, and that a positive demand be made for a material reduction in rates."

REPORT ON PUBLIC POLICY OF THE N. E. L. A.

The report of the committee on public policy of the National Electric Light Association, presented at the convention of that association at St. Louis last week, occupies, with the appendices, a book of 294 pages. The committee consisted of: W. W. Freeman, chairman; E. W. Burdett, Henry L. Doherty, Charles L. Edgar, George H. Harries, Samuel Insull, J. B. McCall, Samuel Scovil, Charles A. Stone and Arthur Williams.

In its report the committee referred to its three earlier annual reports and stated that some of the issues which appeared previously to have been threatening the industry were gradually settling themselves through a better understanding of facts and fundamental principles on the part of the public, and the resulting application of the underlying common sense of the American people. One of these was that of municipal ownership. While municipally owned and operated plants still exist in some places and might so continue, the practice is not being extended and the number of such plants may be expected to decrease steadily rather than increase.

LEGISLATION

The committee represented the association at the National Conference on Uniform State Legislation at Washington on Jan. 17 to 19. The subjects discussed there of interest to the association were particularly those relating to compensation for industrial accidents and conservation of national resources, including the regulation of water-powers. On the first subject the conference resolved to recommend to the several States that workingmen's compensation acts, fair to the employer and employee and just to the State, be uniformly substituted for the present system of employer's liability.

In connection with the regulation of water-powers the conference recommended uniformity of State laws as to the regulation of water-power on non-navigable streams, and the necessity of uniformity of State regulations as to water-power on navigable streams. While the committee said that it was entirely in sympathy with the idea of preventing unnecessary waste of national resources, it believed that there was danger of defeating the real interests in view if unwise restrictions were placed upon the development of certain resources when development was most essential to the prevention of economic waste.

In referring to the corporation tax law the committee recommended that all member companies file the report required within the date fixed by law to avoid the extreme penalties provided for failure to do so, but also to file a form of protest which will be sent to all member-companies in Class A to secure the recovery of the payment in case the tax was annulled.

In considering the employers' liability the committee gave a summary of the recommendations of Senator Wainwright, chairman of the legislative commission, of New York, on this subject, and stated that in its opinion member-companies should favor the amending of liability laws, so as to substitute for the present employers' liability a reasonable basis of employees' compensation for injuries.

WELFARE WORK

The committee mentioned the following methods of welfare work for employees which had been established by member-companies:

Educational courses for technical and business instruction.

Social clubs or organizations for better acquaintance and for recreation and entertainment.

Benefit or insurance associations for indemnity against loss of wages in the event of sickness, accident or death.

Pensions for retirement with partial compensation on account of age or disability.

Savings accounts, with principal or interest, or both, guaranteed by employers.

Sale of stock to employees upon favorable terms, usually involving installment payments.

Investment accounts or clubs which will enable employees to purchase stock by means of general fund.

Profit sharing, based upon success of company and contribution of labor by employees.

The practice of the Commonwealth Edison Company, Stone & Webster, the Cleveland Illuminating Company and the Boston Consolidated Gas Company in establishing savings funds for employees were then described. The committee also gave statistics of the old-age pensions in the principal European countries.

PUBLIC SERVICE COMMISSIONS

The committee gave a digest of the law establishing the Public Service Commissions in Vermont, Maryland and New Jersey and upon the modifications proposed in New York State. An abstract of the recent decision of the New York Court of Appeals in the case of the Delaware & Hudson Company versus the Public Service Commission of the Second District of New York defining the limits of the control of the commission over the issue of securities was then published.

REASONABLE RETURN

The committee stated that the question of what constitutes a reasonable return to a public-service corporation is one of increasing importance in view of rate cases that are constantly being decided. It then referred to the decision of the Supreme Court of the United States in the Consolidated Gas case, stating that rates which would permit the company to earn 6 per cent per annum on the fair value of its property would not be confiscatory, and, therefore, unlawful; and in that of a water case in 1903 that a reduction of rates to a point to yield 6 per cent per annum of the value of the property of the water company was not confiscatory; and to that in the Knoxville water case, where the court declined to determine, because unnecessary in that case, whether a demonstrated reduction of income to a point that would yield 6 per cent would or would not amount to confiscation.

The committee also referred to the decision of the Wisconsin commission in the Madison Gas & Electric Company's case where the commission held that it would be reasonable to allow for both interest and profit a return of not less than 7½ per cent on a fair valuation of the gas plant and not less than 8 per cent on a fair valuation of the electric plant, these percentages being arrived at upon the theory of 6 per cent interest, with 1½ to 2 per cent for profit in addition to interest, to enable the company to secure both the business capacity and capital required to maintain its business upon a permanently successful basis. The report also referred to the decision of the Public Service Commission of the First District of New York in the Coney Island fare case with the Brooklyn Rapid Transit Company. This decision was published in the Electric Railway Journal of March 12, 1910, page 456.

The committee concludes that from the opinions in the New York and Wisconsin cases that there is an inclination on the part of these commissions to consider that a return of approximately 8 per cent upon a fair valuation of the property is warranted as a reasonable return to investors without interference from rate-fixing authorities.

APPENDICES

The appendices include a digest of workmen's compensation acts in different countries; the plan of organization of the employees' savings and investment funds already mentioned, and the legal decisions in Delaware & Hudson Company, the Madison Gas & Electric Company and the Coney Island fare cases.

A. I. E. E. ANNUAL CONVENTION

The annual convention of the American Institute of Electrical Engineers will be held at Jefferson (White Mountains), N. H., June 27-30. Headquarters will be in the Waumbek, where the meetings will also be held. Among the papers of railway interest which will be presented are: "Electric Locomotive Design," by N. W. Storer and R. W. Eaton, Westinghouse Electric & Manufacturing Company; "A Method of Determining the Adequacy of an Electric Railway System," by R. W. Harris; "Third Rail Construction," by Jesse H. Davis, B. & O. Railroad, Baltimore; "Power Economy in Electric Railway Operation—Coasting Clock Tests on the Manhattan Elevated Railway," by H. S. Putnam, New York. At the San Francisco meeting, held May 5-7, a paper on "Transmission Line Crossings of Railroad Rights of Way" was presented by A. H. Babcock.

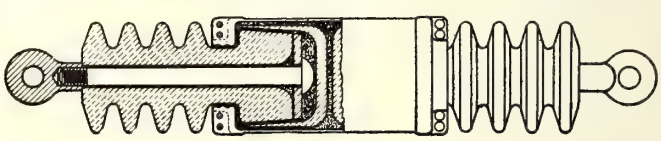
NEW OFFICERS OF THE N. E. L. A.

The following were elected officers of the National Electric Light Association for the ensuing year at the convention last week at St. Louis: President, W. W. Freeman of Brooklyn; first vice-president, John F. Gilchrist of Chicago; second vice-president, Frank M. Tait, of Dayton. Executive Committee—Alex. Dow of Detroit, H. A. Wagner of Baltimore and W. C. L. Eglin of Philadelphia; treasurer, Gen. George H. Harries of Washington, D. C.; secretary, T. C. Martin, of New York.

THE APPLICATION OF PORCELAIN STRAIN INSULATORS*

By W. H. Kempton

As porcelain is strongest in compression, the preferable form of a strain insulator from the standpoint of mechanical strength would be one in which only compression strains existed, and in which sufficient stock was placed under the load to give a proper factor of safety. In practical design this condition is difficult to realize, and the load on most types of insulators gives a combination of compression and shearing stresses. The three types of porcelain strain insulators, suitable for high voltage railway, are the spool type, the loop type, and the compression or barrel type. The spool and the loop types are the simplest and oldest, but both are limited in mechanical strength owing to the fact that the load is applied between a cable and pin at right angles, and two cables at right angles, respectively. This throws a comparatively small volume of porcelain in direct compression, the larger part of the load producing bending stresses. The spool type insulator is further limited mechanically by the possible bending strength of the pin, and electrically, by the amount of surface insulation possible. If the pin fits the hole in the insulator snugly, and the hole is of uniform diameter, the least bending of the pin will throw a bending stress on the insulator and break it. If a metal sleeve be cemented in the pin hole to distribute the load along its length, the expansion of the metal with heat may burst the porcelain. Practical design has settled down to a form of pin hole smallest in diameter under the wire groove and enlarging



Compression Insulator.

toward each end. This allows the pin to bend without pressing on the ends of the pin hole. The problem then becomes one of designing a pin of such length as to allow the desired insulation, and of such diameter as to give the desired bending strength. Several forms of spool strain insulators have been designed, respectively for 1200-volt and 6600-volt service, and also for higher voltages. These forms of spool strain insulators have an ultimate strength of from 9000 lb. to 12,000 lb.

The ideal porcelain strain insulator would have the load-bearing portion of the porcelain made with two exactly parallel surfaces held between two exactly parallel and absolutely rigid plates. The accompanying cut shows a form of compression insulator which approaches this condition. It consists of a porcelain bushing with an undercut head portion, so that two approximately parallel bearing surfaces are obtained. The head of the bolt passing through the bushing rests on a steel washer bearing on its inner end, and the shoulder of the bushing rests against an inner end of a split cylindrical case, riveted or bolted together over the porcelain head. The irregularities incident to manufacturing porcelain are taken care of by placing a lead washer under the steel washer and embedding the portion of the insulator inside the case in neat Portland cement. The bolt head is insulated from the case by a porcelain cap cemented over the head of the bolt and the insulator. The chief requirement in the design of this insulator is to make the case ribbed and of such form as to prevent the end bearing surfaces from sagging. If these surfaces sag the load is thrown on the outer rim of the porcelain head, causing the sides to split off. One sample, with a 4-in. diameter head, stood a test of 34,000 lb., at which point the bolt broke. On tearing down the insulator a crack in the porcelain was discovered with difficulty. Insulators of about half the above size, with 2½-in. diameter heads, will stand mechanical tests of from 18,000 lb. to 20,000 lb.

For low-voltage work, what is known as the "goose egg"

*Abstract of a paper presented at the May 27th meeting of the American Institute of Electric Engineers, New York.

strain insulator has been used for several years. It consists merely of an oval mass of porcelain about 5 in. long by 3 in. thick, with wire grooves in opposite ends and at right angles to each other. Practically all of the porcelain helps carry the load directly or indirectly, so a very strong insulator results. The ultimate mechanical strength is from 12,000 lb. to 14,500 lb. A smaller size, 3½ in. long, stands from 9000 lb. to 12,000 lb. stress.

However, on account of the rough usage insulators are apt to receive in low-voltage work, the molded form has been more popular. The load is carried directly by metal parts with hard and tough insulation, usually sheet mica, interposed between and surrounded by tough molded protecting covering. This construction makes a very reliable insulator mechanically, and one that, on low-voltage work, is reliable electrically. All forms of molded strain insulators, whether for high or low-voltage work, tend to depreciate on exposure to the weather. Molded strain insulators are not so well suited for high-voltage work. To stand the higher electrical test the metal parts must be further apart, and on account of the resulting greater leverage the metal parts must be made much heavier to maintain the same mechanical strength. When large iron parts are embedded in the molded insulation, the expansion and contraction of the metal with heat is apt to crack the covering and admit moisture.

ELECTRIC RAILWAY CATENARY CONSTRUCTION

At the May 27 meeting of the American Institute of Electrical Engineers in New York, W. N. Smith presented a review of electric railway catenary trolley construction. Beginning with current collectors, Mr. Smith compared the sliding bow and trolley wheel. Although the advantages of the sliding bow seemed conclusive for high-tension trolley operation, it had the drawback of responding more sluggishly to irregularities in the trolley wire. The writer's observation led him to believe that the objections to the bow trolley had developed particularly where the catenary was defective. It was easy to allow enough slack to get into a catenary trolley to cause sufficient sag in the 10-ft. sections to make kinks at the hanger points. Under such circumstances high speed operation with a sliding bow was extremely unsatisfactory while with a wheel trolley, whose rate of vibration as about double that of the pantograph, such a condition was not prejudicial to smooth operation.

The author divided catenary construction into three types as follows: Plain single catenary with the trolley wire hung directly from the messenger; compound or three-wire single catenary in which the trolley wire was suspended by clips of uniform length from a tight secondary wire just above, this secondary wire being supported by hanger rods of varying lengths from a slack messenger wire; and double catenary construction, consisting of two messenger wires and one trolley, arranged to form an equilateral triangle as in the original New Haven construction. The three-wire single catenary was the one so extensively adopted abroad mainly because it enabled the maintenance of uniform tension on the trolley wire.

Taking up poles and bridges, the author recommended that where wooden poles were used they should invariably be treated by some one of the vacuum, open tank or brush methods. There were three important types of steel poles—the two or three-section tubular pole; the tripartite pole, built up of re-rolled Bessemer steel "U" sections with malleable iron collars and spreaders; and the diamond pole, which consists of two steel "V"-shaped troughs tapered and flanged over the edges, one being driven lengthwise within the other to form a box-shaped pole whose extra strength lies in the additional thickness of the overlapping flanges. The tubular type was the least economical in weight for a given strength while the diamond pole was superior to the tripartite in weight economy. The tripartite had a great advantage in being rustproof and accessible for painting throughout. The reinforced concrete poles which had recently come into use for electric railways could, under favorable conditions, compete with cedar or chestnut poles as to first cost. They were about twice as stiff as a cedar pole and had 30 per cent to 50 per cent greater ultimate strength besides being practically indestructible. Poles for catenary construction must be stronger and larger than those for the ordinary line work. On this point Mr. Smith gave some information on setting, rake and spacing on curves. He also described a number of bracket insulator pin fittings such as those used by the Denver & Interurban Railroad, the Connecticut Company and other roads.

In considering messenger and trolley wires, the author called attention to conditions which had arisen in using the plain type of catenary construction with no take-up devices. In warm weather, the 10-ft. sections between hanger points became slack enough to cause the sliding bows to pound kinks into the wire at hanger points. The only remedy for this situation aside from providing overlapping breaks was to pull the wire tight enough so that its strain at maximum temperature would not be less than 2,000 lb. for a No. 0000 wire. If the minimum tension at 100 deg. Fahr. was to be 2,000 lb., it would run up to about 5,000 lb. while the elastic limit of the wire would be reached at 5,817 lb. Since 5,000 lb. was so close to the elastic limit, it could be expected that a copper trolley wire pulled tight enough to be effective at maximum temperatures, would be likely to get pulled beyond its elastic limit in a season or two, particularly after the outer skin had been worn down somewhat by the passage of current collectors. These considerations might explain much of the trouble that had been experienced with plain catenary construction using hard-drawn copper wire. Usually, the only remedy was to pull out the slack as often as required. This warm weather slackness could be obviated where a wire could be pulled sufficiently tight to be at a minimum of 2,000 lb. at a high temperature and 5,000 lb. at a low temperature. This could be done with the phono-electric wire, steel or copper-clad steel wire.

The author recited the experience of the Denver & Interurban Railroad with phono-electric trolley wire and said that it had not been necessary to pull any slack out of this wire despite constant operation for two years over a 45-mile line. Tension devices for trolley wire, as thus far developed, chiefly in Europe, did not seem to contemplate tensions of more than 1,000 lb. to 1,500 lb. Furthermore, the clips by which the trolley wire was supported from the secondry wire directly over it were of a type that would yield vertically, so that the trolley could carry a wave along with it as it traveled underneath the wire. The writer believed that without the upwardly yielding hangers it would be necessary to maintain a minimum tension of at least 2,000 lb. and that the only excuse for maintaining a lower tension was the ability of the trolley wire to yield at the hangers. Such hangers had not been generally adopted for use in this country. Good results had been effected on the New Haven Railroad by a maximum tension of about 5,000 lb. on the trolley wire without using automatic tension devices.

In the latest New Haven construction, the clips by which the working conductor was attached to the lower or secondary messenger were fast to both the wires, and no vertical play was allowed other than that due to the yielding of the secondary wire. The European compound catenary, however, had its hanger clips designed to permit the trolley wire to yield vertically. The other principal feature of the compound catenary was the placing of tension devices at intervals to take up any expansion in the trolley wire. These contrivances consisted of weights operated by chains over pulleys and pulling against the free end of a 3000-ft. to 4000-ft. section. The consecutive sections were overlapped so that the contact bow would slide readily from one to the other. This arrangement naturally served for the installation of section insulators around each of which a jumper could be placed, if desired. Mr. Smith also referred to the equalizer catenary construction described in the ELECTRIC RAILWAY JOURNAL, of March 5, 1910.

The author next presented illustrations and descriptions of the catenary hangers used on the experimental line of the Connecticut Company as described in the ELECTRIC RAILWAY

JOURNAL of Feb. 26, 1910. He pointed out that in the hunt for the best imaginable solution, it should not be forgotten that some existing lines were operating very satisfactorily. It might be well, perhaps, to call a halt to ask ourselves whether all these catenary hanger adjustment features really were worth their cost. There was a tendency now toward increasing the distance between hanger points in catenary spans. The original spacing was about 10 ft. During the early development one company had advocated three-point suspension on tangents for spans as long as 150 ft. At present, however, the three-point suspension was recommended only for wheel trolley operation and 11-point suspension recommended for sliding bow operation. The spacings brought the hangers approximately 14 ft. apart. Another company recommended a construction having 12 points of suspension for 120-ft. spans and 11 points of suspension for 150-ft. spans.

The conclusions of the Power Distribution Committee of the American Street & Interurban Railway Engineering Association in its report on catenary construction in 1908 were rather in favor of 20-ft. to 30-ft. hanger spacing because the sag between hangers, though very slight, would still be enough to take up the expansion of a copper trolley wire in warm weather. The committee also favored making spans 300 ft. long, using light and flexible hangers and adopting a plow steel messenger cable strung to a small sag.

Much had been said from time to time about the necessity of staggering the trolley wire for sliding bow operation. The writer had noted enough successful operation without staggering to confirm his belief that it was not absolutely necessary in interurban service with average track and average motor cars, as the car generally was sure to sway enough fairly to equalize the wear on the sliding bow. Staggering might be seriously entertained on lines with very heavy locomotives and extremely solid roadbed. Although the latter conditions existed on the New Haven Railroad, it had not been found necessary to stagger the wires. Mr. Smith then described the new curved bent construction of the New Haven Railroad, as illustrated in the ELECTRIC RAILWAY JOURNAL of April 16, 1910.

In discussing steady strain insulators of various types, the author mentioned the one used on the Denver & Interurban Railroad and described in the article on this line printed in the Sept. 5, 1908, issue of the ELECTRIC RAILWAY JOURNAL. The author thought highly of the disc type of insulator. He did not believe in using wood for heavy strains where there was any possibility of full voltage being applied to opposite ends of the insulator. Deflectors were about the worst nuisance with which one has to contend in maintaining a catenary line, because it was very difficult to stretch the intermediate wires perfectly tight and to keep them so even if they were adjusted. Deflectors were heavy enough to require considerable care in installation and on account of their weight it was desirable to have them placed under a bracket or as near to one as possible. The use of frogs on catenary construction for a sliding bow had been found unnecessary. Wood section insulators were a necessity with wheel trolleys and ordinary trolley suspension, but by far the best form of section insulator for bow trolley operation was the overlapping break without wood or any other insulating under-run. Section insulators made good feeding-in points and should be fitted for a jumper, which would include a normally-closed knife switch. A hooked stick with a grounding chain attached above the handle could be used to pull this switch when it was desired to open a section of high voltage trolley. It was desirable to have such switch boxes located at railroad stations or signal towers and well out of the reach of all but employees.

At high voltages it was absolutely necessary to ground all the brackets and spans of a catenary line. This could be most effectively done by steel or iron bars about 5/16 in. or ⅜ in. by 1¼ in., having the top end bolted to the butt end of the bracket and the bottom end run over to the track through the ground from the butt of the pole. The best kind of a connection to make with the track was through a cross bond, as this was more flexible than to connect a rod directly to one of the rails. The ground rods, brackets and truss rods together formed a fair lightning protector for the trolley construction. To make this more effective, the Denver & Interurban Railroad had used a steel, grounded cable which was run along the tops of all the poles, connected to every bracket and grounded on the fifth pole through a rod attached to a cross bond and also to a pipe or ground plate set in moist earth.

Referring to current collection, Mr. Smith was disposed to believe that the roller type of trolley eventually would be developed to constitute a distinct improvement over the present sliding bow in the applications for the rough and ready service of trunk line work. In this connection he quoted an article from the ELECTRIC RAILWAY JOURNAL of Oct. 2, 1909, on the excellent results of the roller collectors of the San Francisco, Oakland & San José Railroad. The quoted life of 67,500 miles seemed incredible, but it was quite evident that the device was worthy of consideration. In conclusion, the writer mentioned double trolley construction. The Europeans had worked it out for three-phase railway equipment, but it was doubtful whether any American railroad man would ever become reconciled to employing two trolley wires of opposite polarity over any railroad track if he could possibly get along with one.

DISCUSSION

In discussing Mr. Smith's paper, C. J. Hixon, of the General Electric Company, laid great stress on the matters of flexibility of the trolley wire if good results are to be obtained in the operation of collectors at high speed.

R. D. Coombs, of the Pennsylvania Tunnel & Terminal Railroad Company, told of the tests made by that company in the Long Island test track. It was Mr. Coomb's opinion that the simple single catenary with flat-iron strap hangers looped over the messenger so as to allow of a vertical motion, offered a satisfactory form of overhead construction. He thought that the question of tension did not play such an important part in the operation of a successful system as to justify all the expense and trouble often devoted to it. With reference to tension in the trolley wire R. C. Thurston, of the Erie Railroad, said that when the tension is slack, a high wind has been known to deflect the trolley wire until the hangers touched the contact shoe.

The general problem of energy collection was clearly stated by Charles Rufus Harte, of the Connecticut Company. According to his statement the successful system for energy collection by a moving train involved the consideration of collector design as well as the type of overhead construction. The overhead structure should be uniform throughout its length, and a perfectly rigid conductor, which would approximate a third rail, should be equally as satisfactory as a perfectly flexible structure. The collector itself should be a compound mechanism; one part designed to take care of the large variations in height of the wire and another of small inertia to follow the minute and rapid variations. He suggested a type in which the angular displacement of the top member or flap would actuate air valves and operate the main or pantograph member, so as to keep the pressure against the wire about constant. A stop could be provided to force down the pantograph in case other air cylinders did not have time to act. Mr. Harte gave much interesting information regarding the results of the extensive tests being carried on by the Connecticut Company and promised to send in a written communication, which would give specific data.

Chairman William McClellan stated that the only way to get satisfactory results was with a flexible overhead system. He believed that the latest New Haven construction is a step in the right direction and yet it is not a satisfactory solution of the problem. In his opinion the overhead construction would finally come to straight poles on the sides and cables between them to carry the catenary as in the Erie yards.

MEETING OF THE COMMITTEE ON TRAINING OF EMPLOYEES

A meeting of the committee on training of employees of the Transportation and Traffic Association was held at the headquarters in New York on May 27. Those of the committee present were: G. O. Nagle, Wheeling; C. E. Learned, Boston, and L. C. Bradley, Pottsville. Henry C. Page, Worcester, was also in attendance during a great part of the meeting.

In drawing up a plan for the work for the ensuing year it was found that the committee for the two preceding years had considered the employee from the time at which he made his application for service up to the time at which he was accepted for employment. It was decided, therefore, to devote the greater part of the report this year to the period during which he served as a scholar or apprentice and until the time when he was accepted by the transportation department and placed on the extra list. The committee hopes during its investigation of this subject to establish a recommended form of examination for new employees.

During the meeting Mr. Learned gave a very interesting account of the method employed by the Boston Elevated Company in breaking-in new men. New men, after having been passed by the employment department, are assigned to one of the group of special instructors selected from among the regular men, who teach them the duties of motormen or conductors. These instructors receive 10 cents a day in addition to their regular wages whether they are engaged in instructing or not. This price is not considered unreasonable by the company because in addition to the work of teaching the new men each instructor necessarily has to give some extra time to the student before his run to show him how to begin his work and at the end of the day to teach him how to make up his card. The new men are paid $1 a day while breaking in. This policy seems justifiable by the management inasmuch as it is at least an amount sufficient to pay the man's board. A new man who is perhaps from the country with a little capital will often get discouraged during the first few days, and if he feels that his money is gradually being spent may leave the service and then the company may lose some good men. Another advantage of paying a student is that the man will take another day or two, or longer, in breaking in if he does not feel that he is quite competent for the work.

After a man has broken in in this way he goes on the extra list, and during this time the company guarantees that he shall receive at least $7 a week, provided, of course, that he reports for duty every day.

The company keeps its records of employees on individual cards and uses a cipher system for indicating all offences. For instance, the letter "A" may indicate insolence, "B" failure to hold the trolley rope while passing around a curve, etc. This system has two advantages. In the first place it very much abbreviates the work of keeping the records; in the second place, a glance at a card will show by the repetition of certain letters whether a man's failures have been of the same kind or not. The original records from which these reports are compiled are kept for only a short period of time, say, 6 to 8 months. Each inspector is instructed to report all offences on the car on which he is riding, as if he himself owned the car, and as if the car was in competition with every other car on the system. Each offence is considered to have three phases: First, the violation itself; second, the cause of the violation, and, third, the effect. For instance, the failure of a conductor to announce a street might be the violation reported. Talking, or general inattention, may be given as the cause, and the effect that a certain number of passengers had been carried past their destination.

All inspection reports are received in the transportation service, and after being noted, are sent direct to the division superintendent where the employee is in service. The attention of each man affected is called to the fact that he has broken a rule. The extent to which this system is carried is indicated by the statement that out of 6000 employees probably 2000 are spoken to a month in regard to various minor or greater infractions in the rules. When a rule is broken the man is requested to report the number of the rule broken and to quote its exact language. This impresses the matter upon his attention.

In the general discussion which followed this description of the method in Boston a great variety of practices was found in the methods of arranging runs. In Boston a man scheduled for a run, if unable to reach the station, is permitted to notify the starter by telephone or letter that he cannot take the run. If the notice is received 10 minutes or longer before the time scheduled for departure there is no penalty. If received within an hour after the time when the missed run begins the man goes to the bottom of the extra list for one day. If not received within that time he goes to the bottom of the extra list for three days.

Mr. Bradley said that in Pottsville if a man missed three times within a certain period he loses his rating and goes on the extra list. He also stated that in Pottsville it had been possible to divide runs into early and late runs and to divide the men into two sections, so that half of the men were assigned the early runs and the other half the late runs. The assignments for the sections are alternated every two weeks, and this plan has proved quite popular with the men. It allows a man, if he wishes to have some time off in the day time, to arrange to take that time off while he is working on a late run, and if he wishes an evening off, to arrange to take it while he is having a day run. Of course, once in two weeks each man has to work 18 hours out of 24 hours, but on the other hand every man has every other Sunday off.

Mr. Page stated that when he went to Springfield the practice there was to give the regular runs to the new men and give the extra runs to the old men. As a sliding scale of wages was used, the old men received higher wages than the new men. He had taken a concensus of the opinion of the men and had found this plan popular, so that it had not been changed.

The next meeting of the committee will be held during the early part of the summer, after the returns for the data sheets have been completed.

ASSOCIATION CIRCULARS ON TRANSFER INFORMATION AND CITY RULES

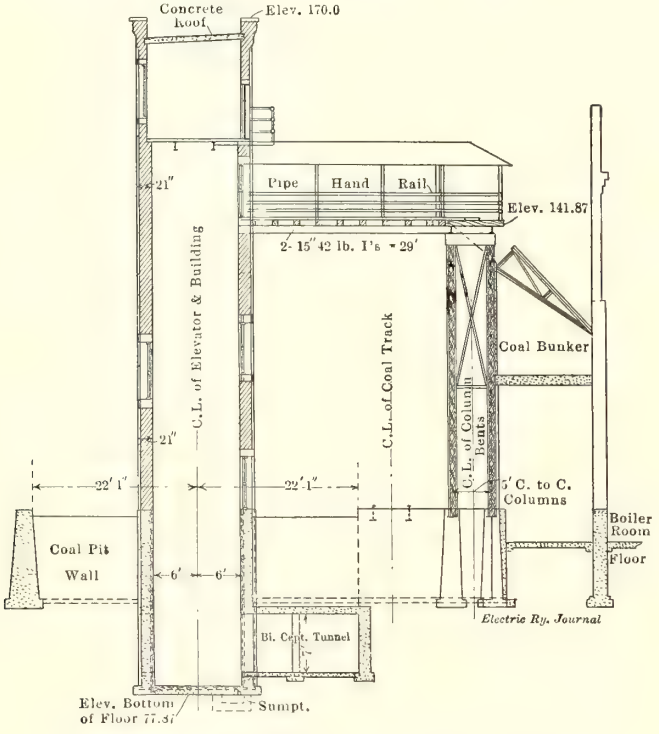
The committee on transfers and transfer information of the American Street & Interurban Railway Transportation & Traffic Association has sent out through Secretary H. C. Donecker data sheet No. 56 relative to this subject. Among the questions which the member companies are asked to answer are those relating to changes in transfers made necessary by the use of pre-payment cars; whether passengers who present lapsed or incorrect transfers should be ejected if they refuse to pay cash fare; whether transfers are registered; what percentage of passengers receive transfers; what percentage of total passengers ride on transfers, and whether automatic transfer issuing devices are employed.

The committee on city rules of the same association is sending out data sheet No. 55, on which member companies are asked to give their opinion of certain city rules, for which amendments were proposed at the Denver convention. The rules are as follows: No. 2, Responsibility; No. 21, Standing on Steps; No. 101, Position on Car; No. 116, Change; No. 213, Power Off Line, and a suggested additional paragraph to rule No. 10, relative to the conditions under which the motormen should proceed to the other end of the car when it is necessary to reverse the car for more than 10 ft. In the case of the other rules mentioned, the circular first gives the rule as submitted by the committee, then the amendment, and concludes with legal and other comments on the desirability of changing or retaining the original wording.

NEW COAL HANDLING PLANT FT. WAYNE & WABASH VALLEY SPY RUN STATION

The Spy Run generating station of the Ft. Wayne & Wabash Valley Traction Company was built in 1906. This plant has an ultimate capacity of 8500 kw with horizontal steam turbo-generator units. The generators are mounted on a floor carried above the boiler plant. The coal-handling plant of this station as first built included a gantry crane traveling over a coal-storage pit. The crane was equipped with a one-ton clam-shell bucket with the necessary hoisting and coal-crushing apparatus. The crane bridge, which was 60 ft. wide, was arranged for electrical propulsion over tracks 225 ft. long carried on the sides of the concrete coal-storage pit. Coal was received in cars and unloaded into the pit or directly into the power-station bunkers. The crane bucket elevated the coal and dumped it into a bunker of about 400 tons capacity. The crane served a storage yard of approximately 6000-ton capacity and is stated to have been satisfactory while in operation, except that the maintenance cost was high.

On Aug. 28, 1909, the crane was blown over during a heavy windstorm. The crane operator had failed to lock the crane to the rails and the wind pressure against the framework of the



Coal-Handling Arrangement of the Fort Wayne & Wabash Valley Railway's Power Plant

bridge moved it along the runway at sufficient speed to break the bumping blocks when the end of the travel was reached. The crane then upset, falling into a water tower nearby. The force with which the crane struck the water tower served to destroy both crane and tank. After this accident the engineers of the Ft. Wayne & Wabash Valley Traction Company were confronted with the problem of replacing their coal-handling equipment. Several systems were considered and practically all except the new plant as here illustrated were not accepted on account of the high maintenance cost. The new installation was chosen, not for its low first cost, but because it promised to require little maintenance.

The new system includes a coal tunnel under the storage pit, an elevator shaft and distributing tracks for handling coal in industrial railway cars. A tunnel was built under the coal-storage pit directly alongside of the tracks from which incoming coal cars are unloaded. Coal valves were fitted into the roof of the tunnel and thus the industrial railway cars in the tunnel are quickly loaded by gravity through the valves. Three 2-ton roller-bearing push dump cars were purchased from the C. W. Hunt Company for this use. One man can easily handle one of these 2-ton cars when loaded.

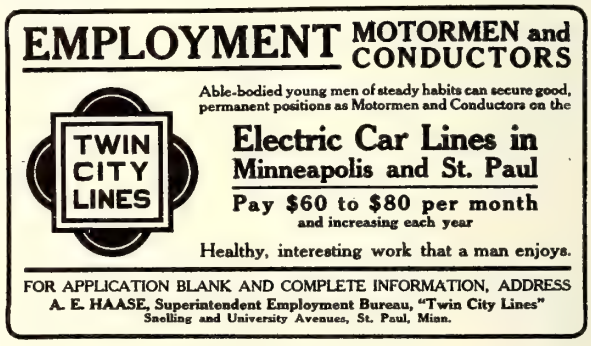
After a car has been filled in the tunnel it is pushed onto an Otis elevator and raised to a trestle just above the level of the coal bunker. The total lift from the floor of the tunnel to the elevated tracks is 60 ft. The car is then pushed out onto the trestle tracks and the coal is distributed to the bunkers. The engineers state that the total cost of this coal-handling plant was about $15,000. At present the coal consumption of the Spy Run station is approximately 150 tons per day. It is now said to cost about 3.63 cents per ton to unload, store, reclaim and deliver coal to the bunkers over the boilers. This figure includes only operating cost.

An accompanying engraving shows a vertical section across the coal pit and elevating machinery and through the elevator tower. Acknowledgment is made to M. J. Kehoe, superintendent of power, Ft. Wayne & Wabash Valley Traction Company, for information used in the preparation of this description.

TWIN CITY RAPID TRANSIT COMPANY'S METHOD OF ADVERTISING FOR TRAINMEN

The Twin City Rapid Transit Company is now advertising in a large number of daily papers throughout Minnesota and North Dakota, asking young men to apply for employment as motormen and conductors. The accompanying advertisement, bearing the monogram of the Twin City lines, ran for a month in each of 92 newspapers in country towns and brought good results in the form of applications from young men raised in the farming country.

A larger advertisement has been run as an advance announcement of the visits made to numerous towns by the assistant superintendent of employment, B. F. Jager. With a view to inspecting candidates for positions, Mr. Jager followed carefully



One of the Advertisements Printed in a Country Newspaper

laid out schedules, which took him to certain towns on definite dates. An advertisement of the itinerary was run in local daily papers a week previous to the arrival of the representative of the Twin City lines. Thus, at the published time of his visit, the candidates were on hand and he was in position to accept applications. It is stated that by means of this advertising campaign for employment the Twin City lines are obtaining applications from a satisfactory number of highly desirable men.

The Denver (Col.) City Tramways is entirely rearranging its lightning protection. General Electric electrolytic arresters are being installed in each car at a total expense of about $15,000, and other equipment, including line arresters, will add about $20,000 more. The points for special protection are determined from a "tack" map kept by the company for about a year, to show the points which have been suffering most by lightning strokes.

THE TECHNICAL SCHOOL AND ELECTRIC RAILWAY

The regular monthly meeting of the New England Street Railway Club was held at the American House, Boston, on the evening of May 26, with President C. H. Hile in the chair. The speaker of the evening was Prof. A. S. Richey, of the Worcester Polytechnic Institute, who read a paper on "The Technical School and the Electric Railway." An abstract of Professor Richey's paper follows:

The notable point of contact between the engineering college and the railway company is the engineering graduate. He is the product of the college and the raw material which is to enter into the human organization underlying the transportation industry. The attitudes of both the college and the railway company toward the graduate are changing greatly. Engineering laboratories and new methods of instruction show that the colleges are active and alert in trying to meet the new needs. On the other hand, the railway companies do not so often repulse the efforts of the technical man to secure a position, nor do they expect the graduate to be a ready-made engineer. The railway companies are beginning to follow the example of the manufacturing companies in establishing apprentice courses in cadet engineering for the final training.

A representative course in a manufacturing plant was described by the author, who emphasized the fact that although the student may get long hours daily of work embodying little interest in the early part of his course, if he tries to master each task and study the reasons for details of design and construction he will soon be allowed to do more responsible work. During the time spent in the winding department he sees embodied in concrete form the principles of electricity which in the classroom were represented by formulas and diagrams. He learns that a mistake in making connections or carelessness in putting the coils into the slots is almost sure to result in injury to the installation, which causes a breakdown in the subsequent test. In the shop department the student has the benefit of the premium system, and the bonus offered for doing certain work within a specified time urges him to work as fast as he can. But the temptation to gain speed at any cost is lessened by the knowledge that his mistakes will surely be discovered, and as time lost in repairing defects very materially reduces his premium, the student soon learns that reliability is more important than speed. The natural bent of the student usually makes itself known in a short time after entering the shops. His future can be predicted with considerable accuracy from the report of the shop foremen after six or eight weeks. The managers also have full opportunity to take the measure of the apprentice. College graduates are able to take up the work of the different departments more quickly than are men without educational advantages. The character of the student counts for more than does the knowledge which he acquires at college.

Charles F. Scott, of the Westinghouse company, interviewed a number of his associates in different departments to ascertain the reasons for the deficiencies of the college graduate. No one mentioned lack of theoretical knowledge as a cause. Among the causes of failure mentioned were general mediocrity and lack of ability to do large things; lack of initiative and ability to carry through tasks independently; undeveloped faculty of attending to details; lack of diplomacy and tact; absence of real interest, and too great haste in passing from one line of work to another. Several referred to instances in which young men declined to take minor work, although their superiors had a succession of positions which were to follow successful performance. It was inexpedient to explain the plans to the young men, and their failure to undertake and do the little things proved that they were not made of the right kind of material.

While the college graduate is not a perfect employee any more than he is a complete engineer, he will average in a higher class and with no more of those faults which have been enumerated than the average non-technical employee. It simply means that in employing technical men as well as non-technical, the employer must "hire, try and fire" to weed out those with undesirable qualities. Even though objections as cited are found to technical graduates the fact that the manufacturing companies yearly send representatives to the technical schools in search of men proves that their services have some value. Competitive bidding for the services of apprentice engineers may of itself be bad for the young graduate, on account of the fostering of conceit to which it often gives rise.

Mention was made of the relations of the American Telephone & Telegraph Company to the technical schools, and the practice of the Denver Gas & Electric Company in seeking the services of new graduates was reviewed. The results have been most satisfactory. The Rochester Railway & Light Company, the Public Service Corporation of New Jersey, and the Metropolitan Street Railway Company of New York offer definite courses of instruction to technical graduates. R. M. Searle, of the Rochester company, writes: "It has been our practice every year to put on a number of cadet engineers at $50 or $60 a month, the idea being to give them a salary that would clothe and board them, and let them maintain sufficient self-respect to take up that which for two years is ordinarily a post-graduate course. About two men out of five stick or succeed along the channels we lay out. They are given everything to do from shovelling coal to actual executive work, and one of the chief things we teach them now is the necessity of having tact, not only with the men under them, but with the public. The fact that we are continually approached by outside companies for our cadets after training is a gratification to us, and indicates that the lines we are following approach good practice. We have found that at the outset the average college graduate is almost useless and hopeless in true commercial lines, leaning too much upon what he has learned at college and not using it to his advantage. It takes him at least two years to reach his equilibrium, and then if he has initiative left he manifests to his colleagues or competitors the superior benefits of technical education."

The details of the apprentice engineer's course as conducted by the Public Service Corporation of New Jersey were mention, as printed in the ELECTRIC RAILWAY JOURNAL of May 21, page 1908. The instance was cited of a young man who practically created such a course for himself in another company. The young man had just graduated from a technical school, and having a speaking acquaintance with the president of the electric railway company in his home city (in the Middle West), he requested the president to give him a letter of introduction to the head of any department, asking that he be put to work in that department as an inexperienced employee, with absolutely no unusual favors—to be discharged the moment he showed himself worth less than the man working alongside of him. He wished to remain in that department until he was satisfied that he had become familiar with the operating principles there, and then he wanted the privilege of resigning that job and being placed in a similar manner in some other department. He cared nothing for the order, but wanted a working knowledge of all departments. The president of the company listened to his plan and granted his permission, more as a personal favor to the son of a former acquaintance than as a practical scheme. The young man went to work. None of his superiors knew of his plan except the president, who kept track of his movements and progress in a half-interested sort of way. In the course of about two years he realized that the young man was "making good" and rapidly becoming a first-class railroad man. He is now in a regular position and in direct line for promotion to the headship of a department.

The constant need of first-class men as heads and sub-heads of departments in electric railway work is evident. That technical graduates are the best material as a class from which to fill these positions is being slowly realized by the companies is evidenced by the increasing number of technically trained men who are filling these positions year by year. Until recently these men have had to fight to secure a foothold, and most of those who have done so have done it in spite of every obstacle. The prejudice against college men has lasted here probably longer than in any other business. Too much has

been expected from the college man at the start. We must not expect him to be an engineer merely because he holds a diploma. He must start at the bottom like any man without college training. We must watch him, and in many cases take the conceit out of him, and shift him from one job to another, remembering if he is the kind we want he will "catch on" at different jobs quicker than the non-technical man.

The method used most generally by an electric railway in employing a technical graduate, if it may be called a method, is to put him at work somewhere in the electrical department, drafting, bond testing, pole checking or the like, and then letting him alone to watch him grow. He is four years older than other men of equal practical experience, or, in other words, four years younger than other men of his age. These four years have been spent away from actual business cares, which is in many cases to the disadvantage of the graduate. Sometimes he has a case of "swelled head," which could easily be reduced by proper treatment. Electric railway men do not realize these facts and act accordingly. We handle him precisely like other men, whom we do not expect to advance, and then damn technical education because he does not make a railroad man. And in spite of it some do make railroad men.

One result of this policy is that electric railways get only two kinds of graduates; those men who have their hearts set on railway work and have the idea so firmly fixed that all the advantages offered by the manufacturing, telephone and other companies do not shake their intentions, and the men who are not able to secure work with the companies offering better opportunities. The second class helps to fasten a bad name on the technical schools; those who succeed, in the first class, are called exceptions to the rule, and the rest are discouraged and turn back to the manufacturing and other companies, who welcome them.

Adopt a policy of systematically training the technical graduate; select your students as carefully as your conductors, and see how your opinion of the technical man changes for the better in three years. Then, when a valuable foreman or department head leaves you, see how much easier it is to fill his place and from men trained in your own methods and on your own property. Note the ease of thus officering a new division or department. One serious objection often raised to the apprentice system is that none but the largest roads can afford to adopt it. It ought to be possible for several small roads in close touch with an organization like the New England Railway Club to conduct a course between them. One road might set aside a subordinate job in the car shop; another in the transportation department; another in the power station, etc. A committee representing the roads could arrange the course and select men from the applicants, rotating them through the different jobs. There would be no trouble in getting applications, and the courses cost nothing, since the men can be discharged if they do not give services for their pay. Larger properties could well afford to conduct such a course in their own organizations, and after it was well started could not afford to drop it.

A STUDY OF TRANSIT CONDITIONS IN PHILADELPHIA

On May 27 the State Railroad Commission of Pennsylvania announced that Ford, Bacon & Davis, of New York, had been appointed expert engineers of the commission to make a thorough investigation of the transit conditions in the city of Philadelphia, particularly with reference to the service rendered by the Philadelphia Rapid Transit Company, and "to report thereon to the commission at the earliest possible moment." It was understood that the firm of consulting engineers mentioned will begin its work directly and will use a considerable amount of data which is already in the possession of the commission. Although the scope of the investigation has not been announced, it is supposed that it will be directed particularly in regard to the physical condition of the road and the method of operation and will not include financial matters connected with the company.

COMMUNICATION

SUBSTATION COSTS

Boston & Worcester Street Railway Company.
South Framingham, Mass., May 24, 1910.

To the Editors:

I read the editorial on substation economy in the May 21 number of your magazine with much interest, and thought it worth while to compare some of the estimates made with the actual figures resulting from operation in the case of the plant of the Boston & Worcester Street Railway Company. It occurred to me that you might be interested in these comparisons.

You assume that the ratio of the average output to the normal capacity of the substation might be 30 per cent. I find that last year this percentage for our four substations ran as follows: 34½, 28, 14½, 25. The largest figure is for a substation 1000-kw rating, located in the power house, and the figure of 25 per cent is for a 500-kw substation, or one of the same capacity you are considering.

You estimate an allowance for repairs of $780 and for supplies $400, or a total of $1,180 for these two items per annum. I think this is much too high. I have not readily accessible exactly the same figures for our plant, but supplies and repairs to all electrical machinery, including that in the power house, have averaged $1,336 per year for the past five years. This is for a total of 3800 kw of substation machinery and 3500 kw generators, together with the switchboard apparatus, transformers, etc., for the entire plant. This amounts to a little over 18 cents per year per kw, whereas your estimate amounts to $2.36 per year per kw.

You estimate the labor cost of running this substation at $8 per day for three men. The labor cost of running our three substations outside the power house the last five years has averaged $1,808, with a maximum of $1,976. This is an average of $1.65 per day per substation. Of course, this showing is only made possible by using substation men, who also have other duties, and charging up to the substation only that part of the time actually spent in substation work, but the labor cost to us from this method of operation has been very much less than you estimate, even after making allowance for such other use of the substation men.

It would seem to me that in a substation of this size, or even one of twice the capacity, it would be rather absurd to use more than two men per station, whether or not they had other duties. Of course, if only two men are used as substation attendants, there should be some other man available who can operate the substation in case of emergency, such as sickness or unaccountable absence of one of the regular attendants; but there ought to be no difficulty in providing some one who can do this, but whose whole time would ordinarily be charged up to something else.

The total cost of handling the substation service, according to your figures, which you estimate at .52 cent per kw-hour, is a very formidable item; and if it was the best that could be done in work of this kind, would go quite a ways toward an argument in favor of the use of several small power stations in place of one large station with high-tension transmission and substations.

Milan V. Ayres.
Electrical Engineer.

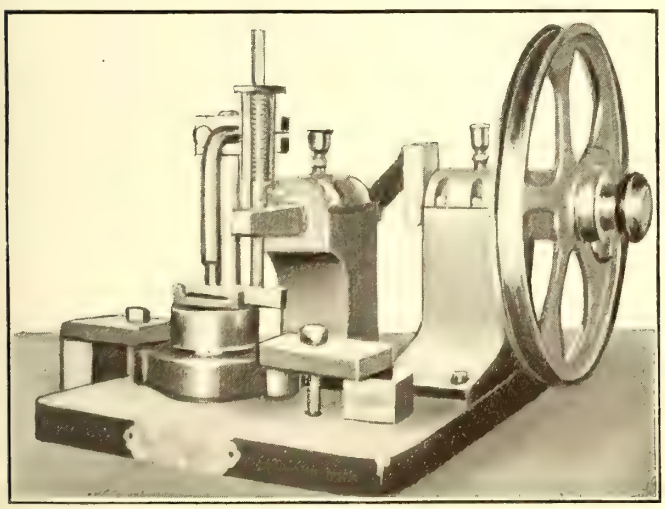
[Mr. Ayres' figures are interesting, and we are glad to learn that he has been able by good management to reduce the cost of operation below that quoted in the editorial. The figure of $44 per kilowatt for first cost of sub-station including land, given in the editorial, was based on the cost of a 500-kw substation in central Massachusetts. The fixed charges, which are not included in Mr. Ayres' figures, amount to 0.22 cent per kw-hour and account for 42 per cent of the total cost of substation operation given in the editorial. The labor charge of $8 per day was based on a 24-hour operation, and if three men are used, as assumed in the editorial, the amount quoted does not seem to be an unreasonable one, provided the men

have no other duties except those of looking after the sub-station machinery. Mr. Ayres was able to reduce this charge by using his sub-station men in other service, and the importance of doing this was mentioned in the latter part of the editorial. In regard to the final charge, that of repairs and supplies, it is undoubtedly true that with care these items can be kept low, as Mr. Ayres has succeeded in doing. During the first few years of sub-station operation practically the only charge for repairs and supplies should be for lubrication, cooling of transformers and brushes, but as the sub-station advances in age the repair expenses are apt to increase, and in a general estimate like that published it was thought advisable to make ample allowance for repairs. It would not take long to use up $1,100 a year in supplies and repairs if a sub-station suffered even only occasionally from armature or transformer burn-outs. We hope that the discussion by Mr. Ayres will elicit other records of sub-station maintenance which have not been so generally published as power station figures. Records of sub-station expenses from the Third Avenue Railroad of New York are published elsewhere in this issue through the courtesy of the engineering department of that company.—Eds.]

THE ACCURATE REGRINDING OF MOTORMAN'S BRAKE AND TRIPLE VALVES

BY C. S. BANGHART, GENERAL SUPERINTENDENT OF THE NEW YORK & QUEENS COUNTY RAILWAY COMPANY

In the past much trouble has been encountered in the operation of air-brake apparatus, attributable to leakage in imperfectly ground valve seats and valves in the motorman's brake and triple valves. These defects cause loss of air pressure, with resultant strains on the entire braking system and difficulty in effecting smooth, accurate stops. The sudden shocks and jerking of trains frequently observed are most invariably due to sticking valves caused by irregularities and imperfectly machined moving parts, valves and their seats. To say the least, the method of regrinding moving internal parts by hand, as employed heretofore, has never approached perfection, and



Grinder for Engineer's Air Brake as Applied to a Slide Valve

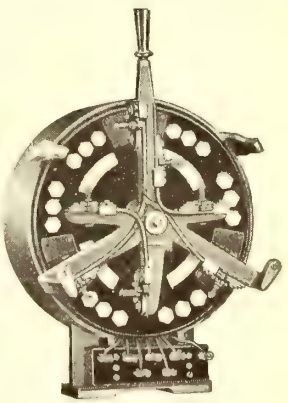
is unsatisfactory for the following reasons: (1) Only the most skillful mechanic can show any results in producing true surfaces, hence high cost of labor; (2) the minimum time required to regrind a valve or seat by this process is excessive, therefore added expense; (3) inequality in pressure between valve and seat during regrinding usually develops a slightly convex surface in the finished job, this condition creating leakage when the finished job is tested and necessitating a second regrinding, which adds a still greater cost.

These troubles have now been eliminated by the use of the Hartford-Blanchard valve-grinding machine, exhaustive tests of which were made some time ago by the mechanical department of the New York & Queens County Railway Company, at its Woodside shops. Furthermore, the mechanical method thus employed has the added advantage of increasing the efficiency and durability of the work produced. The results obtained by the use of this very simple and inexpensive machine have been far beyond my expectations. The simplicity of the device and its great usefulness would seem to warrant its universal adoption. It is quite singular that the device has not found its way into the railway supply market long ago, as the need for just such a tool has been recognized since the use of power brake equipment was inaugurated.

The machine will grind any type of engineer's valve in use. The face plate or chuck is counterbored to secure the various types of valves directly under the moving piston. The piston is fitted with a vertical spring plunger directly over the center of the valve. The lower part of the plunger engages in a small shoe, which is attached to the sliding part of the valve to give the required motion when the machine is in operation. By means of nuts on top of the plunger the pressure on the valve can be adjusted as desired. In using the machine for grinding a rotary valve, an extra arm is used with a stationary spring plunger for regulating the pressure on the valve. The valve is placed to one side and by means of a sliding shoe the reciprocating motion of the piston is converted into a rotary one for the valve. The plunger on the piston must be raised by the lock nuts and clamped there to avoid pressure on the valve. All the downward pressure for grinding this type of valve is supplied by the stationary plunger. The machine is compact in design, can be placed on a bench in the valve department and may be driven by using a small, round belt connected to the line shaft. Only a fraction of a horsepower is required for operation.

NEW A. C. CONTROLLERS

The flexibility and ease with which alternating current may be used for crane and similar motors have led to its use in a field formerly occupied exclusively by the series wound d. c. motor because the latter had the very desirable characteristic of high starting torque. In a. c. motors this feature is more nearly found in the slip ring motor than in the squirrel cage type. Speed and torque control of the former designs are obtained by inserting and varying resistance in the secondary winding of the motor. The Electric Controller & Manufacturing Company, Cleveland, Ohio, has developed a comprehensive line of manually operated controllers for such slip ring a. c. motors from 1 hp to 100 hp. These controllers follow as closely as possible in design and construction, the d.c. controllers which this company has been manufacturing for years. In fact, the wearing parts of the a.c. and d.c. controllers are interchangeable to a large extent.



A. C. Controller

These controllers are used with either two-phase or three-phase reversing slip ring motors. The resistance is entirely self-contained, it being necessary to connect only seven leads to the controller. Where heavy currents are to be handled, cast grid resistance is employed. Unusual precautions have been taken to insure permanently satisfactory insulation.

All contacts are mounted on a vertical slate face so that dust cannot settle between segments to cause short circuits. All contacts are of heavy copper and are reversible. Screws or bolts with special threads have been avoided, and so far as possible the wearing parts have been designed to permit their manufacture by the user. All of these controllers are oper-

ated by a lever motion which the manufacturers consider advantageous for crane and mill service. The company also makes controllers for squirrel-cage motors and a.c. commutating motors.

INDEPENDENT HYDRAULIC JACKS

The Duff Manufacturing Company, Pittsburgh, Pa., recently has put on the market the hydraulic lifting jack shown in the accompanying cut, in capacities ranging from 100 to 500 tons, with a raise from 6 in. to 12 in. It is for use in restricted areas where it is inconvenient to operate an ordinary jack. There are two main parts—the water reservoir with pump chambers and the ram or lifting mechanism. As illustrated, these parts are separate except for the flexible copper tubing which connects them. Consequently, the ram can be placed wherever there is room for it, while the pump can be set at any distance permitted by the length of the tube. The jack can be placed at any angle, and with small modifications in the frame construction can be put to many uses for which an hydraulic press is employed.

The pump is double-acting with a working stroke on both the upward and downward motion of the piston. There are two pump chambers, the upper having about five times the capacity of the lower. The valves in the pump chambers are so arranged that on light loads the larger volume of water in the upper chamber is forced under the bottom of the chamber, causing it to rise through larger spaces than on heavy loads or overloads when the smaller volume of water in the lower chamber is utilized. This speed variation is secured by an automatic by-pass valve in the diaphragm between the upper and lower reservoirs acting against a spring which can be adjusted so as to allow the water in the upper pump to escape at predetermined loads. The operating lever is reversed to trip the load so that the lug on the side projects upward to allow the lever to be pressed further down, thereby causing the trip sleeve and pump piston to bear directly on the suction and discharge valves respectively.



Parts of Hydraulic Jack

This action permits the liquid to pass back from the ram cylinder to the reservoir. The load may be lowered as slowly as desired or stopped at will by varying the pressure or lifting up on the lever.

Since the weight lifted by the jack is inversely proportional to the speed of ram travel the arrangement just described automatically adjusts the speed to the varying conditions of usage. The valve action is positive and there are no refinements of construction to cause trouble in a tool that is sure to receive rough usage. The tube which leads from the pump to the ram cylinder is made of flexible copper to withstand a pressure of 10,000 lb. per square inch, and is about 8 ft. long.

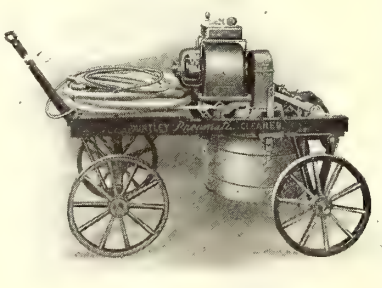
The ram cylinder is a solid steel forging with no joints at its base. This design gives greater stiffness and strength with minimum weight, and, what is more important, obviates the necessity of having a packed joint at the body of the cylinder. A base joint is a fruitful source of leakage and is the hardest to make water-tight because it is subject to the greatest pressure. The only packed joint in this jack is between the ram and cylinder walls, where packing is easy and leakage is less likely to occur owing to pressure being less direct and decreasing as the ram rises and quite inconsiderable when the load is at rest at the end of the lift.

SUBSTATION COSTS IN NEW YORK

In connection with the general subject of the labor and material required per kw-hour in substations, it may be of interest to give some figures on the substations of the Third Avenue Railroad Company, New York. This company operates three substations, the total output of which for the year 1909 was 40,877,186 kw-hours. The total cost of all material required for operation and repairs was $2,423.20 and the cost of labor was $19,302.31, making an average cost of $.0005315 per kw-hour. The substations do not suffer from lightning troubles, as all conductors are underground, but the engineers believe that the expense of static disturbances in the cables is quite as costly as an ordinary overhead system. The labor item covers the cost of 24-hour service. There are employed in each substation two men from 8 a. m. to 2 p. m., three men from 2 p. m. to 6 p. m., and two men from 6 p. m. to 8 a. m. The schedule of the substation forces is so arranged that there is a total of 52 labor-hours for every 24 hours. It is considered impossible in Manhattan borough to operate any substation properly without at least two men.

PNEUMATIC CAR CLEANER

The accompanying illustration shows a pneumatic car cleaner made by the Duntley Manufacturing Company, Chicago, Ill., for cleaning railways cars, stations and office buildings. It is mounted on a light truck, with 20-in. wheels, and can be easily moved from point to point in passenger yards. The electric machine is equipped with a 1½-kw motor of any current to suit the user. The vacuum pump is of special design, with diaphragm and only one ball bearing. It gives a 15-in. vacuum and has 75-ft. displacement. It is so constructed that the exhaust air from the pump can be used at about 8 lb. pressure for blowing dust and dirt from behind curtains, blinds, windows, seats. Thus this machine answers the double purpose of first blowing dirt and dust out of inaccessible places and then taking it up for deposit in a tank under the machine.

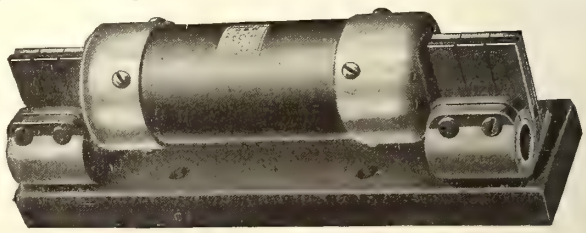


Vacuum Cleaner

The entire equipment consists of one 12-in. carpet sweeper; two 4-in. renovating nozzles; renovating handle complete; one 50-ft. piece of vacuum hose; one reducer, for reducing from hose nipple to small tools, and one blower to nozzle.

A 1000-AMP FUSE

The D. & W. Fuse Company, Providence, R. I., is now manufacturing 1000-amp fuses for 500-volt railway service. These are of this company's well-known cylinder link construction which has been so successfully employed in the 400-amp and 600-amp fuses designed for excessively heavy service.



A 1000-Amp Railway Fuse

The construction permits ready reloading at the factory, so renewals are a comparatively small expense. The accompanying illustration shows one of these fuses in its cut-out.

WOOD BLOCK PAVEMENT IN PHILADELPHIA

Work was recently completed by the United States Wood Preserving Company, New York, on the pavement by wood blocks of Market Street, Philadelphia. This street is the center of the retail shopping district and one of the busiest in that city. Because of the building of the subway, it was open, for more than a year, and the adjacent business houses suffered large losses through the diversion of traffic to other streets and the difficulties of handling goods. When the subway was completed, an association was formed by the merchants along Market Street to see that the street was paved with a material that would not be disturbed for years. A committee was appointed to investigate street paving, especially in New York. It returned enthusiastic for wood block pavement, on the ground that it was quieter than brick or asphalt, more durable and cleaner. The association then employed pavement testing experts, whose report was highly favorable to the use of wood blocks.

The contract awarded was for 85,000 sq. ft. of pavement at a cost of $3.49 per square yard, guaranteed for 10 years. The blocks used are 4 in. x 4 in. and of varying lengths, and are laid immediately against the rails. The foundation consists of 6½ in. of cement and a 1-in. cushion of four parts sand and 1 part mortar. A measure introduced in the City Council some time ago calls for wood paving on all the central streets of the city. At present, several petitions are before the authorities for other downtown streets, especially Walnut Street and Chestnut Street, urging an extension of wood block pavement.

UNIVERSAL ARMATURE REPAIR AND FIELD COIL WINDING MACHINE

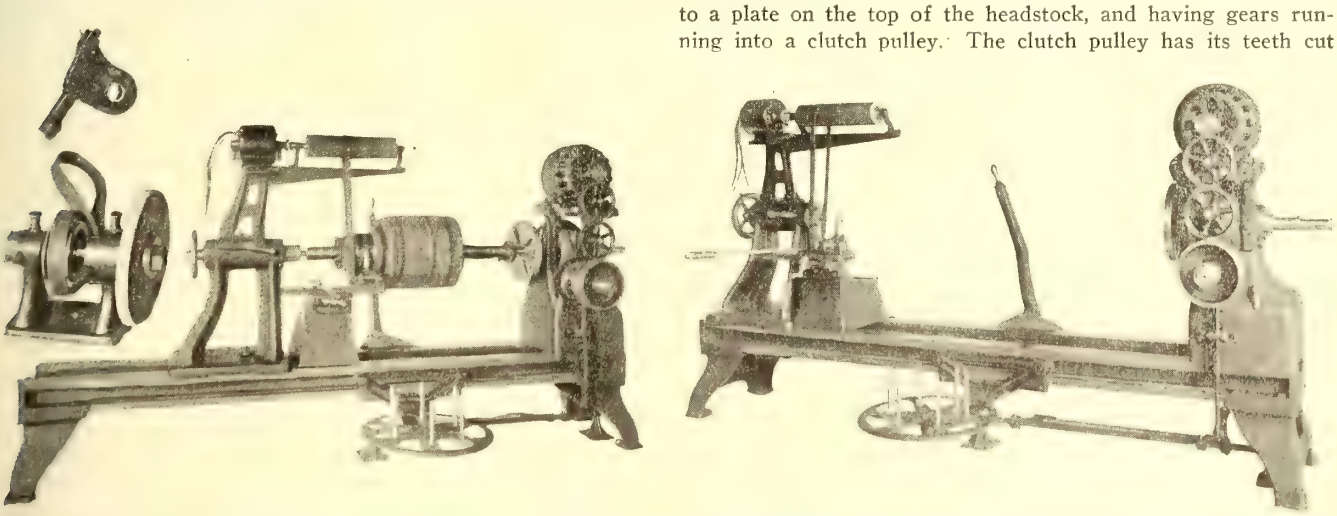
The American General Engineering Company, New York, has recently patented a novel combination machine for handling all kinds of armature repairing and field coil winding. It is made in two sizes—one model with 36-in. swing and 6-ft. centers is for the large motors used in elevated, subway and interurban work, and another, with 27-in. to 30-in. swing and 5-ft. centers, for street railway motors. A specimen of the larger size has just been furnished to the Panama Canal Commission. This machine is well adapted for shops where space is limited, as it is compactly designed and ordinarily is arranged for motor drive. It is particularly suitable for small shops, where there is not enough armature work to keep three or four special machines busy all the time. All the processes are carried out on one machine, so that it is unnecessary to remove the armature until every part has been repaired. The operation of the machine requires no skilled labor, as the various adjusting devices are of the simplest nature.

By referring to the accompanying illustrations it will be observed that the tailstock of the machine is adapted to receive the slotting, truing and grinding devices. The grinder and truing tool are made interchangeable merely by unscrewing one nut. The slotter is mounted on the same base as the grinder and is operated by the same transverse lever. The grinder can also be used for grinding armature shafts and similar stock. The commutators are slotted by a milling tool in preference to a saw, so that no finishing is necessary. The slotter is of the floating type to allow automatic adjustment to the mica in case the commutator bars are uneven. The slotter is belt-driven and is operated by a lever which gives a transverse movement of 12 in. The slotting tool is also fitted with a feed screw adjustment. Separate views of the truing tool and grinder are presented. The slotter and grinder are motor-driven through a belt drum, which can be swung backward or forward to permit the adjustment of the belt or the throwing out of the latter when the truing device is in service. The inside of the tail-stock may be used as a tool table.

The banding device has an arm mounted on a movable carriage with friction plates, one of which is adjustable by a screw attached to a steel spring. This arrangement permits the wire, as it passes from the reel on the carriage through the friction plates, to be adjusted to any desired tension by the operator. The construction of the friction plates allows uneven or kinked wire to pass through without changing its tension or breaking the wire, thus making the device automatic. The carriage is run in a double track to prevent dirt from accumulating or clogging its rollers. By adjusting a screw, the operator can vary the tension of the swing, while a fiber shoe is used to lessen the friction. A speed of about 30 r.p.m. is used for banding.

As shown in the illustrations, there is attached to the opposite side of the headstock an extension shaft on which armature coils are wound. On the reverse side of the headstock, not shown in the illustration, there is another extension shaft for winding field or magnet coils. These shafts are direct driven at 240 r.p.m.

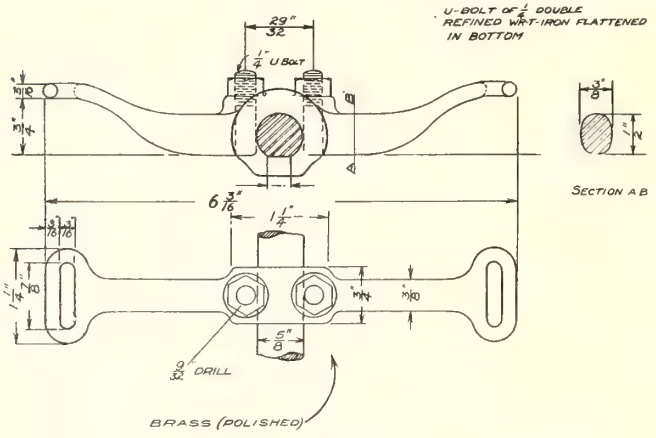
The machine is driven by a Westinghouse motor fastened to a plate on the top of the headstock, and having gears running into a clutch pulley. The clutch pulley has its teeth cut only half way, so that by removing the intermediate gears, which is done by taking out two cotter pins, the machine can be belt driven. When the machine is used for banding or coil winding, the clutch is thrown in or out at the will of the operator by means of an adjustable treadle. The reverse side of the headstock carries a starting box, which is within easy reach of the operator when he is running the machine. The main drive is self-contained, consisting of a worm and screw in a dust-proof gear case, which is split in the center, so that by unfastening two screws the gears can be removed without any further dismantling. When desired this machine can be furnished for variable speed operation.



Universal Armature Repair Machine, with and without Armature; Showing also Grinder and Truing Tool Separately

DETACHABLE REGISTER ROD HANDLE

The accompanying drawing shows a detachable center-rod register handle used by the Virginia Railway & Power Company, Richmond, Va. The handle is made of brass and is fitted over the rod by a pair of ¼-in. wrought-iron U-bolts. There



Richmond Detachable Register Rod Handle

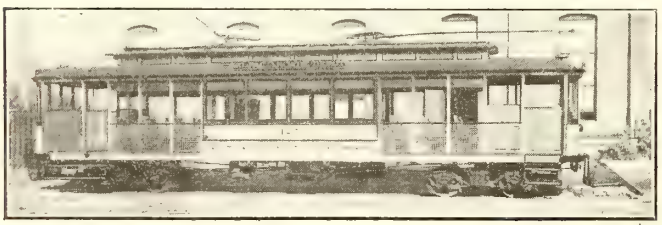
has been no difficulty in keeping these handles tight on the rod, not one having ever been loose. This device is the invention of and has been patented by A. Taurman, shop foreman of the company.

P.A.Y.E. CARS FOR LOS ANGELES RAILWAY COMPANY

The Los Angeles Railway Company has just completed and placed in operation on May 15 on its Central Avenue line 27 pay-as-you-enter cars. The cars were rebuilt from 27 old cars which had been practically discarded, as they had become somewhat out of date in comparison with the standard cars. These pay-as-you-enter cars were originally 34 ft. in length with a double floor framing and 19-ft. truck centers. They are of the California combination class, having both ends open with a closed center.

In the work of changing the cars over the company was compelled to devise some new features to adapt these open cars for prepayment service. The bodies were rebuilt with an entirely new floor framing of 5-in. I-beams and increased in length to 44 ft. 8 in. with 29-ft. truck centers. It will be noticed that dropped platforms are not used, as they could not be installed on account of the short track radius on narrow street corners where the platform must not exceed 7 ft. 10 in. New open sections and vestibules were constructed to increase the seating capacity from 34 to 42 and the platforms were lengthened from 3 ft. 6 in. to 7 ft.

All changes made in the rebuilding of these cars are to standards of this company, every part being interchangeable with



Los Angeles Pay-As-You-Enter Car with California Body

the same part on any other car on the system. The platforms are equipped with swinging lattice gates which are held in position from the forward or motorman's end by locks. When open, the gates fold together to make a division for the exit and entrance on the rear or conductor's end. Over the front exit steps a lattice sliding gate is provided; this is operated on ball-bearing rollers and is controlled by a motorman's pneumatic double-acting four-way valve connected to the airbrake line. These cars have been equipped with Stanwood steps, ball-bearing center bearings and Westinghouse 38-B motors with a gear ratio of 16:66.

ATLANTIC CITY SELECTED FOR THE 1910 CONVENTION

Secretary H. C. Donecker, of the American Street & Interurban Railway Association has issued the following preliminary announcement in regard to the 1910 convention. It is addressed to the members of the association and of its affiliated bodies, the Engineering, Accountants, Claim Agents, and Transportation & Traffic Associations, and also to the members of the Manufacturers' Association:

PLACE OF MEETING

The annual convention of your association will be held at Atlantic City, N. J., on Monday, Tuesday, Wednesday, Thursday and Friday, Oct. 10, 11, 12, 13 and 14, 1910. Definite information will be given in later bulletins as to the days upon which the different affiliated associations will hold their meetings.

We have been particularly favored this year in the number of invitations received, among the cities which have cordially expressed a wish to entertain us being Atlantic City, Saratoga Springs, Niagara Falls, Toronto, Toledo, St. Louis, Richmond, Portland, Ore., and within the past few days, Cleveland. The executive committee at its meeting in January last gave considerable attention to this matter, finally appointing a Committee on Convention Location with power to decide upon the time and place for the 1910 meeting. This committee, working conjointly with a similar committee appointed by the allied Manufacturers' Association, has secured, with the kind co-operation of local representatives, complete details of the hotel, exhibit hall and other essential facilities available in the various suggested convention cities. It has also visited some of these places, and having in mind the fact that our 1909 convention was held in a far Western city, has in a general way endeavored to ascertain the prevailing sentiment of our members on the subject. The result of this thorough investigation has clearly indicated the advisability of selecting Atlantic City this year and has brought about the now announced decision of the committee.

HOTELS

Previous conventions have given the great majority of our members personal knowledge of the splendid hotel accommodations obtainable in Atlantic City, and as this matter will be more fully covered in a later bulletin, nothing need now be said beyond a general statement concerning rates. Your committee has given this particular subject due attention and, in addition to securing the customary guarantee against an advance in rates, has effected an arrangement by which the association is to be provided with a complete schedule of hotel rooms, shown by numbers, and their corresponding daily rates. This unusual privilege will enable our members to secure at any time full information regarding charges for specific rooms and enable them to avoid misunderstandings or readily correct mistakes. A subsequent bulletin will give necessary general information with relation to hotel rates, the detailed schedules to be in the hands of the secretary (unless otherwise announced) for your inspection or reference.

EXHIBITS OF THE MANUFACTURERS' ASSOCIATION

As in 1908, the exhibits of the Manufacturers' Association will be located on Young's "Million Dollar" Pier. The steady growth in the membership of our allied association, its increasing efficiency and the advances in the art guarantee that the exhibits in 1910 will surpass even the high standard of former years.

ADDITIONAL INFORMATION

The association from time to time will issue bulletins containing information relating to hotel and railroad facilities, convention halls, manufacturers' exhibits, programs and the many other features of our annual meetings.

LONDON LETTER

(From Our Regular Correspondent)

The Leeds trackless tramway bill has been passed by the Lords' committee, and the bill to authorize a trackless system in Bradford has received the consent of the Commons' committee. Sheffield is also turning its attention to the same subject. The question of trackless trolleys in Sheffield is before the tramway committee, and as soon as Sheffield has other privileges to apply for, authority for trackless trolleys will be included in the first bill which it presents to Parliament. Mr. Fearnley, the general manager of the tramways, who visited the Continent some time ago to study the trackless trolleys, favors that system and gave evidence in their behalf in the cases of Leeds and Bradford.

In the appeal by the Corporation of Glasgow against the valuation of the Corporation Tramways made by the assessor of railways and canals, Lord Dundas has decided in favor of the corporation. The assessor fixed the valuation at £278,070, but the Corporation contended that it should be less on the plea that the tramway undertaking was a railway, and that accordingly the assessor was bound to deduct from the valuation one-half of the yearly repairs. Lord Dundas has reduced the valuation to £258,838, without expenses to either party. He held that the tramway is a railway. The growth of the business of the electric light plant and the electric tramways in Glasgow has been so great within the last year or two that, notwithstanding the large stations which have already been installed, the electricity committee has authorized the town clerk to secure a site for a new generating station.

For some months Belfast has been divided upon the question of the purchase of the Cavehill & Whitewell Tramways by the Corporation. It was finally found necessary to vote on the subject. At the election more than 26,000 voted in favor of the purchase while only 8000 voted against the proposal. Mr. Nance, the general manager of the Belfast Tramways, reported on the subject, and all his recommendations which have been carried out have proved successful.

C. W. Hill, manager of the Bournemouth Tramways, advocates the substitution of the overhead system for the conduit system through the center of Bournemouth. The total receipts of the Bournemouth Tramways last year were £85,539 and the operating expenses £55,677, leaving a balance of $29,862. After all the charges were met, however, the deficit was about £2,000. Mr. Hill considers that all the economies that can be effected have been worked, and unless traffic increases a demand will have to be made on the rates in the near future. Mr. Hill claims that by abandoning the conduit system a saving of £3,000 a year could be effected.

The directors of the City of Carlisle Electric Tramways, Ltd., which have not been successful financially, have sent a circular letter to the shareholders of the company in which they recommend the sale of the undertaking. An offer of £7,000, subject to the debenture debt of £40,000, has been made for the property. This offer will have to be submitted to the shareholders for approval.

Though no official statement has been made by the London, Brighton & South Coast Railway, the electrification of the south London line has been so successful that it is anticipated that the shareholders of the company will be asked to sanction the electrification of the entire main line between London and Brighton. Specifications are being prepared by Mr. Dawson for an extension of the electric system in the vicinity of London, and this extension will probably be proceeded with soon. The more ambitious Brighton project will undoubtedly be considered by the shareholders at the half-yearly meeting in June. The outer suburban area will be equipped first and the tracks electrified to Sydenham and the Crystal Palace. The development of the seaside traffic of the metropolis to the various pleasure resorts on the south coast demands more frequent service, and there is a large and growing residential long-distance traffic to places on the south coast. If the shareholders approve the proposal to electrify, it is understood that trains would be run at an interval of about one hour with a running time of 50 minutes between London and Brighton. Eastbourne and other popular health resorts on the south coast would be equally benefited.

At a recent meeting of the London County Council, the chairman of the finance committee stated that the financial condition of the tramways was extremely satisfactory and that there would be a surplus for the year of £244,132, which would be divided between the renewals fund and the general reserve fund. The profit, however, was not sufficient to justify anything being applied to the relief of rates at present. The chairman feels that in any event it would be better to reduce the fares than to relieve the rates.

An important extension of the tramways in east London has recently been completed and through service of electric cars established between Aldgate and Ilford and Aldgate and Leytonstone. The London County Council, the East Ham and West Ham Corporations and the Leyton Urban District Council are combined in the new service, the cars of the three outside bodies having been altered to suit the conduit system, which has been installed between Burdett Road and Aldgate. The fare between Aldgate and either Leytonstone or Ilford is threepence.

Sir George Gibb has resigned as managing director of the Metropolitan District Railway and Albert H. Stanley has been elected a director and appointed managing director. W. E. Mandelick, the secretary of the Underground Electric Railways of London, and of the Allied Tube Railways, has been appointed secretary of the District Railway. It is understood that Sir George Gibb has been appointed chairman of the board.

The Rhondda Urban District Council Tramways extension bill came before a committee of the House of Commons recently. For the promoters it was stated that among the objects of the bill was the construction of additional tramways at an estimated cost of £36,000. The Taff Vale Railway opposed the scheme. The committee, however, passed the proposals.

The report of the Anglo-Argentine Tramways for 1909 shows a large increase in traffic during the year, but there has been little saving in operating expenses. The effect of the economies which followed the merging of the several lines has not yet been felt, but the changes will undoubtedly work a considerable saving. The ratio of operating expenses to gross receipts last year was 62.26 per cent, a saving of 0.60 per cent in the 12 months and only 3.52 per cent below the average for the previous decade, for the greater part of which period the company was run in competition with other undertakings. The gross receipts of the company for 1909 were £1,939,900, as compared with £1,257,700 for 1908; operating expenses for 1909, £1,207,200, as compared with £790,700 for 1908; net earnings for 1909, £731,700, as compared with £467,000 for 1908; available balance for 1909, £768,600, as compared with £490,800 for 1908; city company annuity, preference interest, ordinary dividend for 1909, £758,300, as compared with £12,800 for 1908. A. C. S.

The Maryland Public Utilities Commission has moved from the Union Trust Building, Baltimore, Md., to the Builders' Exchange Building, Baltimore. Chairman Ambler and Mr. Laird have been conducting business pending the appointment of a successor to Walter W. Abell, who has declined appointment to the commission. Louis M. Duvall has accepted appointment as secretary of the commission. Frederick Wryght has filed a complaint against the United Railways & Electric Company, Baltimore, in connection with its method of handling cars at Frederick Avenue terminus. William H. Grafflin, Millersville, has complained against the Electric Express Company, a subsidiary of the Washington, Baltimore & Annapolis Electric Railway. He states that the company refuses to haul strawberries to Odenton and make a connection with the Adams Express Company, but that the company will take consignments to Washington, or bring them to Baltimore and make the transfer. This, he alleges, is done to secure a longer haul. He also complains that the company charges $1 for a round-trip ticket from Waterbury to Baltimore, the distance between which places is ten miles less than between Annapolis and Baltimore, for which the same fare is charged.

News of Electric Railways

Considerable Preparation Needed Before Detroit Arbitration Progresses

The prospects are that some considerable time will elapse before the board of arbitration will sit which has been appointed to consider the appraisal of the property of the Detroit United Railway made by the company and that made by Fred T. Barcroft for the committee of fifty. Frederick W. Walker, who has succeeded Mr. Barcroft as engineer for the committee, and Clyde I. Webster, general counsel for the committee, have addressed a statement to Mayor Breitmeyer, in which they estimate that the cost of making proper preparations and conducting the hearings will be more than $20,000. After reciting the need for exact information on various matters treated in the Barcroft appraisal, the statement by Mr. Walker and Mr. Webster continues:

"A number of engineers who assisted in making your appraisal have agreed to appear before the board of arbitration and testify and also assist in preparing the case, but unfortunately a large amount of detail matter prepared by them and forwarded to Frederick T. Barcroft, together with other important papers, have not been turned over to your committee. Furthermore, in some cases it is impossible to determine at the present how fully the work of these engineers has been incorporated in the appraisal and what modifications, if any, have been made in their conclusions. This can only be done, where the details are beyond your reach, by again working them up.

"It is to be hoped that as the work of preparing your case progresses every man who assisted in your formal appraisal will come forward and signify his willingness to appear and testify and assist, and that the detailed information and other papers previously mentioned will be delivered into your possession. Otherwise new men must undertake the work and prepare themselves to testify.

"It is evident that a determination of the valuation of the properties of the Detroit United Railway in some way is absolutely necessary before there can be any settlement of the street car situation in the city of Detroit. If the proceedings are to be continued before the board of arbitration under conditions existing as above outlined, we estimate that the cost of making proper preparation and conducting the hearings will be upwards of $20,000.

"This expense may be reduced if all the assistant engineers will appear and testify, and if the detail matter and papers are turned over to your committee, yet it would not be proper to proceed on such assumption in arranging for the funds for carrying on the work.

"We believe that the proceeding can be shortened by eliminating all items upon which there is no material difference in valuation and no disagreement as to their being properly included in the inventory, as it seems useless to take testimony except on those portions upon which there is a dispute."

Transit Affairs in New York

The corporate stock budget committee of the Board of Estimate of New York appointed to consider the amount of money which the city should spend during the coming year in permanent improvements submitted its report to the full board on May 27, 1910. It recommends the expenditure of $85,000,000, including $13,000,000 for new subways, between now and July 1, 1911. This will leave a debt limit margin, exclusive of the large sums which will be released under the constitutional amendment, approved by the people last fall, exempting self-sustaining subway and dock bonds from computation in the debt limit, of $8,400,000. It is expected that at least $100,000,000 will be added to the borrowing capacity of the city by the approval by the Appellate Division of the Supreme Court of the schedules to be submitted to it by the board under the enabling act under the amendment. It has been arranged that $60,000,000 in total shall be spent for subways in the next three years. The figures for the subway bonds will be presented within a few days. They total some $44,000,000. It will take several weeks to draw up the dock bond schedule.

Justice Brady in the Supreme Court on May 27, 1910, directed an order to be served on W. R. Willcox, chairman of the Public Service Commission, to appear before him in court on June 1, 1910, to show cause why he should not be adjudged in contempt of court for alleged public utterances made before the West Side Young Men's Christian Association recently. Mr. Willcox is said to have attacked Frederick W. Whitridge, receiver of the Third Avenue Railroad, and is reported to have made the following reference to the suit brought by the commission against the Union Railway and the Third Avenue Railroad for failure to comply with an order of the commission, which suit was dismissed by Justice Brady: "This suit was, unfortunately, tried before a judge who admitted he was the owner of stock in the company, and the suit was dismissed on a technicality." Counsel for the commission and counsel for the receiver, knowing that Judge Brady was a stockholder in the Third Avenue Railroad, consented to have the case go on before him.

Samuel Rea, second vice-president of the Pennsylvania Railroad, conferred on May 24, 1910, with Chairman Willcox of the Public Service Commission regarding the plan for a west side subway. The company is anxious to have a subway built which will accommodate the passengers arriving at its new terminal at Thirty-third Street and Seventh Avenue, New York. It has heretofore expressed a preference for the extension of the present subway, operated by the Interborough Rapid Transit Company south from Forty-second Street and Seventh Avenue, as being the most speedy method of getting such a subway. Mr. Willcox assured Mr. Rea that the engineering department of the commission is giving attention to the west side problem, although at present it is chiefly occupied with the completion of plans and contracts for the triborough subway route.

Short Strike in Albany

The employees of the United Traction Company, Albany, N. Y., tied up the lines of the company in Albany and Rensselaer on May 27, 1910, by a strike which lasted one day. The issue involved certainly was far fetched. On the day mentioned the Barnum & Bailey circus was announced to show in Albany, and in order to accommodate the crowds which attend the circus the company decided that it would be advisable to operate cars of the Rensselaer division direct to the circus grounds over the Albany division north of Clinton Avenue, Albany, at which place passengers from Rensselaer are usually transferred to Albany cars. Despite the fact that the employees of the two divisions are both affiliated with the same parent union organization, the employees of the Albany division objected to the men of the Rensselaer division operating over the lines in Albany, and by refusing to take out their cars seriously interrupted the service. Toward the close of the day, however, when the men found that the company would not yield to their demand they returned to work. The cars of the Cohoes Railway were run as usual, but were unable to carry the crowds, so the Public Service Commission of the Second District of New York authorized the Delaware & Hudson Company, which controls the United Traction Company, to run trains from the station of the New York Central & Hudson River Railroad to the circus grounds.

Cleveland Traction Situation

The platform men of the Cleveland Railway have demanded 32 cents an hour, and the demand has been refused by J. J. Stanley, president of the company. The question will be arbitrated. Robert D. Beatty, receiver of the Eastern Ohio Traction Company, has been selected to represent the company, and Elroy M. Avery has been selected to represent the employees. If Mr. Beatty and Mr. Avery cannot agree on the question of wages, they will choose a third arbitrator to act with them. Little has been said of

late regarding the demand of the union that the men should be discharged who refused to take part in the strike which was declared when the lines in Cleveland were under the management of the Municipal Traction Company. The management refused to entertain the proposal, and also refused to reduce the standing of the men.

The company will begin work soon on the West Sixty-fifth Street line. The various sections in use on that street will be connected to make a crosstown line, which will extend south to Clark Avenue.

The West Side Chamber of Industry has started a movement to have West Sixty-fifth Street opened through to Denison Avenue and the track extended to an intersection with the line on that street, which would make possible a belt encircling almost the entire city. In order to do this, the Big Four Railway would have to erect a bridge across West Sixty-fifth Street. The company has agreed to meet half the expense of this change, so that the cost to the city would be about $30,000. The proposed belt route would start at the Public Square, extend to West Sixty-fifth Street, thence to Denison Avenue, over the Denison-Harvard bridge to Harvard and Broadway, thence to 105th Street, thence to St. Clair Avenue, and back to the Public Square.

Association Meetings

Central Electric Traffic Association.—Indianapolis, Ind., June 11.

Master Car Builders' Association.—Atlantic City, N. J., June 15, 16 and 17.

American Railway Master Mechanics' Association.—Atlantic City, N. J., June 20, 21 and 22.

Central Electric Accounting Conference.—Toledo, Ohio, June 25.

Street Railway Association of the State of New York.—Cooperstown, N. Y., June 27 and 28.

Colorado Electric Light, Power & Railway Association.—Glenwood Springs, Col., Sept. 21, 22 and 23.

Oklahoma Public Utilities Association.—Oklahoma City, Okla., Sept. 30 and Oct. 1.

American Street & Interurban Railway Association.—Atlantic City, N. J., October 10, 11, 12, 13 and 14.

New Line Opened in Montana.—The Missoula (Mont.) Street Railway has placed its line in Missoula in operation. The system comprises 10 miles of track. The initial service is being given with three cars, which are operated on a 15-minute schedule.

Havana Electric Railway Moves Offices.—The Havana (Cuba) Electric Railway has moved its general office from 52 Broadway, New York, N. Y., to 55 Liberty Street, New York. David T. Davis, vice-president of the company, and H. Kreamer, secretary and treasurer of the company, are located in New York.

Decision in Ticket Suit in Philadelphia.—The Supreme Court of Pennsylvania affirmed the decision of Common Pleas Court No. 2 of Philadelphia in the case of the City of Philadelphia against the Philadelphia Rapid Transit Company, and has also affirmed the finding of the lower court in the case of Rudolph Blankenburg against the company. The lower court decided that the company had the right to withdraw the strip tickets as it was a matter of administration of the ordinary affairs of the company and not a matter of fare.

Increase of $847,986 in Valuation of Electric Railways.—The Indiana Tax Commission closed its first session on May 23, 1910, and has made a report on the increases deemed necessary on the several classes of property under review. The increase in the appraised value of electric railway property is $847,986. The totals on the electric railways follow: Main track, $19,344,709, an increase of $587,722; second main track, $233,670, an increase of $40,070; side track, $139,710, an increase of $6,195; rolling stock, $1,759,515, an increase of $175,565; improvement to right-of-way, $906,423, an increase of $37,434; total, $22,384,027, an increase of $847,986.

New Home of the Portland Railway, Light & Power Company, Portland, Oregon.—The Portland Railway, Light & Power Company, Portland, Ore., has issued a booklet for distribution to the public as a souvenir in commemoration of the opening of the company's new headquarters in Portland. The building was opened on April 23, 1910. It is nine stories high, and the Portland Railway, Light & Power Company occupies the entire basement and the first, second, third, fourth and fifth floors and part of the sixth floor. There are 24 pages in the publication. Notes on the progress of the electric street railway and the light and power systems in Portland since 1900 conclude the souvenir. Eight excellent half-tone engravings are used to illustrate the text. They include interior and exterior views of the new building, a view of the building occupied by the company in 1900, and a particularly striking view of the new building at night.

Special Trains to Master Car Builders' and Master Mechanics' Convention.—To accommodate those who propose to attend the annual conventions of the Master Car Builders' Association and the American Railway Mechanics' Association, at Atlantic City, the Central Railroad of New Jersey will run a special train of Pullman parlor cars, leaving New York from the foot of West Twenty-third Street at 3:20 p. m. and from the foot of Liberty Street at 3:40 p. m., on June 14, 1910. The one way rate is $3.25 and the round trip excursion fare, $5.00, tickets good for six months, via the direct route or Philadelphia, with privilege of stopover at Lakewood and Philadelphia. Regular trains of the Jersey Central Railroad leave New York at 9:50 a. m. and 3:20 p. m.; Saturday at 12:50 p. m.; Sunday, 9:50 a. m. and 2:20 p. m.; Liberty Street, 10:00 a. m. and 3:40 p. m.; Saturday, 1:00 p. m.; Sunday, 10:00 a. m. and 2:30 p. m. Those who propose to travel by the special train are requested to communicate with H. D. Vought, secretary of the New York Railroad Club, 95 Liberty Street, New York City.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The committee on street railways has reported to the Senate a bill to authorize the Boston Elevated Railway to purchase and hold the stocks of other street railways. In its present form the bill provides that the company may acquire and hold the stocks and bonds of any connecting or intersecting line, subject to the approval of the Railroad Commission. The facilities of travel on the railways of each of the companies are not to be diminished nor the fares increased. The company, subject to the approval of the commission, may issue its own stock or bonds to provide means for paying for securities purchased, but the par value of the stock and bonds so issued is not to exceed the par value of the securities purchased, and in no case is the amount of bonds to exceed the amount of bonds purchased. The railways whose stocks are owned in whole or in part are not to be considered as owned, leased or operated by the Boston Elevated Railway within the meaning of Chapter 500, Acts of 1897, which determines the rental to be paid upon the East Boston tunnel. The act is not planned to permit the Boston Elevated Railway to acquire the stocks and bonds of the West End Street Railway, now leased by it, or any other railway which may hereafter be constructed in any city or town in which the company now owns, leases or operates a street railway. A feature of the bill provides a 5-cent fare for 5.5 miles from the Massachusetts State House, but this is not to be regarded as affecting the law relating to fares on roads leased or operated or owned by the company at the time of the passage of the bill. The bill to permit the New York, New Haven & Hartford Railroad to own stock in the Berkshire Street Railway has been passed by the Senate to be engrossed. A bill has been reported by the committee on metropolitan affairs to permit street railways to use the tracks of railroads. The same committee has reported favorably on the question of authorizing the Boston & Eastern Electric Railroad to build a tunnel and subway under Boston Harbor. The bill to require street and elevated railways to transport pupils of industrial schools at half fare has been passed by both branches and laid before Governor Draper for signature. The Senate has rejected the bill to reduce the hours of labor of street railway employees.

Financial and Corporate

New York Stock and Money Market

May 31, 1910.

The Wall Street stock market opened fairly steady this morning after the three-day holiday with trading as listless as during the previous week. Then came the news that President Taft had instructed the Attorney-General to begin suit to enjoin the Western railroads from putting into effect the increased rate schedule. This was seized as a basis for a vigorous attack upon the market and prices broke sharply. Some of the more active railroad issues declined from 4 to 5 points.

The money market was little affected by the selling and rates continued easy. Quotations to-day were: Call, 3 to 3½ per cent; 90 days, 3 to 3¾ per cent.

Other Markets

Although Lehigh Valley and other railroad issues were very weak in the Philadelphia market to-day, traction shares were little affected. Transactions have not been heavy in these stocks during the past week and prices have remained practically stationary.

In the Boston market there has been little trading in traction shares. Before the holiday they were dull, and to-day only a few shares of Massachusetts Electric preferred and Boston Elevated made their appearance.

The feature of the Chicago market during the past week has been the weakness of the Chicago Railways issues. Series 1 during the week sold as low as 67, and Series 2 as low as 16. Northwestern Elevated preferred has also declined and closed to-day at 53.

There has been little doing in the Baltimore market. The stock of the United Railways & Electric Company has been traded in at 13¼ and the bonds at former prices.

Quotations of various traction securities as compared with last week follow:

	May 24.	May 31.
American Railways Company	a45	a44½
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	128	a128½
Boston & Suburban Electric Companies	*16	*16
Boston & Suburban Electric Companies (preferred)	*74½	*74½
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	*43	a42
Brooklyn Rapid Transit Company	*81¾	78⅞
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	85	84¼
Capital Traction Company, Washington	a132	a129
Chicago City Railway	a195	*195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3½
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	*75	a80
Chicago Railways, ptcptg., ctf 2	a18	a18
Chicago Railways, ptcptg., ctf., 3	a9	a10
Chicago Railways, ptcptg., ctf. 4s	a4	*4
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104	a104
Detroit United Railway	*59½	a60
General Electric Company	150¼	147
Georgia Railway & Electric Company (common)	*110	110¾
Georgia Railway & Electric Company (preferred)	*87	88
Interborough-Metropolitan Company (common)	20⅝	19½
Interborough-Metropolitan Company (preferred)	56¼	53¼
Interborough-Metropolitan Company (4½s)	80⅞	80
Kansas City Railway & Light Company (common)	a26	a26
Kansas City Railway & Light Company (preferred)	a76	*76
Manhattan Railway	135	a135
Massachusetts Electric Companies (common)	17½	16¾
Massachusetts Electric Companies (preferred)	86	a85
Metropolitan West Side, Chicago (common)	a17	a18
Metropolitan West Side, Chicago (preferred)	a58	a56
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	74⅜	*74⅜
Northwestern Elevated Railroad (common)	a18	a17
Northwestern Elevated Railroad (preferred)	a60	a56
Philadelphia Company, Pittsburg (commcn)	a49½	a49
Philadelphia Company, Pittsburg (preferred)	a44	a44
Philadelphia Rapid Transit Company	a19	a18
Philadelphia Traction Company	*85¼	a85¼
Public Service Corporation, 5 per cent col. notes	*96½	a96
Public Service Corporation, ctfs	103½	a102½
Seattle Electric Company (common)	111¼	a111½
Seattle Electric Company (preferred)	103	a102½
South Side Elevated Railroad (Chicago)	a59	a58
Third Avenue Railroad, New York	6½	7
Toledo Railways & Light Company	9	a9¼
Twin City Rapid Transit, Minneapolis (common)	111	a112
Union Traction Company, Philadelphia	a48	a47½
United Rys. & Electric Company, Baltimore	*12¼	*12¼
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	a38	a35
Washington Ry. & Electric Company (preferred)	a89	a89
West End Street Railway, Boston (common)	88	87¾
West End Street Railway, Boston (preferred)	102½	*102½
Westinghouse Elec. & Mfg. Company	65	62½
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Athens Railway & Electric Company, Athens, Ga.—The Railroad Commission of Georgia has approved the application of the Athens Railway & Electric Company to issue $825,000 of 40-year 5 per cent first and refunding mortgage gold bonds, $300,000 of 5 per cent cumulative preferred stock, and $700,000 of common stock. The mortgage will be dated July 1, 1910, and will be drawn in favor of the Farmers' Loan & Trust Company, New York, N. Y. The Athens Railway & Electric Company will formally take over the property of the Athens Electric Railway and the James White power plant.

Atlantic City & Shore Railroad, Atlantic City, N. J.—The Atlantic City & Shore Railroad has purchased the Atlantic City & Suburban Railway.

Brooklyn (N. Y.) Rapid Transit Company.—James McKeen has been elected a director of the Brooklyn City Railroad to succeed D. G. Leggett, resigned.

Forty-Second Street, Manhattanville & St. Nicholas Avenue Railroad, New York, N. Y.—The sale of the property of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railroad, under foreclosure, has been further postponed until July 1, 1910.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—Judge Carter of the Superior Court at Indianapolis has authorized C. L. Henry, receiver of the Indianapolis & Cincinnati Traction Company, to sell $20,000 of the bonds of the Indianapolis, Shelbyville & Southeastern Traction Company, a subsidiary of the Indianapolis & Cincinnati Traction Company, and apply the proceeds to paying obligations.

Massachusetts Electric Companies, Boston, Mass.—The directors of the Massachusetts Electric Companies have declared a semi-annual dividend of 2 per cent on the preferred stock, payable on July 1, 1910, to stock of record on June 4, 1910. The last previous dividend was 1¾ per cent.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, of the United States Circuit Court, in a memorandum filed on May 31, 1910, ordered the sale of the property of the Metropolitan Street Railway on July 1, 1910, under foreclosure of the mortgages held by the Guaranty Trust Company and the Morton Trust Company, and that the $10.000,000 upset price fixed on the sale under the prior one of these two mortgages shall cover the sale under both. An unsuccessful attempt was made to conduct a sale under the $12,500,000 mortgage held by the Guaranty Trust Company, as noted in the Electric Railway Journal of May 21, 1910, page 920, which has priority over the $16,000,000 mortgage held by the Morton Trust Company, with respect to most of the property of the railroad. In his memorandum the judge says that it is within the power of the court to reject all bids and order another offering of the road at auction if the bids received are not satisfactory.

Ocean Shore Railway, San Francisco, Cal.—J. Howard Smith and Sydney M. Van Wyck, attorneys for the bondholders of the Ocean Shore Railway, have asked Judge Van Fleet in the U. S. District Court to make an order directing that the indebtedness of the road be ascertained and suit begun against the stockholders to recover the amount necessary to pay the creditors.

Orange County Traction Company, Newburgh, N. Y.—The Public Service Commission of the Second District of New York has authorized the Orange County Traction Company to issue a first and refunding mortgage to the Union Trust Company, Albany, N. Y., as trustee, to secure the payment of $750,000 in 50-year, 5 per cent bonds. The company has also been authorized to issue at once bonds to the amount of $233,800 to be sold at not less than 85. The proceeds are to be used to discharge indebtedness incurred in additions, improvements and equipment. The company has also been further authorized to issue bonds to the amount of $425,000 at not less than par, without further authorization of the commission for the purpose of refunding existing bonded indebtedness, bonds to be exchanged at any time, par for par.

Pennsylvania Railroad, New York, N. Y.—Samuel Rea, vice-president of the Pennsylvania Railroad, and Charles S. Mellen, president of the New York, New Haven & Hartford Railroad, have both issued statements regarding the

increase in the holdings of stock of the New York, New Haven & Hartford Railroad by the Pennsylvania Railroad. According to Mr. Mellen, the Pennsylvania Railroad now holds 60,000 shares of stock of the New York, New Haven & Hartford Railroad, a little less than 5 per cent of the total stock of the company. When there is a vacancy on the board of directors of the New York, New Haven & Hartford Railroad a director to represent the Pennsylvania Railroad will be elected. Mr. Rea said: "It is true that the company has some stock which it has absorbed from time to time, but no such a thing as control was ever contemplated. The East River tunnel will be in operation about Aug. 15, 1910, and the North River tunnel will come later. It will be about three years before the line of the New York Connecting Railroad can be built, and also before the New York, New Haven & Hartford Railroad will get its trains into the Pennsylvania terminal by way of bridges extending from the Bronx across Hart and Ward Islands."

Philadelphia (Pa.) Rapid Transit Company.—On May 26, 1910, the Philadelphia Rapid Transit Company issued the following statement: "The joint committee of the Union Traction Company and the Philadelphia Rapid Transit Company have agreed upon a plan for financing the property, which has been approved and accepted by the fiscal agents of the company, Drexel & Company. The company will dispose of its insurance fund and replace the indemnity with fire insurance policies. It will issue $1,500,000 of the 10-year 5 per cent equipment notes, which will have the guarantee of the Union Traction Company. These notes have been taken by Drexel & Company, who have also taken car trusts on 20 new cars which will be purchased for the elevated road. These plans, with the $600,000 of the collateral loan of Dec. 15, 1908, now available, will give the company between $3,500,000 and $4,000,000. Of course, the guarantee of the Union Traction Company must be given by the stockholders and the question will be submitted to them at the annual meeting in September. But as the plan has the unanimous approval of the directors no doubt is entertained of their affirmative action." Formal permission has been granted the Philadelphia Rapid Transit Company to place the stock of the Lehigh Avenue Street Railway, a subsidiary of the Philadelphia Union Traction Company, on a 6 per cent dividend basis, by the directors of the latter company. This is a utility measure so that the stock could be used as a part of the collateral upon which the Philadelphia Rapid Transit Company proposes to borrow $2,500,000.

Shelburne Falls & Colerain Street Railway, Shelburne Falls, Mass.—The Shelburne Falls & Colerain Street Railway has decided to issue $100,000 of 5 per cent bonds to retire a similar issue of 6 per cent bonds.

South Side Elevated Railroad, Chicago, Ill.—The directors of the South Side Elevated Railroad on May 26, 1910, decided to resume dividends on the stock of the company, and authorized the payment of ½ of 1 per cent on June 30, 1910, to stock of record on June 18, 1910. The last payment made on the stock of the company was a quarterly disbursement of ¾ of 1 per cent paid on March 31, 1908.

Worcester & Southbridge Street Railway, Worcester, Mass.—The Worcester & Southbridge Street Railway has petitioned the Railroad Commissioners for authority to issue $140,000 additional stock, the proceeds to pay indebtedness incurred for the purchase of the property of the Hartford & Worcester Street Railway.

The New York, New Haven & Hartford Railroad has transferred all its gas and electric lighting properties, owned or leased, to the Housatonic Power Company, which includes the lighting plants at Norwalk, South Norwalk, Greenwich, Naugatuck, Waterbury and New Britain, Conn. The Housatonic Company already owns the New Milford Power Company, which supplies electricity for the electric railways in Waterbury, New Britain, and other parts of Connecticut. The capital stock of the Housatonic Power Company has been increased from $1,000,000 to $3,000,000, the proceeds to be used to pay for the newly acquired properties, which will also provide for extensions and working capital. The new company was formed for the purpose of segregating the lighting and power companies from the electric railways owned by the New York, New Haven & Hartford Railroad.

Traffic and Transportation

Special Tickets for Miners in Indiana Unlawful

The Railroad Commission of Indiana holds that the Terre Haute, Indianapolis & Eastern Traction Company is guilty of discrimination in making special rates to miners which are not available to other patrons of the road. The special rates to the miners were made because the fare generally charged would prohibit them from residing in Terre Haute and working in the mines in Brazil. The question raised was whether or not this constituted discrimination within the meaning of Section 13 of the Act of March 9, 1907, known as the Railroad Commission Act. So much of said section as was applicable follows:

"If any railroad subject hereto, directly or indirectly, or by any special rate, rebate, drawback or other device, shall charge, demand, collect or receive from any person, firm or corporation a greater or less compensation for any service rendered or to be rendered by it than it charges, demands, collects or receives from any other person, firm or corporation for doing a like and contemporaneous service in the transportation of a like kind of traffic under substantially similar circumstances and conditions, such railroad shall be deemed guilty of unjust discrimination, which is hereby prohibited.

"(a) It shall also be an unjust discrimination for any such railroad company to make or give any undue or unreasonable preference to any particular person, firm, corporation or locality, in connection with the transportation of any persons or property, or to subject any particular kind of traffic or any particular person, place, or locality to any undue or unreasonable prejudice, delay or disadvantage in any respect whatever."

Under the statute of Indiana commuters' tickets may be sold, and party tickets may be held under the Interstate Commerce Law. J. F. McClure, of the commission, in an opinion rendered on May 4, 1910, in the case of the Terre Haute, Indianapolis & Eastern Traction Company, said:

"I am of the opinion that the issuing of tickets either for single trips or for any number of trips to a certain class, such as to miners, as is being done by the Terre Haute, Indianapolis & Eastern Traction Company between Brazil and Terre Haute, to the exclusion of all other patrons of the line, is in contravention of Section 13 of the Act of March 9, 1907. If such special rates could legally be given to a class of workmen such as the miners, they might be given to another class who would be railroad employees working upon a steam railroad or the electric railway, to men engaged in quarrying stone, to farmers or farm hands who might be residing in the towns, going back and forth to their work in the country, to merchants as a class, to members of various religious and civil societies, and so on to the end of all possible classification of citizens.

"As was suggested by the commission in the case of Risher vs. the Evansville & Indianapolis Railroad, the company, if it so desires, may publish a special passenger rate at a reduced price for a specified number of trips to be used within a specified time, open to everyone who might desire to use the same, and so to do will be no violation of the law.

"Any other method would be a discrimination within the meaning of the statute unless some provision in the ordinance in Terre Haute or Brazil granting the company a franchise stipulated that such special rates might be so made, provided, however, that such ordinance had been enacted before the passage of the Act of 1907."

Transfer Talks in New York

The Metropolitan Street Railway, New York, N. Y., has for some time past been calling the attention of its patrons to a variety of subjects in messages printed on the back of its transfers. Six of such messages selected from a batch of recent transfers follow:

EVERY CONDUCTOR ON THIS SYSTEM

is expected at all times to be courteous and polite to passengers. If you notice any flagrant violation of this rule we will thank you for writing us in regard to it, giving the

conductor's number, time of day and date. This will help us to keep the service at its best and to discipline employees who depart from our rules."

LOOK ON THE OTHER SIDE

"This ticket is valid only when presented at regular transfer points printed on the other side. Do not blame the conductor if you forfeit your transfer privilege by getting on the car at the wrong place. When in doubt examine your ticket. It will set you right."

MOVE UP FORWARD PLEASE

"Somebody has estimated that on all the lines of this system conductors repeat 'Move up forward, please,' at least half a million times during every day. This phrase is an appeal to passengers who are standing to move up toward the front of the car and thus prevent crowding and blocking at the rear end."

DON'T GIVE AWAY THIS TRANSFER

"If for any reason you decide not to use this transfer ticket, destroy it. Do not pass it to somebody else to use. Such an act is unfair to the company, depriving it of legitimate revenue, and it engenders a habit of petty fraud on the part of the recipient who otherwise would be glad to pay his fare."

THE AQUARIUM IS FREE

"Hundreds of thousands of New Yorkers have never been to the Aquarium, yet it is perhaps the most wonderful and interesting institution in New York—a veritable fairyland of wonders for adults and children. The pleasantest way to get there is to take a Broadway car, to which all Metropolitan lines transfer, to Battery Park. Admission to the Aquarium is free."

THE ESQUIMAUX VILLAGES

"Take the children some Sunday afternoon to see the Esquimaux Village and other wonderful things at the Museum of Natural History. Take a Columbus Avenue or Eighth Avenue car to Seventy-seventh Street. Admission to the Museum is free."

Increase in Commutation Rates Out of New York

The New York Central & Hudson River Railroad has made public the changes in commutation rates over its divisions which will go into effect on July 1, 1910. The general effect of the new tariff is to increase the fare, although in some instances the present fares will be reduced. In the following table the present 60-trip commutation fare and the new 60-trip commutation fare are given from the principal stations along the several divisions of the road to New York:

HUDSON DIVISION.

	Miles from New York.	Present fare.	New fare.	Per cent of increase.
Kingsbridge	10	$4.75	$5.25	10
Yonkers	15	5.90	6.75	14
Hastings	19	6.65	7.55	13
Dobbs Ferry	20	6.90	7.70	11
Tarrytown	25	7.60	8.25	8
Ossining	31	8.05	9.20	14
Peekskill	41	10.30	11.05	7

HARLEM DIVISION.

	Miles from New York.	Present fare.	New fare.	Per cent of increase.
Fordham	9	$4.45	$4.85	9
Williamsbridge	11	5.15	5.60	8
Mount Vernon	14	5.60	6.50	16
Scarsdale	19	6.65	7.55	13
White Plains	23	7.35	8.10	10
Hawthorne	29	7.90	8.95	13
Pleasantville	31	8.05	9.20	14
Mount Kisco	37	8.90	10.15	14

PUTNAM DIVISION.
(Including fare on the elevated.)

	Present fare.	New fare.	Per cent of increase.
Kingsbridge	$5.95	$6.00	8
Van Cortlandt	6.45	6.05	*6
Caryl	6.75	7.00	3
Lowerre	6.75	7.00	3
Park Hill	7.15	7.45	4
Yonkers	7.15	7.85	9
Nepperhan	7.45	8.60	15
Mount Hope	8.05	9.05	12
Ardsley	8.20	9.20	12
Elmsford	8.60	9.75	13
Tarrytown Heights	8.90	9.75	9
Pocantico Hills	8.90	9.75	9

* Decrease.

The West Shore Railroad, the Delaware, Lackawanna & Western Railroad, the Lehigh Valley Railroad, the Central Railroad of New Jersey and the Erie Railroad, all of whose lines out of New York are still operated by steam, and the Long Island Railroad, operated by steam and electricity, have made public the increases in commutation fares over their various divisions.

Increase in Speed Limit.—The City Council of Columbus, Ind., has passed an ordinance which increases the speed at which street cars can be operated within the city from 8 m.p.h. to 12 m.p.h.

Additional Station on Forest Hill Line, Boston.—The Railroad Commission has suggested that the Boston Elevated Railway should install a station at Green Street, on its Forest Hill extension, which was opened on Nov. 12, 1909.

Collision on Indiana Line.—A freight car and a passenger car of the Indiana Union Traction Company collided head-on near Wabash, Ind., a few days ago. The wreck took fire and the cars were partially destroyed. The motorman and conductor of the passenger car were injured, but none of the passengers was hurt seriously.

New Jersey Company Discontinues Sale of Tickets in Quantities.—The Public Service Railway, Newark, N. J., has discontinued the sale of tickets at the rate of 21 for $1 and in books of 106 for $5, the demand for tickets having lessened so much recently that the company did not feel that the patronage warranted the clerical expense involved in disposing of the tickets.

Arbitration of Terms of Service in Massachusetts.—E. C. Foster, who is now connected with Sanderson & Porter, New York, N. Y., has been selected by the New England Investment & Security Company to represent it as a member of the board of three which will consider the question of wages and terms of service of the employees of the company, and former Senator William P. Hays has been chosen to represent the men. The third member of the board of arbitration has not yet been selected by Mr. Foster and Mr. Hays.

Fare Complaint Against the Schenectady Railway.—The Public Service Commission of the Second District of New York has served upon the Schenectady Railway a complaint in which it is alleged that the fare from Troy to various points between the stations known as Lathams and Niskayuna has been 15 cents each way for each passenger and from Schenectady the sum of 15 cents each way; that the rate charged by the company from Troy to Lathams is 10 cents and from Schenectady to Niskayuna 10 cents, and that the fares charged are inequitable, unfair and unjust. The commission is asked to make an order which shall fix an equitable rate of fare between the points stated. A hearing was set to be held before the commission in Albany on June 1, 1910, at which all those who objected to the fare schedule were to be permitted to make known the cause of their objections.

Increase in Wages in Kansas City.—The Kansas City Railway & Light Company, Kansas City, Mo., has announced an increase in the wages of the employees of the railway department of the company, which affects motormen, conductors, division superintendents and assistant superintendents. The wages of the division superintendents and the assistant superintendents are increased $10 and $5, respectively, a month, and the wages of conductors and motormen are on a sliding scale, as follows: First year, 20 cents an hour; second year, 20 cents and a bonus of $3 a year; third year, 21 cents and a bonus of $5; fourth year, 23 cents and a bonus of $8; fifth year, 24 cents and one uniform; sixth to tenth year, 25 cents and one uniform; tenth year and over, 26 cents and two uniforms.

Fares in Revere to Be Investigated.—Two petitions have been addressed to the Massachusetts Railroad Commission by the Selectmen of Revere to secure modifications in the fare and transfer arrangements on the Boston & Northern Street Railway and the Boston Elevated Railway in Revere. The principal issue is the fare to and from Revere Beach in connection with proposed through car service from Boston. Another feature is a desired 5-cent fare between Lynn and the Park Avenue district by means of transfers. The fare question is complicated somewhat at present by the status of the proposed Boston Elevated Railway holding bill before the Legislature, and it is unlikely that the Rail-

road Commission will order any marked changes while the above measure is pending, although any hearings which are considered necessary will be assigned by the commission.

Campaign with Buttons to Prevent Accidents.—In its campaign to prevent accidents the Denver (Col.) City Tramway is distributing buttons which bear the legend: "I don't get off the car backwards." Recently the company gave the buttons out among the pupils of the McKinley School, and Clara J. Coney, of the school, addressed a letter to John A. Beeler, vice-president and general manager of the Denver City Tramway, in which she said that several of the classes from the school had recently made trips by trolley and that the girls had counted the men and women who got off the car correctly. According to Miss Coney, for a long distance the girls counted only two women who alighted correctly. She thought that "if the cars passed to the left, as in England and Victoria, women and girls would not have such a hard time learning to alight from them."

New York Commission Rules on New Haven Rates.—The Public Service Commission of the Second District of New York holds that the New York, New Haven & Hartford Railroad cannot legally put in effect its proposed increase in commutation rates on June 1, 1910, and that fares now in force will continue in effect after June 1, notwithstanding the filing with the commission and partial publication of these tariffs at stations. The company has been ordered to continue to charge the fares duly established and set forth in its tariffs now in effect until these tariffs shall have been superseded by tariffs filed with the commission and published at stations as required by the Public Service Commission's law. It is further ordered that the company be permitted to establish and put in effect on one day's notice commutation passenger and round-trip rates and school commutation rates between Harlem River and its stations in New York State, and also joint rates between its New York State stations and stations of the Interborough Rapid Transit Company at 129th Street, New York City.

Railroad Tariff Bulletin in Indiana.—The Railroad Commission of Indiana has issued tariff bulletin No. 1, dated April, 1910, in which information is given concerning changes in the freight rates on railways within the jurisdiction of the commission. In announcing the publication of the bulletin the commission says: "In accordance with circular No. 64 of the commission these tariff bulletins will be issued monthly, and will be distributed to commercial bodies throughout the State. They are also free to the public and will be mailed to any interested party upon written request with necessary postage enclosed. It has been found impossible with the amount of money at the disposal of the commission to give in these bulletins the number of tariffs and full information with reference to the changes made. We have endeavored, however, to call attention to all increases in rates in the State; more specific information and full description of the tariffs and changes made will be given upon inquiry by letter, telephone or at the office of the commission."

Collision on Illinois Traction System.—An express train and a sleeper of the Illinois Traction System collided near Carlinsville, Ill., on May 20, 1910. The trains had orders to meet at a siding called Loveless, seven miles south of Carlinsville. The motorman of the express train repeated his order to his conductor and flagman when the order was received from the dispatcher, and designated Loveless as the meeting point. The sleeper had approached within about 80 feet of the meeting point and was running about 2 m.p.h. when the motorman noticed the express train approaching at high speed without slowing up for the siding. He jumped and sustained a broken rib. The conductor of the sleeper had his hip broken. None of the five passengers was injured, however. After the collision the wreckage caught fire and all the cars were destroyed. The motorman and conductor of the express train were killed. It has been established that the motorman of the express train clearly understood his orders. The sleeper which was destroyed was the "Springfield," which was in use in the Springfield-East St. Louis service of the company.

Personal Mention

Mr. A. B. Stitzer, formerly electrical engineer of the Philadelphia (Pa.) Rapid Transit Company, has become associated with the engineering department of Ford, Bacon & Davis, New York, N. Y.

Mr. Marshall Craig has been appointed assistant engineer of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia. Mr. Craig was formerly city passenger and ticket agent of the Chicago Great Western Railroad at Omaha.

Mr. Edward M. Bigelow, formerly director of public works of Pittsburg, Pa., has been appointed by the commissioners of Allegheny County as consulting engineer to report on the construction of tunnels through Mt. Washington at Pittsburg, with particular reference to their utilization for transit purposes.

Mr. Louis M. Duvall has been appointed secretary of the Maryland Public Utilities Commission. Mr. Duvall was for many years the business manager of the Baltimore *News*. He began his business career as expert accountant with the Northern Central Railway. He next served in the Baltimore *Record* office as cashier for 10 years, and then went with the Maryland Title Insurance & Trust Company, of which he was secretary-treasurer for three years. Mr. Duvall resigned from the Maryland Title Insurance & Trust Company to become connected with the Baltimore *News*. Meanwhile he studied law, and has been engaged in the practice of his profession recently.

Mr. W. B. Tuttle, who was elected president of the Southwestern Gas and Electrical Association at the meeting held in Beaumont, Tex., on May 12, 13 and 14, 1910, is vice-president and general manager of the San Antonio (Tex.) Traction Company. Mr. Tuttle was educated at the University of Virginia, and entered the employ of the Consolidated Gas Company of New Jersey in 1896 as an apprentice. Subsequently he became superintendent of the gas department of the company, and finally general manager of the company, with jurisdiction over both the gas and electric departments. Mr. Tuttle also worked for some time as assistant to the chief engineer of the American Light & Traction Company. In July, 1906, he was elected vice-president and general manager of the San Antonio Traction Company and the San Antonio Gas & Electric Company.



W. B. Tuttle

Mr. L. E. Lynde, whose appointment as superintendent of the Manchester Traction, Light & Power Company, Manchester, N. H., was noted in the ELECTRIC RAILWAY JOURNAL of May 7, 1910, has entered upon the duties of that office. Mr. Lynde entered street railway work as a conductor with the Stoneham Street Railway in 1884. In 1887 the Stoneham Street Railway was purchased by the Lynn & Boston Street Railroad, and Mr. Lynde was made inspector of the Stoneham branch, in which position he continued until 1889, when he was appointed superintendent of the Woburn division. In 1891 he was appointed superintendent of the Malden, Revere Beach and Chelsea branch of the Lynn & Boston Railroad. In 1893 Mr. Lynde resigned from the Lynn & Boston Railroad to become assistant superintendent and clerk of the Haverhill & Amesbury Street Railway. In 1895 he was appointed superintendent of the Haverhill & Amesbury Street Railway, which later became part of the system of the New Hampshire Electric Railways, with which he served as superintendent of the Eastern Massachusetts and Eastern New Hampshire divisions.

OBITUARY

Alfred John Greathead, who has been connected with John A. Roebling's Sons' Company for 23 years, and who had been secretary of the company for the last five years, died at his home in Chicago, on May 21, 1910. Mr. Greathead was born at Barnstaple, Eng., on May 5, 1861.

Construction News

RECENT INCORPORATION

Evansville, Mount Carmel & Olney Electric Railway, Evansville, Ind.—Incorporated in Illinois to build a railway from Mount Carmel to Olney, Ill. Capital stock, $30,000. Incorporators: E. Q. Lackrie, C. J. Seibert and S. J. Laubscher, Evansville; Thomas Marvel and E. B. Rider, Cynthiana, Ind.; Aden Knoph and J. F. Hyatt, Olney, and Lewis Seitz and Robert Parkinson, Mount Carmel. [E. R. J., Feb. 12, '10.]

FRANCHISES

*Rogers, Ark.—The Rogers-Bentonville-Decatur Interurban Railroad has been granted a 50-year franchise to build a railway in Rogers. Construction will begin at an early date. J. D. Houseman and G. G. Southerland, St. Louis, Mo., are promoting this railway.

*Portersville, Cal.—F. W. Nofziger, who is promoting the building of an electric railway in Portersville, has asked the City Council for a 50-year-franchise for that purpose.

Carterville, Ill.—The Egyptian Traction Company, Eldorado, has asked the Council for a franchise to build a railway in Carterville. [E. R. J., May 7, '10.]

Chicago, Ill.—The Eastern Illinois Traction Company, a subsidiary company of the Consolidated Railways Company, Chicago, has secured franchises in West Hammond, Thornton Township, Blue Island, Riverdale and Harvey, and it is reported that construction will begin within a month.

Peoria, Ill.—The Peoria & Galesburg Railway has been granted a franchise by the Council to build a railway in Peoria. This is part of a plan to connect Galesburg and Peoria. S. F. Atwood, Peoria, secretary. [E. R. J., Sept. 25, '10.]

Brockton, Mass.—The Old Colony Street Railway, Boston, has been granted the approval of the Board of Aldermen of its plans to rebuild and extend some of its lines in Brockton.

*Summit, Miss.—The Summit-McComb Motor Line Company has been granted a franchise to build a railway within the corporate limits of Summit. This is part of a plan to connect Godbold, Mineral Wells, Summit and McComb with a gasoline motor railway. J. E. Randell, Gulfport, contractor.

Hastings, Neb.—The Omaha, Western & Lincoln Railway, Lincoln, has been granted a franchise to build a railway in Hastings. This is part of a proposed plan to build a railway from Hastings to Omaha. Frank E. Schaff, president. [E. R. J., May 21, '10.]

Englewood, N. J.—The Hudson River Traction Company, Hackensack, has been granted a 50-year franchise for the extension of its line north to Tenafly.

Bolivar, N. Y.—The Southwestern New York Traction Company, Bolivar, has been granted a 50-year franchise to build a railway in Bolivar. This is part of a plan to connect Bolivar, Scio, Allentown and Wellsville, a distance of 15 miles. B. F. Patterson, Bolivar, N. Y., general manager. [E. R. J., April 16, '10.]

Saratoga Springs, N. Y.—The Hudson Valley Railway, Glen Falls, has asked the Council for a franchise to build a railway through East Avenue in Saratoga Springs for the purpose of connecting the Glen Falls line with the Troy-Saratoga line and thus forming a direct route from Troy to Warrensburg.

Woodsdale, N. C.—The North Carolina Traction Company, Winston-Salem, has asked the Council for a franchise for a street railway in Woodsdale.

*Ontario, Ore.—A. N. Soliss, representative of Henry Lewitt, Spokane, has asked the Council for a franchise to build a railway in Ontario which would connect at Snake River near Nyssa with the Pierce line to Caldwell.

Greenville, S. C.—The Greenville, Spartanburg & Anderson Railway has applied for an electric railway franchise in Greenville. This railway will connect Belton, Greenville and Spartanburg.

Brownsville, Tex.—B. G. Stegman and associates have been granted a 25-year franchise to build a railway over certain streets in Brownsville. Construction is to be started within four months and 3 miles must be finished within one year. The whole line must be completed within two years. [E. R. J., March 12, '10.]

Port Arthur, Tex.—The Council has amended the franchise of the Port Arthur Traction Company by extending its franchise to 50 years instead of 30 to build a line over streets of Port Arthur. [E. R. J., May 14, '10.]

*Raymond, Wash.—P. E. Hall, Jr., has asked the Council for a 45-year franchise to operate a street railway in Raymond.

TRACK AND ROADWAY

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company has awarded a contract to M. P. Cotton for clearing and grading line and constructing roadbed ready for ballasting and tracklaying of its 7½-mile extension from Burnaby to Vancouver.

San Francisco, Vallejo & Napa Valley Railroad, Napa, Cal.—This company reports that it expects to ballast the entire length of its line and all additions on private right of way. It will also build together with St. Helena a combination stone bridge which will cost approximately $9,000.

City Suburban Railway, Brunswick, Ga.—This company has started construction on a belt line in Brunswick. F. D. Aiken, general manager.

*Habersham Orchard & Improvement Company, Clarkesburg, Ga.—This company is considering the construction of a 7-mile electric railway from Clarkesburg to its orchard property. Norman T. Poole, president.

Caldwell-Roswell Interurban Railway, Caldwell, Idaho.—This company advises that it will start construction in July on its proposed 27-mile railway to connect Roswell, Caldwell, Notus, Greenleaf and Big Bend. Capital stock, authorized, $250,000; issued, $27,000. Headquarters, Caldwell. Officers: H. W. Dorman, president; J. H. Lovell, vice-president; H. S. Kneedler, secretary; E. A. Clark, treasurer, and H. W. Dorman, general manager. [E. R. J., May 7, '10.]

Murphysboro Electric Railway, Light, Heat & Power Company, Murphysboro, Ill.—This company, which is building an extension to Carbondale, is reported to be planning to extend the railway from Carbondale to Du Quoin, Herrin, Carterville, Marion and Harrisburg. S. B. Newton, general manager.

Fort Wayne & Springfield Railway, Decatur, Ind.—It is reported that this company will let a contract for the construction of an 18-mile extension of its railway south to Portland. W. H. Fledderjohann, general manager.

Sioux City & Eastern Traction Company, Sioux City, Ia.—This company advises that it has not completed any definite plans for the construction of its proposed 100-mile railway to connect Sioux City, Ida Grove and Dennison. The company wishes to communicate with some engineering firm to build the line. Capital stock, authorized, $100,000. Headquarters, 520 Farmers' Loan & Trust Company, Sioux City. Officers: A. H. Tennis, president; W. B. Goodrich, vice-president; W. F. Harding, secretary; H. C. Fedderson, treasurer, and Walter H. Foss, general manager. [E. R. J., May 14, '10.]

*Iowa City, Ia.—It is reported that Messrs. Rheins and Chamberlain, Des Moines, are planning to build an interurban railway from Iowa City to Des Moines via Williamsburg and Montezuma.

Louisville (Ky.) Railway.—This company is making arrangements to construct the 3½-mile extension of its Orell line to Kosmosdale. W. H. McClure, purchasing agent.

*Summit-McComb Motor Line Company, Summit, Miss.—This company is clearing the right-of-way for its proposed 5-mile interurban railway between McComb and Goldboldt Wells via Summit. J. E. Randall, Gulfport, has charge of work. Construction will begin this month.

St. Louis, Creve Cœur & Western Railway, Clayton, Mo.—This company advises that it will start construction in July on its proposed 14-mile railway to connect St. Louis, Mt. Olive, Olivette, Stratmann, Creve Cœur, Fern Ridge,

and Creve Cœur Lake. Power will be purchased from the United Railways or the Union Electric Company. Capital stock authorized $300,000. Issued $300,000. Bonds authorized $300,000. Officers: William F. Pfeister, Creve Cœur Route 27, president; Carl Feld, Clayton Route, vice-president; S. H. Werremeyer, Clayton, secretary, and Jacob Studt, treasurer. [E. R. J., March 27, '09.]

Eastern Montana Electric Railway, Billings, Mont.—This company advises that it is securing right-of-way for its proposed electric railway from Billings to Bearcreek via Laurel, Red Lodge Bridge, Rockvale, Belfry and Fromberg. It has received and accepted long time franchises from Laurel, Red Lodge and Bridges. F. A. Kesselhuth, chief engineer. [E. R. J., Jan. 29, '10.]

***Hutchinson, Neb.**—J. J. Booth is reported to be interested in promoting a railway to connect Hutchinson, Arkansas City, Conway, Wellington and Gueda Springs.

***Norfolk-Newman Grove Interurban Railway, Norfolk, Neb.**—W. R. Martin and associates are promoting an electric railway to connect Norfolk and Newman Grove.

Nebraska Traction & Power Company, Omaha, Neb.—This company advises that it has started grading on its 4-mile extension from Ralston to Papillion.

Citizens' Traction & Power Company, Albuquerque, N. Mex.—This company is said to have started construction on its 2-mile line in Albuquerque. Wyman & Barton, Amarillo, will superintend the construction work. A. W. Hayden, Albuquerque, president. [E. R. J., April 18, '10.]

Westchester Northern Railroad, White Plains, N. Y.—The Public Service Commission of the Second District has granted a certificate of public convenience and a necessity to this company and authorized it to begin the construction of its proposed 45-mile railway. It will extend from White Plains through Lewisboro, with a branch line from Pound Ridge, near Cross Pond, northerly through Westchester and Putnam Counties for 14 miles to a connection with the New York, New Haven & Hartford Railroad at the boundary line between the States of New York and Connecticut. L. S. Miller is interested. [E. R. J., Feb. 12, '10.]

Central Ohio Promoting Company, Columbus, Ohio.—This company advises that it proposes to begin construction next spring on its proposed 60-mile railway to connect Columbus and Zanesville via Millers Port, Thornville, Glenford and Gratiot. Its repair shop will be located at Glenford. Capital stock authorized $25,000. Officers: James L. Holden, 1050 Bryden Road, Columbus, president; Henry A. Auxline, first vice-president and secretary; James L. Holden, treasurer, and Albert E. Boone, Zanesville, general manager. [E. R. J., May 21, '10.]

Wilkes-Barre & Wyoming Valley Traction Company, Wilkes-Barre, Pa.—This company is extending its Hughestown line from No. 9 breaker to West Avoca, and eventually will be built to Rocky Glen. T. A. Wright, superintendent.

***Paris and Mount Pleasant Railway, Paris, Tex.**—This company has been organized to build a 53-mile railway from Paris to Mount Pleasant. Grading on the first section from Paris to Bogota, 25 miles, has been finished, and contract for track laying and bridge work has been let to D. J. Trigsby, Dallas. The company will build a 2,100 ft. trestle. N. H. Rageland, Paris, general agent.

Ogden Rapid Transit Company, Ogden, Utah.—This company reports it will build soon 20 miles of new track. J. W. Bailey, superintendent.

Tacoma Railway & Power Company, Tacoma, Wash.—This company announces that it will build an extension railway from Tacoma to Bismarck. L. H. Bean, general manager.

Clarke County Suburban Railway, Vancouver, Wash.—This company, which is a subsidiary company of the Vancouver Traction Company, has just completed its new line from Vancouver to Orchards. It is expected to continue the line to Sifton and La Center. O. C. Spencer is interested. [E. R. J., Aug. 21, '09.]

South Morgantown Traction Company, Morgantown, W. Va.—This company is preparing plans for the extension of its line across Chancery Hill into South Park and thence to Marilla.

Morgantown & Dunkard Valley Railroad, Morgantown, W. Va.—This company has started work on its extension between Morgantown and Blackville. The part of the line between Fairmount and Mannington has been completed and is in operation.

Chicago & Wisconsin Valley Railroad, Milwaukee, Wis.—Press reports state that the company will let contracts within 30 days for the construction of its railway from Janesville to Merrill via Friendship, Easton, Portage, Lodi, Middleton and Madison. Allen T. Russell, Chicago, general manager. [E. R. J., March 19, '10.]

Ontario & Northern Railway, Ontario, Wis.—This company advises that it will begin construction as soon as necessary incorporation and bonding matters are arranged on its proposed 8-mile railway from Ontario to either Oil City and Wilton or Oil City and Norwalk. Power station will be located in Ontario. Steam will be used until hydro-electric developments are made. Capital stock authorized $75,000. Bonds issued $50,000. A. E. Rau, Sparta, engineer in charge. [E. R. J., May 21, '10.]

SHOPS AND BUILDINGS

Athens (Ga.) Electric Railway.—This company has awarded a contract to the Foy Proctor Company, Nashville, for building a reinforced concrete car house. Plans are being prepared by J. W. Barnett, Athens. C. L. Proctor, Athens, general manager.

Old Colony Street Railway, Boston, Mass.—This company will erect a new car house, 280 ft. by 134 ft. with a ten-track entrance, at the corner of Torrey street and West streets, Brockton. It is stated that construction will begin at once.

Nebraska Traction & Power Company, Omaha, Neb.—This company advises that during the next few weeks it will let contracts for building a new car house and office building at Ralston. George D. Rice, general manager.

New York, Westchester & Boston Railway, New York, N. Y.—This company will build a new station at Weaver Street in upper New Rochelle. It will be 30 ft. by 340 ft., of concrete construction, and will be known as the Quaker Ridge Station.

Philadelphia Rapid Transit Company, Philadelphia, Pa.—This company has awarded a contract for a substation, 59 ft. by 32 ft., at Germantown avenue and Erie avenue, to Charles McCaul Company.

POWER HOUSES AND SUBSTATIONS

Augusta Railway & Electric Company, Augusta, Ga.—This company will install a 1000 kw. turbine at its power house in Augusta, with necessary boilers, etc., increasing the capacity of the plant by 25 per cent. John H. Adams, chief engineer.

Mason City & Clear Lake Railway, Mason City, Iowa.—This company expects to move its principal power station from Emery to Mason City. F. J. Hanion, general manager.

Nebraska Traction & Power Company, Omaha, Neb.—This company is considering the purchase of a rotary converter.

Public Service Railway, Newark, N. J.—This company will erect a power plant at Perth Amboy to have a capacity 8000 kw.

Galveston-Houston Electric Railway, Galveston, Tex.—Press reports state that this company has decided to build its power plant on the north bank of Clear Creek, near Webster.

Wheeling (W. Va.) Traction Company.—In connection with its plan to increase the capacity of its power station by the addition of a 1875 kva. low pressure turbine and condenser, as mentioned in the Electric Railway Journal of May 21, 1910, this company will install a dry well and motor driven pumps with a capacity of raising 3500 gallons of water a minute a height of about 40 ft. Up to this time the company has been using non-condensing engines. The water for condensation will be taken from the Ohio River.

Manufactures & Supplies

ROLLING STOCK

Philadelphia (Pa.) Rapid Transit Company will order 20 new cars for its elevated division.

Cumberland (Md.) Electric Railway has ordered two 22-ft. closed cars from the John Stephenson Company.

St. Petersburg (Fla.) Investment Company will purchase six cars for its street railway. A. Welton, superintendent.

New York & Queens County Railway, Long Island City, N. Y., has drawn specifications and is asking for bids for 25 cars.

Third Avenue Railroad, New York, N. Y., has placed an order with the General Electric Company for motors, control, etc., for 30 storage battery cars.

San Francisco, Vallejo & Napa Valley Railroad, Napa, Cal., expects to purchase four light trailer cars with seating capacity of 60 or more, which can be operated in trains.

Nebraska Traction & Power Company, Omaha, Neb., expects to purchase one electric locomotive, 10 freight cars and several passenger cars. George D. Rice, general manager.

West Jersey & Sea Shore Railroad, Camden, N. J., which was noted in the Electric Railway Journal of May 28 as receiving bids for eight new cars, complete with new motors, etc., has placed an order with the General Electric Company for eight type M control equipments.

Ogden (Utah) Rapid Transit Company has bought six interurban cars and one electric locomotive from the St. Louis Car Company. The company has also ordered from the General Electric Company two GE-80 four-motor equipments, four GE-219 four-motor equipments and one GE-210 four-motor equipment.

Interborough Rapid Transit Company, New York, N. Y., mentioned in the Electric Railway Journal of April 18, 1910, as having completed specifications for 100 cars for elevated service, has placed the order as follows: 40 cars with Wason Manufacturing Company, 40 cars with Jewett Car Company and 20 cars with the Cincinnati Car Company.

New York & North Shore Traction Company, Mineola, N. Y., which was noted in the Electric Railway Journal of May 28, 1910, as contemplating the purchase of several motor equipments, has placed an order with the General Electric Company for four 40-hp motor equipments for passenger cars, two 75-hp motors for a sweeper and two 75-hp motors for a sprinkler.

Houston (Tex.) Electric Company, reported in the Electric Railway Journal of March 12, 1910, as having ordered 15 closed motor cars from the American Car Company, has drawn the following speifications for this equipment:

Length of body	26 ft.	Gongs	Brill
Over vestibule	37 ft. 6 in.	Hand brakes	Brill; Peacock attachment
Width over sills	8 ft. 5 in.		
Over posts at belt	8 ft. 5 in.	Headlights	Crouse-Hinds
Body	wood and metal	Journal boxes	Brill
Interior trim	bronze	Motors	G.E. 219A
Underframe	wood	Push button signal	Brill
Axles	Brill	Registers	International
Bolsters, body	Brill	Roofs	turtle back
Bolsters, truck	Brill	Sanders	Brill
Brakeshoes	Brill	Seats	Brill, long
Car trimmings	Brill	Seating material	rattan
Center bearings	Brill	Side bearings	Brill
Couplers	Brill-Hovey	Springs	Brill
Curtain fixtures	Forsythe	Step treads	Murray & Jacobs
Curtain material	Pantasote	Trolley retrievers	Wilson
Destination signs	Hunter	Trucks, type	Brill 39-E
Fare boxes	Brill	Varnish	Murphy
Fenders	Pfingst	Wheels	St. Louis

TRADE NOTES

E. Saxton, Washington, D. C., has moved his office from 841 Bladensburg Road to the Washington Loan & Trust Building.

Beers-Offutt Construction Company, Fort Wayne, Ind., has been incorporated to engage in general electric railroad construction work. George W. Beers, president, and H. C. Offutt, secretary.

Ackley Brake Company, New York, N. Y., reports a cable order for 100 brakes for the Shanghai Construction Company, Shanghai, China, and eight brakes from the Tranvias de Caracas, Caracas, Venezuela.

Lintern Car Signal Company, Cleveland, Ohio, has received an order for 100 marker equipments from the Cincinnati Car Company to be applied to cars now being built for the Public Service Railway, Newark, N. J.

Pawling & Harnischfeger Company, Milwaukee, Wis., designers and builders of electric traveling cranes and hoists, have recently appointed A. B. Bowman, 720 North Second Street, St. Louis, a special sales representative.

Ohio Brass Company, Mansfield, Ohio, has received an order from the Chicago-Joliet Electric Railway for 54 Tomlinson automatic couplers instead of 20 couplers, as was noted in a previous issue of the Electric Railway Journal.

The Inter-Ocean Steel Company, Chicago Heights, Ill., has recently constructed a plant for the manufacture of tires for locomotive and cars and also for steel-tired wheels. The company also makes at its works roll shells, die rings, flanges and other rolled circular shapes. The plant is very modern in its equipment.

Wonham, Sanger & Bates, New York, N. Y., report that the Chicago City Railway has installed 668 additional "H-B" lifeguards on its cars. About 1100 "H-B" lifeguards were installed by the Chicago City Railway during 1909. Ralph Sanger, of this company, recently sailed for Europe on an extended business trip in the interests of the firm.

Browning Engineering Company, Cleveland, Ohio, has received an order from the Cincinnati Traction Company for a 15-ton locomotive crane mounted on M.C.B. trucks. It is to be electrically operated, equipped with a 36-in. lift magnet for loading and unloading steel rails, and a 1½-cu.-yd. clamshell bucket for handling ashes, crushed stone, coal, etc.

Nichols-Lintern Company, Cleveland, Ohio, has recently received orders for sander equipments from the Niles Car & Manufacturing Company, American Car Company, Kuhlman Car Company, and an order for 100 equipments from the Cleveland Railway. The company also reports that its auxiliary valves are being received favorably by many of its customers.

General Electric Company, Schenectady, N. Y., has leased a six-story building on Second Street in San Francisco, which it will use for its Pacific Coast headquarters. The building has a frontage of 60 ft. on Second Street and 74 ft. on Minna Street, and is a handsomely finished office structure. It is the purpose of the General Electric Company to occupy the entire building.

American-La France Fire Engine Company, Elmira, N. Y., has recently sold a No. 9 chemical engine to the Susquehanna Railway, Light & Power Company, and a number of Arctic non-freezing fire extinguishers to the Union Railway, New York, N. Y. These extinguishers are also being used by the Washington Railway & Electric Company and the Milwaukee Electric Railway & Light Company.

Frank F. Fowle, Chicago, Ill., has made extended investigations into the subject of protecting high-tension transmission line crossings. In the course of this work he has examined many types of crossings, and has gathered considerable data on sleet and wind loads. A recent book by Mr. Fowle, entitled "Transmission Line Crossings," gives an extended treatment of this subject that should interest street railway officers whose systems employ high-tension distribution.

Condit Electrical Manufacturing Company, Boston, Mass., has devised a shock absorber for tungsten lamps which will translate the sudden shock into an easy spring movement and will also act as a cord adjuster. It consists of a piece of flexible non-rusting wire, coiled into a spiral with extended arms, one end of each arm being formed into a U-shaped loop. The arms are crossed so that the spring is under compression and not under tension, and the

U-shaped loop in the ends permits the adjustment of the cord. The device can be readily applied on present installations without necessitating any changes in the electrical features.

E. G. Long Company, New York, N. Y., has concluded negotiations with Robert Wilkinson, trustee in bankruptcy of the New York Car & Truck Company, for all the right and interest in the Peckham system of street railway trucks and the supply part business and property of the New York Car & Truck Company. The E. G. Long Company is now the sole manufacturer of the renewal parts for the various types of Peckham trucks and the Taylor brake. Frank Van Anden, secretary of the company, was formerly connected with the Peckham plant in Kingston, N. Y., and will give his whole time to this branch of the business. Mr. Van Anden as secretary will be assisted by John P. Cullen, Jr.

Western Electric Company, New York, N. Y., was well represented at the convention of the Pennsylvania State Engineers' Society in Harrisburg, on June 1, 2 and 3. An exhibit of telephones, including interphones, mine telephones and an artillery telephone set and a line of Hawthorn motors, exhaust fans and transformers, together with street railway and sundry electrical supplies, was shown. This company reports that the St. Louis & San Francisco Railroad is now installing new telephone circuits from St. Louis to Springfield, Mo.; from Springfield to Thayer, Mo., and from Amory, Miss., to Birmingham, Ala., a distance of 500 miles. The equipment which is now in service and that which is soon to be installed consists of telephone apparatus and selectors made by the Western Electric Company.

Indianapolis Switch & Frog Company, Springfield, Ohio, has opened an office at 1528-29 McCormick Building, Chicago, Ill., in charge of J. C. Jameson. The company reports extensive sales of special track work, especially its manganese line of solid frogs, crossing and switch points. It has recently placed on the market several designs embodying features which are meeting with recognition. A new feature added is a universal type of manganese frog adaptable for all railroads, making it possible for the company to carry regular sizes and numbers of manganese frogs in stock for the various weights of rail, overcoming the heretofore necessary length of time and delay required to manufacture manganese or hard service frogs after orders are placed. One of its special types, known as design R-N-R rigid frog, is a radically new departure, and while not placed on the market until the first of the year, is already in use on over 25 of the largest railroads using manganese track work.

ADVERTISING LITERATURE

W. L. Buckland, Utica, N. Y., illustrates and describes the Buckland rail joint and safety clamp, which he manufactures, in an 8-page folder.

Climax Car Cleaner Company, Cleveland, Ohio, has issued a folder devoted to the application of its car cleaning compounds, paste, thinners and oil soap on passenger cars for both interior and exterior work.

A. O. Schoonmaker, New York, N. Y., in his 1910 standard price list of India and amber electrical mica, gives the various grades of mica which he handles, with details as to the sizes in which the mica is furnished.

Holland Trolley Supply Company, Cleveland, Ohio, in Catalog A, describes and illustrates its trolley supplies, including Holland bases, harps and wheels and other electric railway equipment. The publication contains 32 pages.

Flower Waste & Packing Company, New York, N. Y., has issued a 16-page booklet entitled "Flower's Resilient Journal Packing." Illustrations are presented which show the proper method of using packing and tools for use in packing journal boxes in shops and shop yards.

Economy Oil Cup Company, Augusta, Ga., has issued a booklet in which the merits are discussed of the Economy oil cup, which it manufactures. Another booklet issued by the company contains a reprint of the famous poem "Casey at the Bat" and the "companion" poem "When Casey Hit the Ball."

Sellers Manufacturing Company, Chicago, Ill., has issued a folder describing its anchor bottom tie plate. It is made in several sizes and punched to fit any weight of rail. The company states that there are over 75,000,000 of these plates in use to-day on 100 of the largest railroads in this country and Canada.

Pawling & Harnischfeger Company, Milwaukee, Wis., describes and illustrates its traveling electric cranes in Bulletin No. 18, which supersedes Bulletin No. 16. A feature of the bulletin is an illustration of the product of the company applied to the power house of the Milwaukee Electric Railway & Light Company.

H. W. Johns-Manville Company, New York, N. Y., has issued the first number of the J.-M. Roofing Salesman, which is devoted to J.-M. roofings and other J.-M. building materials. The first article, entitled "The Roof of the World," describes briefly the primitive attempts at building and waterproofing, and will be continued in the June issue of the publication. The publication also contains other reading matter relative to the merits of the various products manufactured by the company.

Chas. R. Morse Manufacturing Company, Chicago, Ill., which manufactures calculating machines, has moved to its new factory at 181 East Madison Street, Chicago. The company reports repeat orders from Stone & Webster, Commonwealth Edison Company, New York Telephone Company, Chicago Union Traction Company and others. The company is manufacturing a new calculating machine known as the Morse rotary slide calculator, a cylindrical slide rule, on which calculations can be performed with speed and accuracy.

Electric Storage Battery Company, Philadelphia, Pa., has issued a 12-page booklet, entitled "The Story of the Storage Battery." It contains some interesting facts relative to the wide use of storage batteries for various purposes and the position of the Electric Storage Battery Company in the storage battery field. The company has also issued Bulletin No. 124, which contains data on the performance of the Exide battery for emergency service in central station work. Only recently has the Exide battery been adapted to this class of service, and the record of its performance during the past year has been very satisfactory.

American-La France Fire Engine Company, Elmira, N. Y., includes among its recent publications the following: "Everything for Fire Prevention and Fire Protection in Fire Department Supplies," "Two-Wheel Chemical Fire Engines," "The Story of the Chemical Fire Engine," "Fire Protection for Automobiles, Motor Boats and Railroad Coaches," and "Alert Fire Extinguisher," "Salvage Fire Extinguisher," "Arctic Fire Extinguisher," and "No. 1 Standard Babcock." The application of the fire extinguisher to railway rolling stock in service is shown in "Fire Protection for Automobiles, Motor Boats and Railroad Coaches," in which is illustrated a Junior Arctic mounted in a car of the Elmira Water, Light & Railroad Company, Elmira, N. Y.

Murray Iron Works Company, Burlington, Ia., has issued Catalog No. 60, which is devoted to its water-tube boilers, and a publication which is entitled "Murray Corliss Engines." The catalog on water-tube boilers contains 38 pages, and in it the construction of the company's product in boilers is thoroughly described and illustrated. Illustrations which are presented of a number of plants in which Murray boilers have been installed include railway shops, school buildings, starch works, office buildings, mills, water works, etc. "Murray Corliss Engines" is a publication which is in the nature of a reference work, covering the subject of the Corliss engine as made by the Murray Iron Works Company. The different types of engines made by the company are described and illustrated; directions are given for ordering the engines, and detailed descriptions and illustrations are presented of the castings of the engines, the fly-wheels, the cylinders, the governors, pistons, cross heads, dash pots, connecting rods, etc. A chapter is also devoted to the high-pressure Murray boilers. A feature of the work is a series of miniature plans for power-plant installations, made to represent original blue prints.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit. ‡Includes Ferry earnings to April 1, 1909.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Apr. '10	173,763	*103,683	70,080	43,292	26,789
	1 " " '09	151,906	*89,586	62,320	43,779	18,541
	4 " " '10	658,339	*389,856	268,483	173,167	95,317
	4 " " '09	586,989	*341,557	245,433	175,266	70,167
BANGOR, ME. Bangor Ry. & Elec. Co.	1m., Apr. '10	41,705	19,390	22,315	13,103	9,212
	1 " " '09	38,424	18,018	20,406	12,956	7,450
	10 " " '10	467,355	200,844	266,511	131,106	135,405
	10 " " '09	438,528	204,930	233,588	123,740	109,848
BATON ROUGE, LA. Baton Rouge Elec. Co.	1m., Mar. '10	8,407	5,400	3,007	1,959	1,048
	1 " " '09	7,689	5,772	1,917	1,671	246
	12 " " '10	103,474	70,723	32,752	22,845	9,907
	12 " " '09	93,885	64,545	29,340	.....	.....
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Mar. '10	32,837	20,421	12,416	8,370	4,047
	1 " " '09	32,172	18,063	14,109	8,190	5,919
	12 " " '10	412,458	235,457	177,000	100,650	76,350
	12 " " '09	369,849	214,970	154,879	101,554	53,325
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Apr. '10	26,924	17,762	9,162	8,845	317
	1 " " '09	24,972	16,281	8,691	8,966	†275
	4 " " '10	106,658	64,876	41,782	35,622	6,160
	4 " " '09	100,881	59,102	41,779	36,468	5,311
BIRMINGHAM, ALA. Birmingham Ry. Lt. & Pwr. Co.	1m., Apr. '10	214,835	114,669	100,166	.....	.....
	1 " " '09	182,667	100,384	82,283	.....	.....
	4 " " '10	851,127	458,991	392,136	.....	.....
	4 " " '09	733,514	404,532	328,982	.....	.....
CHAMPAIGN, ILL. Illinois Traction System.	1m., Mar. '10	486,490	*281,460	205,030	4,781	202,249
	1 " " '09	375,391	*221,642	153,749	3,038	150,711
	3 " " '10	1,110,685	*646,315	469,370	8,664	455,706
	3 " " '09	1,030,897	*606,314	434,583	.....	434,583
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., Mar. '10	118,709	69,443	49,266	32,263	17,002
	1 " " '09	101,972	60,350	41,622	28,764	12,858
	9 " " '10	1,181,898	655,610	526,289	273,955	252,333
	9 " " '09	1,076,990	589,257	487,732	251,692	236,040
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Apr. '10	25,207	*13,236	11,971	8,714	3,257
	1 " " '09	21,807	*12,559	9,248	8,283	965
	4 " " '10	90,062	*48,416	41,647	34,703	6,943
	4 " " '09	77,620	*44,398	33,222	32,840	382
Lake Shore El. Ry.	1m., Apr. '10	86,915	*48,513	38,402	34,903	3,450
	1 " " '09	78,574	*45,651	32,923	34,353	†1,430
	4 " " '10	322,770	*193,470	129,300	138,823	†9,523
	4 " " '09	289,316	*182,481	106,836	137,590	†30,754
DALLAS, TEX. Dallas Electric Corporation.	1m., Mar. '10	114,849	77,240	37,608	26,347	11,261
	1 " " '09	102,667	62,996	39,671	28,918	10,753
	12 " " '10	1,359,384	864,695	494,689	330,458	164,231
	12 " " '09	1,208,226	786,701	421,525	346,081	75,444
DAVENPORT, IA. Union Ry., Gas & Elec. Co.	1m., Apr. '10	230,323	131,780	98,543	65,397	33,146
	1 " " '09	216,016	109,694	106,332	63,892	42,430
	4 " " '10	982,928	561,997	420,931	261,554	159,377
	4 " " '09	927,399	466,960	460,459	255,454	205,005
DETROIT, MICH. Detroit United Ry.	1m., Apr. '10	737,608	486,897	250,711	161,489	89,222
	1 " " '09	619,705	374,203	245,502	154,155	91,347
	4 " " '10	2,766,649	1,781,487	985,162	641,159	344,003
	4 " " '09	2,322,302	1,438,353	883,949	614,404	269,545
EL PASO, TEX. El Paso Elec. Co.	1m., Mar. '10	51,579	29,564	22,015	8,574	13,440
	1 " " '09	45,602	29,005	16,597	7,911	8,686
	12 " " '10	621,847	359,758	262,089	100,193	161,896
	12 " " '09	542,404	377,654	164,750	89,198	75,552
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Apr. '10	121,522	71,523	49,999	44,988	5,011
	1 " " '09	106,250	65,974	40,277	39,965	312
	4 " " '10	476,008	271,737	204,271	179,656	24,615
	4 " " '09	420,971	253,257	167,714	162,839	4,875
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Mar. '10	128,679	67,290	61,389	18,786	42,603
	1 " " '09	109,013	60,357	48,656	17,173	31,482
	12 " " '10	1,306,550	710,843	596,067	207,821	388,246
	12 " " '09	1,124,025	657,058	466,967	198,310	268,657
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Mar. '10	105,144	67,673	37,471	23,080	14,391
	1 " " '09	95,611	59,076	36,535	21,578	14,957
	12 " " '10	1,228,619	734,835	493,784	268,126	225,658
	12 " " '09	1,119,176	649,063	470,113	249,067	221,046
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Apr. '10	86,632	44,052	42,580	19,593	22,987
	1 " " '09	77,625	37,291	40,334	18,875	21,459
	4 " " '10	337,663	171,128	166,535	79,735	86,800
	4 " " '09	302,801	150,214	152,587	75,681	76,906
HARRISBURG, PA. Central Penn. Trac. Co.	1m., Apr. '10	65,774	46,458	19,316	.....	.....
	1 " " '09	57,168	43,612	13,556	.....	.....
	4 " " '10	249,861	188,061	61,800	.....	.....
	4 " " '09	224,500	174,058	50,442	.....	.....
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Mar. '10	27,019	13,131	13,888	6,317	7,572
	1 " " '09	25,457	14,906	10,551	5,797	4,754
	12 " " '10	323,604	168,395	155,209	75,933	79,275
	12 " " '09	280,676	156,311	124,365	61,618	62,747
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Mar. '10	52,558	26,974	25,584	9,469	16,115
	1 " " '09	41,047	23,591	17,457	9,558	7,899
	12 " " '10	514,129	275,060	239,069	112,350	126,719
	12 " " '09	445,411	259,254	186,157	112,155	74,002
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., Mar. '10	622,555	347,084	275,472	160,666	114,806
	1 " " '09	561,774	315,171	246,603	156,800	89,803
	10 " " '10	5,961,714	3,354,467	2,607,247	1,576,179	1,031,067
	10 " " '09	5,500,067	3,130,220	2,369,848	1,572,076	797,772
LEWISTON, ME. Lewiston, Augusta & Waterville St. Ry.	1m., Apr. '10	37,883	24,221	13,662	14,432	†770
	1 " " '09	34,579	22,341	12,238	13,253	†1,015
	10 " " '10	433,552	252,526	181,026	149,921	31,105
	10 " " '09	373,905	234,180	139,725	132,372	7,353
MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co.	1m., Apr. '10	376,793	266,831	109,962	47,116	62,847
	1 " " '09	339,718	224,128	115,590	46,714	68,876
	4 " " '10	1,494,477	1,071,834	422,642	185,678	236,965
	4 " " '09	1,341,187	913,978	427,209	186,237	240,972
Milwaukee Lt., Ht. & Traction Co.	1m., Apr. '10	116,202	46,193	70,009	54,980	15,029
	1 " " '09	105,596	38,840	66,756	50,442	16,315
	4 " " '10	455,866	184,272	271,595	221,334	50,260
	4 " " '09	412,597	156,767	255,830	201,607	54,223
MINNEAPOLIS, MINN. Twin City Rapid Transit Co.	1m., Apr. '10	584,378	268,045	316,332	140,229	176,103
	1 " " '09	537,049	261,714	275,335	140,367	134,968
	4 " " '10	2,303,697	1,157,069	1,146,628	560,917	585,712
	4 " " '09	2,087,748	1,100,631	987,117	547,256	439,861
MONTREAL, CAN. Montreal St. Ry.	1m., Apr. '10	344,765	190,842	153,923	49,136	104,787
	1 " " '09	294,374	170,552	123,822	40,623	83,197
	7 " " '10	2,337,001	1,407,826	929,175	264,115	665,060
	7 " " '09	2,107,716	1,320,135	787,581	238,666	548,915
NORFOLK, VA. Norfolk & Portsmouth Trac. Co.	1m., Apr. '10	155,338	91,988	63,350	.....	.....
	1 " " '09	138,859	87,817	51,041	.....	.....
	4 " " '10	605,115	353,301	251,814	.....	.....
	4 " " '09	‡607,417	357,561	249,856	.....	.....
PENSACOLA, FLA. Pensacola Electric Co.	1m., Mar. '10	21,536	12,649	8,888	4,913	3,974
	1 " " '09	19,013	11,549	7,464	4,339	3,125
	12 " " '10	250,741	144,606	106 136	54,041	52,094
	12 " " '09	214,323	138,677	75,646	51,808	23,837
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Mar. '10	7,282	5,790	1,493	1,795	†302
	1 " " '09	7,580	6,393	1,186	1,980	†794
	12 " " '10	130,144	94,121	36,023	20,822	15,201
	12 " " '09	123,479	86,112	37,367	25,925	11,442
PORTLAND, ORE. Portland Ry., Lt. & Power Co.	1m., Apr. '10	440,560	187,615	252,945	133,093	119,852
	1 " " '09	377,489	170,839	206,650	123,610	83,040
	4 " " '10	1,700,298	732,668	967,630	526,592	441,038
	4 " " '09	1,442,446	699,812	742,634	484,134	258,500
ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Power Co.	1m., Apr. '10	77,990	45,564	32,426	22,350	10,276
	1 " " '09	72,440	41,862	30,658	20,818	9,840
	4 " " '10	329,028	181,989	147,039	88,676	58,363
	4 " " '09	300,637	162,649	137,988	83,332	54,656
SAN FRANCISCO, CAL. United Railroads of San Francisco	1m., Mar. '10	648,203	381,772	266,431	.....	.....
	1 " " '09	606,615	363,062	243,553	.....	.....
	3 " " '10	1,846,852	1,089,402	757,450	.....	.....
	3 " " '09	1,716,626	1,045,743	670,883	.....	.....
SAVANNAH, GA. Savannah Elec. Co.	1m., Mar. '10	49,907	32,049	17,858	17,846	11
	1 " " '09	46,814	29,215	17,599	17,512	87
	12 " " '10	605,093	393,127	211,966	210,675	1,291
	12 " " '09	600,274	369,179	231,095	207,778	23,317
SEATTLE, WASH. Seattle Electric Co.	1m., Feb. '10	431,075	262,799	168,276	111,643	56,633
	1 " " '09	379,692	230,038	149,653	96,511	53,142
	12 " " '10	5,970,447	3,487,395	2,483,052	1,265,205	1,217,847
	12 " " '09	4,589,625	2,690,751	1,898,874	1,117,084	781,789
TACOMA, WASH. Puget Sound Electric Ry.	1m., Mar. '10	157,779	125,178	32,061	50,607	†18,006
	1 " " '09	142,049	98,928	43,120	45,911	†2,790
	12 " " '10	1,912,138	1,290,038	622,100	586,833	35,268
	12 " " '09	1,671,109	1,092,390	578,719	523,431	55,288
SYDNEY, N. S. Cape Breton Elec. Co., Ltd.	1m., Mar. '10	20,135	11,615	8,520	5,049	3,471
	1 " " '09	16,462	11,142	5,320	5,023	296
	12 " " '10	250,538	143,780	106,758	60,642	46,116
	12 " " '09	241,910	141,349	100,562	59,506	41,055
TAMPA, FLA. Tampa Elec. Co.	1m., Mar. '10	54,061	28,083	25,978	4,566	21,412
	1 " " '09	48,176	27,702	20,475	4,609	15,866
	12 " " '10	607,394	344,248	263,146	55,907	207,239
	12 " " '09	568,206	365,701	202,505	47,078	155,427
TOLEDO, OHIO. Toledo Rys. & Lt. Co.	1m., Apr. '10	215,553	122,473	93,080	70,915	22,165
	1 " " '09	242,941	144,283	98,659	76,220	22,439
	4 " " '10	873,085	494,498	378,587	283,781	94,806
	4 " " '09	982,094	582,104	399,990	303,736	96,255
TORONTO, ONT. Toronto Ry. Co.	1m., Mar. '10	341,999	184,150	157,849	.....	.....
	1 " " '09	298,142	161,133	137,009	.....	.....
	3 " " '10	974,264	526,803	447,461	.....	.....
	3 " " '09	861,768	464,831	396,937	.....	.....

Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXV. NEW YORK, SATURDAY JUNE 11, 1910 No. 24

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NEW YORK, SATURDAY, JUNE 11, 1910.

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Summer Accidents

This is the season of the year when accidents on single track lines are apt to occur with distressing frequency. In the past some of these casualties have been due to the actual disobedience of despatching orders. Accidents of this kind cannot always be prevented even by the best management, but in some cases the responsibility has been traced directly to the failure of the executive officers to maintain discipline. In others, fatalities have occurred because not enough effort was exerted to keep track weeds and grass low enough to allow braking on dry rails. Still other accidents have resulted from the failure to cut down trees and undergrowth at curves wherever opposing motormen would be unable to see each other within safe braking distance. A heavily-wooded curve may be very picturesque to the passenger, but it is not conducive to safe railroading.

A List of Remedies

Three remedies for the correction of the results of the illogical fare situation on urban lines are suggested by President William A. House, of the United Railways & Electric Company, of Baltimore, in his annual report for 1909. They are an increase in the unit rate of fare, a contraction of the fare limits or a readjustment of the transfer system. A solution of the problems arising from the rapid and unavoidable increases in costs of operation is the most important question confronting the industry. Some of the remedies that may be adopted under existing laws and franchises have already been put in force by various companies. The most conspicuous of these are the 6-cent fare units adopted by several Massachusetts companies. City companies, however, are generally so bound by franchise contracts that a radical advance in rates is impracticable. A contraction of average fare limits might be secured by the abandonment of the policy of building extensions into outlying and sparsely settled districts, as the reversal of the usual liberal practice of companies in extension would produce further congestion of population and traffic on existing lines. Curtailment of the transfer system is a recommended remedy that lies within the power of some companies to make effective. But to the list of restoratives given by Mr. House we add as a serious possibility a reduction in the burdensome direct and indirect taxes levied upon street railway companies. Freedom from municipal taxation would be a helpful decrease in costs and a contribution which communities could make without interference with the convenience of the traveling public.

Preparing Open Cars for Service

The importance of preparing open cars for service in the early spring is widely recognized by the practice of carrying on a general overhauling of this type of equipment during the

winter months. It frequently happens, however, that the actual placing of open cars in service, particularly on short notice, is delayed by minor reasons. In an advanced season like the present one the demands of the transportation department for open cars are generally irregular and frequently unexpected in localities where the climatic conditions are variable in the extreme. Hence it is desirable to perfect the car house organization for handling the open cars quickly and to pay special attention to the question of spare parts in order that the company may not lose the revenue from pleasure riding in the early summer. Cars which have been thoroughly overhauled during the winter are frequently held back from service by the absence of proper signs, shortage of trolley poles, lack of enough registers, trolley catchers, sand pails, fuses, and other fittings. On some roads where this equipment is shifted from box to open cars as needed the stock tends to run so low that it is now and then necessary to wait until a box car completes its trip before an open car which is wanted can be fully equipped. In the praiseworthy efforts to economize by cutting down the local investment in spare parts there lurks no little danger of going so far that equipment may be kept off the line when patronage awaits it. Much good can be accomplished by the interchange of necessary spare parts among different car houses, provided a suitable record is kept of the material and its disposition. A careful inspection of the rheostats of single-motor cars, the correct adjustment of all moving parts and close supervision of the initial handling by motormen are also desirable.

Standard Sizes for Publications

At the last meeting of the Central Electric Railway Association a resolution was adopted recommending to publishers of technical papers and to manufacturers of railway equipment a standard maximum size of 9 in. x 12 in. for all publications and catalogs. The Master Car Builders' Association adopted as standard in 1894 three sizes for pamphlets and trade catalogs, the largest of which was 9 in. x 12 in., and we believe that manufacturers of steam railway equipment have adhered closely to these standard sizes in designing their printed matter. Many of the catalogs of these manufacturers have printed in small letters on the top margin of the title page the words "M. C. B. Standard, 9 in. x 12 in." A similar practice would soon be established in the electric railway field if the manufacturers realized the importance of standardization of sizes to the railway companies. It is a large task to file and index for quick and convenient reference all the printed matter which comes into the office of even a small railway company. Any system of filing is greatly complicated if provision must be made in special filing cases for catalogs of odd sizes. There is no advantage to the manufacturer in adopting unusual dimensions for catalogs merely to make them different from the publications of a competitor. Individuality in advertising literature can be obtained in other ways which do not affect the convenience of the buyer to which it is sent. Some of the member-companies of the Central Electric Railway Association have adopted the practice of stamping on all letters sent out by the purchasing department the words "No catalogs over 9 in. x 12 in. will be filed." It should not be necessary for a manufacturer to receive more than one letter so stamped before he is convinced of the value to him of standardizing this essential part of his product.

LIGHTNING ARRESTERS

A lightning arrester has been defined as a device which sometimes deflects lightning harmlessly away from the apparatus which it is supposed to protect. Nevertheless, lightning arresters are extremely necessary on all aerial lines, and at this season of the year many electric railway companies are looking very carefully into the condition of their arresters, or have already done so, in preparation for the summer storms. The trouble with lightning arresters, so far as electric railways are concerned, is that one not only has to protect the stations, but also has to protect a large number of car equipments scattered over the entire system. It is comparatively easy to secure to the station a fairly satisfactory immunity from damage. But a car equipment is extremely thin-skinned as regards lightning, compared with the station transformers and heavily insulated generators. The comparatively mild induced discharges which usually cause damage upon electric railway systems would, as a rule, be dealt with by the arresters of a modern station equipment without the slightest difficulty. A line fairly hit by a lightning discharge is quite another matter, even if the discharge is only a branch one of moderate intensity, and the result is generally to put the line out of service even if the apparatus is successfully protected.

For the electric railway manager the annual problem is to devise and install means sufficiently effective to keep lightning from burning out the car equipments and putting an end to efficient service. In the early days of electric car lines the lightning arrester equipment was almost always at the station and the cars had to look out for themselves. Later arresters were installed on the cars, but it has always been difficult to get a car arrester sensitive enough to avert short-circuits of controller or field coils when there is severe discharge from the trolley wire. Consequently it has become the practice also to install lightning arresters liberally upon the line with the intent of heading off discharges before they actually get to the car. The severest conditions with respect to lightning are met in the Rocky Mountain region, where on some systems they have come to installing arresters every 500 ft. or 600 ft., on exposed lines. It is a well-known fact that certain points on an electric circuit may be so exposed as to be particularly liable to be struck by lightning and one of the first duties of the engineer in charge is to locate and protect such points, but the majority of so-called lightning strokes which disable electric cars are induced strokes not arising because the line is directly struck and hence not to be averted by protecting merely exposed points.

Practice differs very much regarding arresters on railway systems, but considering the nature of the apparatus to be protected and the ease with which it is temporarily crippled, it seems to us that the arresters generally used err on the side of too little sensitiveness. Thunderstorms do not come without warning and it might even be possible for the motorman to switch on almost any kind of lightning arrester protection, even if it is not considered advisable to keep it constantly in action. There is much to be said in favor of arresters so sensitive as to spill over through a suitable resistance on very small provocation. It is much better to have temporary trouble with an arrester than it is to burn out a car equipment, particularly if the arrester is not too expensive and is easily repaired. It is good practice, therefore, to make sure by frequent inspection, especially during the summer season when thun-

derstorms are frequent, that the arresters are in good operating condition, and even that they are apparently hypersensitive, because a very short spark indeed is sufficient to ground a field coil or short-circuit a controller.

TWO MOTOR EQUIPMENTS FOR CITY CARS

In view of the present day tendency toward reducing the weight of cars for city service we venture the suggestion that many companies which are now operating four-motor equipments could save weight, cost of maintenance and possibly cost of power without seriously affecting their schedule speeds by adopting two-motor equipments of suitable power and design. There have been remarkable developments in railway motor construction since four-motor equipments were introduced 10 or 12 years ago to meet the needs of a service which had outgrown the capacity of two motors of the sizes then built. Modern motors for city service are rated as high as 90 hp on 600 volts, and, owing to improved details of insulation, slotted commutators, ventilation, brush design and the use of commutating poles, they are capable of giving good service when worked continuously at their full load capacity. Two such motors are more than powerful enough to maintain a safe and reasonable schedule speed under the heaviest cars required for almost any city. In view of this development, it might be profitable for many companies now using four-motor equipments as standard to make operating tests with a sample two-motor outfit. We have in mind one city where such an experiment, as suggested by the investigations of the Metropolitan Street Railway of New York, has led to a considerable saving, both in weight of motors and first cost, on new motive equipment. This company had always feared that its narrow-grooved rail would not give sufficient adhesion with two motors, but a thorough test with two-motor equipments proved otherwise.

The saving in weight of a complete two-motor equipment with control over a four-motor equipment of equal horse-power is as much as 3000 lb. per car. The Philadelphia Rapid Transit Company uses four GE-70A motors of 40 hp each under its standard semi-convertible cars having 28-ft. bodies. These motors with control weigh 12,460 lb. As compared with this weight, the 31-ft. convertible cars of the Third Avenue Railroad in New York are equipped with two Westinghouse 310 motors of a rated capacity of 75 hp on 600 volts which weigh with control only 8010 lb. The standard two-motor equipments of the Metropolitan Street Railway in New York are also the Westinghouse 310 and the GE-210 which are nearly identical in their electrical characteristics. This two-motor equipment was adopted as standard after an exhaustive series of tests in comparison with GE-80 four-motor equipments weighing complete with control 12,860 lb. The saving in weight of single-motor trucks over double-motor trucks is also large, amounting to 4430 lb. per car in the Metropolitan cars. By the adoption of two motors instead of four a total reduction in the weight of electrical equipment and trucks of 9280 lb. was effected.

The cost of maintenance of two large motors is much less than for four smaller motors of equal power. Lubrication, brush renewals, babbiting of bearings and repairing of mechanical injuries are items of motor maintenance cost which are approximately proportioned to the number of motors in service and not to their capacity. Owing to the smaller margin of adhesion over torque with a two-motor equipment the motors are seldom subjected to prolonged or injurious overloads since the wheels will slip before much damage is done.

Theoretically, two large motors will have a higher electrical efficiency than four smaller motors of approximately equal capacity, and the gear losses are also less. As long as the wheels do not slip this theoretical advantage should show in actual operation. In the tests previously referred to, which were made by the Metropolitan Street Railway, a saving of 10 per cent in power consumption per ton-mile was found in favor of the two-motor equipments. These tests also showed that there was practically no difference in the rate of acceleration on dry rail in favor of the four-motor equipment and on wet rail not enough to affect the schedules. Modern single-motor trucks carry 75 per cent of the load on the driving wheels, and unless the grades to be climbed are very steep and the acceleration required is close to the maximum for comfort, this proportion of the total weight of a car is sufficient to prevent the wheels slipping when full power is being exerted by the motors. The danger of slipping exists, in any event, only during the first few seconds of acceleration, after which the car resistance drops rapidly. The saving in first cost, maintenance and weight obtained with two-motor equipments of adequate size to fulfill reasonable requirements of ordinary city service would seem to be great enough, at least in most cases, to overbalance the questionable advantage of quicker acceleration obtained with four motors.

THE VALUE OF TRAFFIC CURVES

The managers of city railway systems which do not embrace more than half-a-dozen routes usually feel that they know every detail of the traffic distribution so well that it is unnecessary to go to the trouble of preparing graphic records. The correctness of this point of view, however, is not proved by the experience of those who have had occasion to prepare traffic curves, even for cities of less than 40,000 population as they have found that such curves will betray the riding peculiarities of the public much more clearly than a mere tabulation. From such a record for example, it is easy to observe whether the passengers take kindly to short-trip cars or neglect them in favor of through cars even when they do not ride to the end of the line. In some cases of this kind, the overcrowding of the through cars has been found to be due to the fact that the short-haul passengers wish to ride with friends who are going further. In other instances, it is due to the company's employment of the more attractive cars for the through run or to the condition that the long-haul cars are advertised to leave some prominent traffic point on the even quarters of the hour and so their leaving time is more readily kept in mind.

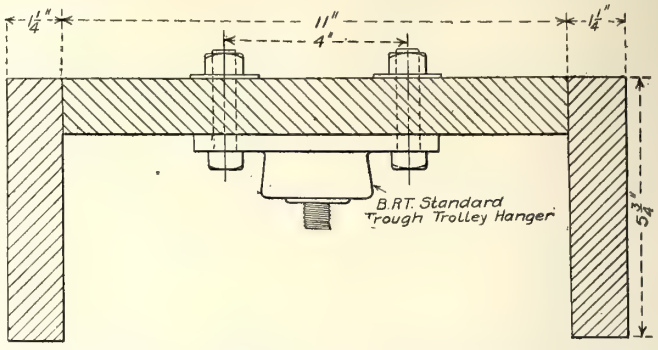
Traffic curves, furthermore, are not only of value to the company in making up its schedule, but are also an aid in its relations with the public. When a complaint is made about the service on a certain line, it is surely convenient to be able to prove graphically that in the course of the day's operation the number of seats furnished far exceeded the passengers and that the schedules adopted are based strictly on the amount of traffic which the line brings. Every company ought to know just how much it costs to carry a passenger, not only on every single line, but on portions of the line as well, particularly where an extra fare is charged on the suburban extensions. Of course, it is not necessary that graphic analyses of this kind should be made out every day. Often one week or one day in the month, as well as holidays, would suffice for most useful purposes.

BROOKLYN LINE DEPARTMENT—THE NOVEL IRON-BAR OVERHEAD CONSTRUCTION

One of the most interesting and novel features of the overhead construction of the Brooklyn Rapid Transit System has been the invention and application on a wide scale of iron-bar overhead conductors. These bars are used wherever traffic is heavy and at every important intersection under the elevated railway structure.

The adoption of this practice meant a great deal more than the simple suspension of the bars, as it was necessary to design section insulators, expansion joints, frogs, diagonals, feed-in castings and other auxiliaries necessary to obtain a well-rounded and complete system of overhead construction. All of these details have been worked out with such success that the bar-iron overhead suspension, wherever used, has proved remarkably reliable and far easier to maintain than methods hitherto regarded as standard. Admitting the reliability of the iron bars for permitting a practically uninterrupted car service, the objection might be raised that they must be very hard on the trolley wheels. This drawback has not been an appreciable factor, however, because the bars are installed only in locations where the traffic is too heavy to operate the cars at high speeds. Hence, there is little chance for the occurrence of severe arcing, except, perhaps, at the inclines on the Brooklyn Bridge.

The bar-iron construction first was tried out some eight years ago at Atlantic and Flatbush avenues, where the trolley wire had a very short life owing to the heavy traffic and the limited clearance under the elevated structure. The original conductor was a section of light channel iron, which has been superseded by ⅜-in. x 2¼-in. bars of round-edge iron. The latter have been found cheaper than the channels, can be more readily purchased in the open market and are spliced and installed more easily. In cases of emergency, even a square-edge bar may be installed, leaving the trolley wheels to round off the bar in short order. The bars may be of any commercial grade of iron or steel, and at this time are purchased at 1 2/3 cents per pound.



Brooklyn Line Department—Trough Work at Williamsburg Bridge Approach



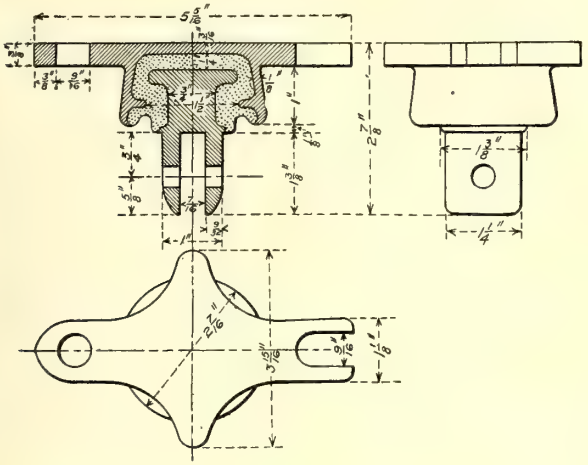
Brooklyn Line Department—Iron-Bar Construction from Davit Trusses on Brooklyn Bridge Incline, Looking Toward Manhattan Borough

The bar suspension is also of the greatest value where clearances are so low that the trolley contact has to be offset 4 in. to 6 in. from the center line in order to permit the cars to operate at all, considering the bending of the trolley poles. An idea of the durability of this work may be obtained from the statement



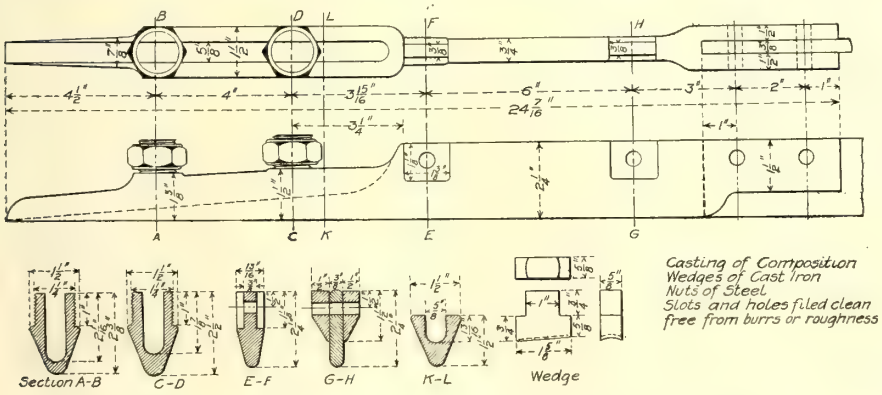
Brooklyn Line Department—Iron-Bar Construction from Davit Trusses, Looking Toward Brooklyn Borough

that all the bars at the Brooklyn Bridge terminal on the Brooklyn side have been in use since April, 1908, without change, and are expected to last until February, 1911, at least, whereas even



Brooklyn Line Department—Trough Bar Hanger

phono-electric wire was not serviceable for more than five months at the same location. At other places frogs and diagonals of the bar design last four to five times as long as those of the composition metal, and cost a great deal less.

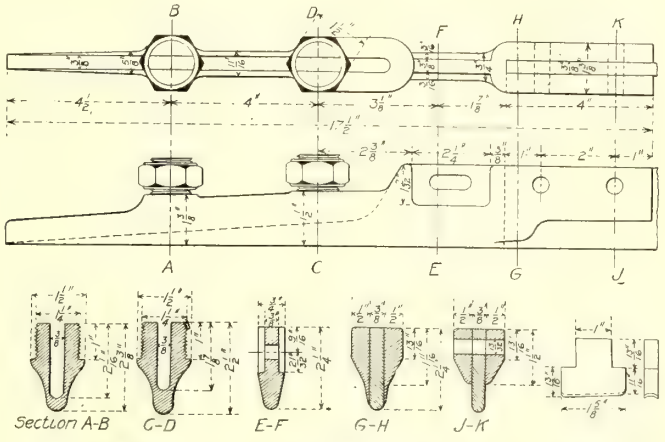


Brooklyn Line Department—End Casting of Expansion Joint for No. 000,000 Bar at Williamsburg Bridge

CONSTRUCTION DETAILS.

All bars are made up in the line department's shops to standard lengths of 16 ft., and are suspended at intervals of 8 ft. One of the accompanying drawings shows the latest form of trough used with this standard bar and hanger. The hanger design permits the use of a lighter bottom-board than heretofore and avoids boring a large hole for the insulating stud, thereby producing economy both in labor and material. The standard trough bar hanger is shown in another illustration. It does not differ from the Brooklyn Rapid Transit wire hanger except for the stud.

The composition iron-bar end casting for No. 00 wire illustrated is employed to join the overhead wire to the conductor bar. The casting is riveted to the bar. Means for suspending this casting from the trough are provided by a slotted hole which allows for the expansion and contraction of the bar. A device similar to the foregoing is the end casting of an expansion joint as used on the Williamsburg Bridge and shown on

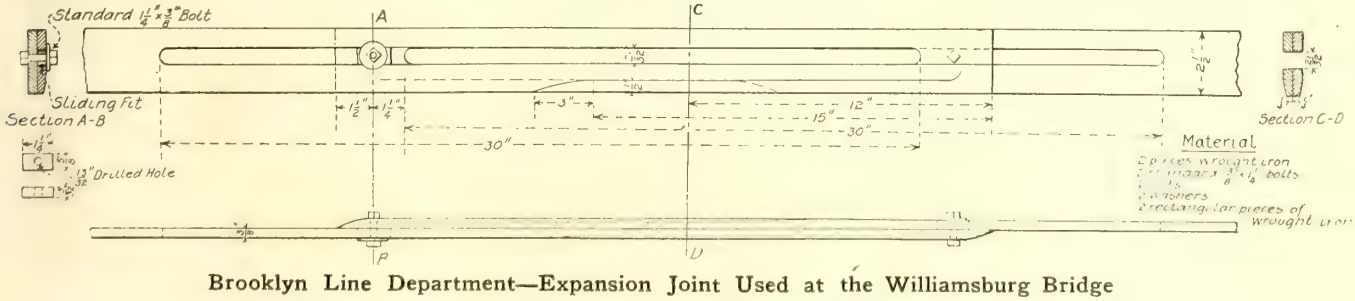


Brooklyn Line Department—Composition Iron Bar End Casting

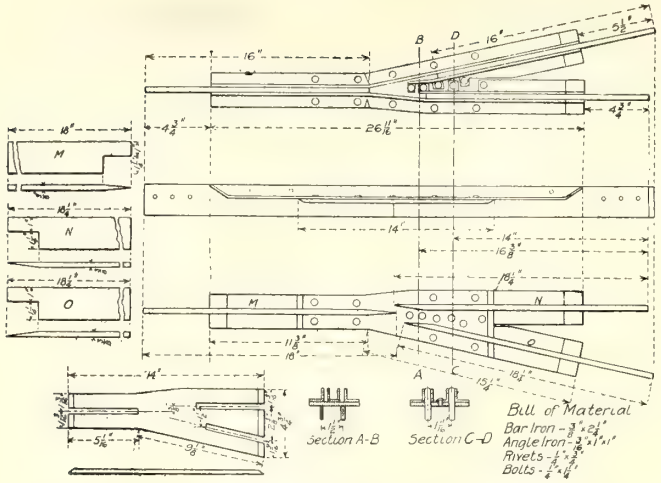
the same page. This casting is arranged for two points of suspension, a condition which is desirable in some locations. No provision is made for expansion and contraction, as this is taken care of by the expansion joints installed for this purpose. An expansion joint of the type in question is shown in an accompanying drawing. Attention is called to the spacing blocks, which permit the bolts of the expansion joint to be set up tight without preventing the free back and forth movement of the bars. In order to receive the trolley wheel, each bar is milled on one side so that the width of the bar at the line of contact with the trolley wheel is only slightly larger than the standard bar. Formerly, the expansion joints were made with a sleeve and a bar telescoping into it. Whenever traffic was severe this construction wore out rapidly and hence it was found necessary to supersede this design.

The standard right-hand iron-bar frog on page 1018 is designed as an entering frog, and operates properly with all types of cars, whether they have one or two poles, are single or double truck, etc. These frogs are made for standard overall lengths and can be inserted in the conductor bar by removing and replacing six rivets. It has not been thought desirable to use bolts, as the little extra time required to remove the rivets is not objectionable, because generally there is no need for removing the frogs in a hurry, and the changes can be made when it is most convenient for the crews. The rivets give better electrical contact than bolts, and none of them has ever been burned out in service. Another drawing, on page 1018, presents the details of a left-hand iron-bar frog which is used either for trailing alone or for trailing and entering.

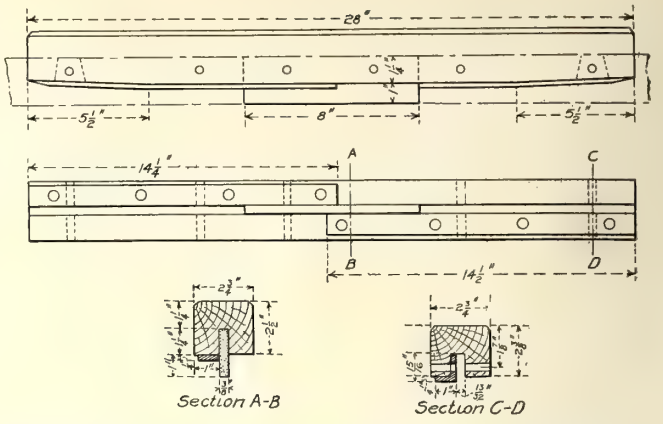
The bar-iron section insulators are made with fiber centers, as indicated on the section in the accompanying drawing. These



Brooklyn Line Department—Expansion Joint Used at the Williamsburg Bridge

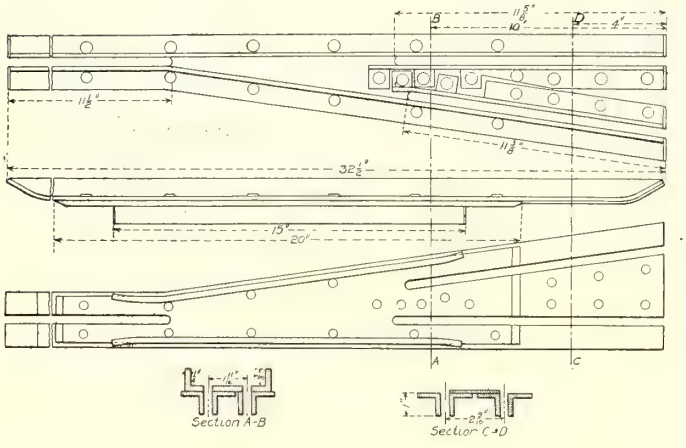


Brooklyn Line Department—Standard Iron-Bar Frog

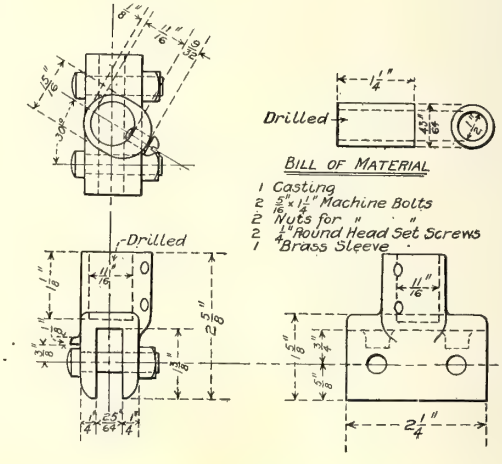


Note.—Wrought iron wearing strips to be fastened, as indicated, with 1-in. No. 10 flat-head screws, countersunk. Insulation—Hard fibre. Wood—Maple or oak.

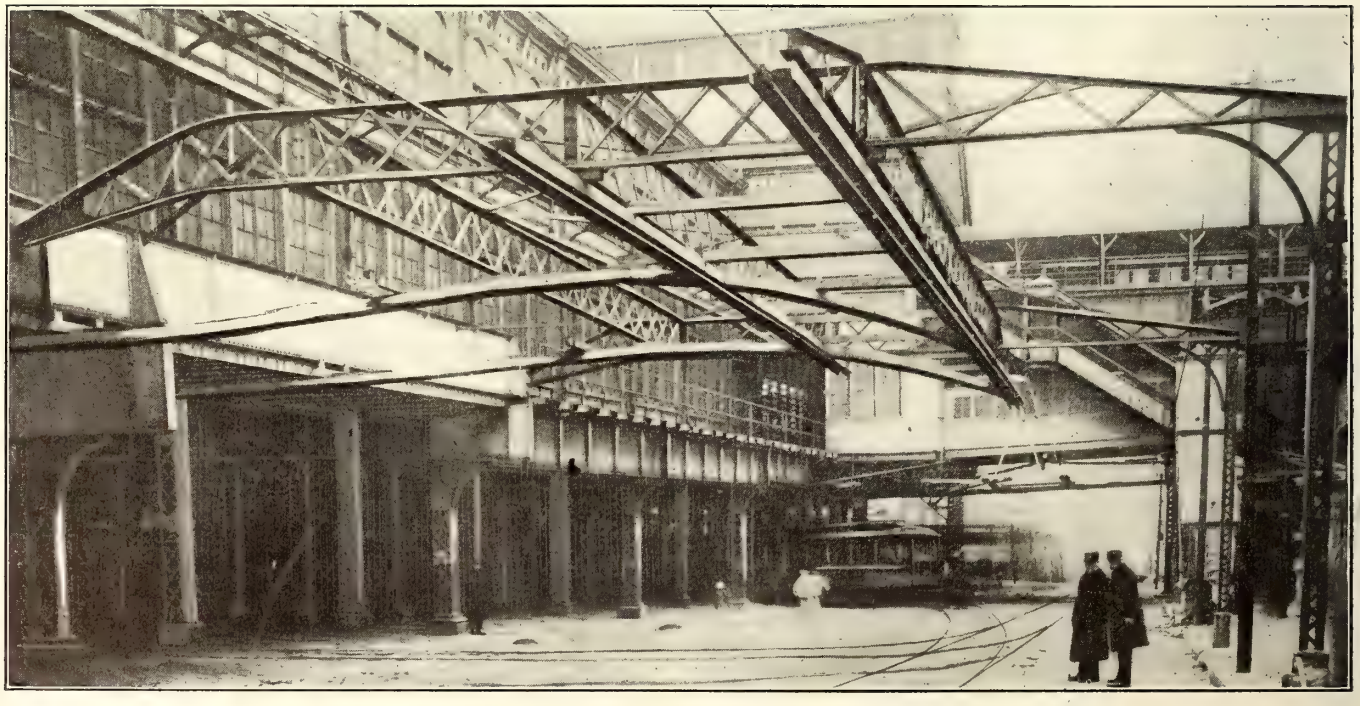
Brooklyn Line Department—Iron-Bar Section Insulator



Brooklyn Line Department—Left-Hand Iron Pan Frog



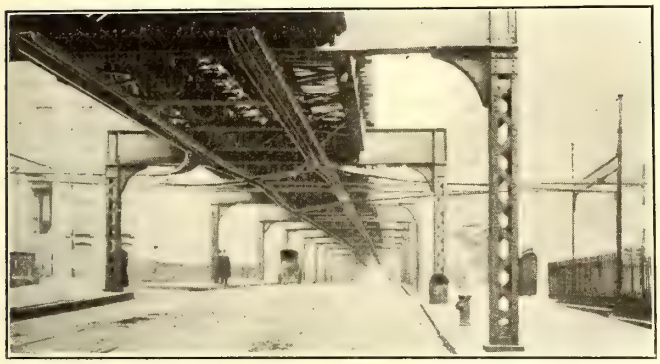
Brooklyn Line Department—Side Feed Casting for Iron Bar



Brooklyn Line Department—Iron-Bar Construction Alongside the Brooklyn Bridge

devices have given a life exceeding 10 months over the most heavily traveled tracks in Brooklyn. At street intersections it is the practice to put bar section insulators into the trough work to avoid having insulated crossings or section breakers in the trolley wire. The bar method gives a more durable and reliable means of insulating the intersecting lines.

The principle of the bar section insulator construction has



Brooklyn Line Department—Iron-Bar Work at Concord and Adams Streets

been applied to the circuit-breakers of the electric automatic track switches operated by the company. These circuit-breakers have been found to last longer than the original designs furnished by the track switch manufacturers.

Side-feed taps are made into the conductor bar by means of the the brass casting shown in one of the detail drawings. This brass casting has two bolts for the connection to the bar. It is drilled in the upper part to receive a sleeve, into which the copper feed wire is wedged and soldered and then held in place by the set screws in the brass casting.

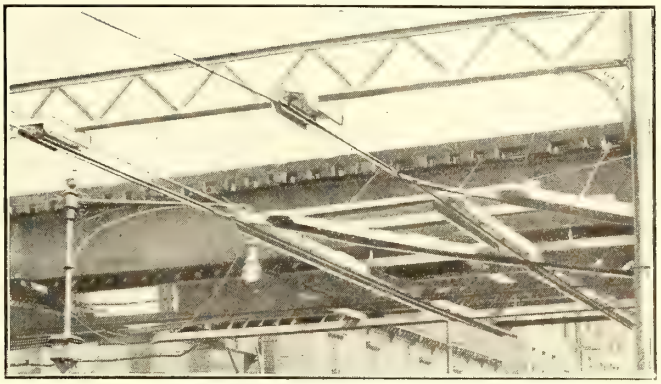
TYPICAL INSTALLATIONS

Several interesting views are presented in the accompanying



Brooklyn Line Department—Iron-Bar Construction on Brooklyn Bridge Surface Car Incline

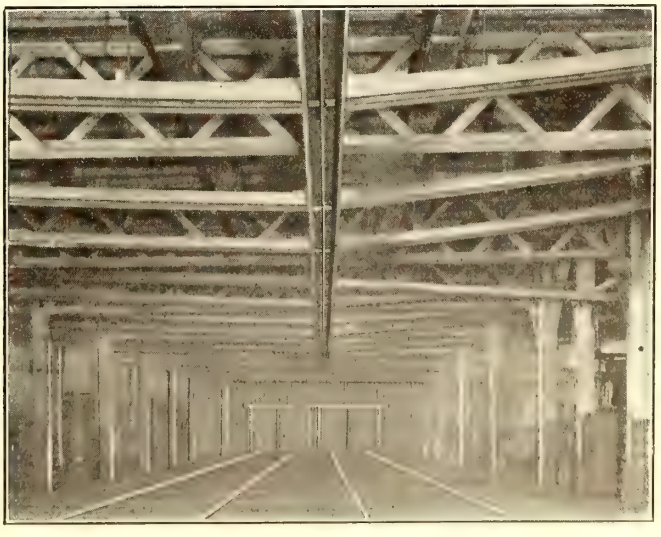
illustrations to show some of the diverse conditions under which the conductor bars have been installed. The single interior view presents the bar-iron overhead work over the transfer table in the Crosstown depot, where cars are shifted back and forth at frequent intervals. The installation at Concord and Adams streets illustrates an instance where the troughs are carried from light lattice girders with ornamental brackets. All of the construction is painted a dark green to make it less conspicuous. The view taken at Fifteenth Street and Fifth Avenue is an unusual case, as here the trough was omitted in part to satisfy



Brooklyn Line Department—Bar-Iron, T-Bar and Wire Overhead Circuit at Fifteenth Street and Fifth Avenue



Brooklyn Line Department—Iron-Bars and Troughs at Concord and Adams Streets



Brooklyn Line Department—Bar-Iron Conductor Troughs in Greenpoint Car House

an adjacent property owner. A T-bar was substituted to bridge the gap, but otherwise the construction is practically the same as elsewhere. The T-section is connected to the standard bar by miniature railway fishplates.

The most important installation of all is that on and near the surface car incline at the Brooklyn end of the Brooklyn Bridge. The trough and bars are carried from davit-form trusses, which are of ample strength to carry the line and withstand the pressure of snow, sleet or wind. So far as the iron bars are concerned, defects rarely occur until the entire installation is worn out, with the exception of the diagonals and frogs, which can be replaced most readily.

Acknowledgments are due to C. E. Roehl, electrical engineer, and H. H. Hilborn, superintendent of the line department, Brooklyn Rapid Transit System, for many courtesies in connection with the preparation of this article.

ACCOUNTING IN PHILADELPHIA FOR POWER PLANT AND SUBSTATION MAINTENANCE AND OPERATING COSTS

Through the courtesy of Charles Hewitt, superintendent of motive power, Philadelphia Rapid Transit Company, the following interesting particulars are available of the departmental accounting practice of that company with regard to the subdivision of its power and substation accounts for maintenance and operation. In making up these accounts, Mr. Hewitt has endeavored to use as a guide, the relative importance of the different items. In his experience, he has found that it is most necessary to have costs on the power subjects as detailed in the following paragraphs:

MAINTENANCE OF POWER STATION EQUIPMENT

The headings used for the sub-accounts relating to maintenance of power station equipment are as follows:

(a) Maintenance of engines, turbines and pumps.

(b) Maintenance of boilers, including furnaces, stokers and setting.

(c) Maintenance of pipe system, including steam, exhaust, oil, air and gas pipes, with all fittings, valves and coverings.

(d) Repairs to auxiliaries, including economizers, condensers, cooling towers, ash and coal elevators, other elevators, etc.

(e) Maintenance of electric plant.

(f) Miscellaneous, including such items as steam gage, steam meters, water meters, feed water controllers, damper regulators, etc.

The following statement shows the ratio of the cost of each of the subdivisions. This is a good indication of the relative importance of these different accounts because it is the combined result of maintaining 14 power stations of widely varying capacities and designs.

Account 30—Maintenance of Power Plant.	Percentage of Total Maintenance.
(a) Maintenance of engines, turbines and pumps	21.0
(b) Maintenance of boilers, including furnaces, stokers, and boiler setting	20.8
(c) Maintenance of pipe system, including steam, exhaust, oil, air and gas pipes	12.4
(d) Maintenance of auxiliaries, including economizers, condensers, heaters, ash and coal machinery, cooling towers, etc.	8.1
(e) Maintenance of electric plant	21.1
(f) Maintenance of miscellaneous, including steam gages, steam meters, water meters, feed water controllers, damper regulators and similar devices	16.6
	100.0

MAINTENANCE OF SUBSTATION EQUIPMENT

The accounts relating to the maintenance of substation equipment are subdivided into "Electric Repairs" and "Miscellaneous Repairs." In the Philadelphia substations, as in many others, there is an assortment of apparatus such as cranes, air compressors, fan blowers, vacuum cleaners and other devices which do not properly fall under "Electric Plant." While smaller companies might not find it worth while to subdivide this account, larger companies do find it of sufficient relative importance to do so. Such subdivisions are particularly valuable to the operating officers.

POWER PLANT OPERATING COSTS

The Philadelphia Rapid Transit Company burns mostly anthracite buckwheat coal, the cost of which in 1908 amounted to 55 per cent of the entire cost of power, including maintenance and operation. In all steam-operated stations, the cost of fuel is the largest item. This item needs no further subdivision, except that some companies might wish to subdivide it into coal, gas (natural gas), and crude oil.

The operating item next in importance is labor. The cost of operating labor for the Philadelphia Rapid Transit Company for the year 1908 was 17 per cent of the total cost of power, so that the cost of fuel and the cost of labor were 72

PHILADELPHIA RAPID TRANSIT CO.

TIME CARD. MOTIVE POWER DEPT.

NAME OCCUPATION

PAY ROLL ENDING RATE PER DAY OF HOURS

DATE	STATION	HOURS	WORK	ACC. NO.	COST
TOTAL			DAYS	TOTAL	

SUMMARY

STRAIGHT TIME			OVERTIME		
STATION	ACC. NO.	COST	STATION	ACC. NO.	COST
TOTAL PAY DUE					

Front of Philadelphia Power Station Time Card

per cent of the total, leaving 28 per cent of the cost for all remaining operating and maintenance charges. The cost of lubricants was only .8 of one per cent of the entire cost of power. This item, Mr. Hewitt thinks, is too small a proportion of the total to be considered a primary account and should rather be a subdivision of the standard Account No. 54 entitled "Miscellaneous Power Plant Supplies and Expenses."

The item of "Electric Labor," is included with "Engine-Room Labor," as nearly all the electric labor in power stations is confined to the engine-room. In many cases, there is such a close association between the engine-room labor and the electric labor that it is difficult to draw any distinction. In some of the Philadelphia stations, there is no electric labor whatever and in still others the generator tenders and switchboard men are also oilers. A very small percentage of the electric labor is exclusively electric, and therefore it has been the company's practice to include the electric labor engaged in operating under engine-room labor. The following shows the relative cost

of these divisions in the Philadelphia Rapid Transit Company's accounts:

PERCENTAGE OF TOTAL OPERATING COST EXCLUSIVE OF MAINTENANCE

Fuel	71.8
Employees	20.0
Water	1.2
Lubricants for power houses	1.4
Misc. power house supplies and expenses	5.6
	100.0

TIME CARD

In connection with this subject, it might be of interest to reproduce the time card used by the motive power department. This card was especially devised to record the work on different jobs throughout the day and week. When used for floating gangs, the card is kept by a time-keeper who makes separate entries in the upper part of the card and afterwards summarizes the work for each station, the account numbers and cost at the bottom of the card. When the men are working at some distant point not conveniently reached by the time-keeper, the latter telephones to the local engineer in charge for the necessary information. It will be observed that the back of the card lists the motive power department accounts to guide the time-keepers and others in assigning the proper distribution charges. This card also serves to cover the time of men who do the same work day after day at a given station, but in this case it is made out by the engineer in charge or by his clerk. Formerly the names, rates and work of the men were copied in a time book and re-written on distribution sheets; this involved making eight entries a week. The time card method requires only one entry of each item and so saves time and errors of transcription. At the end of the week the card is transmitted to the auditing department for making up the pay-roll. The cards are filed by the auditing department in separate envelopes for easy reference in case of disputes.

MOTIVE POWER DEPARTMENT ACCOUNTS.

ACCOUNT No.	3	TURBINE REPAIRS
" "	4	PUMP REPAIRS
" "	5	ENGINE REPAIRS
" "	6	PIPE REPAIRS
" "	7	BOILER CLEANING
" "	8	BOILER SETTING
" "	9	BOILER REPAIRS
" "	10	ECONOMIZER AND HEATER REPAIRS
" "	11	OPERATING LABOR—ENGINE ROOM
" "	12	" " BOILER ROOM
" "	13	" " SUB STATIONS
" "	16	MISCELLANEOUS REPAIRS
" "	17	ASH AND COAL ELEVATOR REPAIRS
" "	18	CONDENSING SYSTEM REPAIRS
" "	19	ASHES
" "	20	COAL
" "	22	STEAM PLANT BETTERMENT
" "	23	ELECTRIC PLANT BETTERMENT
" "	24A	DYNAMO REPAIRS
" "	24B	OTHER ELECTRIC REPAIRS
" "	26	GENERAL MISCELLANEOUS

OTHER DEPARTMENT ACCOUNTS.

ACCOUNT No.	101.	ACCRUED MAINTENANCE OF WAY AND BLDS.
" "	102.	HEAT AND LIGHT
" "	103.	WILLOW GROVE PARK
" "	104.	TRANSPORTATION MISCEL.

Back of Philadelphia Time Card, with Account Numbers

Those who make out these cards are furnished with the following notes to insure uniformity:

"A" Overtime for which time and half time is paid must not be reported on these cards, but must be reported on overtime vouchers.

"B" Overtime will be inserted in the main office on right hand side under summary.

"C" Under summary (left hand side), insert the total charge for each account and each station as shown by daily time distribution above.

"D" All pay-rolls end at midnight of the 7th, 14th, 21st and last day of the month, except for eight-hour shifts ending at 11 p. m., in which case the pay-roll ends at 11 p. m.

"E" All time must be reported for the calendar day on which the shift ends.

"F" Men are not permitted to work each other's shift without being credited with the time worked.

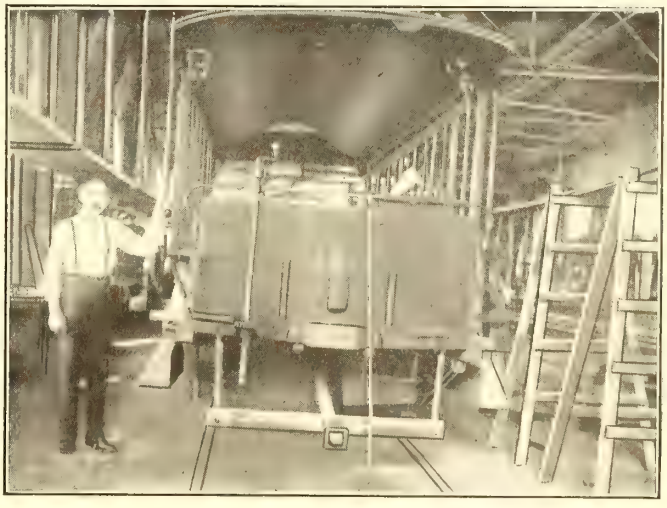
"G" No time less than one-half hour will be considered. Fifteen minutes or more must be worked to be credited with one-half hour.

STATION COMPARISON

Another interesting practice of the motive department is to prepare a monthly digest of the operating results of the separate power houses showing the number of kw-hours produced, the cost per kw-hour, coal, water and steam consumption, etc. A copy of this report is sent to every station with explanatory notes as to any extraordinary cause which affected the record of the station, such as defective water meters, variations in coal, etc. The station records are based on the output available for power, a suitable deduction being made for the power used by the auxiliaries. The same form also gives a record of the substation work. It has been found that the practice of acquainting all interested parties with these reports has produced a very desirable spirit of emulation among the engineers and operators.

PAINTER'S SCAFFOLD IN THE SHOPS OF THE MOBILE LIGHT & RAILROAD COMPANY

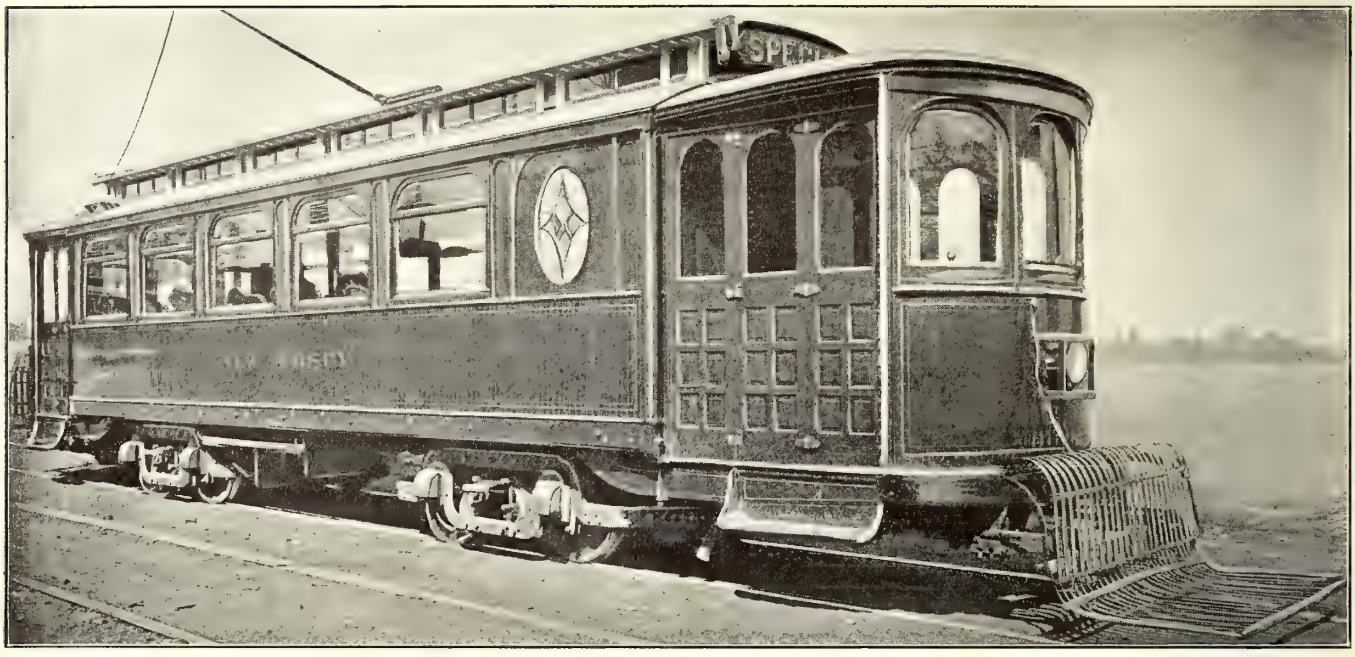
The accompanying illustration contrasts very effectively two ways of getting at the sides and roof of a car to carry on painting. The left side of the picture shows how the roof and upper part of the car can be painted from a strap-iron and board scaffold carried from the roof trusses without interfering with the free movement of anybody along the side of the car. The right side of the picture shows the blockaded condition of the aisle where the ordinary horses are in use. It is apparent that the swinging scaffold is far preferable whenever there is enough headroom to permit its installation. The view shown was taken in the shops of the Mobile Light & Railroad Company, of which S. M. Coffin is master mechanic.



Suspended Scaffold as Compared with Aisle Horses for Car Painting

MANAGER'S INSPECTION CAR OF THE PUBLIC SERVICE RAILWAY

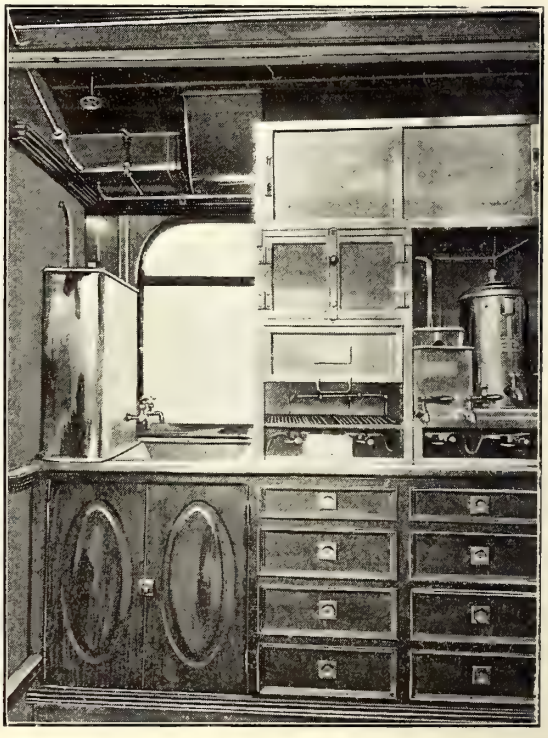
The Public Service Railway Company of New Jersey operates over 675 miles of electric railways measured as single track and of this total 550 miles are of standard gage. This vast network covers more than one-half of New Jersey and supplies transportation to some 150 municipalities with a combined population of 1,500,000 or about five-sixths of the total number of inhabitants. The traction lines are of the most diverse character ranging from complex city systems like those in Newark and Jersey City to single track light interurbans in remote, sparsely settled territory. At first glance, it would seem impossible for the general manager to keep in personal touch with the physical conditions of so large a railway property, particularly as the executive headquarters are in Newark whence only a comparatively small portion of the company's territory can be quickly reached either by steam or electric cars. To be sure, the automobile offers a quick means for getting about from one place to another, but in the desire to make speed the user is tempted to operate over the best roads and thus neglect the very routes where the track conditions may be worst. The only way to learn the state of the line and track is actually to ride over the rails.



Manager's Car—General View of Office Car Built by the Public Service Railway Company, New Jersey

for then every important defect will make itself felt with significant unpleasantness to those who are in the car. Another important point is that when a special car is used, it is practicable to carry a cooking equipment so that the car may proceed without regard to the meal times of wayside hotels. These considerations led the Public Service Railway Company to equip a novel office and inspection car which would enable the general manager and his aides to travel at will over any



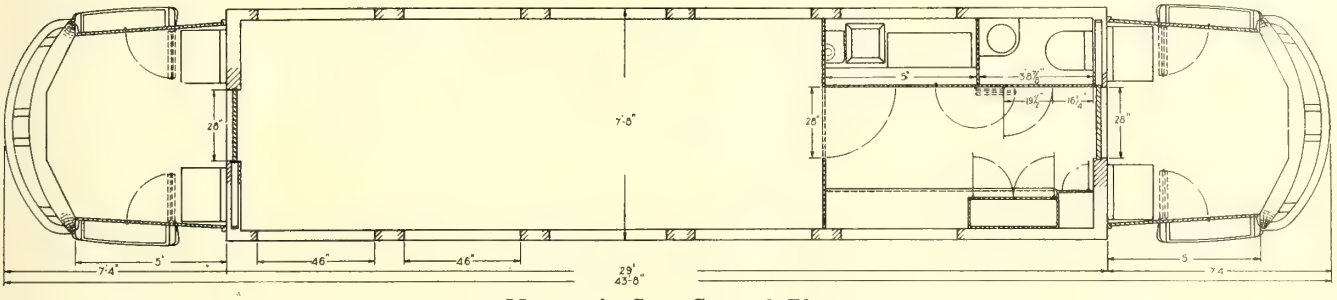


Manager's Car—Views of the Observation Compartment and the Culinary Equipment

part of the standard gage lines, take along or pick up unfinished business and answer correspondence en route. Furthermore, the general manager can arrange to have the division superintendents and engineers board the car at specified points. In this way, the subordinates save much of the time which would be lost if they traveled to headquarters. On the other hand, the general manager is also placed at an advantage because he can confer with his men while traveling over the routes under discussion.

DETAILS OF INSPECTION CAR

The general appearance and arrangement of the Public Service Railway Company's inspection car are shown in the accompanying half-tones and drawings. The car body is 7 ft. 8 in. wide over the sides, 29 ft. long over the corner posts and 43 ft. 8 in. long over the bumpers and the vestibuled platforms. It is constructed of wood throughout with the exception of a steel plate placed over the side sills. The platform knees are of steel with wood fillers. To distinguish this car from the regular rolling stock, which is painted yellow, the body color is maroon with a simple gold striping; the trucks are painted green and are also striped with gold, giving the entire coach a handsome, dignified appearance.

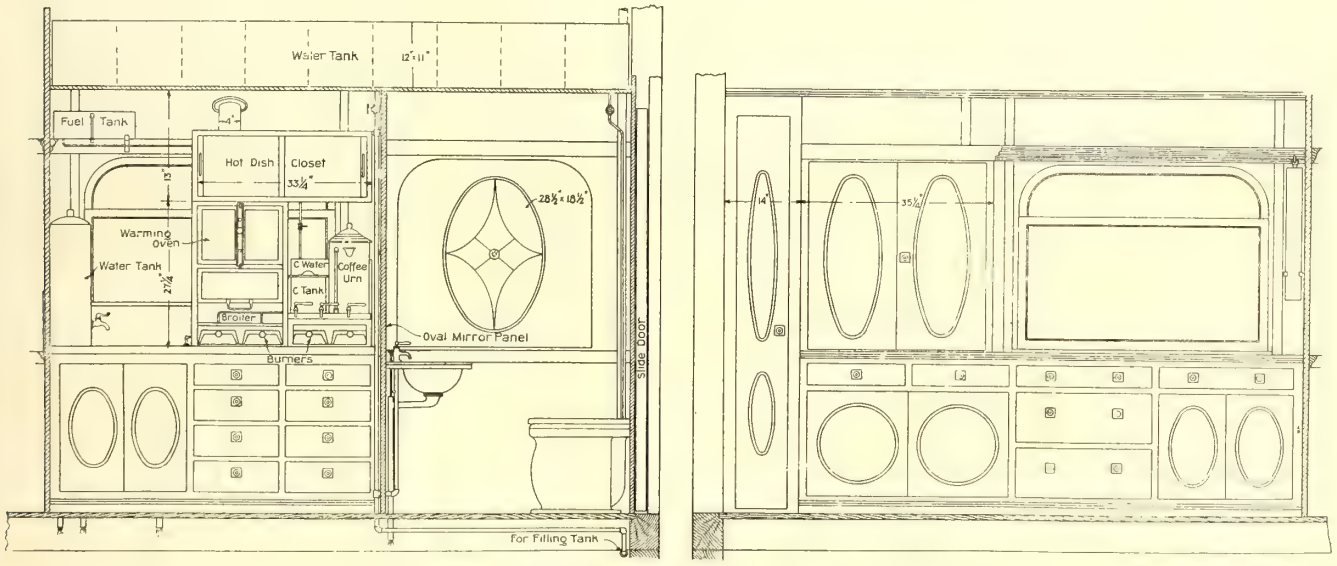


Manager's Car—General Plan

The interior of the car is divided into two compartments, about-two thirds of the body being devoted to a general office for the manager and his assistants and the remainder to the cuisine. The office compartment is furnished with "Brussels" carpet, comfortable wicker chairs and several hinged tables which are equally serviceable for writing or eating. Mirrors, clothing hooks and push-buttons are also installed in this compartment. It will be observed from the view of the interior that a roll map is carried from the monitor. This map is of linen 10 ft. 6 in. wide by 7 ft. long and shows every portion of the company's property on a scale of 2000 ft. to the inch. The windows in the office compartment are very wide and as the front doors are almost entirely of glass, it is easy to observe the road without leaving the interior. In addition, each of the platforms is also furnished with a pair of seats for direct observation of the track.

The cook's quarters are separated from the office section by a swinging door. When the kitchen is not in use, this door is hooked back to form a partition for the sink and water tank, thereby leaving a clear aisle to the rear platform. The kitchen facilities comprise a buffet range, a denatured alcohol stove, fuel and water tanks, cooking utensils, dishes, dish closets, etc. The toilet room, with wash basin and nickel plumbing, is in the same part of the car and is completely enclosed, as shown on the plan.

The car is mounted on two Standard trucks, carrying four No. 101-C Westinghouse motors. Other details of the equipment include K-6 controllers, G. E. compressors, National Air Brake Company's engineers' valves, Providence fenders and Consolidated electric heaters. The compressor is hung between the trucks opposite a box which contains the jacks and other tools required for a complete emergency outfit. The resistances are carried under the rear platform. The car is brilliantly lighted by 16-cp lamps, distributed as follows: Four five-lamp ornamental clusters in the office compartment; one five-lamp cluster in the kitchen aisle, and a three-lamp cluster on each platform. The headlight at each end is also provided with a 16-cp incandescent lamp. The car was rebuilt and equipped in the Plank Road shops of the Public Service Railway.



Manager's Car—Elevation of Cuisine and Toilet Sections

The report of delays to passenger trains in New York State during March, 1910, just issued by the Public Service Commission, Second District, shows that during that month 60,202 passenger trains were run. Of these 85 per cent were on time at division terminals. The average delay for each late train was 20.6 minutes; the average delay for each train run was 4.4 minutes.

PACIFIC CLAIM AGENTS' ASSOCIATION

The Pacific Claim Agents' Association held its annual convention in San Francisco, May 20 and 21, the sessions being held in an assembly room in the Pacific Building. This was the first convention to be held since the organization of the association a year ago at Portland, Ore., and while the attendance was not quite so large as then, the meeting was a very successful one and all in attendance agreed that it was most interesting and helpful.

PRESIDENT'S ADDRESS

The convention was called to order Friday morning, May 20, by President B. F. Boynton, claim agent of the Portland Railway, Light & Power Company, who may be considered the founder of the association. In a short welcoming address President Boynton said it gave him great pleasure to state that one of the first practical results of the formation of their body had been the breaking up of a gang of accident fakers. There had been several cases where witnesses had been located, claims settled and information obtained by the companies from one another because they were all members of one association. As time went on, all of the companies were becoming more and more aware of the importance of the claim department, realizing that through the proper organization and equipment of the latter, their dividends would be largely increased. The president announced also that E. C. Carpenter, president of the American Street & Interurban Railway Claim Agents' Association had extended to the Western body a cordial invitation to meet with the national association at the next convention in Atlantic City.

REPORT OF EXECUTIVE COMMITTEE

The report of the executive committee was presented by the secretary, the principal matter of record being an account of a meeting of the committee in Seattle, Aug. 28, 1909. Ida P. Newell, of the claim department of the Portland Railway, Light & Power Company, secretary-treasurer of the association, then made her report. The work of the association for the year past was reviewed, mention being made of some six or eight accident fakers, concerning whom information was communicated to the different members. Principal among them was a woman who operated successfully in 15 different cities, being finally discovered in Oakland, and although apprehended and acquitted by a sympathetic jury in Spokane, was finally convicted in Vancouver and is now serving an indeterminate sentence. The secretary had also circulated information concerning witnesses which had been valuable.

INVESTIGATING ACCIDENT REPORTS

A paper entitled "Investigating (a) an Accident Report (b) a Claim," was presented by J. H. Handlon, claim agent for the United Railroads of San Francisco. Mr. Handlon's paper was published on page 905 of the Electric Railway Journal of May 21 under the title of "Investigating Accident Reports and Claims."

RELATIONSHIP BETWEEN CLAIM AND TRANSPORTATION DEPARTMENTS

John Ferrin, claim adjuster for the San Francisco, Oakland & San José Consolidated Railway and the Oakland Traction Company, submitted a paper entitled "Relationship Between Claim Department and Superintendent of Transportation." Mr. Ferrin pointed out that no matter how carefully inspection is done by the operating department, matters will occur on the cars of which the superintendent of transportation is ignorant. The information which the superintendent needs to correct these errors can be found only with the head of the claim department. There should be daily conferences between the heads of the claim and transportation departments at which all the defects brought to light by the former can be explained and corrected. The value of information gathered by the claim department is apparent from the consideration that it was not received simply from employees of the company, but also from disinterested outside parties.

COMPANY PHYSICIANS

Mr. Ferrin also contributed a brief paper entitled "Should a Railway Company Have Its Own Physician?" It has been the policy of his companies not to have a staff physician, so when an accident occurs, the injured person is at liberty to select any physician desired. He has found that physicians, as a rule, are reputable and high-minded men, and has experienced no difficulty in arriving at the truth with regard to the extent of the injuries of accident victims in their care. It could not tend to good feeling between the physicians and the railroad for the former to find their patients being treated by a railroad doctor. Again, if the facts in connection with an injury became the subject of litigation, the testimony of an unbiased family physician carries much more weight than that of a medical man who is in the employ of the railroad.

RELATIONSHIP BETWEEN CLAIM AND LAW DEPARTMENTS

On Friday afternoon, the first paper presented was one by A. J. Falkner, attorney for the Seattle Electric Company, entitled "What Should be the Relationship Between the Claim and Law Departments." In Mr. Falkner's absence this paper was read by George Carson, claim agent of the same company. Mr. Falkner pointed out that the law department is the shield of the claim department. The latter should call upon the law department for advice and suggestions regarding the defense of claims in suit at the earliest possible moment. By conference with the attorney, the claim agent is enabled to view the situation from the trial standpoint. The attorney knows from experience the effect upon juries of certain lines of testimony. He also knows that the defendant in a personal injury suit is legally entitled to recovery upon preponderance of the testimony on a disputed fact, yet from a practical standpoint, he knows it must be necessary ordinarily to overwhelm the opponent in order to win the verdict. All evidence available is never too much so that every avenue for obtaining, locating and identifying competent testimony should be exhausted at the earliest possible moment. It is not expected, of course, that the trial attorney should be substituted for the claim agent or the investigators, but it is advisable for the attorney to get in touch with the claim prior to the suit and carefully to check up the work that is being done to prepare the claim for trial. It is also important and necessary that the claim agent not only should consult with the trial attorney to do the preliminary work for the trial, but he also should be in constant communication with the attorney with reference to the liability, if any, and the amount to be paid in case of settlement. In all cases involving cases of liability or where claims are rejected because of excessive demands, it is important that the claim agent should consult with the attorney whose special business it is to know whether the company is liable or not upon the facts. The attorney can weigh the recorded statements out of court and consider them from the average jury's standpoint. It is unfair to ask the trial attorney to attend a suit that should have been settled or one that could have been defeated if proper investigation had been made under his direction. It, therefore, goes without argument that from the beginning of an accident, the relation between the law and claim departments should be most intimate, continual and confidential. The determination of when the claim department should call on the law department to defend rather than settle a claim is one that ought to be left largely to the law department. There should be no promiscuous defence of suits. Primarily, those suits in which the company is right should be defended. "Thrice armed is he whose cause is just" applies at least to some extent to the defence of personal injury cases. As a rule, juries give the defendant in personal injury suits the worst of it, but it is seldom that 12 men can be got together to give a verdict for the plaintiff when the evidence shows that the defendant is clearly right. If a claim that should have been settled is contested, the trial attorney is most likely to lose. The effect of this is to discourage the law department and to weaken the claim department in the making of other just settlements. To attain victory, there must be mutual confidence—the attorney's faith in the tact and industry of the claim agent and the claim agent's faith in the ability and courage of the attorney. Both must have the common purpose of a fair settlement of just claims and defeat of excessive demands. They cannot or ought not to be separated as they are

part and parcel of a properly organized effort to protect their common employer.

TREATMENT OF "BLIND" CASES

E. H. Odell, claim agent for the Tacoma Railway & Power Company, then read a paper on how to handle blind cases. Mr. Odell wittily compared a blind suit to blind staggers in a horse in the phraseology of the veterinary. One of the good points brought out by Mr. Odell was that the claim agent should endeavor to be on as good terms as possible with the medical men and hospital attendants in his city. Mr. Odell's paper was read by T. G. Newman, attorney for the Whatcom County Railway & Light Company.

ORGANIZATION OF CLAIM DEPARTMENT

Following this, T. A. Cole, claim agent of the Los Angeles Railway Company, read a paper on the organization of a claim department. The last paper was one by H. K. Relf, claim agent of the Spokane, Portland & Seattle Railway Company and the Astoria & Columbia River Railroad Company, and was entitled "The Best Method of Obtaining Additional Witnesses." In Mr. Relf's absence this paper was read by Walter L. Heaton, of the Los Angeles-Pacific Railway Company. Mr. Relf said that much of the trouble of obtaining additional witnesses could be avoided if the employees who make the original reports realized the importance of furnishing the name and address of each person who may have any knowledge of the circumstances of the accident. Too often the employees consider their duty done in reporting the mere facts of the occurrence and the names of the employees present. Disinterested persons are the ones upon whom most dependence must be placed to prove the case to a jury, but generally the reports are made without giving the names and addresses of such persons. It then devolves upon the claim agent to find them. This is sometimes impossible because the employee in charge of the car failed to perform this important duty. It may become necessary for the investigator to make a full canvass of all the persons living or doing business in the vicinity of the point of accident. Often police officers and other municipal employees can be of great assistance in helping to obtain additional witnesses. The claim agent should cultivate a large circle of acquaintances as he can never know when one of his friends may be able to help him with the name of a valuable accident witness. The minds of the jurors will be favorably influenced toward the defendant if, in a dispute between its employees and witnesses for the plaintiff, a reliable person can be produced to corroborate the statement of the employees. Too often the inexperienced claim agent is set on developing his side of the case and pays little or no attention to what the claimant may be able to show. This often proves to be a grave error. It should be avoided by mentioning and refuting all that the claimant could bring forward to make his case.

DISCUSSION ON PREVENTION OF ACCIDENTS

A lively discussion was held on all the papers, and in addition to the subjects mentioned other topics were brought up for discussion, among them being safety rules and appliances and other means for the prevention of accidents, physical examination of out-of-town claimants, etc. A membership committee was appointed to solicit new members as follows: Messrs. Bishop, Handlon, Newman and Beck. To select subjects for the next annual convention the following committee was chosen: Messrs. Ferrin, Heaton, Carson and Ross. It was decided to exchange printed forms between members for their mutual benefit.

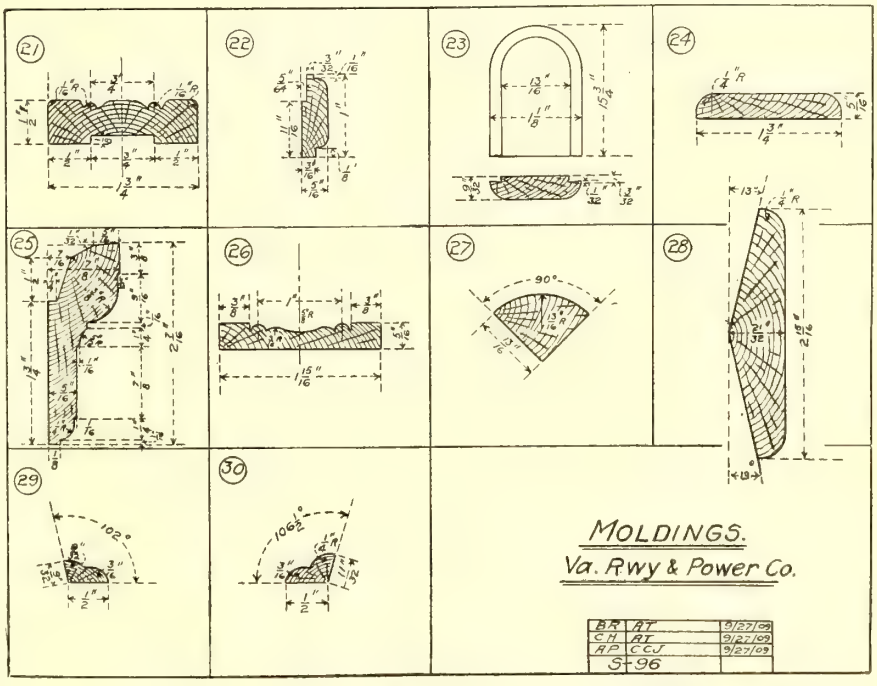
ELECTION OF OFFICERS

The election of officers for the ensuing year resulted as follows, most of the officials being re-elected: President, B. F. Boynton, Portland Railway, Light & Power Company; first vice-president, A. M. Lee, district claim agent, Northern Pacific Railway Company, Seattle; second vice-president, John Ferrin, Oakland Traction Company; third vice-president, Thomas A. Cole, Los Angeles Railway Company; secretary-treasurer, Ida P. Newell, Portland Railway, Light & Power Company; executive committee, president and Samuel Bishop, Pacific Electric Railway Company, Los Angeles; J. H. Handlon, United Railways of San Francisco; T. G. Newman, Whatcom County Railway & Light Company; A. E. Beck, British Columbia Electric Railway, Ltd., Vancouver, B. C.; George Carson, Seattle Electric Company, Seattle, Wash.; H. L. Bleeker, secretary, Washington Water-Power Company, Spokane, Wash. After deciding to hold the next convention in Seattle in May, 1911, the convention adjourned.

President Boynton expressed the sentiments of the delegates in stating that the convention had been a very helpful one and that there was a real need on the Pacific Coast for the association. The members are all loyal to the national association, but perhaps only one or two can attend its convention, and the local coast association supplies the need for mutual exchange of ideas and acquaintanceship which results in direct benefit to the work of all the members.

STANDARD SIZES IN SHOP DRAWINGS USED IN RICHMOND, VA.

Standardization in drawings may not be as profitable as in apparatus, but it is both economical and convenient to confine practically all shop prints to two sizes, one for details and the other for assembling. This is done by the Virginia Railway & Power Company, which uses sheets 9 in. x 14 in. and 14 in. x 22 in. in size. The extent to which this company records its standards for the education of the employees may be judged from the fact that even car-molding drawings are made and indicated by style numbers. This practice not only helps the mill-room, but eliminates all confusion in the ordering of supplies, because the storekeeper is not left in doubt as to what is wanted.



Standard Richmond Shop Print for Car Moldings

Twin City Rapid Transit Company, Minneapolis, Minn., has just completed a portable concrete-mixing plant. This outfit includes a Chicago concrete mixer with independent electric drive mounted on a flat car.

MEETING OF THE COMMITTEE ON STANDARDS

The committee on standards of the Engineering Association held a meeting at the offices of the American Street & Interurban Railway Association in New York on June 3, at which the several subjects referred to this committee at the Denver convention were considered. Those in attendance were: H. H. Adams, Metropolitan Street Railway, New York; John W. Corning, Boston Elevated Railway; John Lindall, Boston Elevated Railway; G. W. Palmer, Jr., Boston & Northern Street Railway, Boston, Mass.; W. S. Murray, New York, New Haven & Hartford Railroad, New Haven, Conn.; J. H. Hanna, Capital Traction Company, Washington, D. C.; James Heywood, Philadelphia Rapid Transit Company, and W. S. Twining, Philadelphia Rapid Transit Company.

The recommendation of the committee on power distribution that the association adopt as standard for No. 0000 grooved trolley wire the section shown on page 355 of the 1909 *Proceedings* was the first subject considered. Mr. Heywood explained that the section shown was standard with manufacturers of trolley wire and was in general use. Mr. Murray said his company had been using this section and had found it entirely satisfactory. He did not believe it could be improved upon. On motion it was decided that it was the sense of the committee on standards that this section should be recommended to the association for adoption as standard with the suggestion that the committee on power distribution consider the question of standard sections for other sizes of grooved trolley wire, with special reference to preserving one contour for the groove in all sections so as to permit the use of only one pattern of clip or hanger. The recommendation that the table of copper-wire dimensions and properties included as Appendix H of the report of last year's committee on power distribution was then considered. Mr. Corning volunteered to check the figures in the table, and with this understanding the committee on standards voted to recommend to the association the adoption as standard of this table, and the adoption as recommended practice of the method outlined by the committee on power distribution for ordering large cables by the number of standard wires of a given diameter which should be used in making up the cable. It was voted to recommend that the committee on power distribution be instructed by the executive committee to consider next year the compilation of a table of stranding for large cables and also to define a cable and a strand.

The rail sections recommended by the committee on way matters last year for adoption as standard were next taken up. The T-rail section for shallow pavement and open track, weighing not less than 80 lb. per yard, was approved and recommended to the association for adoption as recommended practice. The light and heavy high T-rail sections were approved and recommended to the association for adoption as recommended practice. There was some discussion as to the possibility of using these sections in paved streets with wide-tread wheels owing to the liability of breaking up the pavement on the outside of the rails if it projected slightly above the head of the rail. For this reason the committee on standards voted to recommend that the committee on way matters be instructed to consider the design of a wide-head high T-rail for use in paved streets over which interurban cars with wide-tread wheels could be run. The sections of girder rail which were first presented in 1907 and were recommended by the committee on way matters last year for adoption as standard were approved with the recommendation that they be adopted by the association as recommended practice.

The specifications for wrought-iron bars, including sizes and limit gages, presented last year by the committee on standards, were referred back to the committee on equipment with the recommendation that they be considered in connection with the specifications for Grade A wrought iron adopted Aug. 12, 1901, by the American Society for Testing Materials.

The sizes of rolled steel wheels recommended for adoption as standard by the committee on equipment in 1909 were discussed in connection with a request from one of the manufacturers that the committee on standards consider the advisability of changing some dimensions of the proposed standard wheels. The changes advocated consisted principally in reducing the thickness of rim in some of the smaller sizes from 3 in. to 2½ in. Mr. Twining pointed out that it was questionable whether it was economical to buy wheels with thick rims capable of giving a large mileage, but weighing 30 lb. or 40 lb. more than wheels with thinner rims. It cost from 4 cents to 7 cents per pound per year to carry this extra weight around and few companies could allow a variation in diameter of wheels of more than 3 in. owing to height of steps and motor clearances. On motion, the subject, together with the manufacturer's request, was referred back to the executive committee with the request that the members of that committee take a letter ballot on the advisability of referring the entire subject immediately to the committee on equipment with instructions to report at the coming meeting of the association in October.

The specifications for steel axles presented last year by the committee on standards were discussed, and a motion carried that it was the sense of the committee on standards that these specifications should be adopted by the association as recommended practice for specifications covering untreated steel axles. Specifications for heat-treated axles are now in the hands of the committee on heavy electric traction for consideration.

MEETING OF THE COMMITTEE ON EQUIPMENT

A meeting of the committee on equipment of the American Street & Interurban Railway Engineering Association was held at the New York office of the association on June 2. The committee members present were: John Lindall, chairman, superintendent of rolling stock and shops, Boston Elevated Railway Company, Boston, Mass.; H. A. Benedict, chief and electrical engineer, United Traction Company, Albany, N. Y.; M. V. Ayres, electrical engineer, Boston & Worcester Street Railway Company, South Framingham, Mass.; A. T. Clark, superintendent of shops, United Railways & Electric Company, Baltimore, Md. There were also present John W. Corning, electrical engineer, Boston Elevated Railway, and secretary of the Engineering Association; J. L. Davis, of the Westinghouse Electric & Manufacturing Company, and N. W. Storer, of the Westinghouse Electric & Manufacturing Company. Chairman Lindall announced that at the last meeting Terrance Scullin, master mechanic of the Cleveland Railway Company, had been assigned to report on standard gage for mounting wheels and also gage for limiting wear of flanges; R. C. Taylor, superintendent of motive power, Indiana Union Traction Company, on gears and pinions, their material treatment, limits of wear and gear ratio; Mr. Benedict on rolled steel wheels of light design as compared with heavy wheels giving longer life; Mr. Clark on two-motor versus four-motor equipments. No reports were received from Messrs. Scullin and Taylor, nor were they present at the meeting.

TWO-MOTOR VERSUS FOUR-MOTOR EQUIPMENTS

Mr. Clark said that he was not ready to submit a report on two-motor versus four-motor equipments because he had not yet succeeded in collecting all the necessary data. What he had gathered so far tended to show that, while the choice of a certain kind of equipment often depended on the local conditions, yet there was evidence that some companies were using one or the other kind of equipment simply because they were following precedents.

Mr. Lindall said that in his experience it was much better to use two-motor equipments if one could get the necessary horsepower with them. There was less equipment to handle, the control was simpler and there were fewer defects to look after. Some engineers had taken the ground that with four-motor equipments there was less likelihood of a car being completely disabled on the street. Nevertheless for the past two years he

had had in service 100 cars with four-motor equipments and 91 cars with two-motor equipments and he did not hesitate to say that the latter were giving much better satisfaction although operating under practically the same conditions. Mr. Clark said that the controlling factor in Baltimore was the number of heavy grades. This necessitated the use of four-motor equipments.

Mr. Benedict stated that while many of the two-motor equipments used by his company were operating on grades exceeding 10 per cent, he had four-motor cars between Troy and Albany which operated on the comparatively slight grade of 4 per cent. Yet the operating department had refused to let the cars of the Hudson Valley system come into Albany because they had only two motors, it having been found that these large cars were liable to hold up the local cars when the rail was slippery. On the Hudson Valley system, which is practically all interurban, it is absolutely necessary to use four motors because speeds up to a mile a minute are required at times.

Mr. Lindall said that his company had been using two-motor equipments on 12-ton to 14-ton cars. There was considerable trouble from lack of adhesion in damp and frosty weather, but when two-motor equipments were used on cars weighing 20 tons and equipped with steel-tired wheels a great improvement in adhesion was secured. According to the operating department, the steel-tired wheels did not give the snowstorm trouble which there used to be with chilled-iron wheels.

Mr. Ayres said that his company was using four-motor equipments exclusively. If his company had no more than a 3 per cent grade he would be glad to try some two-motor equipments even at the present speeds, but the motor units would have to be larger than the present 75-hp size. The service comprises a great deal of city running in Boston and Worcester and only a comparatively short stretch of interurban running between those cities. The present speeds are 35 m.p.h. to 38 m.p.h. on level track at 500 volts. A speed of 40 m.p.h. has been attained with a higher voltage and on down grades the cars are sometimes operated at over 60 m.p.h. Mr. Benedict thought it a rather abnormal condition to have 200 hp on one truck, as this would give a poorly divided tractive effort. Mr. Ayres said that he would not necessarily place both motors on one truck. He had 8 per cent to 9 per cent grades and the question of traction, particularly in bad weather, was a serious one.

On an inquiry from Mr. Benedict about the Pittsburgh driving-rod scheme, Mr. Davis said that owing to the fact that some of the large motors are hung outside of the trucks, there is a tendency for the idle wheels to lift up every time the motorman applies power. The Pittsburgh Railways Company has a 62½-in. gage and for some reason it does not use a larger wheelbase than 67½ in. As the motors are very large on some of the equipments they must be hung outside.

Mr. Clark thought that Chicago represented an instance where two-motor equipments might be used, although four-motor equipments were now being employed throughout. Mr. Davis in replying said that a single two-motor equipment had been sent to Chicago, but had been taken off before it had been given an extensive trial. New York and Detroit were now using two 60-hp motor equipments with maximum gear reductions despite the fact that with these equipments there was some slipping on the rails at starting, although the trucks have steel wheels. Mr. Davis thought that the poor rail conditions in Chicago had determined the selection of four-motor equipments. Mr. Clark said that on the Baltimore cars equipped with four GE-90 motors, K-28 F controllers and standard contactors it was found that the current broke in the controller if the handle was moved too quickly.

Mr. Benedict thought that the type M equipment was too complicated for his service since there had been brought out such controllers as the K-35, which has individual blow-out coils. His cars were equipped for train operation, although they are not running in this way. The company was operating K-10 controllers with contactors for two-motor equipments and the operating department was so satisfied that it would not allow a car on the road without the contactors. Mr. Davis said that the new electro-pneumatic line switches brought out by his company could be made to go out so fast that they would even protect a fuse.

ONE-WEAR STEEL WHEELS

Mr. Benedict was then called upon to report on the subject of steel wheels. He said that he was not prepared to give a complete report at this time. It was his first impression that all he would have to do would be to write to the manufacturers of steel wheels and then assemble the data secured from them for transmission to the chairman of the committee. He had also hoped to secure a number of light-rim steel wheels with which to equip a motor car for comparative power consumption and wheel wear experiments to demonstrate in a practical way whether there would be any saving in city service by using a light-rim steel wheel as against a heavy-rim steel wheel. The difference in power saving would not be merely that saved by the reduction of 100 lb. dead weight per wheel, as it should be remembered that this dead weight was carried on a 17-in. radius under acceleration and retardation. He had taken up the question of securing a light-rim wheel with different wheel companies and found only one which seemed willing to make such a wheel. This company, however, had the misfortunte to lose some machinery and so the delivery of the wheels would be delayed for some three or four months. Consequently, Mr. Benedict would not be able to carry out his experiments in time for a report at the 1910 convention. It was rather strange that the other manufacturers should have said that they had no means of making a light-rim wheel, when at the last electric railway convention one of their own representatives had stated the possibility of doing so.

Following this there was a general discussion on the life of wheels. Mr. Benedict said that he had tried cast-steel wheels. They were very unreliable as regards life, one running 150,000 miles and another on the same car only 30,000 miles; one wheel would wear perfectly and another would develop soft spots. The wear on his lines was entirely on the flange—where the flange was soft it would run sharp inside of 35,000 miles. Mr. Lindall said that most of his wheel wear also was on the flanges. Mr. Benedict continued that he had not yet had a steel wheel flattened from skidding in ordinary braking operation. To be sure, the wheels would be covered with many small flats, but they would roll out in service. Up to two years ago he used steel-tired wheels almost exclusively. He found that if the wheels were let alone they might run up to 125,000 miles before the first turning, but they would not reach 50,000 miles before the second turning was needed. He hoped that the light-rim, one-wear wheel would displace the heavy-rim wheel. Under his conditions it would pay to use a one-wear wheel if it could be purchased at $15 or less for a life of, say, 100,000 miles. He thought that the rim need not be more than 1 in. thick, as he had found that he did not get more than ½-in. tread wear in 100,000 miles. Mr. Davis said that one manufacturer had sold rolled gears with thin rims. He did not see, therefore, why thin rims could not be made on car wheels.

Referring to steel-tired wheels, Mr. Benedict said that he was scrapping the centers as fast as the tires wore out. He also hoped to eliminate all his chilled-iron wheels because of the trouble they gave from flats. The expense for steel wheels was about the same as the chilled wheels because the latter averaged only about 22,000 miles on 10-ton to 20-ton cars, mainly on account of flats and consequent grinding. At one time he had a contract with a manufacturer who furnished wheels on a 40,000-mile guarantee, the understanding being that if the wheels ran less than 25,000 miles they would be replaced without charge and if they ran between 25,000 miles and 40,000 miles the railway would pay half price. This contract, however, excluded the shortening of life due to flat spots and consequently the manufacturer did not come off badly in the bargain.

Mr. Lindall said that he was running chilled-steel wheels on 14-ton cars. The 30-in. wheels were guaranteed for 36,500 miles and the 33-in. wheels for 40,000 miles. He did not see how a steel-tired wheel could be economical in comparison

with these results. Mr. Clark said that the cast-iron wheel was most advantageous for him, except on one line. Mr. Benedict mentioning the one-wear wheel again, said that it would be of particular benefit to the small roads which were not equipped for turning wheels.

Mr. Davis brought up the question if improper brake-shoe and brake-rigging design did not affect the flange wear. Mr. Clark thought that a good deal of trouble arose from this condition, but that it could be remedied by maintaining a proper brake adjustment.

Mr. Lindall referring to his experience with chilled wheels said that his company had contracts with two makers. He had had no trouble except that there was a tendency of the wheels of one make to chip even when practically new. Mr. Clark said that a good deal of chipping occurred when the sharp flanges struck switch points.

In concluding the discussion on wheels, Chairman Lindall instructed Mr. Benedict to go ahead and secure all possible data for presentation by the committee at the next convention. Even if no practical conclusions could be given at that time there would be at least the benefit of securing the interest of the railway companies at large and of the wheel manufacturers in this important matter. By the 1911 convention it might then be possible to show some solid results.

CAR WEIGHTS

Mr. Lindall then announced that the subject of car weights had been taken up jointly by Mr. Ayres and himself. Mr. Ayres was to treat the car bodies, while he was to consider trucks and equipments. In pursuance with this arrangement he had written to the principal truck manufacturers on the subject of possible reduction in truck weights, considering the cost of ton weight per car to be $100 a year. He also asked the manufacturers to express their preference for the proper weight of trucks, center-plate loading, for city, suburban and interurban service. In reply to this letter one manufacturer sent considerable car body data, which was turned over to Mr. Ayres.

There was a general discussion among those present on the possibilities for lightening trucks. Mr. Clark thought that it I-beam and channel sections were used more freely greater strength could be obtained for less weight than with the rectangular sections. Mr. Davis mentioned that pressed-steel bolsters were used on the latest Pennsylvania Railroad cars and Mr. Lindall was of the opinion that bolsters could be constructed of malleable iron instead of cast iron. Mr. Davis asked if a spring-supported motor with quill drive such as used on the New Haven electric locomotive would not lighten trucks owing to the reduction of shocks, but Mr. Clark thought that this scheme was more suitable for interurban than for city trucks.

Mr. Lindall said that he had also written to the three large manufacturers of electric railway equipments on the subject of possible decrease in the weight of motors and accessories. Data was submitted by one company.

Mr. Davis said he had never made any figures along similar lines, but there were two possibilities of decreasing the weight of motors. One proposition was that of raising the speed of the ordinary city motor from 500 r.p.m. to 650 r.p.m.

Standard equipments made for the high speed had proven too fast, as they could not be geared down enough. By using a 3½ instead of a 3-pitch pinion, employing high-grade material, the gear reduction could be increased and the motor speed raised. In this way a 500-r.p.m., 40-hp motor could be increased to 50 hp capacity in the same frame and even to 60 hp if operated at 750 r.p.m. It was largely a question of finding the limit of armature speed. It was a fact that the interpole winding helped out greatly on high voltage in keeping the commutator in good condition as long as the brushes stayed on the commutator, but as soon as the brushes lifted, flashing was bound to occur. Slotting the commutator did not help out so much on high peripheral armature speeds and it was better if one could get along without it, because undercutting at high speeds set up irregularities which caused brush vibration. So far as forced ventilation was concerned, it would be better to run simply without the covers in the case of motors like 40 hp. Mr. Davis mentioned some motors which had been built for the Pacific Electric Railway. This design was built with fireproof wire, asbestos-taped field coils, impregnated armatures, etc. In the factory tests it was run at 125 deg. Cent. for one and a half months. The weak point was the difficulty of winding fireproof wire without short-circuits. There is no reason why the motor could not run at 100 deg. Cent. right along. He did not know whether such a motor would be a good thing universally, but the result in this instance had been to get 60 hp from a 40-hp frame without using interpoles. Mr. Davis added that the first interpole motors were about 3 per cent heavier than the ordinary types, but now they are designed for about the same weights per horse-power. Referring to the general question of weight reduction, he said that one could take a 40-hp motor weighing 2850 lb. and scale it down to 2450 lb. or 2500 lb. by lightening the gear case and trimming the motor generally. To do this it would be necessary to have extremely light and specially treated gears, high-grade pinions and sheet-steel gear cases. All this could be done without increasing the armature speed. Such a motor would not cost much more. There would be some extra expense for the gearing, but then the result would be to double the strength of the gear and increase the life at least 33 1/3 per cent. High-grade pinions were now being used on small equipments. So far as the manufacturer was concerned it was simply a question of making something which would be universally acceptable. It was easy enough to cut down the weight in special cases. By using special material it would be possible to increase the output from the same size framing by 20 per cent by using a higher speed.

The other possibility of reducing the weight of motors was that of using field control. This would reduce the weight of resistance and the power consumption especially. The idea was in one sense a return to the theory of operation of the old W.P.-50 and GE-800 motors, but, of course, much more was known now about commutation and general design.

Mr. Ayres then submitted as an introduction to his report on car body weights an interesting essay describing the relations, positions and uses of the principal framing and supporting members of car bodies. He also submitted the drawings of a semi-steel car which, according to the manufacturer, would weigh only about 700 lb. per passenger for a car seating 50 passengers.

There was a discussion on the proper basis of comparing car weights, Mr. Storer suggesting that floor areas might be used as a logical basis. Mr. Ayres also read a copy of a letter which he had sent out to different car builders asking them to comment upon 13 principles of car construction as set down by him. As the letter had been sent out very recently he had no replies for this meeting, but hoped to have all of the answers in time for the next meeting of the committee.

WEAR OF STEEL TROLLEY WIRE WITH SLIDING PANTOGRAPH TROLLEY

W. S. Murray, electrical engineer, New York, New Haven & Hartford Railroad, recently made an examination of some No. 0000 grooved steel trolley wire which has been in service over the main locomotive terminal lead track in the Stamford yard for 20 months. The wire showed a reduction in thickness of the lower lobe of 14 per cent, or approximately one-seventh of the allowable wear. A total of 85,000 locomotive movements had been made under this wire, or four times the number of movements made under main track wires in the same period. At this rate of wear a steel trolley wire over main track with the present density of traffic should last 44 years. The sample of wire examined was coated with a thin layer of grease from the pantograph collector pans and soot from the steam locomotive exhaust. When this coating was removed by wiping with waste the surface of the wire was found to be bright and smooth, with no signs of corrosion.

COMMUNICATION

WORKERS' COMPENSATION ACTS

THE BRISBANE TRAMWAYS COMPANY, LIMITED

BRISBANE, AUSTRALIA, May 10, 1910.

To the Editors:

I notice there is an agitation by many of the American papers, especially religious papers and those like the New York *Independent,* for the enactment of workers' compensation acts, both by the Federal Government and by the different States, but in none of the industrial papers do I see anything in opposition. The English act is quoted, and all manner of wild statements made in regard to its operation. Here is an example:

"The law has proved simple and inexpensive in operation. It has given the workman just compensation. It has not cost the employers so much as liability insurance, that does not compensate the workers, now costs American employers."

I will not deny that in theory a workers' compensation act appears a good thing, although I do not think its abstract justice has been proved; but, like many other theories, the test of practical experience has shown that there are very many defects in the present acts. I, myself, have had experience of an act similar to the English act for several years, and owing to political and commercial connection with Great Britain, we here probably know a great deal better how the act operates in Great Britain than most of the people in the United States who write so glibly about it. Perhaps no class of employers in the United States would be more interested in such an act than the street railway people, and all the troubles and tribulations they have experienced in the past from "ambulance chasers" and pettifogging lawyers will be merely the beginning of woes if they get a workers' compensation act. If the American Street & Interurban Railway Association is alive to the interests of its members it will take the matter in hand promptly and have a committee investigate the matter, and if such an act should be inevitable they should endeavor to get an improvement on the English act in the light of experience.

If anyone wishes to get a good idea of the operations of this act from a source which is as nearly free from bias as any can be, I suggest that he get Vol. 6 of "The Transactions of the Medico-Legal Society" for the year 1908-9. This is published by Frederick J. Lamb, 19 Webb Road and 99 Northcote Road, Clapham Junction, S. W., London, England. This society is made up of leading medical and legal men of Great Britain, and its object is the promotion of medical and legal knowledge in all its aspects. The volume above referred to contains two papers which I think will be eye-openers to the advocates of a workers' compensation act. I give a few short extracts:

A writer in the *Law Times* says: "It (the workmen's compensation act) is playing havoc with the morals of the community. There is not a week passes but all through the country there are many cases of gross malingering. Hundreds of thousands of pounds must have been filched from the industrious, the hard-working and the honest by the malingering blackguard in the last few years. Has it come to this in the United Kingdom of Great Britain and Ireland that it no longer pays to be industrious and frugal and saving?"

The writer of one of the papers has the following by way of introduction:

"The workmen's compensation acts were framed with the intention of providing means for genuine workers who were disabled in the course of their employment—and few, of any shade of political opinion, will deny that it is fair that the employer should have to take his share in supporting a man who has been injured while working in his service. But, unhappily, in practice the scheme has led to much hardship to employers, and has exposed them to the plots and plans which lazy and dishonest men are ever ready to form in order to extract money. Such men are aided and abetted by the least reputable members of the legal profession. I know as a fact that it is the custom of some of the latter gentry to ascertain day by day from the receiving-room porters at the hospitals the names and addresses of casualties treated there, and to offer the injured men to take charge of their cases. They then proceed to place every difficulty in the way of an amicable settlement in order to increase their own costs; and finally, when the case is settled, the unfortunate workmen find that only a proportion of the money awarded comes into their own pockets, while in the event of the claim not being sustainable, and of the employer gaining the case in the county court, no costs are ever forthcoming from the unsuccessful side. For this reason employers—or rather insurance companies, for these risks are usually covered by insurance—are very loth to contest a case, and prefer to come to terms, even though the case is recognized to be untenable. Workmen and their advisers are quite aware of this, and they use the fact to extort money on every possible occasion. Workmen have now only to meet with some trivial injury to make up their minds not to return to work without making a good sound profit from the mishap. Most of them still belong to friendly societies and clubs, and so long as they can deceive the club-doctor (who is usually too overworked to give their cases careful consideration) and can persuade him to go on signing their club papers they are getting half-pay from their employers and a substantial allowance in sick pay from the club, and are often receiving more money than if they were at work. I have not rarely met with men who have frankly (though perhaps incautiously) admitted this to me while I have been examining them. Any medical man who sees much of these cases must frequently come across instances of this."

To anyone who wishes to pursue the matter carefully from week to week I recommend the reading of *The Post Magazine and Insurance Monitor,* published by Thos. J. W. Buckley, 9 St. Andrews Street, Holborn Circus, London, E. C., England. There are also many works published upon the subject. One valuable one, although not recent in date, is "Bowstead on Workmen's Compensation," published by Sweet & Maxwell, Ltd., 3 Chancery Lane, London, W. C.

It has been said by those who are in a position to speak from personal knowledge that no piece of legislation in England of late years has been the cause of so much litigation as the workers' compensation act, and from my own personal experience, I regard it as one of the most pernicious pieces of legislation that has been enacted in an English-speaking country in later years. Much more might be said upon the subject, but I fear I have wearied you already. However, if what I have said will be the means of the employers of the United States giving the matter the attention it deserves, it will not have been amiss.

J. S. BADGER.

PENNSYLVANIA RAILROAD JOINS AMERICAN STREET & INTERURBAN RAILWAY ASSOCIATION

Secretary Donecker of the American Street & Interurban Railway Association states that last week the Pennsylvania Railroad joined the American Street & Interurban Railway Association. This company owns the West Jersey & Seashore Railroad between Philadelphia and Atlantic City, which is equipped with electricity, and is also equipping its New York terminal from Harrison to New York.

This is the first of the large trunk lines to join the association, although the New York, New Haven & Hartford Railroad is indirectly represented in the association through its extensive trolley interests in Massachusetts and Connecticut, and the New York Central & Hudson River Railroad and the Delaware & Hudson Railroad through their ownership of trolley lines in central New York. The American Street & Interurban Railway Association is actively taking up the subject of electric equipment for heavy traction service, a fact which is instanced by the recent appointment of a committee on heavy electric traction by the Engineering Association.

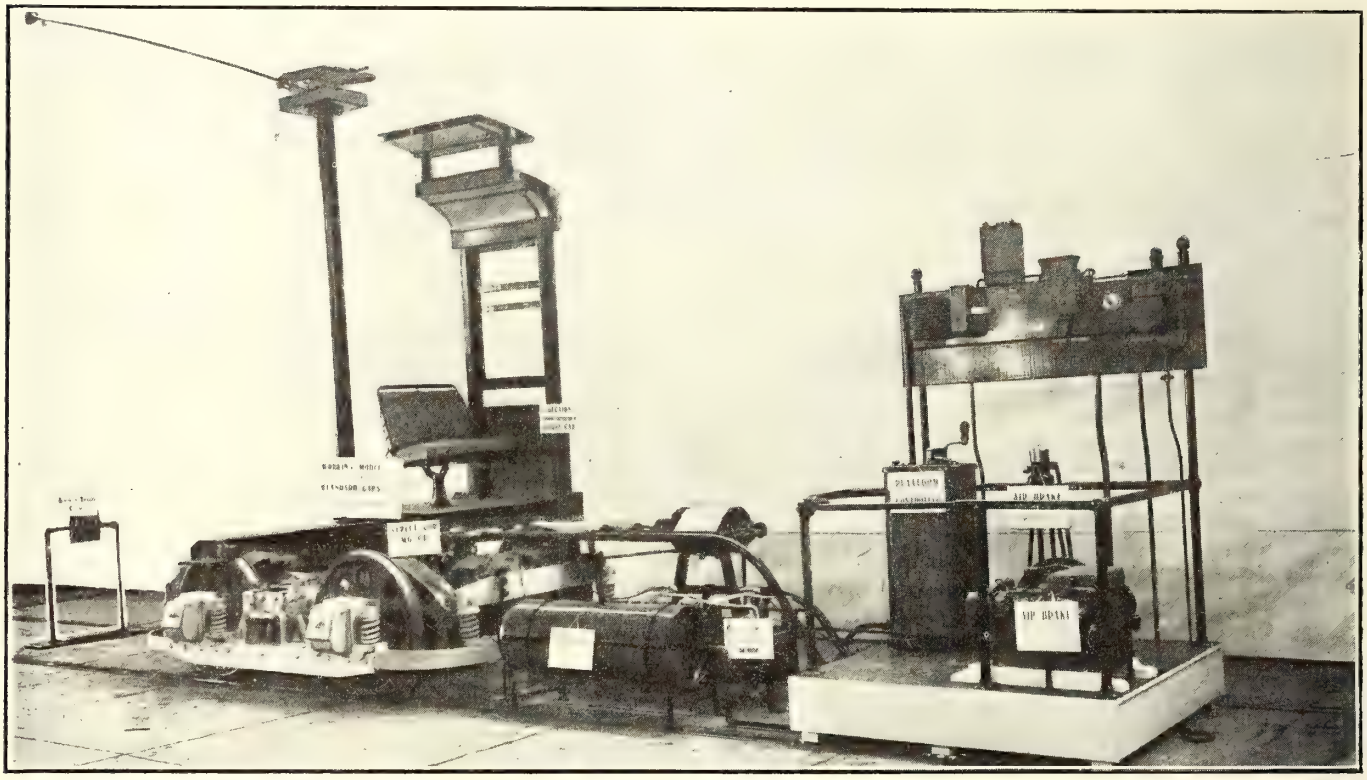
The Cie Generale Française de Tramways proposes to construct new lines at Nancy.

EXHIBIT OF UNITED RAILWAYS COMPANY OF ST. LOUIS AT LOCAL ELECTRIC SHOW

The United Railways Company of St. Louis made an exhibit at the Electric Show held at the Coliseum from May 28 to June 2 which attracted favorable attention. The exhibit consisted of an historical portion showing the evolution of street railway practice from the primitive methods first employed, and also of several moving exhibits. As shown in the accompanying half-tone view, there was exhibited a motor truck together with a cross section of a car with all the electric appliances and air brake appliances used in operation. The truck was jacked up so that the wheels could turn. The gears were covered with transparent gear cases, the motor caps were opened, signs were placed on all the apparatus and an attendant operated the motors and air brakes while explaining their uses to the spectators. A large crowd was constantly around this exhibit and its interest was shown by the many questions which were asked.

Another attractive exhibit consisted of an electrically-operated track switch. A complete switch was shown and the movement of the switch was effected by means of a controller and a sliding trolley base which passed over an ordinary trolley contact. The other exhibits consisted of a set of hose jumpers for use at fires, which were shown ready for operation; a gasoline automobile emergency wagon, one of eight just completed in the shops of the United Railways Company; a standard car just completed in the shops, seating 48 people, shown side by side with a bobtail car seating 12 passengers operated in St. Louis 25 years ago. This exhibit illustrated, more than anything else, the great advance which has been made in electric railway practice during the past 25 years.

The historical exhibit included two grips formerly in use upon the St. Louis cable roads, and a series of full-sized track sections, 4 ft. long, showing the progress which has been made in track construction. The first section was laid with 33-lb. flat rail on wooden stringers and ballasted with crushed rock; the second section was laid with "Butterfly" rail, 45 lb. per yard, and ballasted with crushed rock; the third section illustrated the present standard track construction of the United Railways Company and showed the track consisting of 112-lb. 9-in. Trilby rail laid on wooden ties, 2 ft. centers, the ties resting on concrete 6 in. deep, with the concrete extending around and above the ties high enough to carry the paving of 3½-in. creosoted wooden blocks. A statement of the amount of this kind of track which has been laid in this city during the past four years, together with the estimated cost of about $30,000 per mile, accompanied this section. This track exhibit attracted a great deal of attention, and illustrated very thoroughly the great improvement which has been made in track construction, and also the tremendous increase in the cost of this construction since horse car times. The fourth section showed a full sized section of 95-lb. 7-in. T-rail laid with paving. The use of this T-rail is not at present allowed in St. Louis, but it was hoped that an exhibition of this sort would show that there were no undesirable features connected with the use of T-rail in paved streets. In connection with the track exhibit a number of rail sections, beginning with the old flat horse car rail and ending with the present 9-in. Trilby rail, were exhibited to show the evolution of the street car rail.



Equipment Exhibit of the United Railways of St. Louis at Electrical Show, Illustrating the Several Parts of a Car and Its Motive Apparatus

Twenty enlarged photographs showing the evolution of the street car from the original horse car of 1832 up to the present standard were shown. There were also exhibited enlarged photographs of typical buildings and appliances used in the street railway business.

There were distributed to all spectators cards which were intended to show the extent of the business and to impress upon the public some facts which are difficult to get into the public press. In order to get the visitors to preserve these cards a coupon was attached good for a street railway guide of St. Louis, which the company is having printed. About 20,000 of these cards were distributed. The data on these cards stated that during the year 1909 the United Railways Company of St. Louis transported 326,045,616 passengers, an average of about 900,000 passengers per day. The entire population of this city was transported 465 times, and the entire population of the United States was transported four times. Of this total, 99,311,000 passengers were carried on transfers, which meant transporting the entire population of St. Louis 142 times during the year free of charge.

To do this work there were required 1200 cars, 2800 trainmen and 3000 other employees. There were maintained 453 miles of track and 90 bridges which required during the year: 92,000 cu. yd. of rock; 67,000 cu. yd. of sand; 110,000 barrels of cement. There were used 100 buildings, in which were utilized 60,000 hp of power plants, which consumed 460,000 tons of coal, an average of 1260 tons or 30 carloads of coal per day. There were printed 191,930,000 transfers, which required 130 tons of paper. There was paid out $3,734,000 in wages. There was paid $629,000 in taxes, which makes the United Railways Company the largest taxpayer in the State of Missouri. On the payment of five cents any person has this immense plant placed at his disposal.

MEETING OF THE COMMITTEE ON INTERURBAN RULES

The committee on interurban rules of the American Street & Interurban Railway Transportation & Traffic Association met in Fort Wayne, Ind., on June 7, to discuss the advisability of adopting as a whole, or in modified form, the standard code of train rules of the American Railway Association in place of the code of interurban rules which was adopted by the Transportation & Traffic Association last October at the Denver convention. Those present at the meeting were: C. D. Emmons, Fort Wayne & Wabash Valley Traction Company, chairman; H. A. Nicholl, Indiana Union Traction Company; J. W. Brown, West Penn Railways Company, and J. E. Duffy, Syracuse Rapid Transit Railway. Mr. Emmons announced that C. A. Coolidge, Oregon Electric Railway Company, and F. D. Carpenter, Western Ohio Railway, had resigned from the committee on account of pressure of other duties and that these two vacancies had been filled by the appointment of J. E. Duffy, of the Syracuse Rapid Transit Railway Company, and F. A. Boutelle, Puget Sound Electric Railway. Mr. Emmons said that the chairman of the committee on city rules had tried to arrange for a joint meeting with the committee on interurban rules, but had not found it possible to do so up to the present time.

Mr. Emmons, the chairman of the interurban rules committee, some time ago sent out a data sheet to member companies asking them for criticisms of the rules as adopted last October. Replies had been received up to the time of the meeting from 56 companies operating about 6000 miles of track. These replies had been tabulated by the chairman. Twenty-one companies were opposed to the adoption of the American Railway Association rules and 15 companies were in favor of their adoption. The other 20 companies which replied did not express any opinion on this question. After a brief discussion of the information received through the data sheets which had been returned, the committee took up the consideration of the interurban code of rules.

It was agreed to submit to the association a rule book with the following wording on the cover:

BOOK OF RULES

Name of Railroad Company

The inside front cover is to be arranged with sufficient signature lines so that the book can be reissued to five men without using pasters.

The title page will read: "Rules of the ..... R. R. Co. for the Government of the Transportation Department ..... to take effect ....."

The general notice and form of order putting the rules in effect, which is contained in the American Railway Association standard code, was approved as a substitute for a general notice in the interurban code. It reads as follows:

(Form of order putting rules in effect)

The rules herein set forth govern the railroads operated by the ..... Company. They take effect ..... superseding all previous rules and instructions inconsistent therewith.

Special instructions may be issued by proper authority.

(Name) .....

(Title) .....

GENERAL NOTICE

To enter or remain in the service is an assurance of willingness to obey the rules.

Obedience to the rules is essential to the safety of passengers and employees, and to the protection of property.

The service demands the faithful, intelligent and courteous discharge of duty.

To obtain promotion capacity must be shown for greater responsibility.

Employees, in accepting employment, assume its risks.

It was agreed to designate the general rules by letters rather than numbers, thus following the practice of the American Railway Association. The general rules were then considered one by one.

Rule A of the American Railway Association, "Employees whose duties are prescribed by these rules must provide themselves with a copy," was approved in place of Rule 1 of the interurban code.

Rule B of the American Railway Association, "Employees must be conversant with and obey the rules and special instructions. If in doubt as to their meaning they must apply to proper authority for an explanation," was approved in place of Rule 2 of the interurban code.

Rules 3 and 4 of the interurban code are to be eliminated, since Rule 4 is covered by Rule K of the American Railway Association as follows: "Persons authorized to transact business at stations or on trains must be orderly and avoid annoyance to patrons."

The question was raised as to the necessity of requiring a daily inspection of the bulletin board, but Rule 5 of the interurban code was allowed to stand. The committee agreed to accept the substance of the interurban Rule 6 for a general rule to be designated as M.

Rule C of the American Railway Association, "Employees must pass the required examinations," was substituted for Rule 7 of the interurban code. The committee agreed to eliminate Rule 8 of the interurban code and suggested using only the last paragraph of Rule 9, which reads "Anything which may affect the safe and proper operation of the railroad or the interests of the company in any way must be promptly reported." This will be general rule N. Rule L of the American Railway Association was substituted for Rule 10 of the interurban code. It reads as follows: "In case of danger to the company's property employees must unite to protect it."

Rule 11 of the interurban code was accepted and will be designated as Rule O. Some members of the committee said that the legal departments felt that a rule of this kind was necessary, from a legal standpoint. The committee agreed to omit Rule 12 of the interurban code and to substitute Rule K of the American Railway Association in place of Rule 13 of the present interurban code. Rule G of the American Railway Association, which reads, "The use of intoxicants by employees while on duty is prohibited. Their use or the frequenting of places where they are sold is sufficient cause for dismissal," will be used in place of Rule 14. Rule 15 of the interurban code will be designated as H, Rule 17 as P, Rule 18 as Q, Rule 19 as J, Rule 20 as R and Rule 21 as S. Rules 22 and 23 are to be eliminated and Rule 24 will be designated as T, Rule 25 as U and Rule 26 as V. Rule 27 will be designated as L and the following rule will be designated as W and will be used in place of Rule 28: "Employees while on duty connected with the trains on any division or railroad are under the authority and must conform to the order of the officers of that division or railroad and while at car houses are under the authority and must conform to the orders of the ..... or his authorized agent."

Rule 29 will be designated as X, Rule 30 will be eliminated and Rule 31 will be designated as Y. The last paragraph of Rule 31, regarding the deposit required to guarantee the return of company property is to be eliminated. Rule 32 will be designated as Z.

DEFINITIONS

The definitions of the American Railway Association were

adopted by the committee in place of the definitions now included in the interurban code with a few slight changes. A foot-note will be added stating that the committee does not recommend operation by superiority of direction. They are as follows:

Definitions

Engine.—A locomotive propelled by any form of energy.

Train.—An engine, or more than one engine coupled, with or without cars, displaying markers.

Regular Train.—A train authorized by a time-table schedule.

Section.—One of two or more trains running on the same schedule displaying signals or for which signals are displayed.

Extra Train.—A train not authorized by a time-table schedule. It may be designated as—

Extra—for any extra train, except work extra;

Work extra—for work train extra.

Superior Train.—A train having precedence over another train.

Train of Superior Right.—A train given precedence by train order.

Train of Superior Class.—A train given precedence by time-table.

Train of Superior Direction.—A train given precedence in the direction specified in the time-table as between trains of the same class.

Note.—Superiority by direction is limited to single track.

Time-table.—The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating thereto.

Schedule.—That part of a time-table which prescribes class, direction, number and movement for a regular train.

Division.—That portion of a railway assigned to the supervision of a .....*

*The blank may be filled in by each road to suit its own organization.

Subdivision.—A part of a division so designated on the time-table.

Main Track.—A track extending through yards and between stations, upon which trains are operated by time-table or train order, or the use of which is controlled by block signals.

Single Track.—A main track upon which trains are operated in both directions.

Double Track.—Two main tracks, upon one of which the current of traffic is in a specified direction, and upon the other in the opposite direction.

Three (or More) Tracks.—Three (or more) main tracks, upon any of which the current of traffic may be in either specified direction.

Current of Traffic.—The movement of trains on a main track, in one direction, specified by the rules.

Station.—A place designated on the time-table by name, at which a train may stop for traffic; or to enter or leave the main track; or from which fixed signals are operated.

Siding.—A track auxiliary to the main track for meeting or passing trains, limited to the distance between two adjoining telegraph stations.

Fixed Signal.—A signal of fixed location indicating a condition affecting the movement of a train.

Note to Definition of Signal.—The definition of "Fixed Signal" covers such signals as slow boards, stop boards, yard limits, switch, train order, block, interlocking, semaphore disc, ball or other means for indicating stop, caution or proceed.

Yard.—A system of tracks within defined limits provided for the making up of trains, storing of cars and other purposes, over which movements not authorized by time-table, or by train order, may be made, subject to prescribed signals and regulations.

Yard Engine.—An engine assigned to yard service and working within yard limits.

The definition of "Pilot" given in the American Railway Association code is to be amended so as to read as follows:

"Pilot.—A person assigned to a train when the engineman or conductor, or both, are not fully acquainted with the physical characteristics, or running rules of the road, or portion of the road, over which the train is to be moved, and is responsible for safe operation of train."

The block signal Rules Nos. 71 to 76 of the interurban code are to be added to the definitions.

STANDARD TIME

The committee approved the present Rule 77 of the interurban code in place of Rule 1 of the American Railway Association. Rule 2 of the American Railway Association was adopted in place of Rule 78 and Rule 79 of the interurban code. It reads as follows:

2. Watches that have been examined and certified to by a designated inspector must be used by conductors, enginemen and .....* The certificate in prescribed form must be renewed and filed with ..... every .....

(Form of Certificate)

CERTIFICATE OF WATCH INSPECTOR

This is to certify that on ....., 19.., the watch of.....
employed as.....
on the.....
was examined by me. It is correct and reliable, and in my judgment will, with proper care, run within a variation of 30 seconds per week.

Name of Maker.....
Brand .....
Number of movement.....
Open or hunting case.....
Metal of case.....
Stem or key winding.....

Signed,

.....
Inspector.

Address .....

*The Committee recommends that in filling the blank each company add such other classes of employees as it may desire.

Rule 3 of the American Railway Association, which reads, "Watches of conductors, motormen and ..... must be compared with a clock designated as a Standard Clock. The time when watches are compared must be registered on a prescribed form," was adopted in place of Rule 30 of the interurban code, with an added provision for the comparison of time by telephone or with a standard clock or with the watches of other employees who have standard time or have registered as required.

An additional rule, No. 3a, is to be added, reading as follows:

"Conductors and motormen must compare watches with each other before starting on each trip."

Rules 81, 82 and 82-a of the interurban code were eliminated.

TIME-TABLES

The committee recommended that Rules 83, 84 and 85 of the interurban code be retained, but that they should be renumbered respectively 4, 4-a and 4-b. Rule 5 of the American Railway Association was adopted in place of Rules 86, 87, 88 and 89 of the interurban code. It reads as follows: "5. Not more than two times are given for a train at any station; where one is given, it is, unless otherwise indicated, the leaving time; where two, they are the arriving and the leaving time.

"Unless otherwise indicated, the time applies to the switch where an inferior train enters the siding; where there is no siding it applies to the place from which fixed signals are operated; where there is neither siding nor fixed signal, it applies to the place where traffic is received or discharged.

"Schedule meeting or passing stations are indicated by figures in full-faced type.

"Both the arriving and leaving time of a train are in full-faced type when both are meeting or passing times, or when one or more trains are to meet or pass it between those times.

"When trains are to be met or passed at a siding extending between two adjoining stations, the time at each end of the siding will be shown in full-faced type.

"Where there are one or more trains to meet or pass a train between two times, or more than one train to meet a train at any station, attention is called to it by ....."

Rule 90 of the interurban code was retained, but is to be renumbered 6. Rule 91 of the interurban code is to be eliminated.

SIGNAL RULES

Rules 92, 93 and 94 are to be retained but renumbered respectively 7, 8 and 9.

VISIBLE SIGNALS

The committee recommends the adoption of American Railway Association Rule 10 in place of the interurban code Rule 95. Rule 10 is as follows:

10 COLOR SIGNALS

COLOR	INDICATION
(*a*) Red.	Stop.
(*b*) ———	Proceed, and for other uses prescribed by the Rules.
(*c*) —·—	Proceed with caution, and for other uses prescribed by the Rules.
(*d*) Green and White.	Flag stop. See Rule 28.
(*e*) Blue.	See Rule 26.

It recommends retaining Rule 96, renumbered 11, in place of Rule 11 of the American Railway Association code. The committee approved of the use of Rule 12 of the American Railway Association in place of Rule 99 of the interurban code. Rule 12 is as follows:

(*a*) Swung across the track.	Stop.
(*b*) Raised and lowered vertically.	Proceed.
(*c*) Swung vertically in a circle at half arm's length across the track when the train is standing.	Back.
(*d*) Swung vertically in a circle at arm's length across the track, when the train is running.	Train has parted.
(*e*) Swung horizontally above the head, when the train is standing.	Apply air brakes.
(*f*) Held at arm's length above the head, when the train is standing.	Release air brakes.

Rule 98 of the interurban code was satisfactory but it will be renumbered 13. Rule 99 of the interurban code will be eliminated and Rule 14 of the American Railway Association code will be substituted with a slight re-arrangement.

Rule 14 as at present arranged in the American Railway Association code is as follows:

WHISTLE SIGNALS

NOTE.—The signals prescribed are illustrated by "o" for short sounds; "——" for longer sounds. The sound of the whistle should be distinct, with intensity and duration proportionate to the distance signal is to be conveyed.

SOUND	INDICATION
(*a*) o	Stop. Apply brakes.
(*b*) —— ——	Release brakes.
(*c*) ——o o o	Flagman go back and protect rear of train.
(*d*) —— —— —— ——	Flagman return from west or south.
(*e*) —— —— —— —— ——	Flagman return from east or north.
(*f*) —— —— —— —	When running, train parted; to be repeated until answered by the signal prescribed by Rule 12 (*d*).* Answer to 12 (*d*).*
(*g*) o o	Answer to any signal not otherwise provided for.
(*h*) o o o	When train is standing, back. Answer to 12 (*c*)† and 16 (*c*). When train is running, answer to 16 (*d*).
(*i*) o o o o	Call for signals.
(*k*) —— o o	To call the attention of yard engines, extra trains or trains of the same or inferior class or inferior right to signals displayed for a following section.
(*l*) —— —— o o	Approaching public crossings at grade.
(*m*) ————	Approaching stations, junctions and railroad crossings at grade.

A succession of short sounds of the whistle is an alarm for persons or cattle on the track.

Rule 100 of the interurban code will be eliminated because it is included as part of the proposed Rule 14. The committee agreed to adopt interurban Rule 101, as Rule 15 and favored using interurban code Rule 102 as Rule 34.

Interurban code Rule 103 will be eliminated and Rule 16 of the American Railway Association will be substituted with an optional signal "D" for one bell to stop.

Rule 16 at present reads:

COMMUNICATING SIGNALS

SOUND	INDICATION
(*a*) Two.	When train is standing, start.
(*b*) Two.	When train is running, stop at once.
(*c*) Three.	When train is standing, back the train.
(*d*) Three.	When train is running, stop at next station.
(*e*) Four.	When train is standing, apply or release air brakes.
(*f*) Four.	When train is running, reduce speed.
(*g*) Five.	When train is standing, call in flagman.
(*h*) Five.	When train is running, increase speed.

Rule 104 of the interurban code was adopted as 16-a, Rule 105 was eliminated, and Rule 106 was approved as 16-a.

TRAIN SIGNALS

Rule 17 of the American Railway Association was adopted instead of Rule 108 of the interurban code. It reads:

17. The headlight will be displayed to the front of every train by night, but must be concealed when a train turns out to meet another and has stopped clear of main track, or is standing to meet trains at the end of double track or at junctions.

Rule 108 of the interurban code was added as Rule 17-a.

Rules 18 to 26 of the American Railway Association are used in place of Rules 109 to 118 in the interurban code. They are as follows:

18. Yard engines will display the headlight to the front and rear by night. When not provided with a headlight at the rear, two white lights must be displayed. Yard engines will not display markers.

19. The following signals will be displayed, one on each side of the rear of every train, as markers, to indicate the rear of the train: By day, green flags; by night, green lights to the front and side and red lights to the rear; except when the train is clear of the main track, when green lights must be displayed to the front, side and rear.

20. All sections except the last will display two green flags, and in addition, two green lights by night, in the places provided for that purpose on the front of the engine.

21. Extra trains will display two white flags and, in addition, two white lights by night, in the places provided for that purpose on the front of the engine.

22. When two or more engines are coupled, the leading engine only shall display the signals as prescribed by Rules 20 and 21.

23. One flag or light displayed where in Rules 19, 20 and 21 two are prescribed will indicate the same as two; but the proper display of all train signals is required.

24. When cars are pushed by an engine (except when shifting or making up trains in yards) a white light must be displayed on the front of the leading car by night.

25. Each car on a passenger train must be connected with the engine by a communicating signal appliance.

26. A blue flag by day and a blue light by night, displayed at one or both ends of an engine, car or train, indicates that workmen are under or about it; when thus protected it must

not be coupled to or moved. Workmen will display the blue signals and the same workmen are alone authorized to remove them. Other cars must not be placed on the same track so as to intercept the view of the blue signals, without first notifying the workmen.

Rule 119 of the interurban code will be retained but will be renumbered 26-a. The committee decided to eliminate Rule 120. Rules 121 to 124 covering semaphore signals are to be eliminated. Rule 125 of the interurban code was approved and renumbered 27. Rule 126 is to be renumbered 28 and for Rule 126 of the interurban code is to be substituted Rules 29, 30 and 31 of the American Railway Association code, reading as follows:

"29. When a signal (except a fixed signal) is given to stop a train, it must, unless otherwise provided, be acknowledged as prescribed by Rule 14 (*g*) or (*h*).

"30. The engine-bell must be rung when an engine is about to move.

"31. The motor gong must be rung on approaching every public road crossing at grade, and until it is passed; and the whistle must be sounded at all whistling posts."

Rules 131, 132 and 133 of the interurban code were approved and will be renumbered 31, 32 and 33 respectively. Rule 102 of the interurban code will be renumbered 34, leaving the distance blank. The committee agreed to use interurban Rule 129 as Rule 35 and Rule 130 as new Rule 36.

Interurban rule 200 was accepted as new Rule 71. Rule 71 of the American Railway Association code is to be included as optional with a footnote that the committee did not consider it good interurban practice to assign superiority of direction. This rule reads:

"71. A train is superior to another train by right, class or direction.

"Right is conferred by train order; class and direction by time-table.

"Right is superior to class or direction.

"Direction is superior as between trains of the same class."

Rule 72 of the American Railway Association was adopted as new Rule 72 with the same footnote, regarding the use of superiority by direction. It reads:

"72. Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on.

"Trains in the direction specified by the time-table are superior to trains of the same class in the opposite direction."

Rule 202 of the interurban code was adopted as new Rule 73.

MOVEMENT OF TRAINS

The committee agreed to adopt Rule 82 of the American Railway Association as new Rule 82. It reads as follows: "Time-table schedules, unless fulfilled, are in effect for———— hours after their time at each station.

"Regular trains —— hours behind either their schedule arriving or leaving time at any station lose both right and schedule, and can thereafter proceed only as authorized by train order."

The American Railway Association Rule 83 which reads:

"83. A train must leave its initial station on any division (or subdivision), or a junction, or pass from double to single track, until it has been ascertained whether all trains due, which are superior, or of the same class, have arrived or left," was also adopted with the addition of the second and third paragraphs of Rule 203 of the interurban code. Rule 203-a of the interurban code was approved as new Rule 83-a.

Rule 84 of the American Railway Association was adopted in place of Rule 204 of the interurban code and Rules 85 and 86 of the American Railway Association code were adopted in place of Rule 205 of the interurban code. These rules are as follows:

"84. A train must not start until the proper signal is given.

"85. When a train of one schedule is on the time of another schedule of the same class in the same direction, it will proceed on its own schedule.

"Trains of one schedule may pass trains of another schedule of the same class, and extras may pass and run ahead of extras.

"86. An inferior train must clear the time of a superior train, in the same direction, not less than five minutes."

The meeting then adjourned and further consideration of the rules was postponed until June 22, 1910, when another meeting is to be held at the Hotel Hollenden, Cleveland, Ohio.

PAY-AS-YOU-ENTER CARS FOR TOLEDO

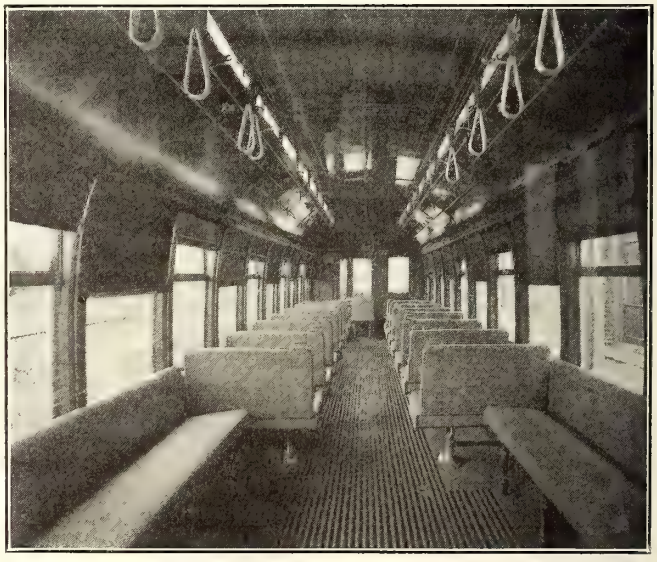
The G. C. Kuhlman Car Company, Cleveland, Ohio, has recently completed 20 vestibuled cars for the Toledo Railway & Light Company, Toledo, Ohio, under license of the Pay-as-You-Enter Car Corporation. The carbody arrangements for prepayment operation include a single sliding door placed at the forward right hand side in the front end and two single sliding doors at the rear end. The front platform is 4 ft. 4 in. long over the vestibule sheathing and has a step opening at the right hand side looking forward. This step is controlled by the motorman in connection with the vestibule folding doors. The



Toledo Pay-as-You-Enter Car

opposite side of the front vestibule is paneled and arranged for drop sash. The rear vestibule is 6 ft. 6 in. over the sheathing. The step opening is on the right hand side and is railed for entrance and exit. The opposite side of this vestibule is also paneled up.

The bottom framing consists of 4-in. x 7¾-in. yellow pine side sills covered with a ⅜-in. x 15-in. steel plate which is reinforced at the bottom by an angle iron; two 5¼-in. white oak end sills; 4½-in. x 5½-in. white oak center cross joists. The body framing includes 3¾-in. corner posts; 3¼-in. side posts;



Interior of Toledo Car, Showing Extra Seat at the Front End

belt rail of grained edge yellow pine; ash ribs; truss rods of double refined iron, etc. Each platform is supported on channel iron knees. A feature of the roof construction is the use of concealed ⅝-in. steel rafters which are distributed to carry the strains from overhead apparatus to the best advantage. Every other of the ventilator sash is fitted with a bronze controller. The steps consist of oak pieces carried from malleable iron hangers and covered with safety tread. The angle iron

buffers are of the Brill type, supported on knees extended for their installation. Among other Brill specialties are the "Dumpit" sand boxes, pedal alarm gongs and signal bells.

The inside finish of the car is in cherry. The ceiling is of ¼-in. Agasote. The seats are of rattan and are of both the transverse and longitudinal type arranged as shown in the view of the car interior. The 11 windows on each side and the large windows in the front bulkhead are provided with Pantasote curtains, mounted on Haviland rollers with the Curtain Supply Company's ring fixture No. 88. The push-button system is operated from a dry battery. The Peter Smith Company heater installed on each car is located on the inner side of the front platform. Among other specialties supplied for these cars are Kirby-Neal headlights and "Eclipse" fenders.

Special attention was given to the car wiring. The motorman's switch cabinet is lined with asbestos and contains a slate switchboard. The cable box is placed between the center stringers under the car with cast-iron spreaders. The interior is lined with ¼-in. asbestos board and coated twice with flameproof paint. After leaving the boxes, the cables are run in steel conduits. The motor lead conduits are brought to the king pin as closely as possible. Asbestos board ¼ in. thick and treated with waterproof paint is placed over the resistances and air compressor.

The principal dimensions of the car body follow: Length over end panel at sill, 30 ft. 8 in.; length over platform crown pieces, 41 ft. 6 in.; width at sill, including panels, 7 ft. 11½ in.; width over posts above belt rail, 8 ft. 2 in.; width over drip rail, 8 ft. 4 in.

LIGHT M. C. B. TYPE INTERURBAN TRUCK

The Baldwin Locomotive Works, Philadelphia, Pa., have recently completed for the North Jersey Construction Company eight trucks of the M. C. B. equalized type. These trucks are to be used under interurban passenger cars which will be operated over the North Jersey Rapid Transit Company's line now under construction from Paterson, N. J., to a point near Suffern, N. Y., 14 miles distant. It is claimed by the builders that they are lighter in weight than any M. C. B. type trucks of similar wheel base and carrying capacity heretofore constructed. The weight of each truck exclusive of motors is 6700 lb.

The design is classed by the builders as 72-16-S., indicating a special truck with 72-in. wheel base and a maximum center pin load of 16,000 lb. The trucks are designed for a service requiring a maximum speed of 40 m.p.h., and will carry two Westinghouse No. 306 motors, arranged for bar suspension. The wheels which were made by the Standard Steel Works Company, are of forged and rolled steel, 33 in. in diameter, with rims 2½ in. thick. The journals are A. S. & I. R. A. standard, 3¾ in. x 7 in. in size.

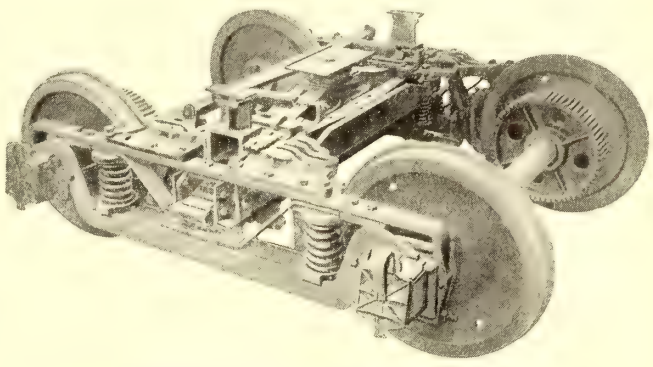
These trucks differ from the Baldwin type A truck chiefly in the frames, which combine lightness, strength and simplicity of construction. The side frames are of wrought iron, 1¼ in. x 3 in.; they are bent down at the ends to form the front and back pedestals. The intermediate pedestals are bolted to the frames. Detachable gibs of wrought iron plate are fitted over the pedestals to protect the jaws from wear. The usual end frames are omitted.

The truck transoms consist of two 8-in. channels, seated at their ends, on cast-steel filling pieces, and braced to the side frames by substantial cast-steel gussets. These gussets have ample bearings on the frames and transom, and because of the omission of the end frames their design has received special attention. They transmit a large portion of the stresses interchange between the side frames and transoms, and they are depended upon to keep the truck square. The transom channels are reinforced, between the gussets, by ⅜-in. plates riveted to the top flanges.

The bolster is a steel casting, and is supported at each end, on a single full elliptic spring with plates 5 inches wide. The lower spring plank is composed of two 2¼-in. x 2¼-in. angles, suspended on swing links. The swing link bearings are of cast steel, and the top bearing bridges the transom channels, thus forming an efficient stiffening member.

The equalizing beams are ¾ in. thick and are punched from steel plate. The frames are supported on the equalizers by single coil springs. The motors are inside hung and the suspension bars are placed close to the transoms and are spring supported from the frame gussets. The side bearings are of the usual sliding type.

The brakes are inside hung, and the brake work has been made as light as is consistent with strength. The two live levers are connected by a transverse beam placed close to the bolster and the pull rod is pinned to the middle of the beam.



Light M. C. B. Interurban Truck

The brake shoe hangers are supported from the frame gussets, which also serve as brake lever guides.

These trucks are simple in construction and as they are built largely of commercial iron and steel shapes, repairs can be easily made at any car barn having ordinary facilities. They are machine fitted throughout. The design is an interesting adaptation of the well known equalized type to conditions requiring a specially light, easy riding truck.

TEST OF PIPE UNIONS

The National Tube Company of Pittsburgh, Pa., presents the following particulars of an interesting durability trial of "Kewanee" pipe unions:

There were taken from stock one 1-in. octagon union and one 1½-in. round union. Each union was connected by a nipple, valve and nipple to a steam line. Into the other end of each union was screwed a nipple, on the outer end of which was another valve. The union connection was then tightened with an ordinary wrench, steam pressure was admitted by means of the valve next to the main, the outer valve was opened to blow out the air and then closed. Close scrutiny was given the union to be sure that there was no leakage of steam. The steam pressure was then shut off, the outer valve opened to blow out the steam and the union ring was unscrewed entirely from the brass end. This operation was repeated over one thousand times on each of the unions, and during the entire time neither union showed the slightest sign of leakage of steam.

After the completion of this test, each union was taken to the union department, and there subjected to the same test which is received by all new unions, that of 110 lb. air pressure under water. Each of these two unions was absolutely tight during this test, not the slightest bubble of air being shown when the union was submerged and subjected to the air pressure of 110 lb. per sq. in.

The point involved in this maker's test is the fact that wherever a union is to be disconnected or reconnected an indefinite number of times, the gasketless type of union is preferable to the gasket type for in the latter case a gasket must be cut and fitted, frequently involving not only costly delays but also uncertain joints.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES

Alabama.—Passengers—Ejection—Damages.

Though a carrier has the lawful right to eject a passenger, it is answerable in damages for any unnecessary force or violence inflicted upon him by its agents acting within the scope of their authority.

Where a carrier has a rule which requires the collection of fares on each car of the train by the separate conductors on said cars, and that passengers changing cars must pay a second fare, a passenger, after taking passage on one car and paying his fare, is not authorized to take another car and refuse to pay a second fare when demanded, after being informed of the rule, although insufficient accommodations are provided on the first car.—(Birmingham Ry., Light & Power Co. v. Yielding, 46 S. Rep., 747.)

Massachusetts.—Eminent Domain—Erection of Trestle for Street Railroad—Compensation to Abutting Owners—Public Easement in Streets and Highways—Scope and Extent—Exercise of Police Power Without Taking Property—Changing Law of Nuisance—Elevated Railways and Other Uses as Additional Servitude—Right to Damages Therefor.

The declaration of St. 1903, p. 124, c. 163, sec. 3, that a trestle erected by a street railway company to carry its tracks over a railroad should be deemed not to be an additional easement or servitude, was coupled with a provision for compensation to any person legally damaged in his property by the construction, maintenance or use of the trestle. Held, that this was equivalent to a statement that the Legislature did not assume to determine finally whether the street could be so used without compensation to abutters.

The law in this commonwealth is exceedingly liberal to the public in its interpretation of the provisions under which streets and highways are laid out, and the public easement acquired under such statutes includes every kind of travel and communication for the movement and transportation of persons or property which is reasonable and proper in the use of a public street; but the kind of uses that may be made in the public interest, under a taking for a street, is limited to those which are reasonable, and in determining what is reasonable, not only the rights of the public as users of the streets in different ways are to be considered, but the rights of abutters as property owners along the line of the street are to be taken into ac count.

In the laying out of streets under our general laws, while it was assumed that they might be used in a variety of ways, for travel, transportation, transmission and communication, it was not assumed that they would be put to uses that would throw a very great burden on adjacent proprietors in the occupation or use of other property, and the public easement is only for uses that are reasonable in reference to their effect on adjacent property, as well as on other kinds of public uses of the street.

A use of the street which would constitute a grave private nuisance to property at the side of the street could not have been contemplated by the law as being acquired by a taking for a highway or street.

In the exercise of police power the Legislature may authorize or limit the use of property within certain bounds, thus changing to a certain extent the law of nuisance, without taking property under the right of eminent domain.

In determining whether an additional servitude is imposed, a distinction is recognized between elevated railways and other uses of streets for travel.

A trestle carrying defendant's street railway tracks over a railroad was constructed in the middle of the street opposite the house occupied by petitioner. The structure was of timber, and started east of the house at the grade of the street, rising gradually to the height of 20 ft. above the railroad measured to the top of a fence built on either side to 4 ft. above the ties on which the rails were laid. In front of petitioner's house it was 12 ft. to the top of the fence. It was 15 ft. wide at the base and 12 ft. wide at the top, and carried two tracks, so placed that cars could not pass in opposite directions. It was not used by pedestrians or vehicles, but carried large, heavy electric cars. Its total length was about 600 ft. and it was a great source of annoyance to petitioner and his family in the use of his premises, obstructing their view, light, air and free entrance in the front. While being constructed, the street between the house and the trestle was completely blocked with timber, so that horses and carriages could not get to the house, and so long as it remained it was not safe to hitch horses and let them remain on account of the noise of the cars. At night searchlights made the rooms as light as day and interfered with sleep. The street at this point was constructed with a reserve space between two driveways, the trestle being constructed in this space, after which it was impossible for a team to pass from the further roadway to the house of petitioner. The cars went up at a speed of 15 m.p.h. to 18 m.p.h., and going down they sometimes went as fast as 25 m.p.h. or 30 m.p.h., making a great noise, clanging the gong to warn travelers, so that it was impossible to sleep until late at night. Held, that its maintenance would have been an unreasonable use of the street, in the absence of statutory authority to provide for new and peculiar conditions; and that the right to construct it and use it was not included in the public easement in the street; and hence; under St. 1903, p. 124, c. 163, which made defendant liable to pay damages if the street was put to a use beyond that paid for under the general law when originally laid out, it was a taking of petitioner's property by right of eminent domain.

Under St. 1903, p. 124, c. 163, making a street railway company liable for the construction, maintenance and use of a trestle carrying its tracks over a railroad, if the street was thereby put to a use beyond that paid for under the general law when the street was originally laid out, the fact that the damage was not permanent does not affect an abutting owner's right to compensation for that which he suffered. (Lentell vs. Boston & W. St. Ry. Co., 88 N. E. Rep., 765.)

Michigan.—Railroads—Right of Way—Covenants—Forfeiture.

Where a railway company in good faith takes possession of a right of way, granted on certain conditions as to construction, no time of performance being stated, the grantor may not declare a forfeiture, and recover the land in ejectment, without notice to the company of the particular breach of which it is guilty, and without giving it time to remedy the breach. (Treat vs. Detroit United Ry., 122 N. W. Rep., 93.)

New York.—Municipal Corporations—Lease of Subway—Rights of Lessee.

The subway in the city of New York being the property of the city, the use thereof by a lessee of the city was limited to railroad purposes, and the use of any of the ducts for the sale and transmission of electric currents for motive power to third parties, whether the owners or operators of connecting or intersecting railways or not, is not one of such uses, and will be restrained by injunction, though the lease contains no express prohibition against it, but has no express grant of such right.—(City of New York v. Interborough Rapid Transit Co. et al., 106 N. Y. Sup. 296.)

New York.—Carriers—Carriage of Passengers—Transfers—Demand.

Where, at the time a passenger gave his transfer to the conductor, he held out his hand to receive another, but the conductor muttered something, not heard by the passenger, and passed on through the car, and, on his return, the passenger orally demanded a transfer, which was refused, there was a sufficient compliance with the rule of the company requiring passengers to demand transfers at the time of payment of fare.—(Sullivan v. Brooklyn Heights R. Co., 106 N. Y. Sup. 378.)

New York.—Carriers—Street Railroads—Transfers—Change of Direction—"Trip"—"Continuous Trip."

Railroad Law (Laws 1890, p. 1127, c. 565, sec. 104, as amended by Laws 1892, p. 1406, c. 676) requiring every street railroad company to carry between any two points on the roads over which it has the right to run cars any passenger desiring to make "one continuous trip" between such points for a single fare, and to give the passenger a transfer entitling him to "a continuous trip" to any point on the road, for the promotion of public convenience by the operation of railroads "as a single railroad with a single

rate of fare," does not prevent a street railway company authorized by sec. 4, subd. 8, to regulate the time and manner in which passengers shall be transported, and the compensation to be paid, from adopting regulations requiring passengers making use of transfers to use the same only in the same general direction of their initial trip; a trip conveying the idea of transportation in one direction, and a continuous trip, like a continuous line, extending in the same general direction.

A railroad corporation in operating a single system may operate two or more lines of road between its terminals, but a passenger purchasing a ticket to his point of destination has no option to take a circuitous route, and he is confined to the through route.

A railroad corporation, subject to the reserved power of the Legislature to alter its charter, has a right to exist under conditions as favorable as a sound state of policy, a due regard for the public interest, and a reasonable interpretation of the law will permit, and it should not be burdened by unnecessary implication of a legislative meaning beyond what those considerations demand; and when the Legislature in unmistakable terms, and within constitutional limits, has exercised its power to regulate corporations, it should be given full effect, but no inferences unfavorable to reasonable operation of the franchise of a corporation should be allowed from words susceptible of use in more than one sense.—(Kelly v. New York City Ry. Co., 84 N. E. Rep., 569.)

Ohio.—Railroads—Crossing Other Roads — Grade—Expense—Double Track.

In a proceeding under Sec. 3333-1, Rev. St. 1908, where a junior and senior railroad company are not able to agree as to a method of crossing, to procure an order of the court in that behalf, the court should equitably apportion between the roads only the cost of such a grade of approach as will be practicable. If the junior road desires a lesser grade, it may, with propriety, be charged with the entire additional expense of such construction.

The statute requires that not only the costs of constructing such crossing as the court may order, but also the cost of maintaining it, shall be equitably distributed between the companies.

When, in such case, the junior road has projected and is engaged in constructing a double-track road, the cost of a crossing sufficient in width to carry a double track should be equitably apportioned between the companies.—(Cincinnati Northern Traction Co. v. Pittsburg, C., C. & St. L. Ry. Co.; same v. Cincinnati, H. & D. Ry. Co., 86 N. C. Rep., 987.)

Wisconsin—Eminent Domain—Compensation—Persons Entitled.

Where, there being no right to take for interurban purposes and no remedy provided for compensation during the ownership of another of land, and before conveyance by him the use of a street during his ownership for interurban purposes gave no right to any permanent use, such other was not entitled to damages in condemnation proceedings thereafter instituted, on the ground that he was the owner when the taking occurred, but the right to damages was in his grantee.—(Wilbur Lumber Co. v. Milwaukee Light, Heat & Traction Co., 114 N. W. Rep., 813.)

LIABILITY FOR NEGLIGENCE

Alabama.—Street Railroads—Injury to Person Near Track—Trespassers—Who Are—Use of Streets—Duty of Railroad—Duty of One on Track—Contributory Negligence—Duty of Motorman—"Wantonness."

A street railroad employee, walking beside the track while going to his place of work in the usual way, was not a trespasser; the company having no exclusive or paramount right to the use of the part of the street occupied by its tracks, either as against other vehicles or as against pedestrians.

The duty of a street railroad company to recognize the rights of persons in the lawful use of streets is imperative, and, while it has the right of way in case of meeting or overtaking a person on the track, it is bound to exercise a proper degree of care and such reasonable prudence and precaution as the attending circumstances may require to avoid injuring such person.

One using a street occupied by street railroad tracks is bound to exercise ordinary care and such reasonable prudence and precaution as the attendant circumstances may require to avoid being injured by a street car.

It is the duty of a motorman, on seeing a pedestrian on the track or dangerously near it, to give warning of the approach of the car by sounding the bell or otherwise; and failure to give such warning may constitute negligence.

While a motorman may, on seeing a person on the track, assume that he will get out of the way, such assumption may not be indulged beyond the time when the person's danger is seen to be imminent.

"Wantonness" is the conscious failure of one, charged with a duty to exercise due care and diligence, to prevent an injury after the discovery of the peril, or under circumstances where he is charged with a knowledge of such peril, and being conscious of the inevitable or probable results of such failure. (Birmingham Ry., Light & Power Co. vs. Williams, 48 Southern Rep., 93.)

California.—Carriers—Injury to Passenger—Negligence—Presumptions—Collisions—Companies Liable.

Where a passenger on a street car was injured in a collision between the car and the car of another street railroad at a crossing, a presumption of negligence on the part of the latter did not arise from the mere fact of the collision.

Whether a motorman was negligent who approached a crossing of another street railroad while a car of the latter was approaching on a level track, and within a few feet thereof, and in plain sight, in such manner and at such speed that he could not stop in time to avoid a collision if the other car continued to advance, depends on whether an ordinarily prudent man, having a due regard for the safety of the passengers on the other car, as to whom he owed the exercise of ordinary care, would have done what he did, though under an established custom of the two railroads his car had the right of way and the other car should stop, and, since a reasonable man might conclude that under the circumstances ordinary care required the motorman to approach the crossing in such a manner that he could stop in time if the other car did not stop, and that failure to do so was negligent as to a passenger on the other car, regardless of whether the motorman on the other car was also negligent, the issue of the motorman's negligence was for the jury.

Where the negligence of two street railroads contributed to the injury of a passenger of one of them, the passenger could recover from both railroads, or either. (Kimic vs. San Jose-Los Gatos Interurban Ry. Co. et al. (S. F. 5016), 104 Pac. Rep., 986.)

Illinois. — Carriers—Electric Railways—Passengers—Contributory Negligence—Riding on Steps—Instructions.

The stopping of an electric car at a place where passengers are customarily received, and opening the door to admit them, is an invitation to all persons desiring to travel on such car to board it, and when one in good faith boards a car in such circumstances the relation of carrier and passenger is established, the carrier's legal duties attaching before as well as after the payment of fare.

In an action against an electric railway company for the death of a passenger, crushed between two cars while riding on the steps of one of them, it was proper to receive parol evidence of a rule of the company requiring the inside vestibule doors to be closed when the cars were on double tracks, where there was no objection to the parol evidence.

In an action for the death of an electric railway passenger, an instruction that, if the carrier "permits" one to board its car without requiring payment in advance, the obligation of the passenger to pay stands for actual payment for the purpose of the giving effect to the contract, was not objectionable as assuming that the company "permitted" decedent to board the car, whereas there was no evidence showing that any employee of the company knew that he was on the car. (Petersen vs. Elgin, A. & S. Traction Co., 87 N. E. Rep., 345.)

Pennsylvania.—Carriers—Carriage of Passengers—Injuries—Contributory Negligence.

To attempt to board a street car going faster than a man could walk was contributory negligence barring a recovery for injuries sustained in being thrown to the ground.—(Quinn v. Philadelphia Rapid Transit Co., 73 Atl. Rep., 319.)

News of Electric Railways

Program of Master Car Builders' Association Convention

The forty-fourth annual convention of the Master Car Builders' Association will be held in Atlantic City, N. J., June 15-17, 1910. The sessions of the convention will be held in the Greek Temple on the Million-Dollar Pier. The president, executive committee and secretary will have their office in the Marlborough-Blenheim Hotel, which has been selected as headquarters. The enrollment committee will be located in the entrance to the pier. Each member of the association, immediately upon arrival, should go to the enrollment booth, register and procure his membership button, and be furnished a properly numbered celluloid disk showing his registration. Cards for registration will be furnished at the enrollment booth at the entrance to the pier. Members should note particularly that there will be a morning and afternoon session each day. Those members who are also members of the Master Mechanics' Association, and expect to attend both conventions, should register twice, once for each convention, in order that a proper record may be kept of those present at each convention. The following program for the meeting has been arranged:

PROGRAM

WEDNESDAY, JUNE 15, 1910

MORNING SESSION, 10:00 A. M. TO 12:30 P. M.

Address by the president.

Reading of the minutes of the last meeting.

Report of secretary and treasurer.

Assessment and announcement of annual dues; appointment of committees on correspondence, resolutions, obituaries, etc.

Election of auditing committee.

Unfinished business.

New business.

Discussion of reports on: Nominations. Revision of standards and recommended practice.

AFTERNOON SESSION, 2:00 P. M. TO 4:00 P. M.

Discussion of reports on: Train brake and signal equipment. Brake-shoe tests. Rules for loading materials.

THURSDAY, JUNE 16, 1910

MORNING SESSION, 10:00 A. M. TO 12:30 P. M.

Discussion of reports on: Rules of interchange. Coupler and draft equipment. Car wheels. Safety appliances. Freight car trucks.

AFTERNOON SESSION, 2:00 P. M. TO 4:00 P. M.

Discussion of reports on: Splicing underframes. Car framing, roofs and doors. Tank cars. Train pipe and connections for steam heat.

FRIDAY, JUNE 17, 1910

MORNING SESSION, 10:00 A. M. TO 12:30 P. M.

Discussion of reports on: Consolidation of Master Car Builders' and Master Mechanics' Associations. Classes of cars. Salt-water drippings from refrigerator cars. Mounting pressures on wheels and axles. Individual paper on "Design of Axle to Carry 50,000 Pounds," by E. D. Nelson, engineer of tests, Pennsylvania Railroad. Springs for freight car trucks.

AFTERNOON SESSION, 2:00 P. M. TO 4:00 P. M.

Discussion of reports on: Train lighting and equipment. Lumber specifications.

Unfinished business: Reports of committees on correspondence, resolutions, and such other committees as may be named during the convention.

Election of officers. Adjournment.

The convention of the American Railway Master Mechanics' Association will be held in Atlantic City on June 20-22, 1910.

Situation in Detroit

Mayor Breitmeyer of Detroit sent a letter to J. C. Hutchins, president of the Detroit United Railway, on June 7, 1910, in which he asked whether the company would accept the terms of the ordinance drawn by Clyde I. Webster, counsel for the committee of fifty, if the Council adopted the ordinance. The Webster ordinance was prepared at the time the committee of fifty presented its report to the Council, but provision was made for writing the value of the property into the ordinance when that point should be finally settled.

On June 6, 1910, the executive committee of the committee of fifty decided to ask the Mayor and the Council to be relieved of the obligation to give a hearing to the company regarding the value to be placed in the Webster ordinance, but disavowed any desire not to lend its aid toward an equitable settlement of the street railway situation. The committee states that after having considered various plans for fixing a valuation for the purposes of the ordinance at the least possible expenditure of time and money, all have been rejected except three, which follow:

The Mayor and the Council to proceed with the hearing before the present court of arbitration, with Mr. Barcroft in charge of the engineering work on behalf of the city.

The Mayor and the Council to arrange for a new appraisal, to be conducted as they deem most expedient.

The appointment of a valuation board of three engineers, one to be selected by the city, one by the company and the third by these two, the three to be authorized to call in such experts as they may need, the expense to be borne jointly by the city and the company.

The committee in its report refers to the conduct of Mr. Barcroft as "unfortunate, deplorable, and, to our minds, wholly inexcusable." Mr. Webster and Frederick W. Walker, who was retained to succeed Mr. Barcroft, acting as a special committee of the committee of fifty, say in their report that "for any engineer to attempt to make use of this (Barcroft) appraisal, without the original reports and all the details, would be unwise and very dangerous." As stated in the Electric Railway Journal of June 4, 1910, Mr. Webster and Mr. Walker estimated that the cost of making proper preparations and conducting the hearings before the board of arbitration with the Barcroft appraisal as a basis would be $20,000. They say that five of the eight non-resident engineers who assisted Mr. Barcroft in his work have signified their willingness to appear before the board of arbitration and explain in detail the valuations with which they were connected, so far as it is possible for them to do so, although their detail work is in Mr. Barcroft's possession. Mr. Webster and Mr. Walker in their report say:

"A more careful study of the Barcroft appraisal and of the inventory of the property as prepared by the company has convinced us that, in the form in which this appraisal was published, it is impossible, with any reasonable degree of accuracy, to determine what property is included and what is not included in arriving at the values under the several sections which go to make up the total value placed upon the railway. We have come to the conclusion that, except to Mr. Barcroft personally, the appraisal in book form without the details which has been withheld, which has cost about $17,000, is of no real value, and therefore a new appraisal is a necessity unless Mr. Barcroft will appear and produce the details and testify and explain.

"The causes which Mr. Barcroft claimed prevented his appearance have, in our opinion, been entirely removed. An explanation of 'the proceedings before the board of arbitration' will show that the Detroit United Railway, through its attorney, has stipulated that it will be bound by the valuation, determined by this board, and will submit to the board 'any records, proceedings, or cost bills or documents that the court shall deem essential to a determination of the question before us.'

"The full text of the letters which are in your files convince us that Mr. Barcroft would not, under any circumstances, act in conjunction with the committee of fifty and give the testimony and evidence and produce the details necessary to substantiate and make applicable for the purposes intended this appraisal undertaken by the committee of fifty, the summary of which the committee has received in book form, while the detail, which constitutes the most valuable portion of the work paid for, has been held back."

Transit Affairs in New York

Announcement has been made by a member of the firm of the Bradley-Gaffney-Steers Contracting Company that the firm is prepared to bid for the building, equipment and operation of the new tri-borough subway.

William R. Willcox, chairman of the Public Service Commission, appeared before Judge Brady of the Supreme Court on June 1, 1910, to show cause why he should not be punished for contempt of court, not only reiterated the allegation that Justice Brady had been disqualified by reason of interest to sit in judgment on the commission's $750,000 penalty suit against Frederick Whitridge, receiver of the Union Railway Company, but declared that in so doing the Justice had committed a misdemeanor. He pleaded not guilty to the formal charge of contempt of court, and on this account the court adjourned the case until June 11, 1910.

Cleveland Traction Situation

At a meeting of the directors of the Cleveland Railway on June 4, 1910, the quarterly dividend of 1½ per cent was declared, payable on July 1, 1910, to stockholders of record on June 11, 1910. This is in accordance with the provision incorporated in the contract with the city which guarantees a return of 6 per cent on the investment.

The directors of the company also approved the proposed contract with the Cleveland, Southwestern & Columbus Railway for joint use of the latter's tracks on Lorain Street. After the City Council approves the contract it will be formally executed. The Cleveland Railway is to pay a rental of $1,250 a year, or half the interest on the investment in tracks, and 6 cents per car mile for the mileage operated. Of the mileage rental 3½ cents is for power and the remainder for repairs.

The demand of the carmen for an increase of about 10 per cent in wages, if granted, would increase the operating expenses about $200,000 a year and almost exceed the surplus indicated by the reports since the company took over its property from the Municipal Traction Company. Great interest will attach to the wage arbitration proceedings, to be begun shortly, as any increase that may be granted will affect the effort to operate at a 3-cent fare, plus 1 cent for a transfer.

Although no change in the allowance per car-mile for maintenance may be necessary, a careful watch is being kept of all costs of this character. Within the past six months an advance of about 20 per cent has been noted in shop work, due to increased cost of labor and materials.

No action was taken by the directors on June 4 toward financing any further improvements.

New Line Opened in Texas.—The Port Arthur (Tex.) Traction Company has placed its line in Port Arthur in operation. There are 7 miles of road, over which six Barber cars are in regular service.

Progress of Investigation in Toledo.—J. B. Tanner, who is examining the books of the Toledo Railways & Light Company, Toledo, Ohio, for the city administration of Toledo, at the suggestion of A. E. Lang, president of the company, has announced that a report will be made not later than July 15, 1910, which will give the administration a general insight into the business of the company.

Change in Motive Power Completed on Utah Road.—The change in motive power on the Salt Lake & Ogden Railway, Salt Lake City, Utah, from steam to electricity has been completed and regular service with electric cars is now being given between Salt Lake City and Ogden, a distance of 55 miles. The plans for the electrical equipment of the Salt Lake & Ogden Railway were published in the ELECTRIC RAILWAY JOURNAL of Oct. 2, 1909, page 522.

Maryland Commission Complete.—Austin L. Crothers, Governor of Maryland, has appointed Joshua W. Hering, State Comptroller, as the third member of the Public Utilities Commission, and William Cabell Bruce, former city solicitor of Baltimore, as the chief counsel to the commission. Mr. Hering takes the place which was declined by Walter W. Abell. The commission is now complete with the exception of an assistant counsel.

Financial and Corporate

New York Stock and Money Market

June 7, 1910.

After a week of heavy selling pressure and almost demoralization, due to the threatened adverse action of the administration with regard to the railroads, the stock market to-day suddenly recovered upon the news that the railroad presidents had come to an agreement with President Taft. This extreme sensitiveness on the part of the market indicates that there is little definite sentiment among traders and no investment buying. Traction shares, although affected, were hurt less than railroad and industrial stocks. Interborough-Metropolitan continues to be active at slightly lower prices.

The money market is easier. Quotations to-day were: Call, 2¼ to 2¾ per cent; 90 days, 3½ per cent.

Other Markets

In the Philadelphia market, traction shares have suffered less from the pressure to sell than other stocks. The declines have been insignificant.

From the sudden activity and substantial advances of the Elevated shares in the Chicago market yesterday and to-day it seems apparent that substantial progress has been made in the merger project. Chicago Railways Series 2 has also advanced under buying of fair volume.

In the Boston market, Massachusetts Electric issues are still active, and there has also been some trading in Suburban and Elevated. Prices show little change.

In Baltimore, there has been some activity in the stock of the United Railways. Fair-sized blocks have changed hands at about 13. The bonds continue to be active at former prices.

Quotations of various traction securities as compared with last week follow:

	May 31.	June 7.
American Railways Company	a44½	a44
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a128½	a128
Boston & Suburban Electric Companies	*16	14
Boston & Suburban Electric Companies (preferred)	*74½	a74½
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a42	a41
Brooklyn Rapid Transit Company	78⅞	78⅞
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	84¼	83½
Capital Traction Company, Washington	a129	a131
Chicago City Railway	*195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a80	a75
Chicago Railways, ptcptg., ctf., 2	a18	a19
Chicago Railways, ptcptg., ctf., 3	a10	a9
Chicago Railways, ptcptg., ctf. 4s	*4	a5½
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a75
Consolidated Traction of N. J. 5 per cent bonds	a104	a104
Detroit United Railway	a60	50½
General Electric Company	147	143¼
Georgia Railway & Electric Company (common)	110¾	a110
Georgia Railway & Electric Company (preferred)	88	a88
Interborough-Metropolitan Company (common)	19½	18⅞
Interborough-Metropolitan Company (preferred)	53¼	51⅞
Interborough-Metropolitan Company (4½s)	80	78¾
Kansas City Railway & Light Company (common)	a26	a25
Kansas City Railway & Light Company (preferred)	*76	a76¾
Manhattan Railway	a135	130
Massachusetts Electric Companies (common)	16¾	a16½
Massachusetts Electric Companies (preferred)	a85	a82½
Metropolitan West Side, Chicago (common)	a18	*18
Metropolitan West Side, Chicago (preferred)	a56	*56
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	*74⅜	67¾
Northwestern Elevated Railroad (common)	a17	*17
Northwestern Elevated Railroad (preferred)	a56	*56
Philadelphia Company, Pittsburg (common)	a49	a47½
Philadelphia Company, Pittsburg (preferred)	a44	a44
Philadelphia Rapid Transit Company	a18	a18½
Philadelphia Traction Company	a85¼	*85¼
Public Service Corporation, 5 per cent col. notes	a96	*96
Public Service Corporation, ctfs.	a102½	a102
Seattle Electric Company (common)	a111½	a111¾
Seattle Electric Company (preferred)	a102½	a102½
South Side Elevated Railroad (Chicago)	a58	a65
Third Avenue Railroad, New York	7	5½
Toledo Railways & Light Company	a9¼	*9¼
Twin City Rapid Transit, Minneapolis (common)	a112	109¼
Union Traction Company, Philadelphia	a47½	a47½
United Rys. & Electric Company, Baltimore	*12¼	a13
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	a35	a33¼
Washington Ry. & Electric Company (preferred)	a89	86½
West End Street Railway, Boston (common)	87¾	a88
West End Street Railway, Boston (preferred)	*102½	a102½
Westinghouse Elec. & Mfg. Company	62½	61¼
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Annual Report of United Railways & Electric Company of Baltimore

Gross earnings of the United Railways & Electric Company, Baltimore, Md., amounted to $7,209,984 in the calendar year 1909, or an increase of 5.49 per cent over 1908. Operating expenses were 2.08 per cent higher in 1909 than in the previous year. The operations for three years compare as follows:

	1909.	1908.	1907.
Miles of track	401	401.2	396.2
Gross earnings	$7,209,984	$6,834,802	$7,018,081
Operating expenses	3,361,872	3,293,338	3,470,087
Net earnings	$3,848,112	$3,541,464	$3,547,994
Other income	2,490	3,240	6,505
Total net income	$3,850,602	$3,544,704	$3,554,499
Charges, taxes, etc	2,734,188	2,637,182	2,487,942
Balance	$1,116,414	$907,522	$1,066,557
Extraordinary expenditures	1,013,413	813,751	1,028,899
Surplus	$103.001	$93,771	$37,658
Operating expenses—per cent of gross earnings	46.63	48.18	49.44

The maintenance expenditures included in the operating expenses for 1909 amounted to $633,881, divided between $257,995 for maintenance of way and $375,886 for maintenance of equipment.

William A. House, president of the company, said in part in his report to shareholders:

"The policy of charging to an account designated as 'extraordinary expenditures' the amounts required for rehabilitating the property, as distinguished from ordinary maintenance and repair, has been continued.

"The long pending easement tax litigation was finally decided, June 29, by the Court of Appeals of Maryland, in favor of your company. The litigation presented the question as to whether the street easements valued by the Appeal Tax Court at $11,214,460 and by the Baltimore City Court at $2,611,925.81, used and occupied by your company, were subject to valuation and assessment by the Appeal Tax Court for taxation purposes. The court had already held that the easements of the other public service corporations in the city were taxable as such, but none of these corporations paid to the city the tax of 9 per cent on gross receipts, known as the 'park tax' which is paid by your company. It was contended by your company that this 9 per cent gross receipt tax was in lieu of and substitution for any other tax on its park tax paying mileage whether it was termed a franchise or an easement tax. The Court of Appeals fully sustained the company's contention on this point.

"One of the most vital questions at present affecting street railway companies is the rigidity of fares. The seller of a commodity can usually increase its price as the cost of production increases. Even the steam roads can to some extent increase their rates to meet increased cost of transportation. But this has not been true of electric railways.

"For example, at the time of the consolidation of the street railways in Baltimore in 1899, the city charter provided that 3 cents should be charged for transfers. At the Legislative session immediately following the consolidation, this provision was abolished and your company compelled to charge no more than a 5-cent fare for adults and 3 cents for children, with the universal free transfer system added. This was a very serious blow to the financial prospects of your company. How serious will be realized when it appears that in 1909 57,030,556 transfers were used, which at 3 cents each would have increased the company's revenue for that year $1,710,916.

"It is, of course, true that so great a number of transfers would not have been used if a charge had been made for them, but the figures will serve to indicate the cost to the company of the change in the law. While during the past 10 years your company's fares have been held to this reduction by law, at the same time the carrying cost to your company per passenger has been increasing.

"This condition is by no means peculiar to Baltimore, as throughout the country both the daily press and the trade journals are devoting much space to discussions of the constantly narrowing margin of profit in street railway transportation. A brief comparative review of this subject is, therefore, timely; moreover, it will enable the stockholders and also the public to appreciate fully the expense involved by your company's policy in giving its patrons the best service practicable.

"Within a few years the possible length of a 5-cent ride has been very nearly doubled, and the running time between given points has been materially shortened. In the matter of transfers alone, the number issued in 1909 was nearly four times as great as the number issued in 1900. This growth is very significant in view of the fact that it costs as much to carry a transfer passenger as one paying fare. To give the public this longer ride and quicker transportation, your company has had to increase the expense per passenger for equipment, for maintenance and for power. While the weight of the double-truck car is more than twice that of the single-truck car, yet its seating capacity has not been correspondingly increased. Further, this heavier car demands heavier track structures, more substantial road beds, and a proportionate increase in the power station capacity, as well as in transmission and distribution lines.

"The cost of rolling stock and construction materials has advanced more rapidly, perhaps, than the cost of any other commodities; moreover, the improvement in service has necessitated a more liberal investment in both rolling stock and construction materials, yet the fare remains unchanged. From this there can be but one deduction, and that is that the unit street railway fare with the present high grade of this commodity is relatively too low. This is the great problem that now confronts electric railway companies, and ultimately there will have to be a readjustment of rates in order to solve it.

"Revenue per capita is on the decline; the expense per capita is on a steady and rapid climb.

"These two lines that should pursue a reasonably divergent, or at most parallel course, have been working their way toward a converging point and are now not very far apart.

"One remedy would seem to be to increase the unit rate of fare sufficiently to afford a reasonable return on the investment and enough surplus to take care of depreciation; another, by a contraction of the fare limits; another, by readjusting the transfer system or curtailing this privilege to some extent. Until some such measures are adopted, the conflict between a fixed and rigid price for the commodity sold, transportation, and the greatly increasing cost of producing that commodity and improving its quality will continue to be waged."

The average earnings per car-mile were 26.59 cents, an increase of 1.04 cents, and the cost of service 12.39 cents, an increase of 0.08 cent.

The number of car miles run was 27,124,556, an increase of 360,411 miles.

The total number of revenue passengers carried was 145,601,990, an increase of 7,200,996.

The number of transfers used was 57,030,556, an increase of 2,442,607.

Chicago Railways Receivership

As the result of a meeting held in Chicago between representatives of the Chicago Railways and the Chicago Consolidated Traction Company, the prospects are that an agreement will be reached by which the difference will be adjusted which was responsible for the appointment of receivers for the Chicago Railways. Another meeting of the representatives of the companies has been arranged to be held in New York during the week ended June 11, 1910. The matter to be adjusted is the judgment for $1,344,000 against the Chicago Railways rendered by Judge Ball, of the Superior Court, based on claims by bondholders of the Chicago Consolidated Company, which it was claimed were guaranteed by the Chicago Union Traction Company. Peter S. Grosscup, Judge of the Federal Court, who appointed John M. Roach, president and general manager of the Chicago Railways, and Henry A. Blair, chairman of the board of directors of the company, receivers of the property, has asked for immediate and effective action aimed toward a reorganization of the Consolidated Traction Company. Judge Grosscup has said in part:

"June 20 is three weeks off. Between now and then, if the men charged with responsibility get together at once and in earnest, we can know whether complete agreement is possible, and if not what specific matters are left open. If, on June 20, it is seen that no agreement can be reached, or only a partial agreement, leaving specific matters still open, let the matter still open go at once to an umpire,

to be named by the parties, or some one for them, to be taken up at once by such umpire and disposed of. In other words, let there be immediate action and effective action.

"It is possible that some of the interests may prove recalcitrant. If the Chicago Railways, for instance, should be the recalcitrant, I would think over carefully whether the court, under such circumstances, owed any further protection to that interest; or if the recalcitrant was one or more of the several interests making up the Consolidated Traction Company, I would think over carefully if the court ought to stand longer between that interest and the consequences that would follow its abandonment; or if the recalcitrant were some of the bondholders who have recently obtained judgment, I would think over carefully if it were not my duty to put them at once to their election either to stand on their judgment or on their opportunity to participate in the reorganization—one of these only, not both."

Federal Light & Traction Company, New York, N. Y.—The Federal Light & Traction Company, organized in the interest of Harrison Williams, Sanderson & Porter, James B. Colgate & Company, and others, has been financed. The company is incorporated under the laws of New York, with an authorized capital stock of $11,000,000, of which half is to be 6 per cent preferred stock. There are no bonds. Of the stock, $2,500,000 of preferred and $4,500,000 of common stock have been issued. The Federal Light & Traction Company has secured a controlling interest in the following companies: Grays Harbor Railway & Light Company, Aberdeen, Wash.; Sheridan Electric Light & Power Company, Sheridan, Wyo.; Rawlins Electric Light & Fuel Company, Rawlins, Wyo.; Montrose Electric Light & Power Company, Montrose, Col.; Hobart Light & Power Company, Hobart, Okla.; Albuquerque Electric Power Company, Albuquerque, N. M.; Albuquerque Gas, Electric Light & Power Company, Albuquerque, N. M.; Las Vegas Light & Power Company, Las Vegas, N. M.; Las Vegas Transit Company, Las Vegas, N. M.; Tucson Gas, Electric Light & Power Company, Tucson, Ariz.; Tucson Rapid Transit Company, Tucson, Ariz.

Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Ia.—Homer Loring, president of the Fort Dodge, Des Moines & Southern Railroad, and Parley Sheldon, Ames, Ia., were appointed receivers of the company on June 4, 1910.

Holmesburg, Tacony & Frankford Electric Railway, Tacony, Pa.—The property of the Holmesburg, Tacony & Frankford Electric Railway was sold for $375,000 at foreclosure sale on June 1, 1910, to George B. Atlee & Company, Philadelphia, Pa., representing a syndicate who outbid the committee of bondholders represented by W. L. Haehnlen, of Charles Fearon & Company. The upset price of the property was $330,000. Atlee & Company have issued a statement in which they say in part: "The property was purchased by a syndicate composed of Jacob S. Disston, president of the Tacony Trust Company; Meyer Schamberg, president of the West Chester Street Railway; William L. Allen and George B. Atlee & Company. George B. Atlee & Company are syndicate managers. Arrangements had been made with the Disston committee whereby, if the syndicate was the successful bidder, they were to receive bond for bond and 25 per cent of stock in a new corporation having $400,000 bonds issued on the same property and $100,000 reserved for extensions and betterments and $500,000 of stock. Holders of bonds not deposited with our committee will probably be allowed to participate in the reorganization. This year the company should earn about $120,000 gross, and with the decreased expenses which will follow the expenditure of about $70,000, the net earnings should approximate between $40,000 and $50,000, or sufficient to pay interest on the proposed bonds and leave between 3 per cent and 5 per cent for the new stock."

Interborough-Metropolitan Company, New York, N. Y.—The Interborough-Metropolitan Company has arranged to extend, until June 1, 1911, at the same rate of interest, the $2,250,000 of 6 per cent collateral trust six months' notes, due June 1, 1910. These notes are a part of the $8,000,000 of 6 per cent six months' collateral notes issued on May 27, 1907, by the company to provide the New York City Railway with funds to electrify various horse car lines and to meet the cost of other improvements then contemplated. It was the original intention of the Interborough-Metropolitan Company to take up these six months' notes at their maturity by issuing in their stead 5 per cent three-year notes. At the maturity of the notes, however, approximately one-half were paid off and the remainder was renewed for six months.

Lancaster & Southern Street Railway, Lancaster, Pa.—A receiver has been appointed for the Lancaster & Southern Street Railway.

Metropolitan Street Railway, New York, N. Y.—In accordance with the mandate of the United States Circuit Court of Appeals, Judge Lacombe of the U. S. Circuit Court has signed an order authorizing Adrian H. Joline and Douglas Robinson, receivers of the Metropolitan Street Railway, to expend $394,205 for improvements on a portion of the leased lines of the Metropolitan Street Railway. This mandate of the Court of Appeals is in confirmation of an order of Judge Lacombe signed in January, 1910, from which the Guaranty Trust Company and Morton Trust Company appealed. The amount is to be paid out of income.

Mineral Wells (Tex.) Electric System.—S. B. Cantey, Ft. Worth, Tex., and others, have secured a controlling interest in the Mineral Wells Electric Company by the purchase of the holdings of D. T. Bomar in the company.

Philadelphia & Chester Railway, Philadelphia, Pa.—The property of the Philadelphia & Chester Railway was sold at foreclosure on May 31, 1910, to L. A. Isenthal, A. W. From and R. I. D. Ashbridge, representing the bondholders' committee, for $350,000, which was $125,000 more than the upset price. The Philadelphia & Chester Railway was a part of the system of the Interstate Railways.

Southwestern Street Railway, Philadelphia, Pa.—The sale of the property of the Southwestern Street Railway under foreclosure has been adjourned until June 23, 1910.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—Drexel & Company, Philadelphia, Pa.; Lee, Higginson & Company, New York, N. Y., Boston, Mass., and Chicago, Ill., and Estabrook & Co., Boston, Mass., and New York, N. Y., having sold more than $3,750,000 of the $5,000,000 of 5 per cent bonds of the Terre Haute, Indianapolis & Eastern Traction Company, which they purchased recently, are offering at 95 and interest, yielding 5.30 per cent, the remainder of the bonds. The bonds are dated April 1, 1910, and are due April 1, 1945, but are callable as a whole on or after April 1, 1915, at 105 and interest, or in part for sinking fund purposes only at 102½ and interest on or after April 1, 1911.

Virginia Railway & Power Company, Richmond, Ind.—The Virginia Railway & Power Company has declared an initial dividend of 1½ per cent on its $4,700,000 of preferred stock, payable to stockholders of record on July 1, 1910.

Western Ohio Railway, Lima, Ohio.—More than $1,200,000 of the bonds of the Western Ohio Railway have been deposited under the pooling arrangement which was recently arranged for. The committee desires to secure the deposit of at least $1,500,000 of the bonds. It is stated that the option of 89 will probably be accepted and that the bonds will be sold shortly after they are pooled. If the option of Hayden, Miller & Company, Cleveland, at 89 on the bonds is not exercised, the committee may sell them to someone else, but at a price not less than 89. The receipts covering the deposit of bonds have been listed upon the Cleveland Stock Exchange. The Western Ohio Railroad has been incorporated to lease the Western Ohio Railway, obligating itself to pay the interest on the bonds of the Western Ohio Railway and the principal at maturity and dividends on the present preferred stock and on the possible issue of first preferred 7 per cent stock into which the second mortgage 6 per cent bonds are convertible. The holders of common stock of the Western Ohio Railway will have the privilege of exchanging it for common stock of the Western Ohio Railroad, however, on the basis of three shares of the former for one of the latter. The charter of the Western Ohio Railroad authorizes the company to construct a line between Toledo and Dayton. The present northern terminus of the Western Ohio Railway is at Findlay.

Traffic and Transportation

Power Brake Measure in Ohio

The following is the text of the measure passed by the Legislature of Ohio and signed by Governor Harmon, which provides that cars of electric railways operating in Ohio shall be equipped with power brakes prior to Jan. 1, 1913:

"Section 1.—That from and after Jan. 1, 1913, it shall be unlawful in the State of Ohio for any corporation, company, person, or persons owning or controlling the same, to operate, use or run, or permit to be run, used or operated for carrying passengers or freight on an urban or interurban railroad or street car line, any car propelled by electricity not equipped, in addition to the hand brake in use on such car, with an air or electric power brake or apparatus capable of applying to all the brake shoes or wheels of such car a maximum permissible braking pressure, and of automatically reducing such braking pressure, as the speed of the car decreases. Fifty per cent of such cars to be so equipped prior to Jan. 1, 1911, and 75 per cent prior to Jan. 1, 1912. It shall be the duty of the Railroad Commission of Ohio to enforce this act.

"Section 2.—Any corporation, company, person or persons operating, using or running any car, or permitting any car to be operated, used or run, in violation of any of the provisions of this act, shall be liable to a penalty of $100 for each such violation, to be recovered in a suit or suits which it shall be the duty of the prosecuting attorney of any county where such violation shall have been committed to prosecute; such suit or suits to be brought by such prosecuting attorney upon verified information being lodged with him of such violation having occurred."

Accident on New Haven Railroad.—The last two cars of an express train over the New York, New Haven & Hartford Railroad from Boston, which was due in the Grand Central Station, New York, N. Y., on June 6, 1910, at 3:50 p. m., left the rails at a junction near New Rochelle, N. Y., in the electric zone, and one of the cars was turned over. None of the passengers was seriously injured.

Accident on Detroit, Monroe & Toledo Short Line Railway.—A limited train on the Detroit, Monroe & Toledo Short Line Railway, Monroe, Mich., collided with a local train at a siding about five miles north of Toledo, Ohio, on June 4, 1910, and more than 20 persons were slightly injured. Traffic over the line at the time of the accident was particularly heavy on account of the ceremonies in Monroe which attended the unveiling of the monument to General Custer in that city.

Central Electric Traffic Association Files Tariffs.—The Central Electric Traffic Association has filed its new Joint and Local Freight Tariff No. 1, which covers the Official Classification No. 36, with the Interstate Commerce Commission, the Indiana Railroad Commission, the Michigan Railroad Commission, the Ohio Railroad Commission, the Illinois Railroad & Warehouse Commission and the Kentucky Railroad Commission. Hitherto the classification has always been filed by the companies separately.

Accidents in Chicago.—The City Attorney of Chicago has issued a report of the street accidents during the 11 months from July 1, 1909, to May 31, 1910. Street cars are charged with 110 fatalities. Of these 14 occurred during May, in which there also were 322 personal injuries. Twenty children under the age of 10 years who were playing in the street were injured; 39 were hurt when getting on or off moving cars, and 84 others were hurt in crossing from one side of the street to the other after alighting from cars.

Arrest for Misrepresentation in Rochester.—The New York State Railways has been active in prosecuting men who have secured employment with the company in violation of Section 939 of the Penal Law of the State, which forbids misrepresentation in securing employment. As a result of a recent prosecution of this kind on a warrant sworn out by Wm. C. Callaghan, superintendent of transportation of the Rochester lines, an employee named Bennetser was recently fined $50. The information against him alleged that he had worked on the street railway systems in Buffalo and other cities and also previously on the Rochester lines. No financial irregularity was charged.

Arbitration in Connecticut.—The following announcement was made in New Haven, Conn., on June 1, 1910, in the interest of the Connecticut Company, in regard to the subject of the readjustment of the terms of service of the motormen and conductors in the employ of the company: "As arbitration of the wage schedule was agreed upon at the last conference of the trolleymen's committee with President Mellen, it is unlikely that any further conferences will be arranged, as the discussion will hereafter be made before the arbitrators. A sub-committee was appointed by the men. This committee is in touch with the officers of the company arranging the arbitration details. As soon as these are agreed upon they will be given to the press."

Complaint to Interstate Commerce Commission Against Electric Railways.—R. W. Sylvester, Prof. Thomas H. Spence, president and vice-president of the Maryland Agricultural College; H. J. Patterson, director of the Maryland Agricultural Experiment Station; George Gaylor and A. J. Wiegman, Berwyn, Md.; Judge Filmore Beall and C. A. Fox, Beltsville, Md., and others have complained to the Interstate Commerce Commission that the rates for transportation charged residents of Maryland who use the cars of the Washington, Berwyn & Laurel Electric Railway and the City & Suburban Railway are excessive and exorbitant. They also allege that the defendant electric railways are unfair and unjust in their dealings with passengers from Laurel to Washington, D. C., and return, and that the present rates charged and the conditions imposed work a hardship upon the patrons of the road.

Funeral Car Service in Chicago.—The Calumet & South Chicago Railway, in connection with the Chicago City Railway and the Hammond, Whiting & East Chicago Electric Railway, has issued a 12-page booklet, in which the funeral car service is described, which the company offers from points on the Chicago City Railway and the Hammond, Whiting & East Chicago Electric Railway to four cemeteries located south and southwest of the city. The booklet illustrates funeral car No. 1, which was described in the Electric Railway Journal of April 16, 1910, page 714. A double-page map shows the surface lines in Chicago south of the loop district. The charges for funeral car service from any point on the three railways to any one of the four cemeteries vary between $30 and $40 for a round trip. On the return trip transfers are issued to the surface cars. Arrangements for funeral car service may be made through undertakers.

Souvenir of Willow Grove Park.—The Philadelphia (Pa.) Rapid Transit Company has issued an illustrated souvenir of Willow Grove Park for 1910, which contains 48 pages. Willow Grove Park was formally opened 15 years ago. It has always held a peculiar position in the world of music in Philadelphia, bringing together the interval between the indoor musical seasons. This year the company has arranged for the appearance of Conway and his band, Fred A. Stock and the Theodore Thomas Orchestra, Victor Herbert and his orchestra and Sousa and his band. With the exception of Conway's Band, which returns after an absence of several years, the concert arrangements are identical with those of last season. In addition to the musical attractions at the park for the summer, the souvenir describes the amusement features. They include boating and the attractions afforded at the Casino, the rustic pavilion, the automobile race track, etc.

Summer Schedule on Inland Empire System.—The summer schedule went into effect on the Spokane & Inland Empire Railroad, Spokane, Wash., on May 28, 1910, and more trains are being operated to Liberty, Cœur d'Alene and Hayden Lakes than ever before. The service to Liberty Lake is separate from that to Cœur d'Alene. The schedule on the main line to Cœur d'Alene calls for 11 trains. The work of double-tracking the Cœur d'Alene division between Spokane and Spokane Bridge, a distance of 19 miles, is nearing completion, and will enable the company to reduce the running time from Cœur d'Alene to Broadway Junction, Spokane, to 42 minutes. The "Campers' Limited Train," which proved popular with summer residents at Hayden Lake in seasons past, leaves Spokane at 4:30 p. m. daily, except Sunday, and arrives at Hayden shortly before 6 p. m. It leaves the lake at 7:35 a. m. and arrives in Spokane at

8:57 a. m. Simultaneous with the summer schedule the special excursion rates for week-end and Sunday trips to the lakes became effective.

Accident Fakir Arrested.—By an arrest made in New York the police believe they have stopped the operations of a successful collector of fraudulent damages against railways. The prisoner is Mrs. Anna A. Strula, and the arrest was secured largely by F. L. Arnold, secretary of the Alliance Against Accident Fraud of New York. According to Mr. Arnold, the woman was accustomed to allege that she had been hurt by a jar due to the sudden stopping of a train or car, but in a majority of instances banana peels or grape skins would be found under her after she had been picked up, seemingly in great pain after a fall. Negligence in leaving such slippery things on the steps or platforms would then be made the basis of a suit. The woman suffered from hernia, and claimed that this trouble was brought on by each accident. Among the companies from which she is said to have collected money are: Public Service Railway, $100; New Jersey & Hudson River Railway & Ferry Company, $100; Brooklyn Rapid Transit Company, $50, and Pennsylvania Railroad, $1,000. Other steam railroads paid sums varying from $50 to $250. Other electric railway companies against whom she is said to have brought claims, but to have collected nothing are: Boston Elevated Railway, Atlantic Coast Electric Railway and the Manhattan Railway, New York.

Increase in Wages in Cincinnati.—W. Kesley Schoepf, president of the Cincinnati (Ohio) Traction Company and the Ohio Electric Railway, has announced an increase in the wages of the platform men of the companies. In the city service no change has been made for the first year, during which the men receive 20 cents an hour. For the second and third years wages are advanced from 20 cents to 21 cents; fourth, fifth and sixth years, from 21 cents to 22 cents; seventh, eighth, ninth and tenth years, from 22 cents to 23 cents; eleventh, twelfth, thirteenth, fourteenth and fifteenth years, from 22 cents to 24 cents; sixteenth year and thereafter, 22 cents to 25 cents; overtime, 25 cents. The advances on the Ohio Electric Railway follow: First six months, from 18 cents to 20 cents; second six months, 19 cents to 20 cents; second year, 20 cents to 21 cents; third year, 21 cents to 22 cents; fourth year, 22 cents to 23 cents; fifth year, 23 cents to 24 cents; sixth year, 25 cents, no change; seventh year and thereafter, 25 cents to 26 cents. On the town and city systems operated by the Ohio Electric Railway, such as Dayton, Hamilton, Zanesville, Newark, Lima and Bellefontaine, the advances follow: First year, 17 cents to 18 cents; second year, 18 cents to 19 cents; third year, 18½ cents to 19½ cents; fourth year, 19 cents to 20 cents; fifth year, 20 cents to 21 cents; sixth year, 20 cents to 22 cents; seventh year and thereafter, 20 cents to 23 cents.

New Schedule on the Rochester, Syracuse & Eastern Railroad.—A new schedule has been inaugurated on the Rochester, Syracuse & Eastern Railroad under which the 82.6 miles between Rochester and Syracuse are covered by the company's limited trains, which make 12 station stops and the necessary slow-downs while passing through villages, in 2 hours and 37 minutes. Of this time 30 minutes are consumed in getting out of one of the terminal cities and into the other, a distance of 7 miles, so that the running time for the 79.8 miles between the city lines of the two terminals is 2 hours and 7 minutes. The first limited cars over the Rochester, Syracuse & Eastern Railroad each day leave Rochester and Syracuse at 7 a. m. and every other hour on the odd hour up to and including 9 p. m. On June 3, 1910, a particularly fast run was made on the Rochester, Syracuse & Eastern Railroad by a special car in which were C. D. Beebe, general manager of the company; William Nottingham, general counsel; H. J. Clark, assistant to the president, and some visitors from Toronto, Ont. The car made a trip of 167.2 miles from the Syracuse terminal to Culver Road at the Rochester City line and return in 4 hours and 15 minutes, making 10 stops going and coming. Of this time 30 minutes were spent in making the 8.8 miles between the Syracuse terminal and Lake Shore Junction. The distance from Lake Shore Junction to Culver Road is 79.2 miles, and westbound it was made in 1 hour and 53 minutes and eastbound in 1 hour and 52 minutes.

Personal Mention

Mr. P. N. Peterson has been appointed master mechanic of the Beaver Valley Traction Company, Beaver Falls, Pa.

Mr. Kade Neiswender has resigned as superintendent of the Marion Railway, Light & Power Company, Marion, Ohio.

Mr. R. C. Gillis has been elected president of the Los Angeles-Pacific Company, Los Angeles, Cal., to succeed Mr. E. P. Clark, resigned.

Mr. F. C. Rapp has resigned as master mechanic of the Atlantic City & Shore Railroad, Atlantic City, N. J., to accept a position in the West.

Mr. John Boyer has been appointed superintendent of the Marion Railway, Light & Power Company, Marion, Ohio, to succeed Mr. Kade Neiswender, resigned.

Mr. M. L. Hibbard has been appointed assistant general manager and resident engineer of the San Antonio (Tex.) Traction Company to succeed Mr. W. H. Thomson, resigned.

Mr. T. S. Adams has resigned as district master mechanic of the Public Service Railway at Newark, N. J., to become master mechanic of the Atlantic City & Shore Railroad, Atlantic City, N. J.

Mr. Ira C. Walborn has resigned from the Eastern Pennsylvania Railways, Pottsville, Pa., to become assistant electrical superintendent of the Eastern Pennsylvania Light, Heat & Power Company, Pottsville, Pa.

Mr. Charles E. Taylor has resigned as general manager and electrical engineer of the Edmonton (Alta.) Electric Railway, and the management of the property is now in the hands of the three railway commissioners.

Mr. James H. Smeaton, who has been in charge of the Lac du Bonnet station of the Winnipeg (Man.) Electric Railway for the last four years, has become connected with the Pennsylvania Water & Power Company, McCall Ferry, Pa.

Mr. James F. Shaw, president of the American Street & Interurban Railway Association, is planning to sail on the *Baltic* on June 11, 1910, for a European trip of four or five weeks. He expects to visit England, France, Germany and Belgium, and will inspect the electric railway practice in those countries.

Mr. E. P. Maxwell has been appointed assistant general manager of the Sterling, Dixon & Eastern Electric Railway and the Lee County Lighting Company, and will have his office at Dixon, Ill. Mr. Maxwell was formerly manager of the Dixon Lighting Company, which was absorbed by the Lee County Lighting Company several years ago. He has managed the gas and electric department of the Eastern Wisconsin Railway & Light Company at Fond du Lac recently.

Mr. A. M. Courtney, formerly foreman of the track department of the San Antonio (Tex.) Traction Company, has been appointed superintendent of maintenance of way of the company, and Mr. George H. Cushman, superintendent of the electrical department of the San Antonio Gas & Electric Company, has been appointed superintendent of overhead work of the San Antonio Traction Company. Mr. Courtney and Mr. Cushman will succeed to the duties performed by J. J. King, whose death was noted in the ELECTRIC RAILWAY JOURNAL of May 28, 1910.

Mr. J. P. Pulliam, who has recently been manager of the railway department of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and the Wisconsin Electric Railway, Oshkosh, Wis., and assistant general manager of the companies in charge in the absence of Mr. Clement C. Smith, has been appointed general manager of the Eastern Wisconsin Railway & Light Company and general manager of the Wisconsin Electric Railway, with headquarters at Fond du Lac. Mr. Pulliam was formerly general superintendent of the Wisconsin Electric Railway and the Eastern Wisconsin Railway & Light Company in charge of operation.

Mr. Joshua W. Hering, State Comptroller of Maryland, has been appointed a member of the Public Utilities Commission of Maryland by Governor Crothers, of that

State, taking the place that was declined by Mr. W. W. Abell. Mr. Hering is a banker of Carroll County. He formerly represented Carroll County in the State Senate. In 1890 he was elected State Comptroller and was re-elected in 1901. From 1903 to 1907 he did not hold public office, but in the latter year he was elected comptroller on the ticket headed by Governor Crothers, and was re-elected in November, 1909. Mr. Hering has qualified as a member of the commission.

Mr. E. P. Clark has resigned as president of the Los Angeles-Pacific Company, Los Angeles, Cal., and Mr. R. C. Gillis has been elected to succeed him. The directors of the company passed the following resolution expressing their regret at the retirement of Mr. Clark: "Resolved, That we hereby express our appreciation of the long-continued, faithful and efficient service of our retiring president, Mr. E. P. Clark, who has presented his resignation, and in accepting his resignation, which he voluntarily presents as incident to the sale of his interest in the stock of our company. We desire that this appreciation be spread upon the minutes of this meeting and a copy of this resolution, properly endorsed, be delivered to Mr. E. P. Clark."

Prof. Albert S. Richey has been engaged by the Boston & Northern Street Railway and the Old Colony Street Railway to make a scientific study of the schedules of these companies for the purpose of determining the most economical speeds, headways, etc., on the various divisions north and south of Boston, comprising about 950 miles of track. Professor Richey has been professor of electric railway engineering at Worcester Polytechnic Institute since 1905, previous to which time he was chief engineer of the Indiana Union Traction Company. Since locating in Worcester he has acted as consulting engineer for a number of Eastern roads. Professor Richey will continue his connection with Worcester Polytechnic Institute, and will divide his time between Worcester and his Boston office at 84 State Street.

Miss S. M. Rothermel has resigned as assistant secretary of the Wisconsin Electric Railway, Oshkosh, Wis., to become confidential secretary to Mr. E. E. Downs, general manager of the Chicago & Milwaukee Electric Railroad, Highwood, Ill. Miss Rothermel was secretary of the Citizens' Traction Company at Kalamazoo, Mich., but resigned in October, 1897, to become connected with the Citizens' Traction Company, Oshkosh, Wis. In 1900 the Citizens' Traction Company was reorganized as the Winnebago Traction Company and Miss Rothermel was made treasurer and assistant secretary of the company, in which capacity she continued until July 6, 1907, when the company went into the hands of the receiver. During the receivership Miss Rothermel acted as chief clerk. Upon the organization of the Wisconsin Electric Railway as the successor to the Winnebago Traction Company in August, 1908, Miss Rothermel was made assistant secretary of the company.

Mr. J. M. Yount has resigned as master mechanic of the Union Railway, New York, N. Y., to become master mechanic of the United Railroads, San Francisco, Cal., to succeed Mr. F. F. Bodler, who resigned some time ago. Mr. Yount was graduated from Purdue University with the degree of electrical engineer. He began his street railway career with the Citizens' Street Railway, Indianapolis, Ind., immediately upon matriculating. In 1898 he entered the employ of the Metropolitan Street Railway, New York, N. Y., with which he served about a year. Mr. Yount then became connected with the Jersey City, Hoboken & Paterson Railway, Paterson, N. J., as assistant to Mr. H. H. Adams, who is now superintendent of rolling stock and equipment of the Metropolitan Street Railway, New York, N. Y. Subsequently he was appointed master mechanic of the North Jersey Street Railway, which was controlled by the same interests that owned the Jersey City, Hoboken & Paterson Railway. When the Public Service Corporation of New Jersey was formed in 1902 Mr. Yount was made superintendent of rolling stock of the company in charge of the North Jersey division of that company. In April, 1906, Mr. Yount was appointed assistant master mechanic of the Pittsburgh (Pa.) Railways. Later he accepted the position of assistant to Mr. W. D. Wright, master mechanic of the Rhode Island Company, operating the electric railways in Providence, R. I.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Brooklyn & Jamaica Bay Railway, Brooklyn, N. Y.**—Incorporated in New York to build a 3-mile electric railway from Montauk Avenue and Liberty Avenue, Brooklyn, to Jamaica Bay. Capital stock, $100,000. Directors: H. J. Subers, Ashbourne, Pa.; N. S. Easton, Daniel Von Wein and E. S. Churchill, New York, and F. B. Lupten, Brooklyn.

***Rochester Belt Line Railroad, Rochester, N. Y.**—Incorporated in New York to build a 15-mile freight belt line around Rochester, connecting up the freight transfer points of the New York Central & Hudson River Railroad, the Lehigh Valley Railroad, the Buffalo, Lockport & Pittsburgh Railway, the West Shore Railroad, the Pennsylvania Lines, the Erie Railroad, the Western New York & Pennsylvania Railroad, all steam lines as well as all the interurban electric lines. It will operate by both steam and electricity. Capital stock, $2,500,000. Directors: Frank A. Dudley, Niagara Falls; Henry C. Brewster, John F. Alden, Rochester, and C. D. Beebe.

***Fifth Avenue Railway & Light Company, Columbus, Ohio.**—Incorporated in Ohio to build a crosstown street railway in Columbus. Capital stock, $10,000. Incorporators: A. C. Wolfe, E. W. Yantes, W. Cushing, J. E. Fippen and J. W. Jennings, all of Columbus.

***Western Ohio Railroad, Lima, Ohio.**—Incorporated in Ohio to build an electric railway to connect Lucas, Wood, Hancock, Allen, Auglaize, Shelby, Miami and Montgomery Counties with branches from Wapakoneta to Celina and from St. Mary's to Lorain. Capital stock, $10,000. Incorporators: Frank H. Ginn, Albert E. Green, G. M. Cummings, Grover Higgins and John M. Garfield.

***Tower City, Reiner City & Johnstown Street Railway, Johnstown, Pa.**—Chartered in Pennsylvania to build a 3-mile railway from the terminus of the Lykens & Williams Valley Street Railway in Dauphin County to Johnstown. Capital stock, $100,000. Incorporators: Joseph W. Moyer, Pottsville, president; W. E. Harrington and John H. Williams, Pottsville, A. B. Greenshield, Philadelphia; Edgar D. Rank, Williamstown; N. D. Yoder, Hegins, and J. F. Romberger, Berrysburg.

Scranton & Lake Ariel Railway, Scranton, Pa.—Incorporated in Pennsylvania to build a 20-mile electric railway to connect Scranton and Lake Ariel. Construction will begin as soon as a franchise is obtained in Scranton. Incorporators: John J. Brown, Valentine Bliss, W. J. Davis, John J. Holland, F. W. Wollerton, E. J. Lynett and A. G. Rutherford. [E. R. J., May 14, '10.]

***Sylvan Dell Park Company, Williamsport, Pa.**—Chartered in Pennsylvania to build a 3½-mile railway from South Williamsport to Sylvan Dell Park, Williamsport. Capital stock, $24,000. H. W. Whitehead, president.

***Mineral Wells (Tex.) Electric Company.**—Chartered in Louisiana to build a street railway in Mineral Wells. Capital stock, $350,000. Officers: S. B. Canty, Fort Worth, president; N. C. Blanchard, vice-president, and W. C. Forbes, Fort Worth, secretary.

***Vancouver, Canias & Washougal Traction Company, Vancouver, Wash.**—Application for a charter has been made by this company in Washington to build an electric railway from Vancouver to Washougal. Capital stock, $100,000. Incorporators: H. C. Phillips, W. D. Smith and E. M. Rands.

***Burnsville, Glenville & Parkersburg Company, Parkersburg, W. Va.**—Incorporated in West Virginia to build an electric railway from Burnsville to Parkersburg, via Glenville. Capital stock, $10,000. Incorporators: N. J. Bartlett and J. B. Supler, Clarksburg; L. W. Bartlett, C. E. Hines and Henry Sipes, Buckhannon, W. Va.

FRANCHISES

Bakersfield, Cal.—The Power, Transit & Light Company has asked the Board of Trustees for a 50-year franchise to build a single or double-track railway in Bakersfield.

New Albany, Ind.—The Louisville & Northern Railway & Lighting Company, New Albany, has been granted a franchise to build a railway on North State Street from the present terminus of its line to the city limits.

Menominee, Mich.—The Menominee & Marinette Light & Traction Company has asked the Council for a franchise to extend its line on Taylor Avenue to Henes Park, in Menominee.

Minneapolis, Minn.—The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company has asked the Council for a franchise to extend its lines to the center of Minneapolis. M. W. Savage, president.

Cincinnati, Ohio.—The Cincinnati Union Depot Terminal Company, Cincinnati, has asked the City Council for a franchise for the use of certain streets and crossings in connection with the construction of the terminal which the company contemplates erecting. [E. R. J., May 28, '10.]

Springfield, Ore.—The Portland, Eugene & Eastern Railway, Eugene, has been granted a franchise by the Council to build a railway in Springfield with the stipulation that within a year cars shall be operating over all of Mill Street to the city limits.

Johnstown, Pa.—The Johnstown Passenger Railway has been granted a franchise to build an extension to Southmont.

McKeesport, Pa.—The Pittsburgh, McKeesport & Westmoreland Railway has asked the Council for a franchise to extend its railway in McKeesport.

New Castle, Pa.—The New Castle & Beaver Valley Street Railway, Beaver Falls, has been granted an extension of its franchise for six months in which to begin work on its 22-mile railway to connect New Castle and Beaver Falls. [E. R. J., May 21, '10.]

Scranton, Pa.—The Scranton & Lake Ariel Railway will soon ask the Council for a franchise to build a railway over certain streets in Scranton. This is part of a plan to connect Lake Ariel and Scranton. [E. R. J., May 14, '10.]

Memphis, Tenn.—The Memphis Street Railway has been granted a franchise by the Council to build a crosstown line in Memphis.

***Austin, Tex.**—C. V. Burkhead, San Antonio, N. A. Dawson and James T. Priest, South Austin, have asked the Council for a franchise to build a street railway in South Austin.

***Port Orchard, Wash.**—The Bainbridge Development Company has asked the County Commissioners for a franchise to construct an electric railway on Bainbridge Island, to connect with a ferry from Eagle Harbor to Seattle.

TRACK AND ROADWAY

Birmingham & Edgewood Electric Railway, Birmingham, Ala.—This company has let the contract to Furtuanger & Smith for building its 3½-mile extension from the Birmingham base of the Red Mountain through Red Mountain Cut, thence across Shades Valley to Shades Mountain.

***Esquimalt & Nanaimo Railway, Vancouver, B. C.**—This company is said to be surveying a 12-mile route between Oyster River on the east coast of Vancouver Island and the north of Comox Harbor to Campbell River, and it is probable that the location of the line to some point on Quatsino Sound will be undertaken in the near future.

Fresno (Cal.) Traction Company.—This company has nearly completed the double tracking of its lines within the city limits of Fresno. Work on the double tracking of its railway to Zapp's Park will be started soon.

Pacific Electric Railway, Los Angeles, Cal.—This company expects to build a 6-mile railway between Wilmington and Long Beach. The line will connect with the Pacific Electric Railway at Wilmington and at Long Beach.

Vallejo & Northern Railway, Vallejo, Cal.—The directors of this company, which proposes to build a railway to connect Vallejo, Cordelia, Suisan, Vacaville and Sacramento, will hold a meeting July 28, when action will be taken toward increasing its capital stock from $2,500,000 to $10,000,000. [E. R. J., April 9, '10.]

Bridgeport & Danbury Electric Railway, Bridgeport, Conn.—This company is reported to be surveying, and is considering the construction of a 20-mile interurban railway this summer to connect Bridgeport, Trumbull, Monroe, Newton, Bethel and Danbury. Capital stock, $1,500,000. Morton F. Plant, New London, Conn., is interested. [E. R. J., Aug. 24, '07.]

***Burley, Idaho.**—Isaac N. Powell, Chicago; Henry C. Yarin, Charles Uhlrich and James R. Van Cleave, Springfield, are reported to be interested in promoting an electric railway between Albion and Burley.

***Mattoon, Ill.**—Messrs. Knollenberg and Lauber are said to be interested in a plan to build an interurban railway to connect Quincy, Springfield, Shelbyville, Mattoon, Charleston and Paris.

Oil Belt Traction Company, Oblong, Ill.—This company has awarded the contract to McCann Brothers, Murphysboro, for building its proposed 12-mile railway between Bridgeport and Oblong. N. L. Upson, manager. [E. R. J., Sept. 11, '09.]

St. Joseph Valley Traction Company, Elkhart, Ind.—This company has started work on its extension to Metz. The interurban connection between Elkhart and Bristol is nearly completed, and will bring Elkhart into touch with Toledo and other important centers.

Albia (Ia.) Interurban Railway.—This company has authorized a $300,000 bond issue to build a 12-mile extension from Albia to Buxton. Engineering and construction of the line are in charge of the Engineering, Construction & Securities Company, Chicago, Ill.

Iowa City Electric Railway, Iowa City, Ia.—This company has been organized to build a railway to Runnell's addition this summer, and another to the city park. Capital stock authorized, $100,000, of which the full amount is said to have been subscribed. Officers: J. O. Schulze, president; John H. Rohret, vice-president; D. A. Reese, secretary and treasurer. [E. R. J., April 24, '09.]

***Wichita, Kan.**—R. Iams, Clay Center, Kan., is said to be interested in a project to build a 200-mile interurban railway from Beatrice, Neb., to Wichita, Kan.

Dowagiac (Mich.) Railway.—Press reports state that this company has started construction of its 10-mile railway between Eau Claire and Dowagiac. H. C. Mann, Benton Harbor, Mich., general manager. [E. R. J., Dec. 12, '08.]

St. Louis, St. Charles & Northern Traction Company, Mexico, Mo.—This company has started surveys from Laddonia to Troy and St. Charles, a distance of 90 miles, for its proposed electric railway from St. Charles through Troy, Olney, Marling, Middletown, Mount Carmel, Laddonia, Mexico and Paris. Bewick & Koch, Columbia, Mo., engineers. C. B. Duncan, president. [E. R. J., May 28, '10.]

Lincoln (Neb.) Traction Company.—This company has decided to survey for an extension from College View to Auburn. J. H. Humpe, Lincoln, general manager.

Orange Mountain Traction Company, South Orange, N. J.—This company has begun work on the extension of its line from its terminus at Northfield to Rock Spring.

Alliance-Akron Railroad, Alliance, Ohio.—A preliminary organization for the construction of the proposed 26-mile railway between Alliance and Akron has been effected by the election of Charles Keith, president, and Arthur Wright, secretary. [E. R. J., May 28, '10.]

Minster & Loramie Railway, Minster, Ohio.—This company, which was recently incorporated to build a railway from Loramie to Minster, has completed its organization by the election of the following officers: John Raterman, president; B. Wuebker, vice-president; Jos. Willman, secretary, and Julius Boesel, treasurer. It will connect with the Minster branch of the Western Ohio Railway at Minster and, it is said, will be operated as a part of that system. [E. R. J., Feb. 19, '10.]

Portsmouth Street Railway & Light Company, Portsmouth, Ohio.—It is reported that arrangements have been completed by this company to extend its line to Hanging Rock, below Ironton, to connect there with the Ohio Valley Electric Railway, Huntington, W. Va. Ultimately, it is believed these lines will extend the entire length of the Ohio River from Pittsburgh to Cincinnati. Construction on this extension will be started at an early date. R. D. York, Portsmouth, general manager.

Enid (Okla.) City Railway.—This company reports that within three months it expects to place a contract for building 1½ miles of new track and overhead work. C. H. Bosler, Dayton, Ohio, president.

Oklahoma Public Service & Interurban Company, Stillwater, Okla.—This company has let contracts to Daniel Sweeney & Company for grading, and to M. B. Ryan for bridge construction and culverts on its 14-mile railway to connect Stillwater, Yale, Morrison and Perkins. Headquarters, Stillwater. Officers: L. J. Lampke, president; Claude Powell, vice-president; F. A. Hoffman, purchasing agent; H. A. Campbell, assistant engineer, and R. A. Sturgeon, chief engineer. [E. R. J., April 2, '10.]

Hanover & McSherrystown Street Railway, Hanover, Pa.—This company has awarded the contract to John H. Dobbling for grading the extension of its line from McSherrystown to Conewago Chapel. At Conewago Chapel the proposed railway will branch, one line going to Gettysburg, the other to New Oxford. Robt. E. Manley, Hanover, general manager.

Southern Cambria Railway, Johnstown, Pa.—This company has started work at Ebensburg and Mineral Point on the extension of its line. At Mineral Point the line will branch off from the present road to South Fork. The line will extend from Mineral Point to Saltlick and Ebensburg. [E. R. J., May 7, '10.]

West Shore Railway, Wilkesbarre, Pa.—This company has been organized at Wilkesbarre and proposes the construction of a third-rail railway, 8 miles long, to connect Pittston, Forty Fort, Wyoming, Exeter, West Pittston and Wilkesbarre. Contracts for the work will be let within four weeks. There will be built 2000 ft. of trestle work about 10 ft. high. J. L. Dunn, 54 Public Square, Wilkesbarre, secretary. [E. R. J., Feb. 12, '10.]

York (Pa.) Railways.—It is stated this company will spend $18,000 building a loop on Carlisle Avenue, Pennsylvania Avenue and West York Avenue. An equal amount will be expended in double-tracking West York Avenue. The company intends double-tracking Market Street. It is now finishing double-tracking West Market Street.

Trinity Valley Traction Company, Dallas, Tex.—This company advises that it has not yet been incorporated, and that it is now operating under the direction of a board of trustees. When preliminary arrangements have been completed a charter will be secured. It is the intention to begin work on the proposed 120-mile railway this fall. It will connect Dallas, Waxahachie, Ennis, Corsicana and Palestine. Power stations will be built at Dallas and near Corsicana. Headquarters, 304 Scollard Building, Main Street, Dallas. Capital stock to be $3,000,000. Officers: J. V. Watkins, 304 Scollard Building, Dallas, president and general manager; J. J. Sears, Aledo, vice-president; W. W. Clopton, Corsicana, secretary. [E. R. J., May 28, '10.]

***Stamford, Tex.**—Messrs. Whyman & Barton, engineers, of Dallas and Amarillo, are promoting a plan to build an electric railway in Stamford.

Ogden (Utah) Rapid Transit Company.—This company has recently placed the following contracts for line material: Illinois Steel Company, 1250 tons of 40, 45 and 48-lb. rail; John A. Roebling's Sons Company, 210,000 lb. of copper wire; Ohio Brass Company, 25 miles of line material and 7 miles of rail bonds; American Steel & Wire Company, 14 miles of rail bonds.

Bellingham-Skagit Railway, Bellingham, Wash.—Preliminary surveys for this projected interurban railway have been completed and construction will be started soon. It will connect towns in Bellingham and Skagit County, and will be built by the Stone & Webster Engineering Corporation. R. T. Laffin, White Building, Seattle, engineer.

***Seattle, Wash.**—C. H. Shields, of the Spokane Grain & Fuel Company, Spokane, is said to be interested in the construction of an electric railway to extend from Seattle to North Seattle.

Clarksburg & Weston Electric Railway, Clarksburg, W. Va.—This company has awarded contracts to Ramage, Wolf & Company for the grading and concrete work, for the three bridges for 6 miles of its proposed 24-mile railway which is to connect Clarksburg and Weston. Construction will start at once. James O. Watson, Fairmont, general manager. [E. R. J., May 28, '10.]

Sabraton Railway, Morgantown, W. Va.—This company will let contracts for the construction of its Dellslow extension and the Lake Erie extension in June. G. Gilmour Sturgiss, Morgantown, general manager.

SHOPS AND BUILDINGS

British Columbia Electric Railway, New Westminster, B. C.—This company expects to begin work at once building repair shops at the south end of Westminster Bridge, Westminster, for its Fraser Valley branch. D. J. McQuarrie, New Westminster, local manager.

Connecticut Company, New Haven, Conn.—This company is having plans drawn by Architects Foote & Townsend for a large addition to its car house in Fair Haven. The structure will be similar to the other car houses of the company, and will be 64 ft. x 104 ft., two stories high, of brick, and with a gravel roof.

Indiana Union Traction Company, Anderson, Ind.—Press reports state that this company is considering plans for the erection of a new station in Bluffton.

Des Moines (Ia.) City Railway.—The car house and shop of this company on West Second Street and Locust Street in Des Moines was completely destroyed by fire on June 2. Twenty-one cars were burned, entailing a loss of $105,000; the car house was valued at $15,000, and its machinery and equipment at $5,000.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has sold its Harney Street car house in Omaha. The company will vacate the building on the completion of its new car house at Tenth Street and Pierce Street.

Enid (Okla.) City Railway.—This company advises it will place contracts soon for a new car house to have a storage capacity for 24 cars at Enid. C. H. Bosler, Dayton, Ohio, president.

POWER HOUSES AND SUBSTATIONS

Capital Traction Company, Washington, D. C.—This company will erect a new power station in Washington to have a 5500-kw capacity.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has started work on its new power house at Fifth Street and Jones Street in Omaha. The structure will be 144 ft. x 165 ft. and 90 ft. high. It will be constructed of steel and brick with tile trimmings. Estimated cost is $300,000. Dichter & Jens, St. Louis, are engineers in charge. [E. R. J., Nov. 6, '10.]

Atlantic City & Shore Railroad Company, Atlantic City, N. J.—This company has shut down its New York Avenue power station and has made a contract with the West Jersey & Seashore Railroad to provide the necessary power for operation of cars in Atlantic City.

Public Service Railway, Newark, N. J.—This company expects to purchase two 4000-kw turbo-generators for a new plant to be erected at Perth Amboy. [E. R. J., June 4, '10.]

Toledo Railways & Light Company, Toledo, Ohio.—This company is considering the purchase of two 750-kw rotary converters.

Galveston-Houston Railway, Houston, Tex.—This company will build a power plant at Webster 70 ft. x 100 ft., two stories high, steel frame, with brick and concrete walls. It will install three 520-hp Babcock-Wilcox boilers, or an aggregate hp of 1560; one 1110-kw turbine, one 500-kw turbine and the necessary condensers, water heaters, feed pumps, air compressors, etc. Power will be stepped up to 33,000 volts for transmission to the three substations, which will be located respectively at about 8 miles south of the city limits of Houston, near Dickinson and Texas City Junction. They will be built with steel frames and brick construction. Work will start soon on the stations.

Ogden (Utah) Rapid Transit Company.—This company has purchased one 500-kw motor generator from the General Electric Company and one 300-kw generator set from the Allis-Chalmers Company.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—This company has ordered a portable substation. S. B. Muller, Fairmont, chief engineer.

Manufactures & Supplies

ROLLING STOCK

Knoxville Railway & Light Company, Knoxville, Tenn., expects to purchase 15 closed cars to be equipped with two 40-hp motors each.

United Railroads, San Francisco, Cal., expects to issue specifications soon, through Ford, Bacon & Davis, New York, N. Y., for 100 cars.

New York & Queens County Railway, Long Island City, N. Y., expects to purchase soon 25 60-hp double-motor equipments, including air brakes.

Des Moines (Ia.) City Railway has placed an order with the American Car Company for 25 cars to replace the 21 cars which were destroyed by fire on May 26.

New York, New Haven & Hartford Railroad, New Haven, Conn., is preparing specifications for several multiple-unit steel cars for suburban service on its New York electric zone.

Fairmont & Mannington Railroad, Fairmont, W. Va., has ordered two 40-ft. 6-in., open excursion motor cars, mounted on Brill No. 27 M.C.B. trucks, from the G. C. Kuhlman Car Company.

Bangor Railway & Electric Company, Bangor, Me., has ordered one 30-ft. baggage car and two 30-ft. 8-in. semi-convertible cars, mounted on Brill No. 27 M.C.B. trucks, from The J. G. Brill Company.

Elmira Water, Light & Railroad Company, Elmira, N. Y., noted in the ELECTRIC RAILWAY JOURNAL as having ordered six single-truck cars from The J. G. Brill Company, will have them built for pay-as-you-enter operation, and they will be mounted on Brill No. 21-E trucks.

Fort Smith Light & Traction Company, Fort Smith, Ark., mentioned in the ELECTRIC RAILWAY JOURNAL of May 14, 1910, as contemplating the purchase of 12 Brill semi-convertible cars, has placed an order with the American Car Company for eight 20-ft. 8-in. semi-convertible cars.

Winona Interurban Railway, Warsaw, Ind., is preparing to build two trailer express cars and a freight locomotive to be equipped with four 100-hp motors. The company has placed a contract with the Hicks Locomotive Works for five stock cars and five standard box cars.

New York & North Shore Traction Company, Mineola, N. Y., has placed an order with The J. G. Brill Company for one centrifugal sprinkler car. The company has ordered from the G. C. Kuhlman Car Company one snow sweeper and two 30-ft. 8-in. semi-convertible cars of the pay-as-you-enter type, mounted on Brill No. 27 FE-1 trucks. The sweeper and sprinkler car will be equipped with two 75-hp GE motors each and the passenger cars with two 75-hp GE motors each.

Long Island Railroad, Long Island City, N. Y., has ordered 100 additional steel motor passenger cars from the American Car & Foundry Company for 1911 delivery. The cars will seat 70 persons, will be 63 ft. 4¾ in. long over vestibules, 54 ft. 4½ in. body length; width overall, 9 ft. 11 in.; height from top of rail to sills, 41⅜ in. The bodies will weigh approximately 53,000 lb. each. They will be equipped with Westinghouse Electric & Manufacturing Company's motors and Westinghouse Traction Brake Company's air brakes.

Tacoma Railway & Power Company, Tacoma, Wash., is building eight cable cars and a wrecking car at its shops. It is also rebuilding nine of its 44-ft. cars, converting them into closed cars, with 6-ft. drop platforms at the rear for pay-as-you-enter operation. The cable cars, which are also of the pay-as-you-enter type, will be 32 ft. long overall, 8 ft. wide, 8 ft. 8 in. high from bottom of sill to trolley plank, and will have a seating capacity of 34. The wrecking car will be 42 ft. over end sills, 9 ft. wide, with cab 16 ft. long and 7 ft. 6 in. high built at one end, and will have Baldwin trucks and four GE No. 57 motors and Westinghouse AMM air brake equipment. It will be equipped with a 20-ton crane operated by a Westinghouse No. 49 motor.

Houghton (Mich.) County Traction Company, noted in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, as having ordered two closed motor cars from the G. C. Kuhlman Car Company, has specified the following details for this equipment:

Bolster centers, length, 19 ft. 7 in.	Control system.....K-28
Length over corner posts, 31 ft. 7 in.	Curtain fixtures..Cur. S. Co.
Over vestibule....41 ft. 9 in.	Curtain material.....Oakette
Width over sills...8 ft. 2 in.	Destination sign..sheet steel
Over posts at belt..8 ft. 2 in.	Gongs .....pedal
Sill to trolley base.9 ft. 2⅜ in.	Heaters.....Peter Smith
Height top of rail to sills, 32⅞ in.	Headlights .....Mosher
Body..... wood	Motors.....four GE-67
Interior trim.....oak	Registers .....International
Bolsters, body..M.C.B. truss	Roofs.....monitor deck
Car trimmings.....bronze	Sanders.....four Brill
	Sash fixtures.....Brill
	Seats.....Brill Winner
	Trolley catchers.....Wilson

TRADE NOTES

George A. Rees has been elected second vice-president of the Chicago Pneumatic Tool Company, with headquarters in the Fisher Building, Chicago, Ill.

Peter Smith Heater Company, Detroit, Mich., has secured a contract from the Cleveland (Ohio) Railway for 250 Peter Smith forced circulation hot water equipments.

Northern Engineering Works, Detroit, Mich., has installed two 10-ton, hand-power, Northern cranes, having a 30 to 34-ft. span, in two of the Detroit United Railway's substations.

Columbia Brake Shoe & Foundry Company, Cincinnati, Ohio., has installed additional equipment in its New Richmond plant, to take care of its growing street railway brake shoe business.

Egry Register Company, Dayton, Ohio, reports that the Union Pacific Railroad has installed the Egry train despatching system on several of its divisions where telephones are used in the despatching service.

Anchor Webbing Company, Woonsocket, R. I., is making a special open-work cotton-gauze tape for winding fields where the vacuum process is not used. This gauze tape is less expensive than linen or other tapes which are sometimes used, and is said to be better adapted to the purpose.

Sanitary Rag Company, Kalamazoo, Mich., has under construction a five-story building which will have a floor area of over 60,000 sq. ft., and will be devoted to the manufacture of its products. It is expected that the company will employ over 200 hands in this building upon its completion.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has arranged for the redemption of its $6,000,000 collateral trust three-year notes, due in August, through the sale to Kuhn, Loeb & Company of $4,000,000, three-year, 6 per cent notes, which, with $2,000,000 in cash on hand, will suffice for the purpose.

Harrison Engineering Company, New York, N. Y., has closed a contract with the Hudson & Manhattan Railroad for the complete heating and ventilating apparatus for its new car shops in Jersey City. The company has also closed a contract to install the Harrison aertube heater system in the new car shops of the New York, New Haven & Hartford Railroad at Middletown, Conn.

J. F. Newell & Company, Gardiner, Maine, reports the receipt of large orders for gray and malleable iron motor shells; also for bronze bearings. The company has recently begun the erection of a gray iron foundry, to be used in connection with its present brass foundry. This improvement will obviate the necessity of purchasing castings. The company will now be prepared to do considerable outside work in both foundries.

Paragon Sellers Company, Chicago, Ill., announces that it has just taken over the business of the Durant Electric Supplies Company and F. W. Pardee, both of Chicago. The new company is organized on broader lines than its constituents and has adaquate capacity and facilities for handling the rapidly increasing business now enjoyed. The officers of the company are: E. M. Platt, president; F. W. Pardee, vice-president; E. E. Dewey, secretary, and R. E. Macduff, treasurer.

Crocker-Wheeler Company, Ampere, N. J., has sold two 3530-kva, 1500-r.p.m., 25-cycle, three-phase, 2300-volt a.c. turbo-generators to the Illinois Steel Company, to be installed by the Ball & Wood Company at the South works in Chicago. Excitation will be effected by two 35-kw, 125-volt, Crocker-Wheeler generators direct connected to the end of the generator shafts, the armature of each to be connected electrically with the turbo-generator field without any regulating resistance in its circuit. The alternators will be regulated by adjusting the strength of the exciter fields. There will be no disconnecting switch between the armature of the exciter and the field of the generator.

Whipple Supply Company, New York, N. Y., has recently closed orders for the Hedley anti-climber with the following railways: Brooklyn Rapid Transit Company, 961 cars; Hudson & Manhattan Railroad, 100 cars; Metropolitan West Side Elevated Railway, Chicago, 25 cars. The above companies will use the old standard section of Hedley anti-climber which is now in service on the Interborough Rapid Transit Company, New York. Orders have also been closed with the Public Service Railway, Newark, N. J., for 100 cars; Cincinnati Traction Company, 50 cars; Syracuse Rapid Transit Company, 25 cars; Washington Water Power Company, Spokane, Wash., 20 cars; Buffalo & Lake Erie Traction Company, 5 cars. The last-named companies operating city surface cars will be equipped with the Hedley combination anti-climber drawhead. A large number of other roads are at the present time negotiating with the Whipple Supply Company for the equipment of their cars with the Hedley anti-climber.

ADVERTISING LITERATURE

Duplex Metals Company, New York, N. Y., is mailing a blotter calling attention to the extensive use of its copper-clad steel wire.

Hurley Track-Laying Machine Company, Chicago, Ill., is mailing a circular calling attention to the various features of its track-laying machine.

Carb-Ox Company, Chicago, Ill., has issued a 16-page catalog illustrating and describing briefly the gas analysis instruments and allied specialties which it makes.

Buck Boring Bar Company, Huntingdon, W. Va., has issued a small folder describing the features of the Buck expansion boring bar for boring steel and cast-iron wheels.

Pittsburgh Track Specialty Company, Pittsburgh, Pa., is sending out several circulars which contain illustrations of its various types of rail joints, tie plates and cast-steel ties.

Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a sheet on ball-bearings and their correct use. It is particularly devoted to ball-bearings for main car journals.

Dayton Manufacturing Company, Dayton, Ohio, has issued catalog No. 143, in which its new enameled iron sanitary closet for use on traction cars is illustrated and fully described.

Felt & Tarrant Manufacturing Company, Chicago, Ill., has issued an illustrated 24-page catalog on its comptometer adding machine in which the many advantages of this machine are set forth.

Clark Manufacturing Company, Grand Rapids, Mich., has printed a circular which contains a brief outline of the principles involved in the construction and operation of the Clark lightning arrester.

Western Electric Company, New York, N. Y., in Bulletin No. 5210, describes in detail a new design of Hawthorn alternators for belt, engine and waterwheel drives, with and without direct-connected exciters.

Stone & Webster Engineering Corporation, Boston, Mass., is distributing a card calling attention to its facilities for rapidly constructing large power plants. The enlargement of the power plant of the Boston Elevated Railway is cited as an instance where work was completed within 10 months, two months less than the contract required.

National Tube Company, New York, N. Y., has issued a folder in which the advantages of the Kewanee union are emphasized. It also contains a list price of all patterns of this product. The company is mailing correction sheet No. 2 of catalog H for 1909, also a blotter calling attention to the merits of the wrought double strap pipe saddle which it manufactures.

Electric Storage Battery Company, Philadelphia, Pa., has printed in Bulletin No. 123 a paper entitled "Attitude of Central Stations Toward Electric Automobiles," which was read by James T. Hutchings, general manager, Rochester Railway & Light Company, Rochester, N. Y., before the first annual convention of the New England Section of the National Electric Light Association, Boston, Mass., March 16 and 17, 1910.

Kennicott Water Softener Company, Chicago Heights, Ill., has issued a comprehensive catalog which covers its various products, and includes Bulletins Nos. 36 and 37 on Kennicott water weighers, which are of interest to power station managers. One of these bulletins, No. 36, contains descriptions, illustrations and other information concerning the type and size of this apparatus, and the other is devoted to its dimensions, drawings and prices.

Allis-Chalmers Company, Milwaukee, Wis., has issued Bulletin No. 4022, which is descriptive of its lighting transformers. The small sizes of these transformers are of cast iron, while the larger are built with corrugated steel cases. They are guaranteed to carry ordinary overload not exceeding 25 per cent for two hours, and are tested at 150 per cent load for 20 minutes, so that temporary excessive loads will not injure them. The coil losses have been brought extremely low and the regulation is uniform.

Niles Car & Manufacturing Company, Niles, Ohio, has issued a catalog in which the various types of cars which it builds are described and illustrated. Several pages of the publication are devoted to a description of Baldwin trucks. There are presented also numerous engravings and drawings which show the standard shapes and sizes of wheels, and standard axles for motor and trailer trucks adopted by the American Street and Interurban Railway Engineering Association and the Master Car Builders' and Master Mechanics' Associations.

North Dakota Metal Culvert Company, Fargo, N. D., has issued its first general catalog covering the entire line of products which it manufactures. The publication is divided into four sections. The first section contains information relative to prices, delivery, freight rates, sizes, capacities, etc., of its galvanized metal products. Sections 2 and 3 describe and illustrate galvanized metal culverts and galvanized steel portable bins. Section 4 is devoted to the various types of galvanized steel cans, tanks, etc., made by the company. Each description is accompanied by a table showing sizes, capacities and prices of these products.

Trussed Concrete Steel Company, Detroit, Mich., has published two booklets containing specifications, one for reinforced concrete cement plastering and the other for waterproofing concrete and stucco. Another publication of the company, entitled "Hy-Rib," describes and illustrates the more general application of this material for roofs, floors, walls, sidings, partitions, ceilings, furring and conduits. Following this descriptive matter is printed a set of specifications and tables for the use of "Hy-Rib." Several letters from firms indorsing the use of this material are reproduced. Among the users are the Syracuse Rapid Transit Railway and the Utica & Mohawk Valley Railway.

General Electric Company, Schenectady, N. Y., has issued Bulletins Nos. 4727, 4732, 4736, 4737, 4738, 4740, 4741 and 4742. In Bulletin No. 4727 two types of the company's sewing machine motors are illustrated and described. Bulletin No. 4732 is an attractive publication which contains more than 50 illustrations of installations of Curtis steam turbine-generators of various capacities. In Bulletin No. 4736 various types of arresters for alternating and direct-current, high and low-voltage circuits are described and illustrated. Bulletin No. 4737 is entitled "Electric Hardening Furnace." It contains sectional views of the furnace, diagrams of electrical connections and a chart which shows the power required to operate it. In Bulletin No. 4738 three sizes of polyphase, 60-cycle generators for use in small isolated plants are described. In Bulletin No. 4740 a line-drop compensator for alternating-current circuits is described. In Bulletin No. 4741 luminous arc lamps for multiple circuits are illustrated and described. In Bulletin No. 4742 the application of the induction motor to grain elevators and flour mills is described.

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Objections to a Transfer

The vagaries of human nature are always cropping out in sight of the electric railway operating department. It is no new thing for the public to demand transfer privileges and then to complain of the lack of through car service when it gets them. A case of this kind occurred recently in Boston where to reduce the congestion on a crowded thoroughfare a number of through cars running from Watertown through Cambridge to Park Street subway station were withdrawn, but free transfers were given at Cambridge in each direction to persons desiring to traverse the old route. The usual result followed in the shape of a complaint to the authorities, yet the patrons of the line were asked to do nothing more than is done perhaps 200,000 times a day at the larger elevated stations in the city. An unreasonable passenger can always find something which dissatisfies him. But if the public in general would apply to its transportation a little of the tolerance and good nature which it exhibits inside the department stores, for example, the result would be a lightened burden upon the railway companies and a real improvement in the conditions of transportation service.

The Emergency Crew

The raising of blockades on densely traveled track in city streets requires unusual skill in order to minimize delays as much as possible. In many cases the time required for the emergency crew to reach the spot is several times that needed to remove the cause of traffic obstruction, even with the comparatively limited distances of an urban business center. Over and over it happens that such a crew, with its practiced skill and complete appliances, will clear the track in from five to ten minutes, while the trip from the station to the locality in trouble takes fully as long. All transportation employees should be instructed to make the quickest and fullest possible use of telephone facilities no matter where located and regardless of the cost, as soon as it becomes apparent that skilled assistance will be needed to relieve the situation. It is better also, in most cases to send for the emergency crew at once in cases of derailment or other breakdown than to attempt to repair the car trouble and lose time which might be utilized by skilled assistance. The best locations for the emergency stations is also a question worth careful consideration. It will often happen that changes in city travel will demand the establishment of new stations or a change in location of those in use, to obtain the best results.

The Pennsylvania Railroad and the American Association

The acquisition of the Pennsylvania Railroad as a member company of the American Street & Interurban Railway Association, which was announced last week, is an important event. This company now operates a third-rail line between Phila-

delphia and Atlantic City and within a few weeks will begin the operation by electricity of its New York terminal. These two electric divisions, combined with the suburban electric zone of the Long Island Railroad, which is controlled by the Pennsylvania Railroad, will constitute one of the largest groups of electric track mileage represented in the association. We believe that the new alliance will be beneficial both to the railroad company and to the association. Executive officers of electric railways can profit in many ways from the interchange of ideas as to general policies with men of ripe experience in the steam railway field. On the other hand, there are many specialized branches of electric railway accounting, engineering and operation in which the steam railways operating electric divisions or subsidiary lines are not so experienced. The numerous associations of steam railway departmental officers, such as the Master Car Builders' Association and the American Railway Engineering and Maintenance of Way Association, cannot in justice to the very large majority of their strictly steam railroad membership devote time in convention to the consideration of subjects relating to the electric equipment or operation of a few roads. Even should they do so the results accomplished would usually be duplication of work done by the electric railway associations. The steam railways which have electric divisions logically should belong to both the steam and electric railway organizations, and we hope that the membership of the American Street & Interurban Railway Association and its affiliated associations will soon be further strengthened by the addition of all the steam railways directly or indirectly interested in electric railways of any kind.

Popular Railway Exhibits

Railway companies in large cities are often asked to become exhibitors in popular expositions. When this occasion arises the management is sometimes puzzled to decide which phase of its work is most worthy of being displayed. To attract attention, the exhibit should be novel and, at the same time, so simple in its arrangement as easily to be understood by the layman. On the other hand, to obtain the best results so far as the company is concerned, the exhibit should impress upon the public with the thought and intelligence which have been exercised in the work of providing swift and safe transportation and the readiness of the company to adopt any improvements which tend toward this result. These purposes were cleverly combined in an exhibit made by the United Railways of St. Louis at the Electric Show in that city, as described last week. A complete car equipment was shown and each part was clearly labeled so that within a few moments the observer could obtain a fair conception of the complexities of the average electric railway. At the same time a series of views of early equipment impressed the observer with the stages of development through which the electric railway had passed until its present condition was reached. Series of statistics, prepared by the company, gave those who had more time to devote to the exhibit a vivid idea of its importance to the community as a taxpayer, employer and purchaser, in addition to explaining the size of the organization and traffic handling facilities. It is well that the public should be given such glimpses of the electric railway business if for nothing else than to dispel the illusion that transportation enterprises are gold mines where all income is profit. Great popular gatherings are ideal places for instructive exhibits of this kind. The more the public is made directly acquainted with the problems and costs involved in giving good railway service, the more difficulties will low fare and universal transfer agitators encounter in securing support for their vagaries.

CENTRALIZED POWER SUPPLY FOR SUBURBAN RAILWAYS

The tendency toward the centralization of power plant production in the vicinity of large cities is of immediate interest to the suburban street railway. The policy of generating electricity for local service on a single railway with a relatively poor load factor is in some quarters giving way to the purchase of power from a central plant of very high economy, through the medium of transmission lines serving a wide area of country with electricity for miscellaneous motor applications. We have frequently had occasion to point out the respective advantages of purchased and locally generated railway power. Each case must be determined upon its own merits, bearing in mind all the operating expenses and fixed charges. Managers of small suburban properties often look askance at the figures quoted them for power by companies which make a business of producing it at low cost and selling it at scattered points for a good profit. Without attempting to favor one side or the other of this question it is necessary to recognize that with the suburban electric railway of small capacity expressed in kw average 24-hour load at the distributing center the supply of power to the rolling stock and buildings of the company is fundamentally an incident of the business and not its essentiality. The power company's existence and success, on the other hand, depend upon minimum cost of supply. Distribution does not enter the case as much as might be supposed, since a considerable part of the line and substation investment, if any, is frequently used in the supply of other customers than the railway. The latter imposes a very desirable load, and has the further advantage of not demanding the close regulation of the lighting installation and the factory.

Some sort of power centralization is inevitable as the campaign for economy drives the suburban system, with its uneven loading and tendency towards long hauls, to join hands with other roads in the supply of power to cars moving at relatively infrequent intervals over thinly populated districts. There is room for co-operation here, since the possibilities of high voltage transmission, particularly in localities where hydroelectric power systems are in operation, indicate that it will often pay to discontinue service with small plants operated under adverse load conditions and supply a couple of hundred miles or so of track from a single main station located advantageously with respect to fuel, water and labor supply, and equipped with modern apparatus capable of delivering current to all the lines at a cost which meets the interest, taxes and depreciation on the additional investment necessary, after allowing for the differences in the economy of the old and the new systems. If central station power is too expensive for a given situation it is quite within the bounds of possibility that a co-operative plant can be built and maintained by the interested railway companies at a cost which represents a saving over the old régime of small, scattered, cramped, and more or less obsolete plants, located in the early stages of the art with respect only to the needs of the local suburban lines most closely associated with them, and in no sense distributed

throughout the territory in accordance with the needs of a modern combination of systems fed from a central source. It is purely a question of engineering detail as to how the power facilities of a group of roads can best be modernized, including the cross-connection of feeder and return systems, the installation of suitable measuring apparatus at company boundaries, and the utilization of existing pole lines or rights of way for the improved transmission service.

REDUCTIONS IN THE WEIGHTS OF MOTORS

The problem of decreasing car weights may be divided into three parts relating respectively to the car body, the trucks and the electrical equipment. Of these divisions, the electrical equipment has received hitherto little or no attention. It seems to have been taken for granted that in the design of d.c. motors the limit of ingenuity had been reached in getting the maximum horse-power output from a given weight and space. Nevertheless the auxiliary pole motor is at least as heavy as one of standard design even though its commutating qualities are better. It does not seem improbable that if the same degree of attention should be given to this subject as has been devoted to a reduction of car body weights important savings might be secured. For example, it is said that by using oxidized aluminum instead of fibre insulated copper for field coils, the Hamburg (Germany) Street Railway saves about 100 lb. per 40-hp motor and incidentally eliminates those short circuits arising from charred insulation. Whether time will develop some objections to the plan we are unable to say. Another place for reduction is in the gear case and one maker has made it a point to recommend sheet steel for gear cases in preference to malleable iron as the former weighs about 70 lb. less; sheet steel has also been recommended for motor covers. Another electric company has had considerable success with special gear and pinion metals which have permitted the speed of a 40-hp motor, for instance, to be raised from 500 r.p.m. to 650 r.p.m. and even to 750 r.p.m.

On the whole, we believe that with care it would be possible to reduce the weights of many standard motors by about 20 per cent. It is possible that by the use of some of the modern steels, perhaps vanadium, a material reduction could be effected in the weight of motor shells, as the latter now are certainly more massive than the magnetic circuit conditions demand. Another possibility, though more remote, is that of increasing the maximum gear ratio from 3:1 to 6:1 by employing a chain drive as in storage-battery and gasoline cars.

Still further reductions could be secured, if necessary, though at the expense of efficiency or first cost, by using a fireproof insulation and increased ventilation. The last means, however, cannot well be applied to street railway conditions owing to the lack of space for mounting blower equipments, and to the difficulty of getting clean air if the movement of the car is utilized to force air through piping to the motor interior. It will be appreciated from the foregoing that the reduction of motor weights is more than a theoretical possibility. The manufacturers in laboratory tests and on special orders have shown that they can secure considerable savings along the lines indicated. It lies simply with the railway companies to decide how far it would pay them to go in the use of lighter equipments at the expense of probably greater first cost and some loss in efficiency.

SYSTEM IN THE TRACK DEPARTMENT

Mr. Schreiber's article in this number on the maintenance of way of his company brings up several interesting points which show that economical and accurate methods are just as attainable in the track department as in the other branches of an electric railway. It is true that the track department deals with the bulkiest material and the lowest grade of labor, but the money that the way-engineer can save by being permitted to use the best articles is just as valuable to the company as that obtained by refinements in shop and power station practice. Examples of the economies possible in the way department are afforded by the use of manganese steel linings for buckets and screens in crusher plants. This reinforcement not only greatly lengthens the life of these items but also avoids most of the annoying delays incident to sending for new parts. The practice of marking and tagging the special work cannot be commended too strongly. It would be still better if the track could be stored under cover and at least part of the material arranged according to size. We have in mind a track storage yard where everything is piled in such pell-mell fashion among waist-high weeds that a gang is sometimes obliged to spend hours in hunting for a certain length of rail or particular piece of special work. Frequently the men do not bother to search at all but simply cut down to the required length the first rail available. The result is that this yard and others like it are cluttered up with a lot of useless but costly material. This evil could be greatly reduced by using a systematic method of storage and by decreasing the variety of pieces through the standardization of switches, mates and other parts as suggested in the article mentioned.

Mr. Schreiber has also been a close student of wood preservation and his comments, drawn from experience, are worthy the attention of all companies who fail to appreciate how quickly exposed, untreated timber structures, even in temperate zones, will require continual repair which is more costly in the long run than the initial application of a good wood preservative. To neglect the care of such important timbers as bridge piling and trestles is to invite disaster sooner or later—usually the former.

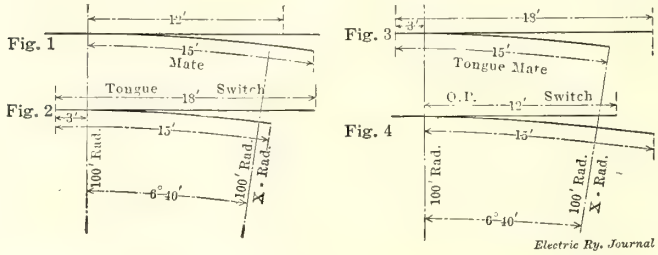
Another interesting point brought up by Mr. Schreiber is the use of adequate symbols, bench marks and the like in the records of the track department. The standardization of such symbols might well be taken up with profit by one of the committees of the Engineering Association. The symbols used by the United States Geographical Survey for its maps could serve as a good foundation for this work. Standard symbols are largely used abroad, while in this country a uniform system for wiring plans has been adopted by the National Electrical Contractors' Association. The use of standard markings would not only facilitate the interchange of data between different companies but would also make it easier in the future to identify records of past surveys than is now the case.

Still another suggestion afforded by Mr. Schreiber's article this week is in connection with forethought on the part of surveying parties. When a party of this kind is sent out to secure data on a particular point, it is an excellent idea to record everything that can be found even if it does not appear to be needed. The extra cost of having the party stay on the ground a little longer is a trifle compared with what it would be if the men had to be sent to the same locality a second time.

SOME SUGGESTIONS FOR ECONOMICAL TRACK MAINTENANCE AND CONSTRUCTION

BY MARTIN SCHREIBER, ENGINEER MAINTENANCE OF WAY, PUBLIC SERVICE RAILWAY OF NEW JERSEY.

It is now a well-proven fact that the advantages of standardization and of a well-defined system for studying all details closely are the possibilities thus afforded of getting the maximum value for every dollar spent in connection with construction and operation. With this thought in mind the writer



Figs. 1 to 4—Track Maintenance—Standard 100-ft. Radius Switch Pieces

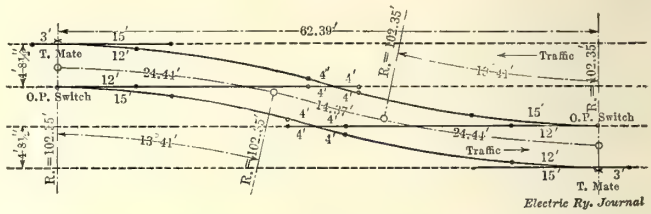


Fig. 5—Track Maintenance—Standard Layout of Cross-Over

proposes to bring out a few recent practical ideas in connection with track work and its accessories.

SPECIAL WORK

In special work for track lay-out, when the best design and material for the particular piece is selected, it is well to go further and standardize the lay-out. It is true not much may be accomplished along these lines with frogs and curved rails, but if all switches and mates are alike, a large advantage is realized. Figs. 1, 2, 3 and 4 show standard 100-ft. radii switches and mates. These designs can generally be used at all locations whether they are for car-house conections, turn-outs, branch-offs, Y's or crossovers. It is understood that special occasions arise where different designs are required, say a long radius curve or an equilateral turnout. However, most urban properties are fortunate if they can start with 100-ft. radii and are likely to compound into 35-ft. radii before the layout adopted. All the standards shown are straight 100-ft. radii. Many advocate spiral switches, but it does not seem that there is much to be gained by further easement when one takes into consideration the limited space, short center radii and slow speed with which an engineer generally contends in city service. If in double-track work the design calls for clearances at curves, a greater variety of switches and mates is required. It is a question whether it pays to attempt to give car clearances in all cases, and especially when it is necessary to plan special radii switches and mates to accomplish that purpose. Often the physical conditions make car clearance prohibitive for any design. Of course if it is possible to get clearance with the standards it should by all means be done. Fig. 5 is a standard crossover, with the standard switches and mates for varying dummy strips. For a distance between tracks of 4 ft. 4 in. and 4 ft. 10 in., one jump frog is used. For a distance between tracks of more than 4 ft. 10 in., two jump frogs are utilized. A crossover with jump frogs and open point switches has the advantage of preventing the main line travel from wearing out the tongues of switches, and its life is materially increased—a consideration which is quite an item when the crossover is but seldom used. Fig. 6 will give some idea of the special work carried in stock by the Public Service Railway Company, both for new installations and renewals. Each piece is tagged so that it may be easily located and piled for convenient handling by the crane.

TIMBER.

No better opportunity is afforded for a saving than by purchasing railway timber and ties under careful specifications and adequate inspection. There is a very great variation in wood, and the life of our present market lumber is short at the best. Several steam railroad companies in this country are now employing experts on timber and allowing them to operate along a very broad gage plan. Fig. 7 shows the hemlock stringer and other portions of a trestle of whose reconstruction the writer had charge during last summer. It is not his intention to discuss the merits of timber preservation in this article, but it seems that such examples as the one illustrated are quite sufficient to show that we should not hesitate to invest something in a reliable timber treatment to save reconstruction. Fig. 8 is a view of the trestle which replaced the one mentioned. All of the piles used were white oak; the other timbers were Southern long-leaf heart yellow



Fig. 6—Track Maintenance—Special Work Storage Yard of Public Service Railway

pine, which was found very desirable because it was unbled and of very slow rate of growth. Besides, after being thoroughly seasoned the lumber was treated in an open tank with a distillate of coal tar. Fig. 9 shows sound and square-edge yellow pine treated ties, installed in connection with the reconstruction of tracks in Newark, N. J. The following is the specification of the company for all untreated ties purchased.

SPECIFICATIONS FOR STANDARD CROSS TIES.

Quality.—All ties to be cut within 10 months from the time of delivery from sound, straight, live and thrifty timber, free from loose or rotten knots, dry rot, wind shakes or any other imperfections affecting the strength or durability of the timber.

Dimensions.—Six inches thick, 8 in. width of face and 8 ft. long. A variation from above specifications will be allowed as follows:

Ties Known as No. 1.	Hewed.	Pole.	Sawed.
Depth not less than.....	6 in.	6 in.	6 in.
Face not less than.....	7½ in.	6 in.	8 in.
Length	8 ft to 8 ft. 2 in.	8 ft. to 8 ft. 2 in.	8 ft.
Ties Known as No. 2.	Hewed.	Pole.	Sawed.
Depth not less than.....	5½ in.	5½ in.	5½ in.
Face not less than.....	6 in.	5½ in.	7½ in.
Length.	7 ft. 10 in.	7 ft. 10 in.	8 ft.

Ties which do not conform in size to No. 1 or No. 2 or have any other defects will be classed as cull ties and will not be accepted.

White and Burr Oak and Chestnut.—Hewed ties must be stripped of bark, hewed smooth and clean of all splinters, deep scar marks, straight with faces true and parallel and of uniform thickness with ends sawed off square. Ties hewed from one-half or one-quarter logs, or sawed from large timber will not be accepted.

Yellow Pine Heart Tie.—Ties must be of good, long-leaf Southern yellow pine and must be hewed smooth on all sides with faces parallel and of uniform thickness, with ends sawed off square. Ties must be free from rot, worm holes, wind shakes, loose or unsound knots, red heart and other defects that will impair the strength and durability of the ties. Ties should be hewed so that the heart will be at or near the center of the tie and must not have over 1 in. of sap on each corner,

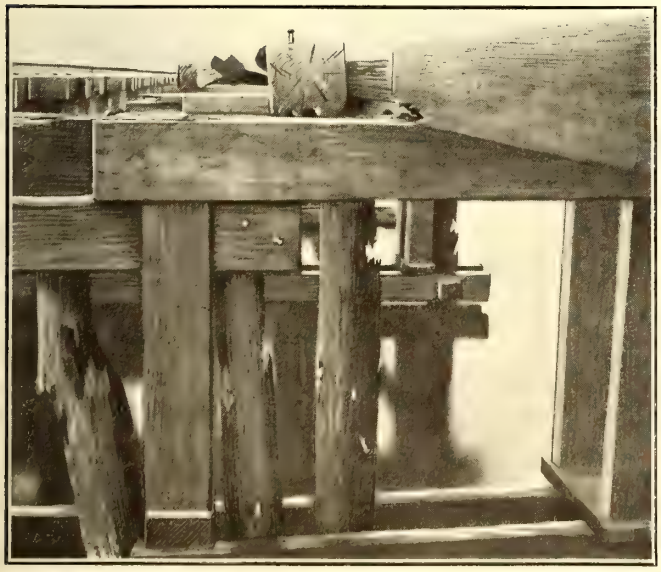


Fig. 7—Track Maintenance—Typical Example of Timber Decay

which means the tie must show 6 in. clear heart on the 8-in. face and 4 in. of clear heart on the 6-in. side. No short-leaf yellow pine ties will be accepted.

Sound and Square Edge Yellow Pine.—Ties must be of good long-leaf Southern yellow pine, or, in other words, must have the same qualities, and must pass the same inspection as the heart pine tie, regardless of the sap.

Cypress.—Hewn cypress must be free from wave, rot, dote, honeycomb and other defects, to show one heart face, allowance 1 in. sap on two opposite corners. Ties must be hewed smooth on all sides, with faces parallel and of uniform thickness and saw butted at both ends.

Inspectors examine each tie before it is placed on the vessel at the point of shipment, and the tie is stamped so that if any tie reaches the yard or later comes on the work in the streets



Fig. 9—Track Maintenance—Treated Ties Installed in Newark, N. J.

and does not comply with the specifications, the responsibility may be easily placed. In like manner, all bridge, crossings, plank, and structural timber is inspected and carefully graded according to the specifications under which it was purchased. Our experience has proved that exception is seldom taken to the inspectors' decisions at point of shipment, whereas inspection can rarely be carried out to the satisfaction of either the railway or the dealer if it is done at the point of delivery.

CRUSHED STONE.

Since the extensive use of concrete and stone ballast for track construction, many companies either have become interested in

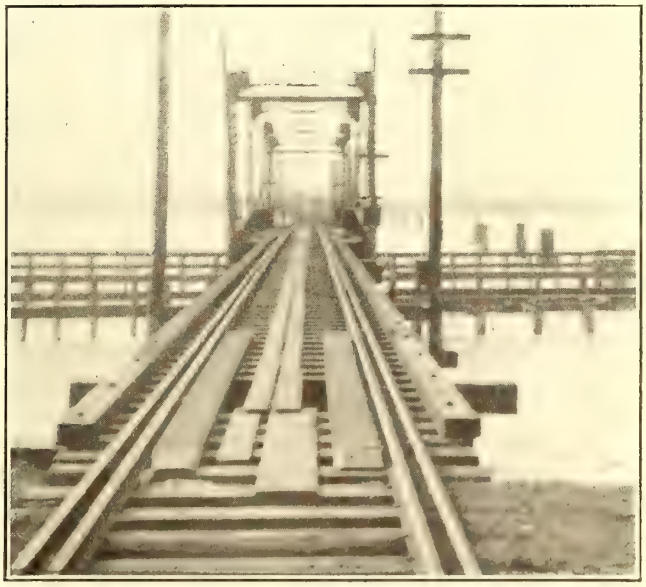


Fig. 8—Track Maintenance—Trestle Rebuilt with Treated Timber

or have acquired quarries and stone crushing plants. The maintenance of the crusher proper is quite a serious problem, especially in handling the harder rocks. Sometimes it costs as much as 5 cents per cubic yard for renewal supply, without figuring on the occasional shutting down of the plant, which is far more expensive and objectionable. Considerable relief from interruptions may be obtained by using manganese steel. In gyratory

type machines, the use of manganese concaves is not new, but this company is now installing manganese steel buckets, ⅛ in. thick, placed on the conveyor runs. It is also using manganese-steel screens with varying perforations for separating the stone into the proper sizes. The screens are not solid manganese, but the outer shell is of ¼-in. soft steel. Inside of the soft steel shell there is riveted a ⅛-in. manganese steel shell. This combination arrangement allows the maximum useful life of the metal.

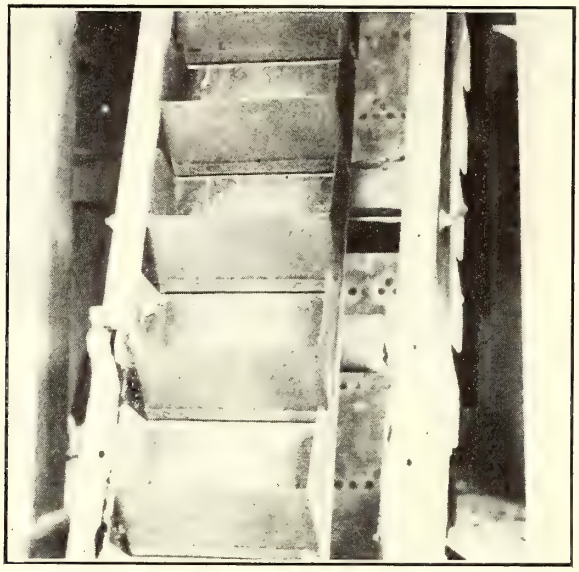


Fig. 10—Track Maintenance—Manganese Steel Conveyor Buckets

When the manganese steel is entirely worn away, the soft steel screen may be promptly relined. Fig. 10 shows a series of manganese steel buckets in a conveyor at the Fair View quarry, and Fig. 11 shows one of the soft steel buckets replaced. Experience has proven that the manganese buckets will wear five or six times as long as the ordinary iron ones. The cost of delivering crushed stone from the Fair View quarries alongside of the track with a radius of 20 miles averages 47 cents per cubic yard, including labor, power, maintenance of line, track and equipment and general expenses. It was found that the cost could be reduced 9 cents per yard by using trailer cars. A further marked saving is possible if arrangements are made so that the cars will carry a load for at least part of the way on the return trip to the crushing plant. This may be often managed by carefully laying out the work of the supply trains.

CAR HOUSE CONSTRUCTION

Assuming that the property in question is protected by outside insurance companies ,two types of car house are permis-

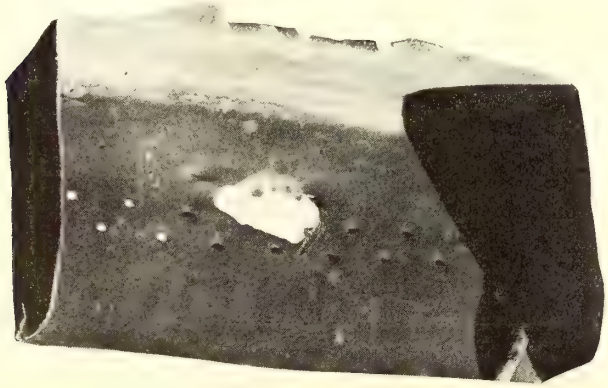


Fig. 11—Track Maintenance—Worn-out Soft Steel Conveyor Bucket

sible, but both must be sectionalized. The risk must be less than $200,000, and the limit of floor area is 20,000 sq. ft. One type of car house is that having fire-proof brick or concrete walls and a concrete or tile roof; the other type is what is known as mill construction. The facts stated were all clearly brought out in the 1908 convention report of the committee on standard car houses to the American Street & Interurban Railway Association. An economical mill construction design is shown in Fig. 12. It is a four-track bay with a line of 12 in. by 12 in. posts in the center. The roof is similar to the standard mill construction, as recommended by the American Street & Interurban Railway Association, except that the roof girders are standard I-beams covered with Roebling wire lath, which is afterwards plastered, instead of being of timber with awkward looking knee braces. Where the building is finished inside in white with cold water paint, a very neat and substantial construction is obtained. Another advantage of the rolled-steel, covered roof girder is that it is possible to adapt it better for a three-track bay.

Fig. 13 represents the same car house built with wooden girders. As will be seen, the 24-in. covered I-beams shown in Fig. 12 accomplish the same purpose as the wooden girders in Fig. 13, and give a neater and stronger building. Moreover, the design is cheaper than the wood truss, because one roof girder is required, while with the wood truss two girders must



Fig. 14—Track Maintenance—Concrete Bridge Built in Freezing Weather

be used. It is practicable by using Bethlehem rolled-steel beams or a flat open truss to go even further with the steeel roof girder by obtaining a single span, four-track mill construction design. The latter type would hardly be permissible with the mill construction wood truss—at least without the use of wood covered iron rods and awkward designs.

CONCRETE TROLLEY BRIDGES

The company, in constructing a reinforced concrete highway and trolley bridge last winter, naturally was hampered on account of the severe and freezing weather. To attempt to execute concrete work by working a day now and then is poor economy and heating the constituents of the concrete or adding salt to the water has many drawbacks. On looking into what represented the latest practice along this line, it was found that very good results could be obtained by using calcium chloride at a temperature even as low as 15 deg. F. In a cubic yard of one part of cement, two parts of sand and four parts of stone, 20 lb. of calcium chloride may be added. This increases the cost by approximately 25 cents per cubic yard. Fig. 14 is a view of the concrete bridge built with this mixture. So far as the design is concerned, it may be of interest to state that concrete through girders were not used, but concrete arches were turned between entirely encased Bethlehem rolled steel 30-in. girder beams. This scheme allowed the building of the bridge without seriously interfering with the railroad

tracks underneath it, besides obtaining maximum clearance. Thus two very important conditions were satisfied without interfering with the most economical method of construction for the strength required.

FIELD ENGINEERING

Good way engineering has not been very conspicuous in the past on many properties, because guessing and the rule of thumb have prevailed. Intelligent engineering has often been

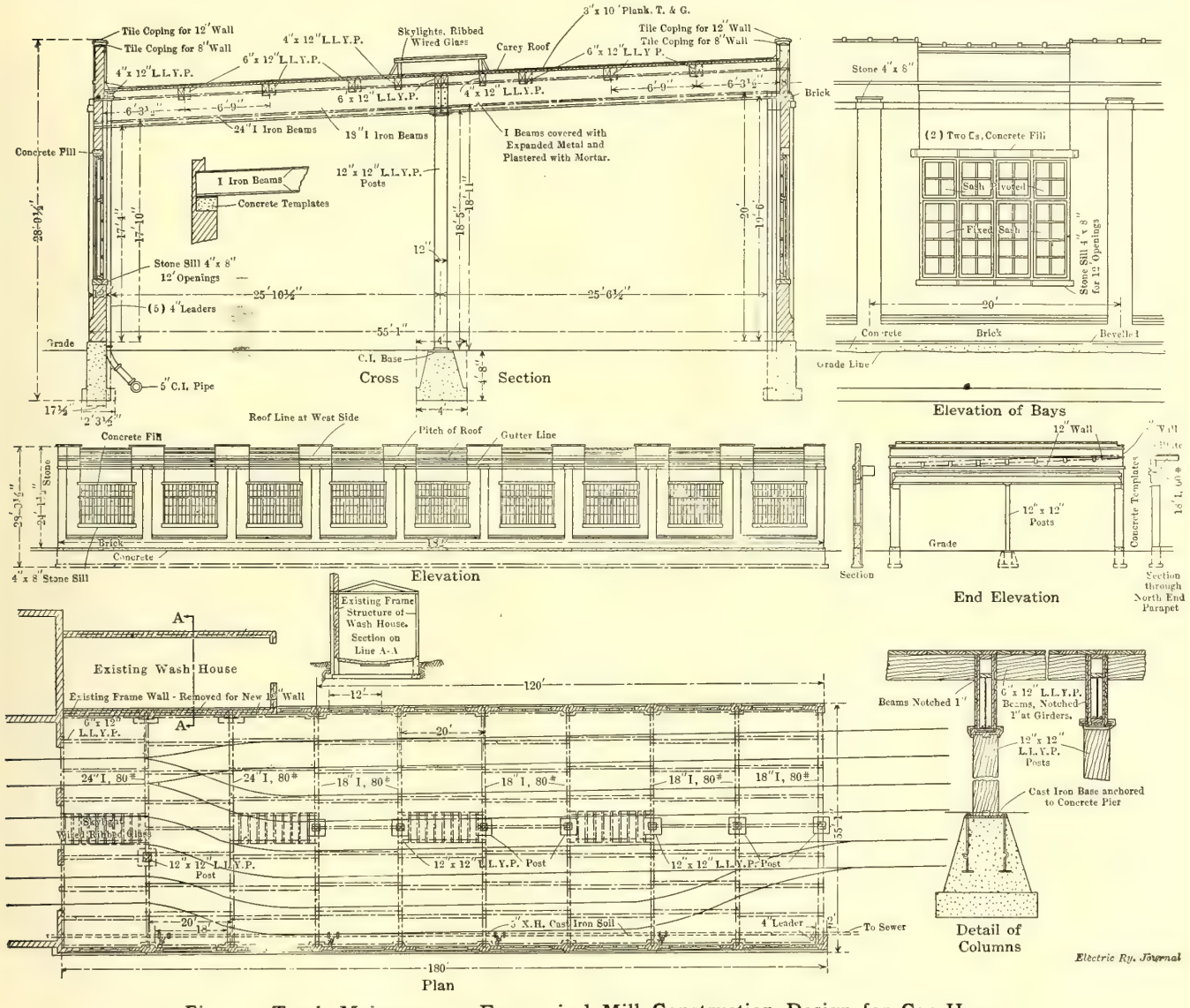


Fig. 12—Track Maintenance—Economical Mill Construction Design for Car House

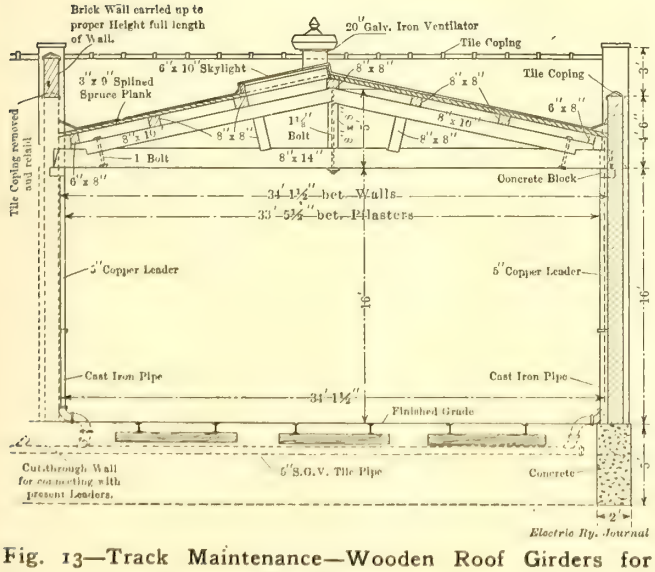


Fig. 13—Track Maintenance—Wooden Roof Girders for Car House

REPORT.

CORRESPONDENCE OF: R. E. Hanforth, Gen. Mg'r.
DATE OF CORRESPONDENCE: Feb 19, 1910.
SUBJECT: Wye encroachment at Morrisville car barn on property of Howard Beard
DETAILS:
ASSIGNED TO: C. E. Means. DATE: Feb 21, 1910.
DATE OF REPORT: Feb 23, 1910.

REMARKS.

A survey of our property lines was made and as shown on sketch attached. The said does not intersect the property of Beard, nor is it on the sidewalk.

It is suggested that a lock switch be placed in the westerly leg of wye to prevent possible derailments on account of the splitting of the switch which I understand was cause of original complaint.

Fig. 15—Track Maintenance—Engineering Report on Track Work

looked upon as an unnecessary expense and non-productive, and where a good report was needed outside engineers were retained. Often the latter would get substantial fees for negative

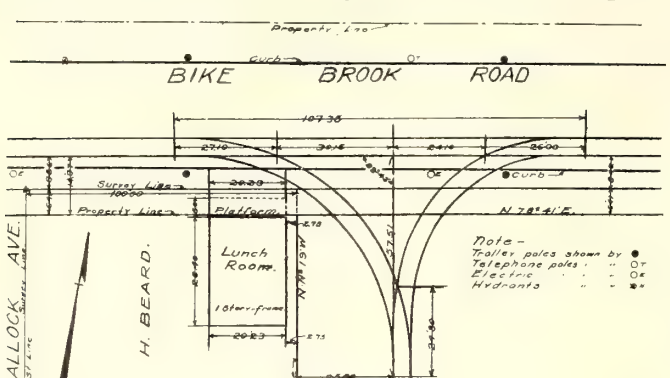


Fig. 16—Track Maintenance—Engineering Report on Track Work

results due to their unfamiliarity with local conditions. It pays, in most cases, to make careful surveys and numerous and intelligent investigations and reports. If this is done, there is

PUBLIC SERVICE RY. CO. STANDARD SYMBOLS.

Rubble uncoursed.	Property lines.	Public Crossing.	Trolley Pole.
Rubble in mortar.	Property line foreign	Private crossing.	Trolley P. foreign
Brick.	County lines.	Private and 2ndry road.	Telegraph Pole.
Ashlar Masonry.	Township lines.	Streams.	Telephone pole
Dressed Masonry.	City lines.	Canals.	Electric light pole
Concrete & Steel.	Street or block lines.	Roads.	Combination pole.
Concrete.	Cattle guard.	Contour lines.	Catch basin.
Solid rock.	original Center line	Hitching post.	Arc lamp.
Seamy rock.	Survey lines and points	Demension lines.	Incandescent lamp.
Earth.	U.S. Harbor lines.	Block Signal.	Gas lamp.
Sand.	Turnstile.	Signal line.	oil lamp.
Gravel.	Railroad under Construction	Present track.	Hydrant.
Marsh.	Railroads	Proposed track.	Manhole.
Mud.	Street railroad.	Foreign track	Meter.
Stone ballast.	Surface & Grade line.	Abutments walls etc.	Riser.
Cinder ballast.	North point	Bottom of slope.	Valve.
Timber.	Bldgs and Villages.	Top of slope.	Wagon Scale.
Water.	Cities and towns.	Cribbing.	Power house.
Glass.	Bench mark.	Road Crossing.	Gas holder
Tree.	Triangulation Station.	Track Scales.	Gas generator
Water pipe.	Monument.	Interlocking tower.	Sub. Station.
Conduit.	Transit point.	Compressed air box	Carbarn
Steam pipe.	Telegraph line	Track drain	Draw bridge.
Compressed air pipe.	Mail Box.	Watering trough.	Culvert.
Compressed air Station.	Embankment	Derail. Derail lever	Truss.
Sewer pipe.	Cut.	Switch Stand	Trestle.

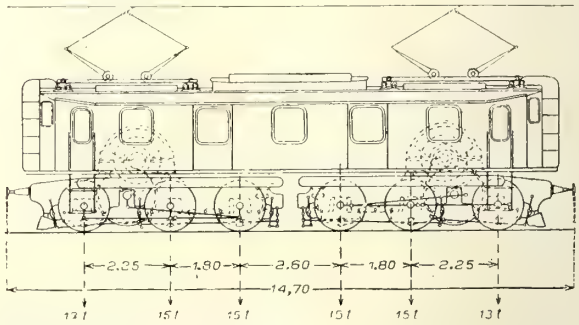
Fig. 17—Track Maintenance—Bench Marks, Monuments and Symbols

no need to go over the same ground again and again, and the cost of engineering will be decreased in proportion to the work and the efficiency of the organization will be increased. Figs. 15 and 16 are from a typical report on track work. This report, which is carefully filed, places the responsibility on the particular individual and is a good guide to show the efficiency of the different men and to compare their respective work. Surveys and field engineering should be carefully done, and when a corps is sent out on a location for any particular data, it is better to make a complete survey of the whole place or location. All the notes may not be particularly interesting at the time, but should be systematically filed for future reference.

Fig. 17 shows a group of the standard conventional signs for drawings and survey notes of the Public Service Railway Company. A standard system of symbols makes it possible for note books to be kept in a neat and readable condition so that they may be understood by any one. It is not necessary in this event to call in the man who made the notes to decipher them from the records.

HEAVY ELECTRIC LOCOMOTIVE FOR BERNESE ALPS

The Oerlikon Company of Oerlikon-Zürich, Switzerland, is building for the Bernese Alps Railways an electric locomotive of the design shown in the accompanying illustration. This locomotive, when operated at 42 km (28.5 miles) an hour will develop a normal tractive effort of 12,800 kg (28,160 lb.) at the wheels, this being equivalent to a normal motor rating of 2000 hp. The locomotive is being built as a unit, 14.7 meters (48 ft. 3 in.) long over the bumpers and mounted on two three-axle trucks. Each motor truck will carry a 1000-hp motor and power will be transmitted to the wheels through gearing, an intermediate shaft and cranked axles. The motor will be unsymmetrically mounted with relation to its truck. The



Single-Phase Locomotive for the Bernese Overland Railway

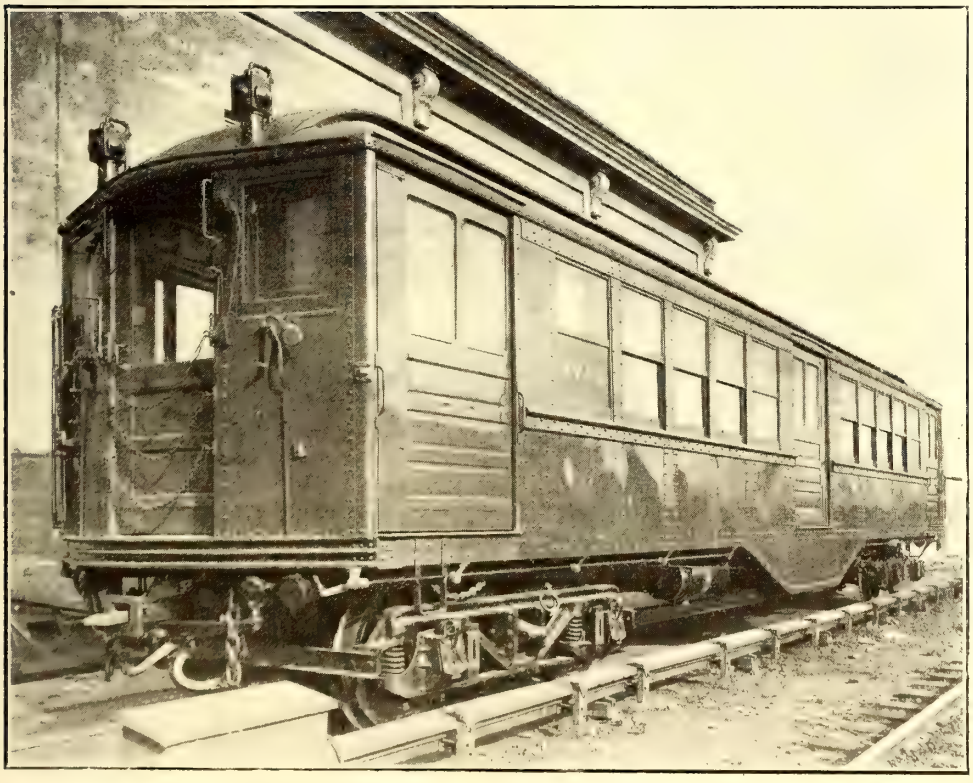
gear ratio will be 3.25:1. The diameter of the locomotive driving wheels has been fixed at 1350 mm (54 in.), so that the normal turning moment of the driving motors will be 13300 meter-kg (9602 ft.-lb.). It is stated that these motors are the largest of the single-phase series type ever built as they will weigh 9800 kg (21,560 lb.) which corresponds to a weight of 7.4 kg (16.28 lb.) per meter-kg (7.22 ft.-lb.), normal turning moment. The main transformer of each motor weighs 5500 kg (12,100 lb.) and serves to step down the line potential from 15,000 volts to 420 volts, 15 cycles. The electrical equipment weighs 42 metric tons (2204 lb. per ton), making the total weight 86 metric tons. It will be observed from the diagram that the weight on the front and end axles will be 13 metric tons, while that on the other four axles will be 15 metric tons. The maximum speed of this locomotive will be 70 km (43.4 miles) an hour.

One of the most striking and novel incidents in connection with the international mourning for King Edward VII of England was the almost universal stoppage of tramway traffic for a given time on the occasion of the King's funeral, Friday, May 20. In a general way, this took place at the time when the final obsequies were going on at Windsor, but in other instances the running of the cars was either wholly suspended for the day, or was interrupted for one or two hours between noon and 2 o'clock in the afternoon.

CENTER SIDE DOOR STEEL CARS FOR NEW YORK SUBWAY

The first steel cars built for the Interborough Rapid Transit Company's subway service were designed in 1904 and were described in the STREET RAILWAY JOURNAL for Oct. 8, of that year. During 1907 50 cars of an altered design were purchased, the principal changes in these cars over the original design being (1) in the side framing which was constructed so as to readily admit of the installation of center side doors; (2) widening of the vestibule side doors to 50 in.; (3) complete fire proofing; (4) reduction in weight, and (5) eliminating of all interior finish. In 1909, the Interborough ordered 110 cars of a still newer design, having center side doors, from the American Car & Foundry Company. Later 40 cars of the new design were ordered from the Standard Steel Car Company and 100 from the Pressed Steel Car Company, which also received a subsequent order for 75 more cars. The first 250 cars have been delivered and are now being equipped with motors and control apparatus in the company's shops at 129th Street and Third Avenue.

The 1909 type cars are notable on account of the marked reduction in their weight, which has been made possible through the use of Hedley anti-climbing devices which permitted reducing the weight of the superstructure. The original steel cars, designed in 1904, weigh complete on trucks 79,200 lb.; the 1907 type cars weigh complete 77,700 lb., while the 1909 type cars weigh complete only 73,400 lb. This reduction in weight of the 1909 type car has been accomplished largely by the substitution, wherever possible of light pressed shapes with suitable flanges instead of using plates riveted to structural shapes. The main members of the under frame have not been changed in size or strength but for the floor beams

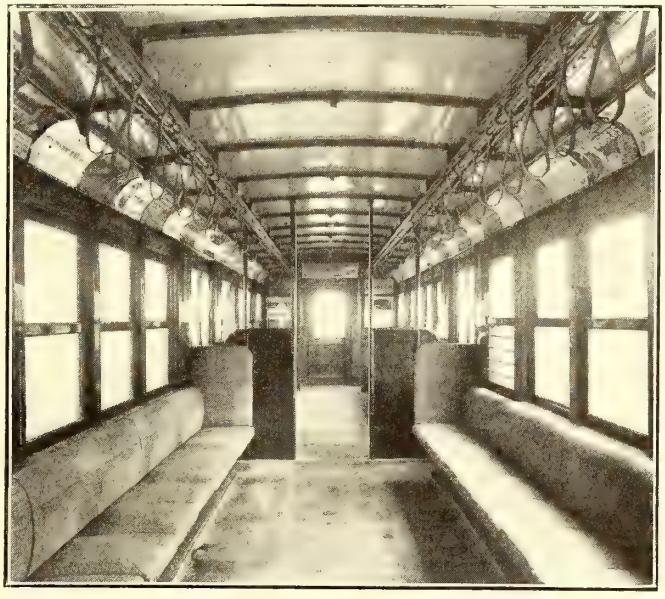


Interborough Steel Car—End and Side View

light pressed steel shapes have been used in place of angles. In the roof and sides, also, pressed shapes have been substituted for angles. Other features of the new car are the absence of all concealed riveting, improved sanitary details and the center side door arrangement and operating mechanism.

UNDERFRAME

The underframe consists of two 6-in. 12 ¼-lb. I-beam center sills and two 6-in., 8 lb. channel side sills on the outside of which are riveted the side sheets. The longitudinal sills are continuous from one platform and sill to the other. A rolled-steel Hedley anti-climber bumper beam, 5½ in. high and having



Interborough Steel Car—Interior View

three ribs, is riveted with corner angles and cast steel reinforcing plates directly to the ends of the longitudinal sills. It is stiffened against telescoping by the ⅛-in. top floor plate and a ¼-in. bottom anti-telescoping plate 23 in. wide. The anti-climber extends around the end of the car and forms the platform and sill without either wood or steel backing. The end bulkheads are supported by two light pressed channel floor beams just outside of the bolsters. Both the side and center sills are heavily reinforced under the platform to prevent sagging of the platform when heavily loaded or buckling in the event of a collision. The center sills have a 5-in. x ⅜-in. plate riveted to their webs and extending 4 ft. outside of the bolster and 5 ft. 3⅜-in. inside of the bolster. The side sills have similar plate 4 ft. 3 in. long riveted to the inside of the channel webs. Built up bolsters made of a ¾-in. x 9-in. top plate and a 1-in. x 9-in. bottom plate are used. The transverse floor beams are 4-in. pressed steel channels. In the center of the car the sills are stiffened by the needle beams and two transverse diaphragms between the needle beams which brace the dropped side girders under the center door openings. The needle beams are built up of ½-in. x 4-in. top and bottom plates with 3/16-in. pressed channel fillers between sills. The diaphragms are pressed from ¼-in. plate with 1⅝ in. flanges.

SIDE AND ROOF FRAMING.

The side framing, which, with the sheathing plates, forms a deep girder, is designed to carry a large part of the load between bolsters. No. 13 gage-steel plates are riveted on the outside of the side sills and posts up to the belt rail. At the

center-door opening, a fish-belly girder 26-in. deep and 13 ft. long is built below the side sill to carry the load across under the door. This girder is composed of a 5/16-in. x 3-in. x 5-in. bottom flange angle reinforced with a 7/16-in. x 2½-in. x 2½-in. angle. The bottom flange of the channel side sill is cut away at the ends of the drop girder just far enough to permit the flange angles to project up and be securely riveted to the web of the side sill. The web plate of this drop girder is cut from one piece 12 ft. 11¼ in. long and 4 ft. 7¼ in. wide.

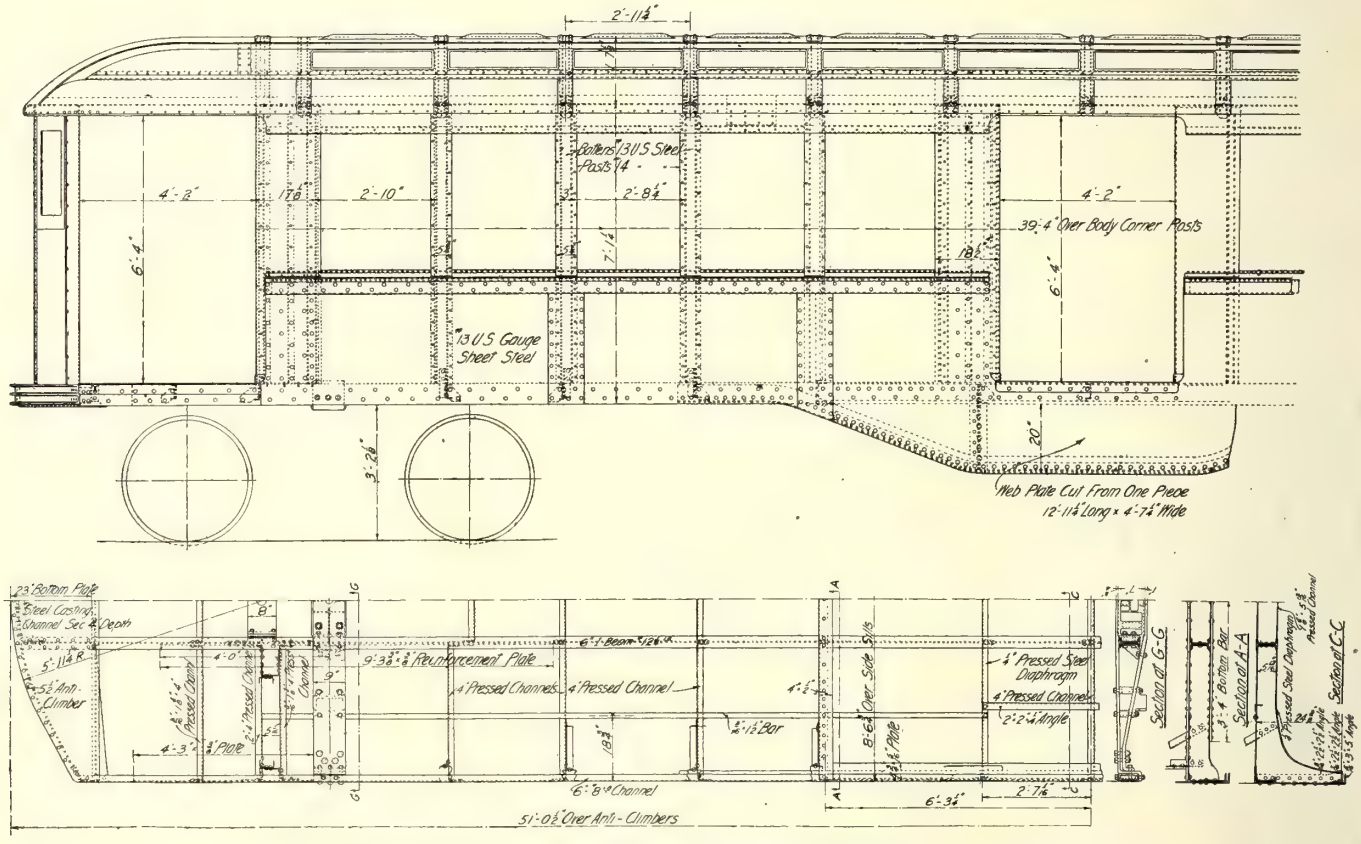
The window posts are substantially the same design as used in the 1907 cars. They are pressed of No. 14 gage-sheet steel into a hollow box section with grooves and ridges into which the sashes fit and are held by curved flat springs. Each post is braced at the bottom on the inside with a light angle. An outside belt rail formed of a special angle section weighing 6.75 lb. per ft. is riveted to the posts just below the window sills and is covered with a pressed steel rounded molding. The door posts, like the window posts, are pressed steel hollow box sections, formed in two pieces to permit the sliding doors to enter the door pockets.

stead of glazed sash, these shutters being operated from inside the car with continuous deck-sash openers. The apron of the upper deck is formed by an inverted U-shaped deck plate and the deck-roof sheets extend over and are riveted along their edges to the horizontal web of this section. The entire roof construction is designed to be watertight without calking of seams and all riveting is accessible and easily cut to remove or replace damaged parts.

The platform-hood construction consists, principally, of two light diaphragms connecting the body deck with the hood bow and supporting the platform-roof plates.

FLOOR AND SEATS

The floor of the car body is formed of corrugated-steel sheets on which is placed a covering of composition flooring 15/16 in. thick at the sides and crowned to 1 5/16 in. thick at center of car. The top covering is applied only in the aisle between seat risers; under the seats only the corrugated-steel sheets are used. The aisle floor is rounded up at the junction with the seat risers to a radius of 3 in. to eliminate a corner for the collection of dirt. On the platforms sheets of ⅛-in.



Interborough Steel Car—Part Plan and Side Elevation of Framing

At the eaves, the letter board, eaves fascia molding and side plate are formed by a single pressed section ⅛ in. thick, which fits over and is riveted to the tops of the posts. The carlines which are one-piece pressed channels bent to the curvatures of the upper and lower deck, are formed with flanged ends which are riveted to the top of the posts. An angle bracket on top of each post is also riveted to the carline and to the top flange of the plate and letter-board section, thus securely tieing together the side and roof framing. No headlining is used on the upper or lower deck, but an advertising card rack, formed of a curved No. 22 gage plate, is riveted to the inside fascia molding section and to a ¾-in. angle at the top. This plate covers the bottom curve of the carlines and the riveting at the top of the posts.

The lower deck roof is formed of curved steel sheets 1/16 in. thick, which are bent over on the outside of, and riveted to the letter board on their lower edge and are riveted to a pressed section which forms the upper-deck sill. The deck ventilator openings are closed with pressed-steel shutters in-

steel are used, which are rolled with small diamond-shaped corrugations on their top surface.

The seats in the car are all longitudinal, the center side doors and passageways taking the place of the eight cross seats used in the earlier types of cars.

DOORS AND WINDOWS

All side windows have double wooden sashes. The lower sash is stationary and the upper sash drops. Round bolt sash locks are used, the bolts fitting into holes punched in the box posts. The center and platform side doors are pressed steel, 50 in. wide. They are pressed in two parts, which are afterwards welded together.

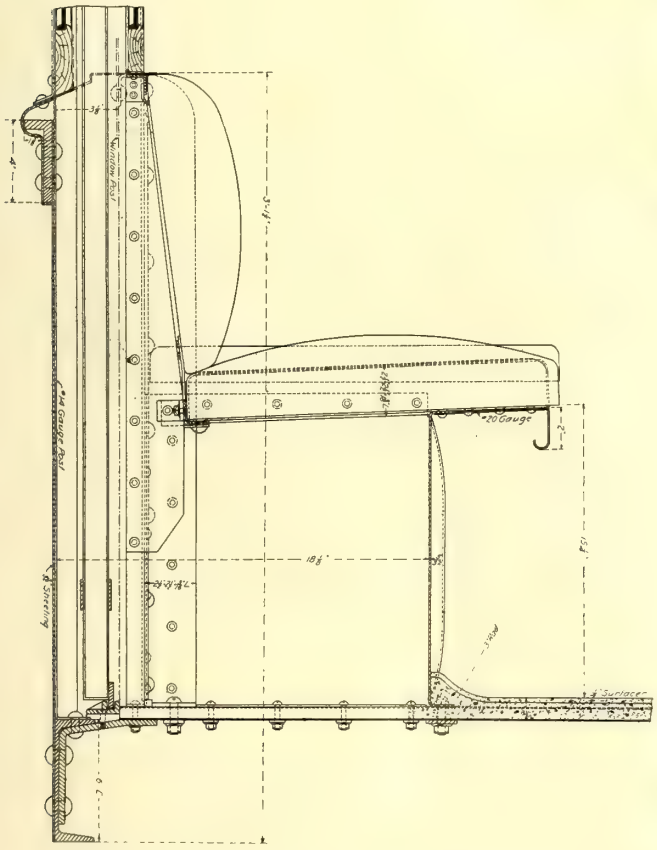
DOOR-OPERATING MECHANISM

The platform side doors are operated mechanically with the Interborough standard door-operating mechanism, but the center side doors are operated pneumatically with mechanically controlled valves.

The center side doors are moved by a double piston air engine mounted on the floor of the car at one side of the

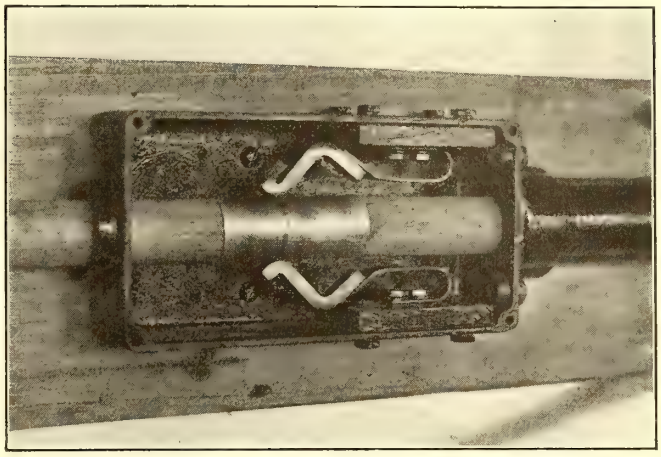
door opening, under the seats. The crosshead of this engine carries a rack, which engages with a sector gear connected to the end of a long radial arm. The outer end of this arm carries a roller, which moves in a vertical slot formed on the rear edge of the door. In the closed position of the door, the radial arm lies horizontally and locks the door shut and it cannot be opened unless air is admitted to the engine and the arm is raised by the movement of the sector gear. The sector gear is not rigidly fastened on the radial arm, but carries a short crank which bears against the radial arm in closing the door. The door, therefore, may be closed by hand by a platform guard without moving the sector gear or the air piston.

The striking edge of the door is fitted with a novel steel-cushion shoe, which prevents any injury to a person who may be caught between the door and the jamb as the door is closing. This device consists of a U-shaped pressed-steel shoe about 6½ in. wide and the full height of the door, which fits loosely over the striking edge of the door. It is carried by two studs, which are fitted into the ends of two pivoted bell-



Interborough Steel Car—Section Through Bottom of Center Door Post

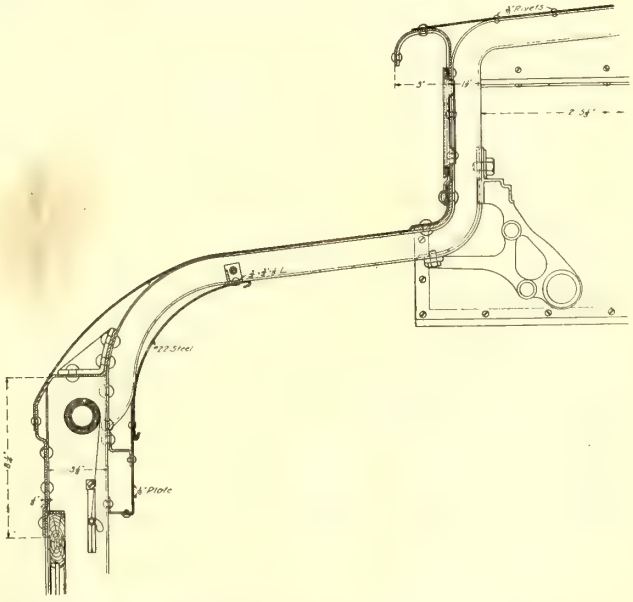
crank arms mounted inside the door stile. These studs work in radial slots in the door and when any pressure is applied on the shoe, it is forced back against the edge of the door. The upper bell crank has a short horizontal arm, which is connected with a vertical rod and turnbuckle to a horizontal arm on the lower bell crank. When the shoe is forced back, either at the top or bottom, the studs move in the radial slots and rotate both bell cranks simultaneously. The lower bell crank is T-shaped and the bottom vertical arm is connected to a round rod, which runs back through the bottom door rail and projects beyond the door about 6 in. On the end of this rod is a cam engaging with a fixed pawl on the back edge of the door and sliding on a square rod 5 ft. 3 in. long parallel to the bottom door track. When the bell cranks are moved by any pressure on the shoe, the round rod in the door is pulled forward, causing the cam to engage with the pawl and make a one-quarter turn. This causes the square rod on which the cam slides to also turn one-quarter revolution. At the extreme end of the square rod is fixed a crank arm, which is connected through a flexible spring with an auxiliary pin valve. This valve, when opened by the turning of the square rod releases all pressure from the cylinder of the air engine and prevents further movement of the piston and door until the pressure on the cushion shoe is removed and the bell cranks assume their normal positions. This device is very sensitive and operates quickly. In regular service, the doors begin to close when the guard turns the control valve handle



Interborough Steel Car—Signal Contact Attached to Sliding Doors

on the end of the car, and advance through an entering stream of passengers by a series of short movements, if at all obstructed. The mechanically operated platform doors are also equipped with the cushion shoes which serve, however, only as a spring cushion on the edge of the door and are not connected to any checking device.

The main control valves of the center side door air engines are operated by the guard standing between cars. A small crank arm, which moves in the same direction as the



Interborough Steel Car—Section Through Top of Side and Roof

manual operating mechanism handles, is mounted on the outside of the vestibule end. This crank carries a sector gear which engages with a geared counterweight crank disk. From this crank an iron rod runs down the sheathing and back of the anti-climbing end sill to a crank arm rigidly fastened to a 1-in. longitudinal pipe shaft under the side sill. The shaft extends under the air engine where a crank arm and connecting rod to the main valve are fitted. The counterweight on

the crank disk holds the operating mechanism in either the full on or off position. The majority of air motors and controlling apparatus has been made by the National Pneumatic Company, Chicago, and 50 cars have been equipped by the Consolidated Car Heating Company, New York.

TRAIN SIGNAL

All of the doors of the center door type cars are fitted with electrical contacts to provide a continuous train-starting signal instead of ringing bells from car to car. A one-wire signal circuit is carried though these contacts on each door of the car and is connected between cars with a special jumper. In the motorman's cab of each motor car is mounted a signal lamp connected to the signal circuit and to ground. In service all signal lamps except that in the operating cab must be cut out with a snap switch.

Current from the third rail is fed to the signal circuit only on the last car of the train and in order to light the lamp in the operating cab in the first car all doors and their contacts must be closed. The connection to the source of current is made by a special loop jumper, which is inserted in a terminal box at one end and into the signal circuit outlet at the other end. In order to insure that one of these jumpers is not connected up on any other car but the last in the train, the plug which fits into the terminal box is formed with a projection, which lies in front of the face of the drawbar. This plug, therefore, cannot be inserted on any car which is coupled to another behind it and can only be used on the last car in the train.

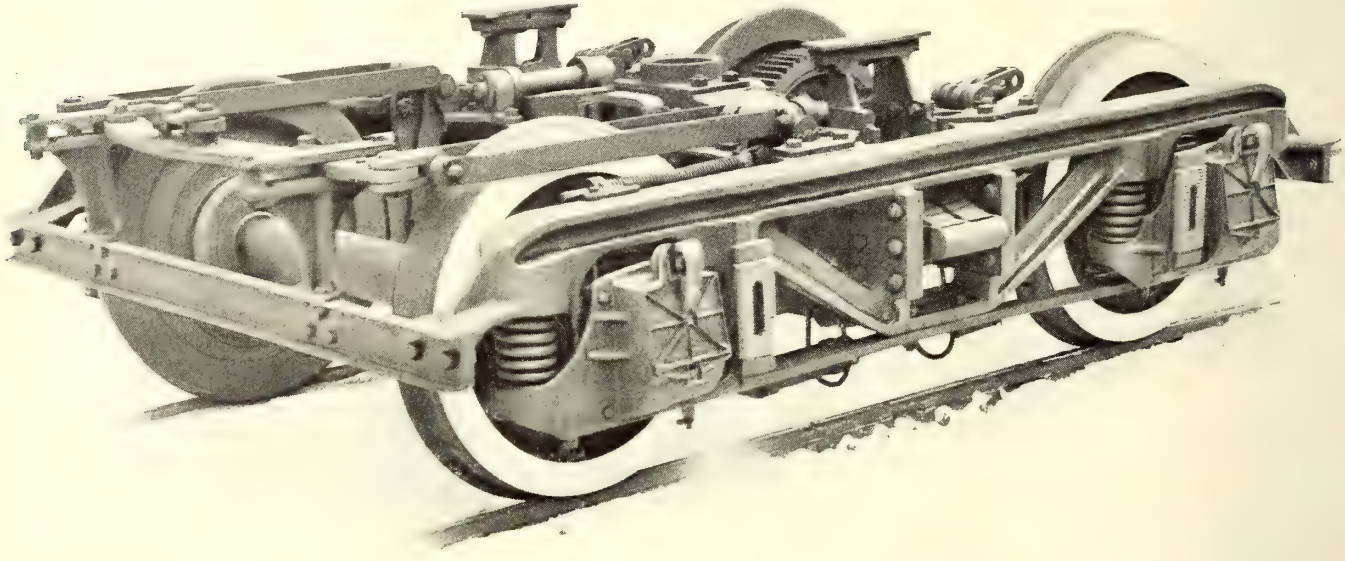
The contacts on the doors consist of two standard controller fingers bearing on the top and bottom of a round wooden rod, which is flexibly connected to the back edge of each door near the floor. A brass collar is fitted on this rod near the outer end and when the door is completely closed, this ring is between the two spring contacts and completes the circuit.

MISCELLANEOUS FEATURES

The arrangement of apparatus in the motorman's cab is the same as in the 1907 type cars. The door enclosing the master controller and brake valve swings out and locks into a door on the opposite panel of the end bulkhead. A motorman's seat folds up against the bulkhead behind this bulkhead door. All switches and fuses are mounted on a slate panel enclosed by a door on the end bulkhead on the left-hand side of the platform.

The arrangement of folding seats and barrier partitions opposite the center side doors is shown in one of the illustrations from a photograph. Two 2-in. iron pipes rise from the floor to the lower deck opposite the center of the doors on each side. A cross rail 4 ft. above the floor connects the two vertical pipes and a third vertical pipe nearer the door sill is bent in at the top and screwed into the same fitting which holds the cross rail. This forms an effective barrier dividing the space opposite the door into two aisles, each 24 in. wide. The outside of each of these aisles is formed by a folding seat, which is raised when the center doors are in use and is lowered when the platform doors only are used. When raised these seats are locked up by a spring catch, which can be turned only with a standard car-door key. When lowered the outer edges of the seats rest on a shelf formed on the pipe barrier. The purpose of these center door barriers is to provide four separate entrances or exits on each side of the car so that four streams of passengers can be loading or unloading at the same time. No attempt is made to compel passengers to enter or leave by any one door or doors.

The cars are all equipped with sanitary hand pole straps. These consist of loops of light steel tubing with the ends riveted to a sleeve which fits over the hand pole. The sleeve contains a spiral spring, which holds the loops up under the lower deck out of the way when not used by standing passengers. The part of the tubing which is grasped by the hand is coated with baked white enamel, which is easily cleaned and disinfected.



Interborough Steel Cars—Hedley Cast Steel Motor Truck

Other special equipment of these cars includes Westinghouse electro-pneumatic brakes, and Hedley cast-steel frame trucks, which were built by the American Locomotive Works.

This type of truck is found to be the most economical for subway operation and also possesses an increased factor of safety on account of minimum number of parts. The accompanying illustration from a photograph shows the simple and substantial construction of this type of truck.

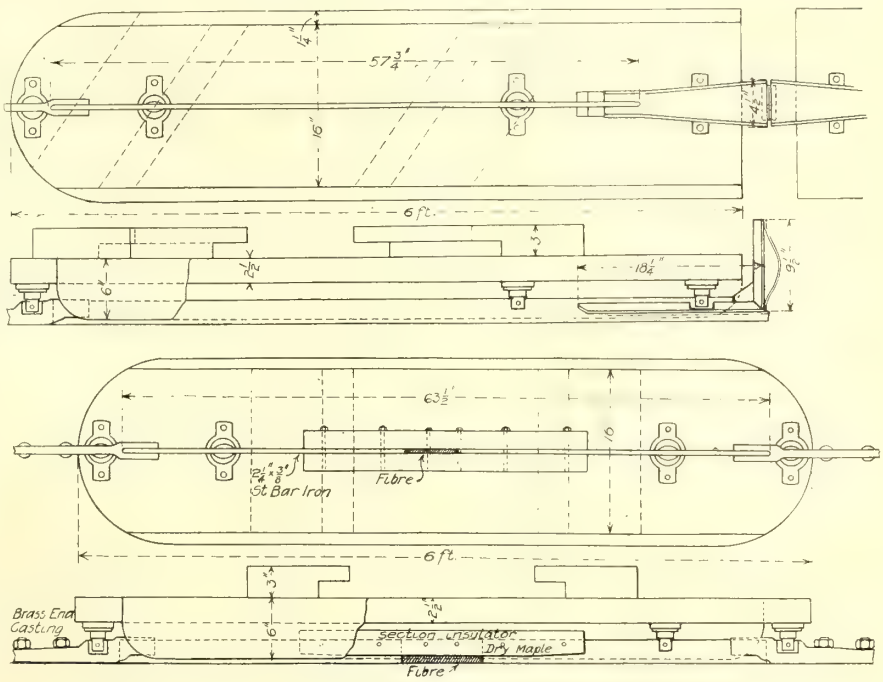
Theodore P. Shonts, president of the Interborough-Metropolitan Company and the Interborough Rapid Transit Company, New York, N. Y., who is chairman of the board of trustees of Drake University, Des Moines, Ia., has made a cash gift of $50,000 to the university.

The executive committee of the International Exhibition of Railways and Land Transportation has issued circular No. 19 relative to this exhibition which is being held in Buenos Aires, Argentine Republic, from May to November, 1910. The pamphlet contains, besides statistical tables on the population and railways of Argentine, a list of instructions for exhibitors, also information relating to the matter of juries and awards for the best exhibits. Several engravings are presented showing the pavilions of the various countries which are represented at the exposition. Among these are the United States, Germany, Austria, England, France, Italy and Belgium.

BROOKLYN LINE DEPARTMENT—SPECIAL OVERHEAD WORK AT MOVABLE BRIDGES

The Brooklyn Rapid Transit Company operates across 11 movable bridges, five over Newtown Creek, two over Gowanus Canal, two over Coney Island Creek, one over Wallabout Canal and one over Flushing Creek. Five of these bridges are of the Scherzer rolling lift type, five are swing bridges and one is a special bascule design. The following paragraphs will explain the overhead construction used on some of these bridges to cover the principal features of folding overhead trolley work in Brooklyn.

Two views are presented on page 1063 of the Hamilton Avenue Scherzer rolling lift skew bridge over the Gowanus Canal, one with the roadway in the normal position and one in the raised position to show the folding of the trolley wire and the type of spring contact. Each of the four end trolley troughs contains a bar-iron fiber section insulator contact as shown on this page. On one-half of the bridge the wires are fed through a double-throw single-pole switch from the bridge attendant's switchboard so that the power is cut off on the overhead wires before the bridge-moving motor is started. The other half of the bridge is fed through the spring contact which engages in similar contact on the live half referred to. On both this bridge and the Union Street bridge, shown in one of the illustrations, the feed wire is run in conduit which is carried up an end post of the bridge and thence along the bridge girders to the trolley troughs.



Brooklyn Line Department—Overhead Trolley Connections on the Hamilton Avenue Bridge

The wire on the separate leaves of the Hamilton Avenue bridge is kept taut by means of a slot in the bar on the land portal. The bridge wires are attached to each end of the bar thereby allowing the tension of the wire on the bridge to be balanced against that of the trolley wire beyond the bridge. The wire employed for this purpose is No. 0000 steel. Flexible iron wire and stranded copper were tried previously, but were not successful in securing the maximum strength. Even this heavy steel wire will crystallize and break off. Owing to the way the bridges of the Hamilton Avenue type close, there is a good deal of whipping about of the ends which produces a severe strain on the trolley wire. Those stresses which are due to changes in temperature are largely relieved by the contraction of the steel bridge itself, but provision must be made for contact between the two halves of the bridge in cold weather by allowing sufficient play in the spring contacts.

On the Union Street bridge, a new type of contact has been put in service. This consists of a single blade on the bridge engaging with a pair of blades on the other half of the bridge similar to a knife switch and jaws. This insures making contact even when there is transverse motion of the bridge. It should be stated that all of the overhead fittings on all of the bridges are of iron with the exception of the trolley end castings which are of copper or brass.

The West End Bridge over Coney Island Creek is fed from a knife-switch contact made automatically at the north end of the bridge when the latter closes. Attention is called to the overhead pantograph frame between the troughs of the forward end of the bridge. This frame is hinged and folds up like a jack-knife when the bridge opens and the bridge counterweight chamber comes down. The forward end of the frame then slides on a guide between the rails. It will be understood,

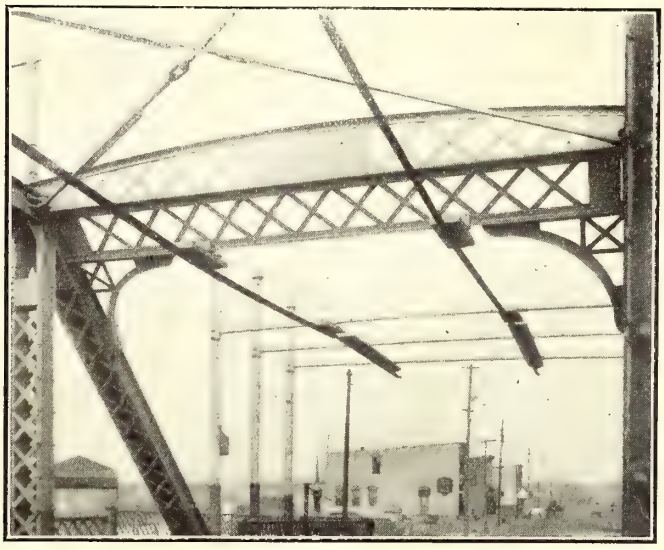


Brooklyn Line Department—Overhead Work at the Washington Avenue Bridge

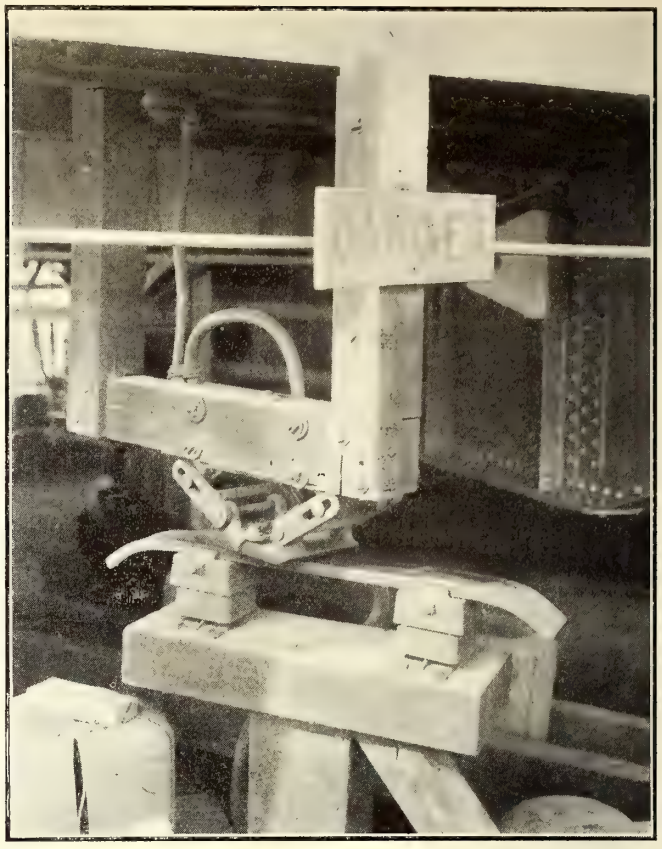


Brooklyn Line Department—Union Street Bridge Feeder to Trolley Wire

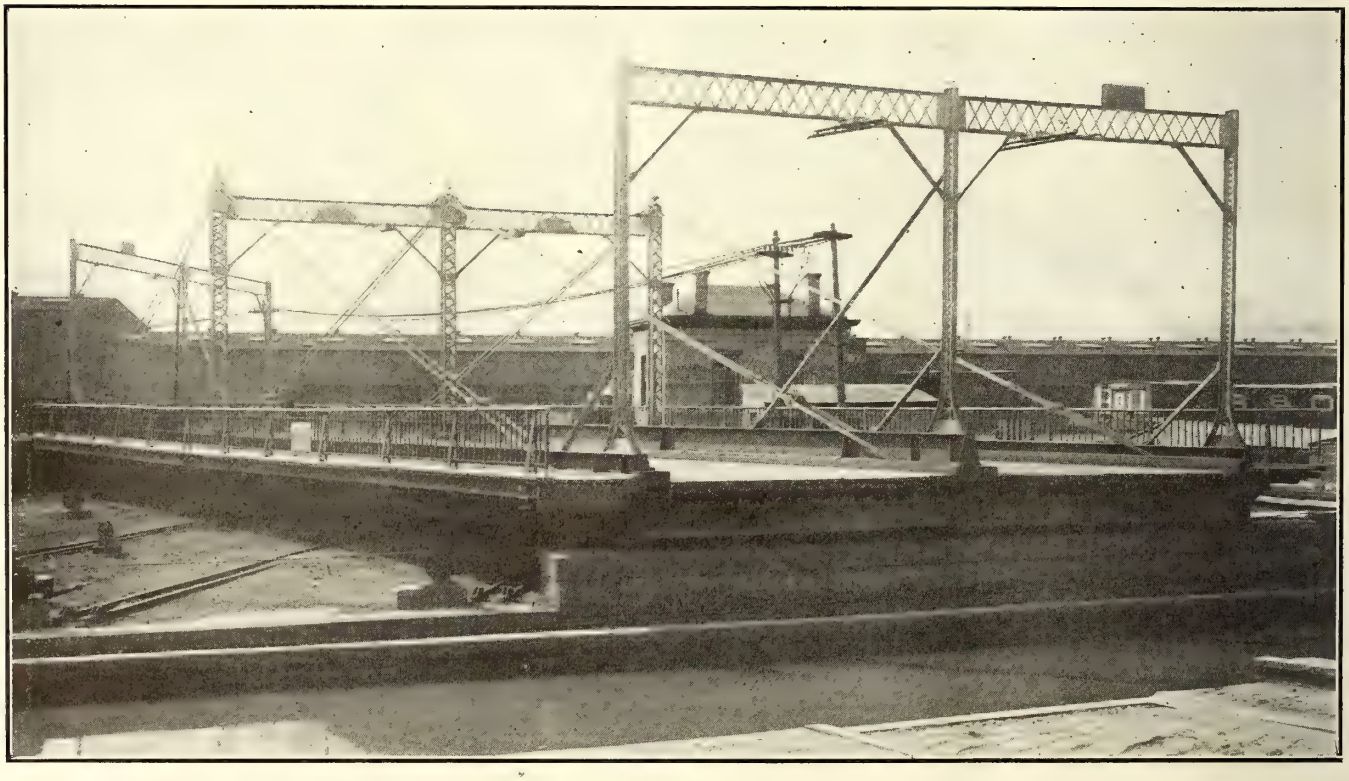
of course, that power is cut off automatically as soon as the bridge begins to move. The pantograph can readily be renewed if it should become injured in service. The peculiar backward motion of this bridge makes this device necessary as there is no other way in which the overhead construction could be cared for readily without resorting to cumbersome counterweights, pulleys or the like. To secure satisfactory operation, great care must be taken in making the dead-end support of the trolley wire on the land portal very rigid so that the alignment will remain unchanged. Otherwise a gap will be formed between the fixed and movable ends of the bridge and the trolley wire, thus causing rapid wear to the overhead work, injury to the poles and delays to traffic.



Brooklyn Line Department—Overhead Work on the Metropolitan Avenue Bridge



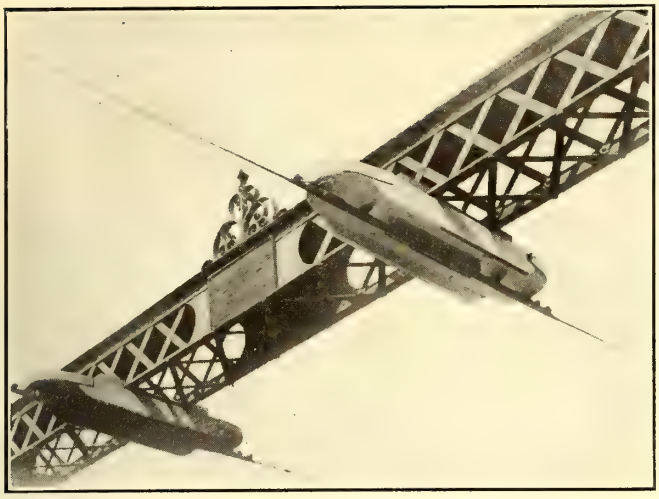
Brooklyn Line Department—Contact Shoe on the Metropolitan Avenue Bridge



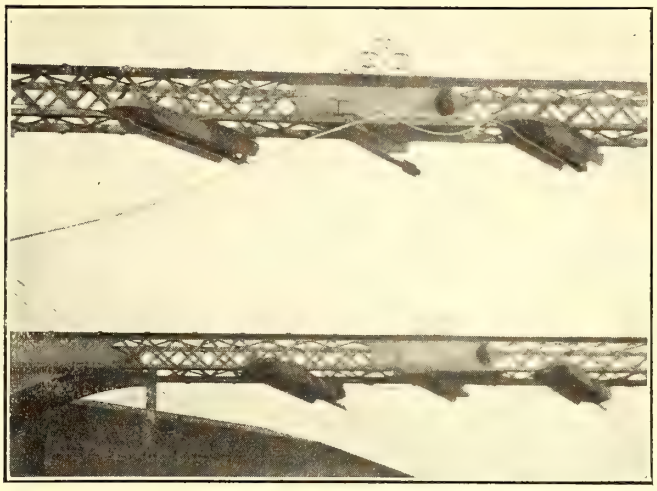
Brooklyn Line Department—Retractile Bridge on Washington Avenue When Back of the Wallabout Canal

The Washington Avenue retractile bridge, illustrated on this page, like the other movable bridges, is operated by a motor installed on the shore and supplied with power through a submarine cable. On each end of the bridge there is mounted a third-rail contact shoe to engage with a short piece of third-rail which in turn is connected to the track for the ground return. The Washington Avenue bridge is mounted on a number of trucks placed on tracks, the whole being moved to and from the canal with an endless rope and motor-driven windlass. The trolley wire on the bridge is fed from the contact shoe and rail which form a circuit only when the bridge is closed.

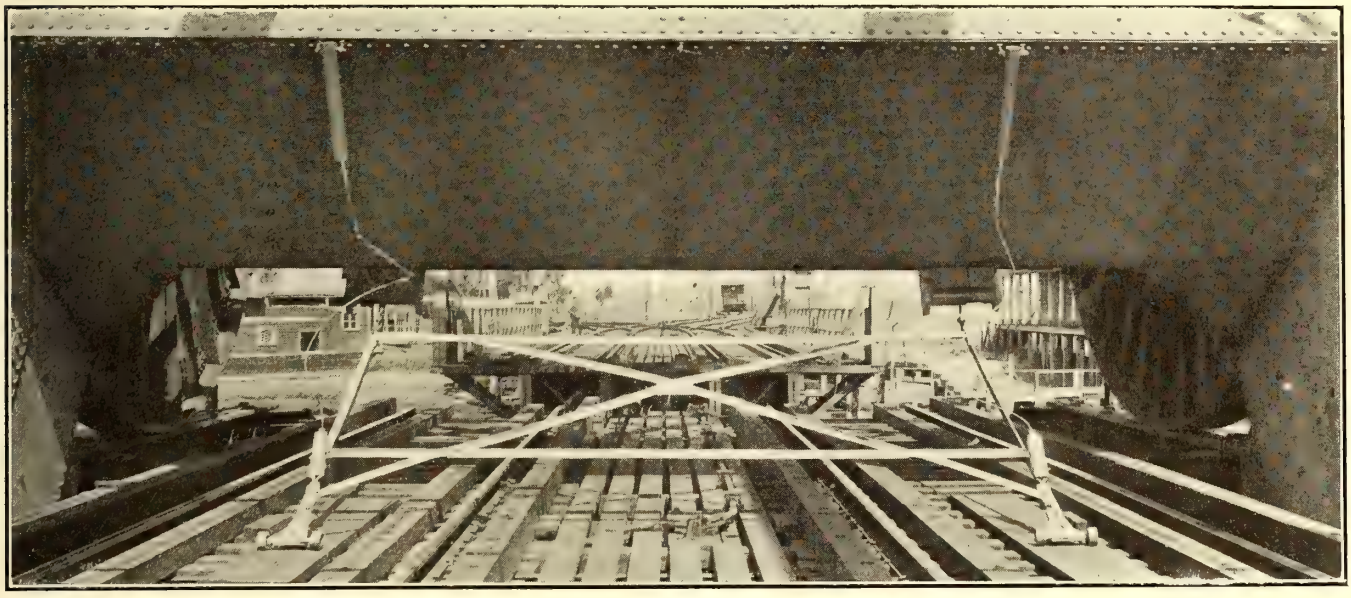
The Metropolitan Avenue bridge, shown on this page, is of the center-pier swing type. Its motor is operated through



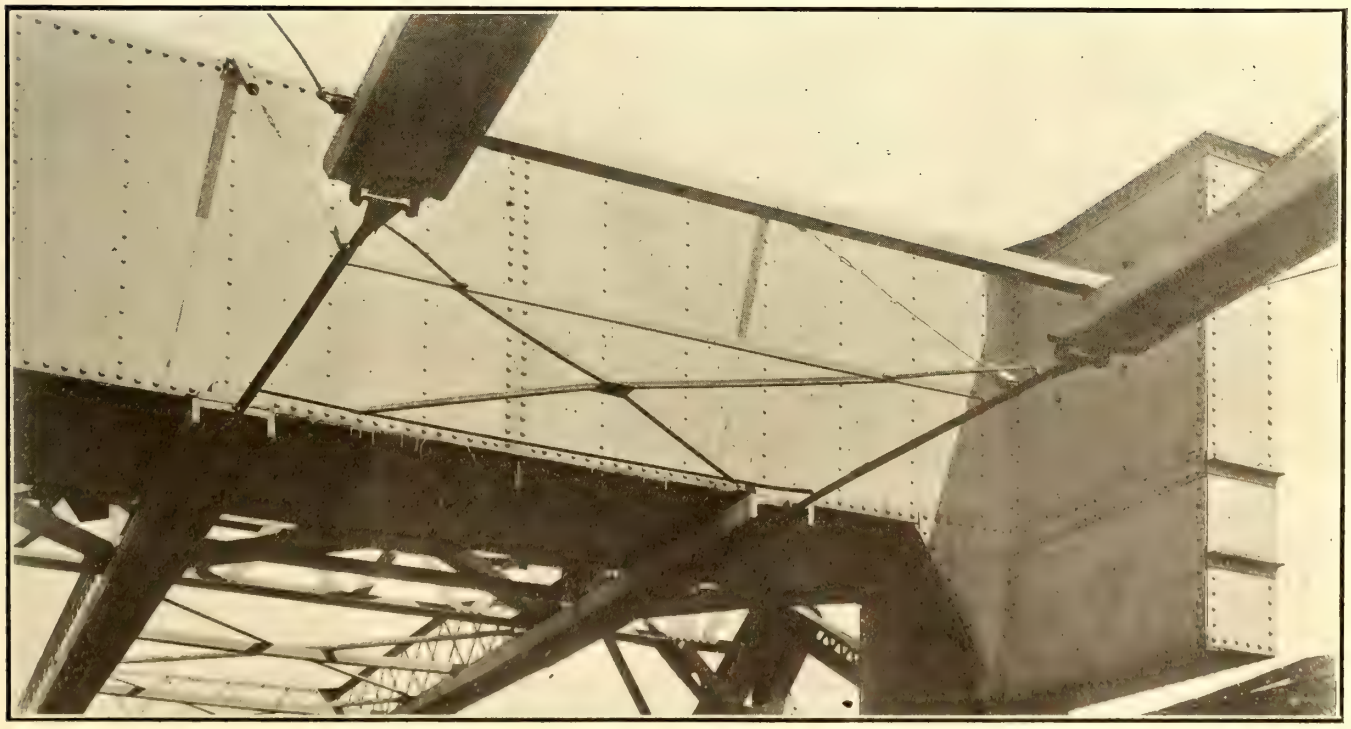
Brooklyn Line Department—Entrance Troughs on Hamilton Avenue Bridge



Brooklyn Line Department—Overhead Connection on Hamilton Avenue Bridge When the Latter Is Raised



Brooklyn Line Department—West End Bridge with Pantograph Down



Brooklyn Line Department—West End Bridge with Pantograph Up

power sent by way of a submarine cable to a contact rail and shoe on the pier and thence through the motor controller which is also mounted on the bridge. A contact shoe which is provided at each end of the bridge engages with a short piece of contact rail under the land piers to supply power to the overhead trolley only when the bridge is closed. A special form of spring contact is employed to make use of the bridge car rails for a ground return. In addition, a submarine return is provided to supplement these rails because this bridge is opened very frequently.

SYSTEMS OF RAILROAD ELECTRIFICATION

The electrification of steam railroad services was discussed at a meeting of the electrical section of the Western Society of Engineers, Chicago, Tuesday evening, June 7, at which Frederick Darlington, of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., read in abstract a paper entitled, "Economic Considerations Governing the Selection of Electric Railroad Apparatus." The paper described the several systems of electrification which are available at the present time—the direct-current system, the single-phase system and the three-phase system—and discussed impartially the inherent limitations of each. The proportion of cost factors for the generating, distribution and locomotive elements of electrification with each of the three systems was given in detail, with some figures on the cost of maintaining electric motors and locomotives of the three types referred to.

TRANSMISSION EFFICIENCY.

Mr. Darlington referred to the high cost with d.c. operation of the power transmission and distribution apparatus, which he said generally cost more than either the power plant or the electric locomotives and motor cars. This item was liable to be between 40 and 60 per cent of the total electrification cost, and was especially high where heavy trains are to be operated requiring large units of power distributed over long sections of track. Even with 1200 volts on the trolley wire, the cost of direct current distribution apparatus is still the largest cost item for electrical equipment.

In connection with three-phase motors he pointed out that these machines could be built for higher potentials than either d.c. or single-phase motors, hence did not usually use transformers on the locomotives or cars. But the difficulties of separate insulation of the two trolley wires employed had generally prevented the use of as high distribution potential for three-phase lines as for single-phase lines. Thus the usual practice in three-phase lines was to use 3000 volts, and 6000 volts was high for them. Three-phase motors also required more uniform potential than either single-phase or d.c. motors, hence, to maintain better potential regulation on the trolley at the relatively low voltages at which three-phase trolleys were generally operated as compared with single-phase trolleys, it was necessary to locate the transformer stations closer together on three-phase lines than on single-phase lines. For heavy trains the number of transformer stations would generally be more than double as many, and under certain conditions three or four times as many for three-phase as for single-phase installations.

There was another point about three-phase transformer stations for railroads which Mr. Darlington thought was more important now than it was a few years ago when it was not practical to use as high a potential on transmission lines as could be advantageously used to-day. Three-phase transformer stations required either one three-phase transformer or three single-phase transformers. It was much more costly, he said, to build one very high voltage three-phase transformer or three single-phase transformers than one single-phase transformer of the same aggregate output. In other words, the cost of transformers per kw of capacity was very much greater for three small units than for one large unit, especially when they are for very high primary potentials such as 100,000 or 110,000 volts. It was now well established that 110,000 volts or thereabouts will be widely used in large long distance power transmission schemes, the increase in potential over the practice of a few years ago having been brought about largely by improvements in line insulators, especially of the suspended type.

The speaker said that he could not state just what the relative cost of three-phase and single-phase power transmission and distribution systems will average for the ordinary requirements of railroads, but it was clear that with two trolley wires for the three-phase system instead of one wire as for single-phase, and with transformer stations two or three times as frequent for the three-phase as for the single-phase system the cost for the three-phase system would be considerably increased and would probably average somewhere from 30 per cent to 80 per cent more for three-phase than for single-phase.

The speaker also thought the constant speed characteristic of the three-phase motor a disadvantage because it imposed heavy demands upon the power station when the train was surmounting grades. He thought a variable speed a great advantage in railway work.

COMPARISON OF WEIGHTS.

Single-phase railway motors, he said, were heavier and more costly than direct-current railroad motors of the same capacity. The difference was somewhere between 10 per cent and 25 per cent in weight and 25 per cent to 50 per cent in cost in favor of direct-current motors as compared with single-phase motors. The transformers required for single-phase electric locomotives would generally constitute about 5 per cent to 10 per cent of the total locomotive weight, and the motors themselves would generally constitute about one-quarter to one-third of the locomotive weight. On the other hand, additional weight seldom had to be put into the locomotive frame and running gear to carry the extra weight of the transformers and single-phase motors when compared with direct-current motors, because when the locomotive frame was designed with sufficient strength to withstand the shocks encountered in operation it would be strong enough to carry all the load put upon it with single-phase apparatus. Three-phase motors were claimed by their advocates to be lighter and cheaper than direct-current motors of the same capacity, but the speaker doubted whether this was correct in the larger sizes, especially when the d.c. motor had commutating poles.

In conclusion the speaker stated that the reliability of the single-phase system had been demonstrated on the New Haven and Grand Trunk railways.

DISCUSSION.

In opening the discussion, G. T. Seeley, of the South Side Elevated Railroad Company, Chicago, who presided, remarked that when his road adopted electricity in 1896 it was burning anthracite at an average cost of from $4 to $4.50 per ton. With the substitution of electric power, the cost of the cheaper coal which could be used to advantage in the power house did not exceed $1.50 per ton, while the total amount burned was less than that previously fired in locomotives. As the result of this early electrification, the cost per car-mile was reduced by one-third.

Remarking that there was only one electric railway company in Cook County which did not purchase all or part of its energy for operating its cars from the Commonwealth Edison Company of Chicago, acting chairman Seeley called upon W. L. Abbott, chief operating engineer of the Commonwealth Edison Company. Mr. Abbott observed that electrification of main lines and terminals was a matter to be really reckoned with by steam railroads in the near future. He also pointed out that the generation of energy in a central power house permitted the use of cheaper grades of coal, and in some instances might avoid the necessity for the steam road's hauling its own coal. These savings, he felt, might represent the difference between operation at a profit and operation at a loss, in the straitened condition in which many railroads find themselves to-day.

W. B. Jackson, consulting engineer, Chicago, called attention to the successful operation of several three-phase roads with which he is acquainted, and predicted that the last word had not yet been said on the subject of three-phase electrification.

A. P. Jenks, of the General Electric Company, Chicago, took

exception to some of the remarks by the author of the paper in comparing direct-current with single-phase electrification costs. For short roads giving frequent service, he felt that 600-volt, direct-current operation would show up more favorably than single-phase, while for the interurban of average length he asserted that 1200-volt, direct-current was as economical as 6600-volt single-phase. Mr. Jenks said that the cheaper operation secured by avoiding rotary converter substations with their attendants was offset by the higher maintenance of alternating-current systems, at least in the case of reports which he had recently examined. High-voltage, direct-current has the advantage of lower first cost compared with the single-phase, he remarked, and was equal in all respects for interurban service. For trunk-line work he suggested that even higher direct-current voltages might be developed, as the result of which operation might be secured the equal of anything accomplished by alternating-current electrification. Mr. Jenks also called attention to the importance of standardization in railway equipment, pointing out that the 600-volt and 1200-volt systems closely approximate familiar electric railway practice.

A. Bement, consulting engineer, Chicago, referred to the public's appreciation, amounting almost to discrimination, in favor of electric service where electric railways parallel steam roads. As an example, he referred to the condition at San Francisco, where steam railroads and electric railways were in competition, each having ferry lines across San Francisco Bay. By far the larger per cent of the traffic preferred the electric line, although the fare and frequency of service was precisely identical.

E. N. Lake, of the Board of Supervising Engineers, Chicago Traction, declared that the two important points of standardization and interchange had not received sufficient attention in the paper. He remarked the large number of different voltages, frequencies and constructions employed in present single-phase practice, and declared that some standard specification would have to be determined upon before universal electrification of railroads could be hoped for. In the case of a wholly new design, he inquired of the author of the paper, what voltage, frequency and construction would be employed for the best operation?

G. H. Lukes remarked the change shown in a few years by the papers read before the Western Society of Engineers, indicating the advance from considering the electrification as suitable only for limited conditions, to the present broad appreciation of electric systems as applicable anywhere in ordinary steam railroad service.

Clarence Renshaw, of the Westinghouse company, Pittsburgh, reasserted the point of the present availability of electrification for all kinds of steam railroad services—terminals, tunnels and trunk lines. The complications of the three-phase distribution system, he thought, presented serious objections to that system. In answer to Mr. Lake's inquiry for a standard specification, he suggested that an 11,000-volt, 15-cycle, single-phase, alternating-current system could be taken at once as an absolute standard of electrification for the future development of railroad work. He added that 25-cycle, 11,000-volt electrification would also be entirely suitable for the service, and that every road in the country might be electrified uniformly with the New Haven installation, handling successfully all kinds of service. Mr. Renshaw then compared the large difference in transmission losses between high-voltage, alternating-current distribution lines, and with the lower voltages available with direct-current trolley. The New Haven electrification, he remarked, was in fact the only example of real trunk-line electrification, besides being the only one which has so satisfied the management that further extensions of the system have been approved. The New Haven company was now experimenting with two types of electric freight locomotives. With the higher voltage available with the single-phase system, said Mr. Renshaw, one unit in the power house can cover a greater section of track than with the low-voltage direct-current systems, thus securing a more uniform loading of the machine. The alternating-current, single-phase system, he declared, was the only one that is entirely suitable for handling both suburban and through train service. The first single-phase line to go into use—that of the Indianapolis & Cincinnati Traction Company—had secured maintenance records showing a cost of ¾ cent per car-mile, a figure which Mr. Renshaw declared was much lower than several examples of 600-volt, direct-current electrification he had examined.

In answer to a question, Mr. Darlington, author of the paper, gave the information that the power factor in the case of the New Haven electrification was between 80 and 85 per cent, probably not as good, he said, as it might have been had 15 cycles been used. Mr. Darlington again reminded his audience that his paper undertook only the comparison of the present systems of electrifications as applied to heavy railroad service, and that in his remarks he had thus far undertaken to discuss not future possibilities, but the present accomplishments with these systems. In an interesting prediction of the future of transportation in Illinois, Mr. Darlington remarked that the electrified railroads would purchase their energy from three or four large central power houses operated by companies which would make a business of selling energy for this purpose, thus doing away with the present low load factors encountered in electric railway power generation. At the present time, the three-phase system did not meet thoroughly satisfactorily all conditions of speed control, said Mr. Darlington, and he reminded Mr. Jackson that in one of the installations of which the latter had spoken earlier in the evening two motors were employed in the car, one being used for each of two of the three efficient speeds, and the two motors being operated in cascade for the third efficient speed. Such a scheme entailed carrying non-productive motor equipment throughout a large proportion of the car travel. Mr. Darlington objected also to the point previously made that a three-phase transformer can be built more cheaply than the equivalent rating in single-phase apparatus.

REDUCTION OF TROLLEY DELAYS ON THE BROOKLYN BRIDGE

BY F. VAN Z. LANE, C.E., ENGINEER IN CHARGE OF TRAFFIC DEPARTMENT OF BRIDGES, CITY OF NEW YORK.

When the writer assumed charge of traffic on the Brooklyn Bridge, it was very soon found that poor condition of the trolley car equipment operating over that structure was responsible for a great many delays to the service there, and inasmuch as the bridge is the terminus of seventeen lines, any delay there not only had local consequences but affected the service in the greater part of Brooklyn.

The table presented on page 1066 summarizes the specific cause of these delays. It was worked up from daily reports which give the delays, by divisions, of each line crossing the bridge. These daily reports are tabulated every month and copies of the monthly reports are distributed through the railway companies to the superintendents of the different divisions. This plan has had the effect of stimulating competition between the different divisions to secure a low record of delays.

The value of this table or system is shown conclusively by comparing the figures for March, 1907, with those of last March. During that time the delays per 100 cars have been cut down from 49 seconds to 9.9 seconds and the average time of delay has been reduced from 4.4 minutes to 2.2 minutes—just one-half.

The net result is shown by the fact that the number of cars operated has been increased 40 per cent during the 5 to 6 p. m. rush hour. It was possible to operate an average of only 236 cars during this hour in March, 1907, whereas the average for the same period in last March was 335. This is the greatest number of cars ever operated from New York over the Brooklyn Bridge during any one hour. At the same time the "consistency or reliability of service" which is as important as the amount, has improved, so that in the year 1909 the rush hour

schedule was operated 82 per cent of the time, whereas for the year 1907 it was operated only 4 per cent of the time.

The prevention of equipment delays has been only one of many things employed in increasing the limit of trolley service that can be operated over the Brooklyn Bridge, both as to amount and reliability. It may be stated, however, that the methods of ascertaining the causes of all other delays and preventing their recurrence have been just as carefully systematized and remedied.

BROOKLYN BRIDGE TROLLEY DELAYS DUE TO DEFECTIVE EQUIPMENT

	Coney Island & Brooklyn Railroad		Brooklyn Rapid Transit Co.	
	March, 1907	March 1910	March, 1907	March, 1910
Number of cars	18,575	19,670	95,311	107,165
Number and causes of delay				
Fuses—Number	18	1	...	...
Minutes delay	78	2	...	...
Trolley poles—Number	9	...	25	15
Minutes delay	48	...	124	44
Trolley ropes—Number	6	1	8	2
Minutes delay	15	2	27	4
Trolley wheels—Number	...	...	6	...
Minutes delay	...	...	23	...
Motors—Number	24	2	15	13
Minutes delay	106	3	79	29
Control fuses—Number	...	1	9	35
Minutes delay	...	1	37	61
Brakes—Number	2	...	27	9
Minutes delay	13	...	109	23
Fenders—Number	4	...	...	...
Minutes delay	27	...	...	...
Resistance—Number	3	1	4	3
Minutes delay	15	4	20	7
Controllers—Number	11	...	10	6
Minutes delay	52	...	48	15
Hot Resistances—Number	...	...	11	2
Minutes delay	...	...	60	7
Overhead switch—Number	1	1	...	1
Minutes delay	2	3	...	3
Trolley leads—Number	4	...	3	...
Minutes delay	22	...	14	...
Gears—Number	2	...	...	...
Minutes delay	8	...	...	...
Total				
Number of delays	84	7	118	86
Minutes delay	386	15	541	193
Per cent of cars	16.25	15.6	83.75	84.5
" " delays	41	7.6	59	92.4
" " time delayed	41.5	7.2	58.5	92.8

Note.—In 1907 delays equalled 49 sec. per 100 cars; in 1910, 9.9 sec. per 100 cars.

FOLLOWING UP CONTRACT WORK ON THE LONDON COUNTY COUNCIL TRAMWAYS

The London County Council Tramways make use of several interesting report forms to keep track of the progress on large contracts for cars and trucks as they are carried toward completion from day to day in the manufacturers' shops. Furthermore, the tramways employ a staff of inspectors to see that the work and materials supplied are in accordance with the specifications, and the responsibility of the inspectors is so direct that there is not the slightest difficulty in placing the blame should any part betray a defect in service. An idea of the thoroughness of this follow-up and inspection system may be obtained from a glance at the accompanying reproductions taken from the weekly report book on "Materials and Finished Parts Inspected," which was printed in connection with a contract made for 175 sets of maximum traction trucks. It will be observed that the item number is given, the name of the part, the number of pieces required in all, the number passed up to the end of the preceding week, the number passed every day and the total to the end of the reporting week, also the names of the inspector and the manufacturer. In addition to the foregoing columns, it is usually necessary to have a like number of columns opposite to cover the report on the item after it has been turned, machined, bored or otherwise finished ready for assembly. It therefore happens that most parts are subject to two examinations, one when they are in the rough and another when they are in the finished state.

Contract No. ....

LONDON COUNTY COUNCIL TRAMWAYS.

PROGRESS OF WORK ON CONTRACTS.

Contractor's Name .....

....

Nature of Contract .....

175 sets of maximum traction trucks

Number of days completion overdue .....

Amount due as liquidated damages .....

Remarks as to progress of work .....

....

Plow carrier trucks (units) shipped to date	171
Plain trucks (units) shipped to date	171
Plow carrier trucks (units) delivered to date	171
Plain trucks (units) delivered to date	171
Sets of trucks licensed and in service	128
Plow carrier trucks (units) completed and ready for licensing	43
Plain trucks (units) completed and ready for licensing	43

Summary for the General Manager to Show Progress on a Given Contract

(799) LONDON COUNTY COUNCIL TRAMWAYS. No.....

Report of Progress of Car Bodies at the Works

of Messrs.....for week ending.....190

Contract .....

Remarks:

Particulars.	For week ending	To date.	For past week.
Bodies laid down			
Roof covers do.			
Underframes do.			
Bodies despatched			
Roof covers do.			

Totals.

No. of car in course of construction.	Location. Bay No.	Berth No.	Body framed.	Panelled.	Roofed.	Power cables.	Lighting wires.	Ceiling boards.	Rail casements.	Seats.	Mouldings.	Vent gears.	Brass furniture.	Lower saloons only. Plasterers.	Dashers.	Stairways.	Stanchions.	Handrails.	Movable steps.	Hood gears.	Brake gears.	Painted.	Filled up.	Rubbed down.	In colour.	Lined and lettered.	Varnished.	No. of car in course of construction.

Weekly Car Body Progress Report

LONDON COUNTY COUNCIL TRAMWAYS.

(904) **175 sets of Maximum Traction Trucks—materials and finished parts inspected.**

Item.	Name of part.	No. required.	Number of unfinished parts inspected and passed.	At works of Messrs.	Inspector.	Machining, &c., required.	No. required.	Number of finished parts inspected and passed.	Where passed.	Inspector.
01	Driving wheel axle	350	No. passed to Sat. week endg..... Mon..... Tues..... Wed..... Thurs..... Fri..... Sat..... Total No. passed for week ending.....190.. Total No. passed to date.....190.. Number yet to be passed.			Turning Milling Keyway	350	No. passed to Sat. week endg..... Mon..... Tues..... Wed..... Thurs..... Fri..... Sat..... Total No. passed for week ending.....190.. Total No. passed to date.....190.. Number yet to be passed.		

Typical Arrangement for History of a Truck Part

On this particular contract for 175 trucks, report columns were printed for 208 pieces relating to the trucks and 12 pieces relating to the conduit plow-carriers. At the end of the week each inspector turned in his report book to the headquarters of the tramways, where the rolling stock superintendent assembled the data in all the books to determine the state of the work, and then filled out for the general manager the form called "Progress of Work on Contracts," substantially as shown in the accompanying reproduction.

The third form shows the weekly report which is sent to the general manager every Monday morning, stating the progress of work on individual car bodies under construction. Each portion of the car body as completed is checked off, and a study of the gaps will show whether or not some parts of the work are being held up through the failure to carry out some other work which should be done first. Thus, if there is a delay in the installation of the power cables, the work on seats, molding, brake gear and other items is necessarily delayed. Hence these reports are of value in showing whether the car builder is slow or whether the trouble is due to some sub-contractor's failure to deliver material.

UNITED STATES CENSUS REPORT ON ELECTRIC RAILWAYS IN 1907

An abstract of the forthcoming census report on electric railways has just been issued at Washington by the census bureau. It shows that in 1907 the total number of miles of line, by which is meant length of first main track or roadbed, was 25,547.19, as compared with 16,645.34 in 1902, the per cent of increase being 53.5. The total number of miles of track, including sidings, was 34,403.56 in 1907, as against 22,576.99 in 1902, the per cent of increase amounting to 52.4. Of the total number of miles of track, those operated by electricity in 1907 numbered 34,059.69 and in 1902, 21,907.59. The per cent of increase was 55.5. The trackage operated by animal power in 1907 was 136.11 and in 1902, 259.10. The per cent of decrease amounted to 47.5. The trackage operated by cable in 1907 was 61.71 and in 1902, 240.69, the per cent of decrease being 74.4. The trackage operated by steam in 1907 was 146.05 and in 1902, 169.61, a decrease of 13.9 per cent.

The cost of construction and equipment in 1907 was $3,637,668,708, as compared with $2,167,634,077 in 1902, the per cent of increase amounting to 67.8. The number of employees in 1907 was 221,449, and in 1902 it was 140,769, the per cent of increase being 57.3. The total number of cars in use in 1907 was 83,641, as against 66,784 in 1902, an increase of 25.2 per cent. The number of passenger cars in 1907 was 70,016, as compared with 60,290 in 1902. The per cent of increase was 16.1. The number of all other cars in 1907 was 13,625, and in 1902 it was 6,494, the per cent of increase being 109.8.

The total number of passengers in 1907 was 9,533,080,766, as against 5,836,615,296 in 1902, an increase of 63.3 per cent. The number of fare passengers in 1907 was 7,441,114,508, as compared with 4,774,211,904 in 1902, the per cent of increase being 55.9. The number of transfer passengers in 1907 was 1,995,658,101, and in 1902 it was 1,062,403,392, the increase amounting to 87.8 per cent. The number of "free" passengers in 1907 was 96,308,157. The statistics of 1902 furnish no figures of this kind. The number of fare passengers per mile of track in 1907 was 216,522, and in 1902 it was 212,217, the per cent of increase being 2.

The car mileage, including passenger, express, freight, mail, etc., in 1907 was 1,617,731,300, as compared with 1,144,430,466 in 1907, an increase of 41.4 per cent.

In 1907 the number of power houses was 829, as against 805 in 1902, the increase representing 3 per cent.

The steam and gas engines and water wheels used in generating electricity were reported as having 2,476,479 hp in 1907 as compared with 1,349,211 in 1902, an increase of 1,127,268 hp, or 83.6 per cent. The kilowatt capacity of generators in 1907 was 1,723,416, and in 1902, 898,362, an increase of 91.8 per cent.

The gross income of the operating companies in 1907 was $429,744,254, and in 1902 it was $250,504,627, an increase of 71.6 per cent. The operating earnings in 1907 were $418,187,858 as compared with $247,553,999 in 1902, the increase being 68.9 per cent. The income from other sources in 1907 was $11,556,396, and in 1902 it was $2,950,628, an increase of 291.7 per cent. The income from passenger service formed 99 per cent of the total income from operation in 1890, but this proportion decreased to 94.5 per cent in 1902 and to 91.4 per cent in 1907. The percentage that the income from sources other than operation formed of the gross income was 1.2 per cent for both 1902 and 1890, and by 1907 it increased to 2.7 per cent.

The per cent ratio of operating expenses to operating earnings in 1907 was 60.1, and in 1902 it was 57.5.

The total capitalization outstanding of the operating and lessor companies in 1907 was $3,774,772,096, while in 1902 it was $2,308,282,099, an increase of 63.5 per cent.

The average number of "fare" passengers per car per year was 106,277 at the census of 1907 as compared with 79,187 for 1902 and 62,237 for 1890.

The greatest actual increase in the net trackage in any State was reported for Ohio, the increase amounting to 1,337.36 miles. The next largest increases were in Indiana, with 1,272.15 miles; Pennsylvania, with 1,257.49 miles; California, with 1,184.39 miles; Illinois, with 1,096.15 miles, and New York, with 1,011.29 miles. The largest relative gain occurred in Idaho, when the track increased from 3.50 miles in 1902 to 73.09 miles in 1907, or 1,988.3 per cent.

The use of electricity has made it possible to increase the size of the passenger cars, which accounts for the fact that there was, from 1902 to 1907, an increase in the total number of only 16.1 per cent. The truth of this is evidenced by the fact that the increase in the number of fare passengers, 55.9 per cent from 1902 to 1907, was much greater than the corresponding increase in the number of cars.

The contents of the report are in two parts. Part I pertains to the statistical phase of the subject and comprises a chapter on scope and method; another on comparisons with the censuses of 1902 and 1890; the third relates to power-plant equipment and output of stations; fourth, track and rolling stock; fifth, traffic; sixth, capitalization; seventh, financial operations; eighth, employees, salaries and wages, and ninth, sale of current by electric railways. Part II concerns the technical side of the subject, and the first chapter covers equipment; the second, fares and transfers; third, use of electricity by steam railroads; fourth, interurban railways—economic, financial and social features; fifth, franchises, public regulation and public ownership, and sixth, foreign tramways and electric railways. There are 187 tables and 4 supplementary tables; also 2 appendices, 3 maps and 7 diagrams. The illustrations in halftone are 30 in number and show overhead construction, third-rail coverings, underground stations and steel cars in tunnels, subway tunnel tracks, prepayment cars, side-rod electric locomotives, etc.

CARBON BRUSH CHANGES OF THE VIRGINIA RAILWAY & POWER COMPANY

The Virginia Railway & Power Company, Richmond, Va., has recently adopted the practice of slotting all of its commutators and using LeCarbone brushes in connection with them. This decision was the result of a series of careful tests carried out on a number of motors which had been giving considerable commutator trouble. After the commutators were slotted and used with the new brush, their wear was cut down practically to nothing. Not only was flashing largely eliminated, but it was also found feasible to adopt a lighter brush-holder spring tension. The old tension varied from 5 lb. to 15 lb. per holder according to the condition of the brush-holder springs. It is the practice of the Virginia Railway & Power Company to reduce this pressure to 4½ lb. per square inch of brush contact area. The LeCarbone brush is also giving three to four times the life of the replaced brushes, a result which is due in part to the lowering of the brush-holder tension.

PROTECTION OF LINEMEN WORKING ON HIGH TENSION TRANSMISSION LINES

The practice of a number of electric railway companies in protecting linemen against accidental shocks while repairing high-tension transmission circuits is briefly described in the following paragraphs. The precautions taken vary with the different companies. In addition to cutting out the section under repair at the adjacent substations the use of a grounding chain or wire at the point where repairs are being made is quite general.

WESTERN NEW YORK & PENNSYLVANIA TRACTION COMPANY

Part of the substation operating rules of this company are as follows:

"When the linemen have communicated with the substation and notified the operator that they are going out on the line, the operator will state in writing what linemen have so reported. He will then throw out the high-tension line and will under no circumstances again throw in this line until he has received reports from all the men or gangs who have reported for work in looking up the trouble. This rule must be adhered to to the letter, regardless of who gives orders to throw in the line, inasmuch as failure to do so is liable to cause the death of some employee working on said line.

"In case of trouble on a line, as above noted, the operator will note on the back of his daily report the time at which the men reported for duty in looking up this trouble. He will also report the time that each of said linemen or gangs report back, and also the time at which the trouble is reported cleared up. He will then note the time at which the line is again thrown into service. The matter of exact time of the above events is very essential and important and the substation operators will be held responsible therefor.

"When repairs are to be made on the high-tension line as noted, the operators in each of the substations will not only throw out their high-tension oil switch in connection with the said line, but will also open the high-tension disconnecting switches. They will, however, note that they are to leave the disconnecting switches on the lightning arresters in the closed position.

The rules for the governing of the linemen are in accordance with the above and when looking for trouble, they are required to report in at every telephone jack-box along the line. When making repairs, the linemen use a chain fastened to an insulator on the top of a pole about 10 ft. long. This chain is thrown around the three wires in order to short-circuit the line, and in turn is grounded to take off any static which may exist.

BEEBE SYNDICATE LINES

On two of the properties, the Rochester, Syracuse & Eastern Railroad and the Syracuse, Lake Shore & Northern Railroad, the transmission lines, carrying 33,000 volts, are in duplicate, being on each side of the track 28 ft. apart, and in case repairs are necessary on any one of the lines, communication is had with the power house by means of the telephone. When assured that the current is off the line required to be repaired, the linemen are required to drive a grounding bar, attached to a steel chain, well into the ground and throw the chain over the top wire so that it is in contact with all three wires, forming an absolute ground for the entire circuit. This ground is left on at one or more points during the time the transmission line is under repair, and upon removal of the grounding chains, the power house is again notified that the line is cleared. Such notification is given only by the foreman of the overhead line, who is responsible for all his men being clear of the circuit before the removal of the grounding chains and notice given to the power house. This precaution seems to be all that is necessary, as it has worked perfectly and we have never had an accident from repairs to the transmission line.

On the Auburn & Syracuse and Syracuse & South Bay lines the duplicate transmission lines are on the same poles. They are too near one another to allow of work being done on either while the current is in the other one. It is necessary, therefore, to do this work at night after the power house has closed down, but the same precautions are observed during the work as noted above. The transmission lines are in the form of an equilateral triangle, with one wire on the top of the poles and two wires on the cross-arms. With this form it is very easy to get all three wires in contact on the same chain.

NEW YORK STATE RAILWAYS

The rules covering linemen working upon operating transmission lines are to the effect that no employee is to touch any high-potential wires without first grounding the line, which is done by means of a short chain pulled over the transmission wires by means of a small rope. In case a man desires to work on a line, he calls the station or stations at which he wishes to have the line killed and the station operator pulls out the switches and reports back to him that the line is clear. The lineman then throws a rope over the transmission line and draws the small chain, above referred to, over the wires, thus grounding the line. After the work is done the same lineman who called the line out telephones back to the station that the line is clear and ready to be thrown in again. Only in extreme cases is any other man permitted to call the line back in, as it is very important that the same man who requests that the line be cut out should report that the line is clear. The station operator takes the name of the man when he first calls and when he reports that the line is clear, thus eliminating as far as possible any chance of getting orders confused. Transmission lines are not grounded at the substations, as the company feels that the man who should do this is the man who is actually doing the work.

THE SEATTLE (WASH.) ELECTRIC COMPANY

The substations are tied together electrically by means of three-wire, three-phase, 13,000-volt lines. With two exceptions they are connected by two separate circuits on different pole lines. This arrangement allows one of the lines to be dead while making repairs on it, while the other line temporarily carries the full-load current. As a further protection, when the men are working on either of the lines, chains are thrown across them on either side of the point at which the work is being done, so that if by accident the circuit should be cut in from either substation it would throw a dead short on the line and thus protect the linemen. While working on 2300-volt primary lighting circuits and other high-tension lines of the distribution system the linemen are furnished with rubber gloves and protective rubber shields. As further protection, in case of very wet weather, the circuits are opened when repairs are being made.

MILWAUKEE (WIS.) ELECTRIC RAILWAY & LIGHT COMPANY

Careful and explicit instructions are given to all men who are intrusted with this class of work. They are furnished with grounding chains, but before using these the linemen control the feeders through a dispatcher, who receives their orders for cutting in and out lines and transmits them to the proper power houses, advising the linemen by telephone when the lines are supposed to be dead.

ALBANY SOUTHERN RAILROAD

It is the practice of the line foremen to work on high-tension lines only after he has ascertained from the power house that the current has been shut off and has further assured himself that all substation switches have been opened so that no direct current can be converted into alternating current through the rotary at the substation, thus keeping the line alive. After ascertaining that the power house and substation attendants have done their work properly, the next procedure is to short-circuit and ground all wires of the transmission line. This is accomplished with three bamboo rods about 5 ft. long with a copper hook fastened at one end of each, which hooks are in turn connected to each other and to a suitable ground. This device is always placed between the lineman and the power plant and left connected to the wires until all work is finished.

NORTHERN ELECTRIC RAILWAY

The Northern Electric Railway buys all the current required for the operation of its trains from the 60,000-volt network of the Pacific Gas & Electric Company. The protective practice

of the latter company is of interest. The safety of linemen against accidental shock is primarily insured by the use of mechanical grounding devices, which are installed on incoming and outgoing lines at all switching stations. These devices are so arranged that by the operation of a lever located either within or without the station grounded metal arms are raised simultaneously into contact with the three wires of the circuit to be repaired. If the other end of this circuit terminates in a switching station it is shorted and grounded in the same way, thus affording double protection to the workmen on the line. As it is impossible to positively interlock all switches and grounding levers between distant substations, a system of load and line dispatching, similar to the train dispatching system of a railroad, has been developed and put in operation to insure the correct sending, understanding and execution of orders. Each switch and grounding device is designated by its own number, which is painted conspicuously on a marker attached to the operating handle of the switch. These numbers and their respective location, both geographically and electrically, are shown on the map of transmission lines and their connections posted in the chief dispatcher's office, which is connected by telephone to each distant switching station. The manipulation of all circuits is directly controlled by the dispatcher and no switch can be moved without his orders. In each case when it is found necessary for linemen to do work on any section of line a request must be forwarded through the nearest station to the dispatcher to have the desired circuit killed. The dispatcher upon receipt of such request telephones an order to the operators of the proper switching stations, who record the order in an order book and repeat it back to the dispatcher, giving hour and minute of its receipt. The operators then move their switches and grounding devices in accordance with the orders received and telephone back to the dispatcher that the orders are completed, again giving the hour and minute. Linemen are then notified that the circuit is safe to work on. If the line is to be again required for service the line foreman is instructed to complete his work or clear the line within a certain definite time and notify the dispatcher accordingly. In all cases line foremen are instructed to secure advice from the proper switching operator regarding the condition of a circuit before permitting their men to work on it.

HUDSON VALLEY RAILWAY COMPANY

This company has about 100 miles of 22,000-volt transmission circuits. On the same pole is a private telephone line running to the dispatcher's office and connecting the different power houses and substations. The company makes nearly all its repairs between the hours of midnight and 5 a. m. The superintendent or line foreman makes arrangements with the power house to have a certain line or section of line made dead at a stated time. As soon as the current is taken off, the operator in charge of the station calls the train dispatcher asking him to put an order on his train order book that such a section of line is dead for "John Doe," lineman, to make repairs. Each repair man is provided with a portable telephone. Before going on any line he must first call the train dispatcher to ascertain if the circuit is dead. When informed that it is dead he grounds and short-circuits the wires, then makes his repairs, reporting to the train dispatcher as soon as he is clear from the line. The train dispatcher in turn notifies the station operator that the line can be re-energized. The only posted order is that "no employee shall attempt to make any repairs to a high-tension line without first ascertaining from the train dispatcher that the line is dead, then grounding and short-circuiting the wires before handling them." The grounding device used is made from No. 8 flexible rubber-covered wire and is provided with bamboo handles about 3 ft. long, with spring hooks to engage the line wires.

BERKSHIRE STREET RAILWAY

Most of the work on this company's high-tension transmission lines is done at night after the current is shut off. When it is necessary to make repairs in the daytime the line man notifies the dispatcher's office and does not attempt any work on the line until he is notified in turn by the dispatcher that the current has been shut off. In the power station there are sign boards to be hung on the switches when the current is off, notifying the engineer that the current should not be turned on until he receives word from the dispatcher. All linemen have been instructed also when working on any of these lines in the daytime, to protect themselves by short-circuiting the line between themselves and the power station by throwing a chain over the lines.

PORTLAND (ORE.) RAILWAY, LIGHT & POWER COMPANY

The only standing orders of this company for the protection of linemen working on high-tension transmission lines are that the man in charge of all work to be done on any of our high-tension lines shall call in by telephone to the head operator located in the one of the substations, for the line to be shut down, and that the same man shall again call in that the line is clear and ready to be started. The head operator in the substation is notified ahead of time of the name of the man who is to do the work and who is to call in for the line. There are no special grounding irons or other devices used on the lines or in substations to insure complete grounding of the circuits under repair, but the linemen, as a rule, take the precaution to throw a chain across the various legs to make sure that the line is dead, and they leave this chain on as long as they are working upon the line.

UTAH LIGHT & RAILWAY COMPANY

All high-tension switching is done by a chief operator located at Jordan substation, in Salt Lake City. All linemen or substation operators apply to him for authority to open or close any line switches. A special form is used for recording switching orders from the dispatcher, and all orders are repeated back to insure accuracy. After a circuit has been opened it is grounded at least two points before permission is given to the linemen to begin work. In addition to this ground the circuit is also grounded at the point where work is to be done. Linemen use for this purpose a long, flexible wire soldered to a steel spike about 18 in. long which is driven into the ground. The other end of this wire divides into three branches, each connected to a clip on the end of a wooden handle 3 ft. long. These clips are hooked over the three wires of the circuit, thus giving a combination ground and short-circuit. After completing the repair work the same man to whom the dispatcher gave authority to work on the line must report all clear before current is again turned on. The report of another man will not be acted upon under any circumstances. Except in emergencies not more than one man or one gang is allowed to work at the same time on a double-circuit pole line.

ILLINOIS TRACTION SYSTEM

Before linemen are permitted to work on a high-tension transmission line they must call the substations on each side of the trouble and ascertain that the disconnecting switches are open and the line is dead. A chain 60 ft. long made up of links with a 5/8-in. sharpened rod on one end, is used to ground the line at the point of repair. Each party of linemen must protect themselves separately and not depend on another party.

The gist of some results obtained in a study of the thermal conductivity of fire clays at high temperatures made at the University of Illinois, is of interest in boiler-house practice. Very little accurate work heretofore has been done with a view to obtaining by direct methods a measure of the amount of heat that escapes through the walls of furnaces. Any loss through boiler housings of course reduces the efficiency of the steam generating unit and only recently have steps been taken to provide against such losses by the use of air-tight furnace walls and special heat insulation. A report of the thermal conductivity tests cited states that the heat transferred through the 20-in. walls of a 210-hp Heine boiler when working under full load with average temperatures of 1400 deg. F. inside and 150 deg. F. outside, is 172,000 b.t.u. per hour. This is about 1.6 per cent of the total heat generated. The investigators point out that methods are available for carefully measuring the heat lost through the various parts of the walls.

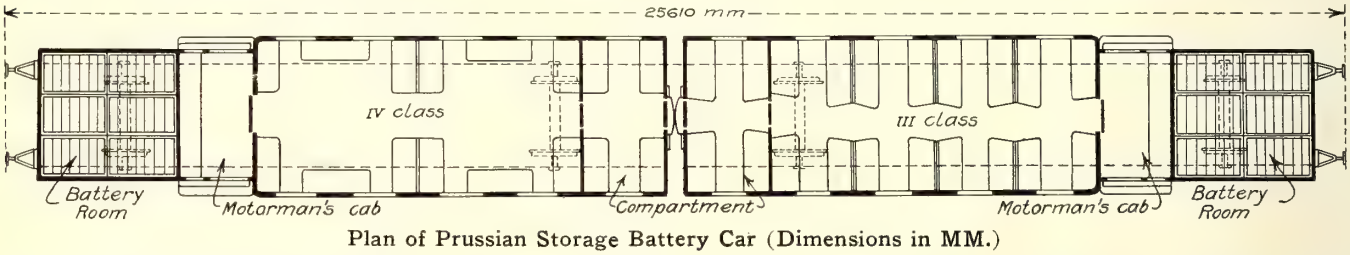
MOTOR CARS ON THE PRUSSIAN GOVERNMENT RAILWAYS

The Prussian Government is making extended use on some of its branch lines of independent motor-cars operated by steam, gasoline and storage batteries. At the end of 1908 an aggregate of 762 miles of track was equipped with these motor-cars, individual lines being from 4 to 32 miles in length.

By far the largest number of motor-cars are operated by storage batteries, with which experiments have been continuously conducted since 1907. At first old steam coaches were used and the batteries were placed under the seats. Each car was equipped with two 50-hp motors and weighed, without passengers, 32 metric tons, of which the battery weighed 10 tons. These cars had a radius of action of about 37 miles and ran about 100 miles a day. The performance varied from 26.4 watt-hours to 32 watt-hours per metric ton-mile.

The experience with these equipments was so satisfactory that in 1908 57 more were purchased and in 1909 33 more. These later cars were designed especially for storage-battery operation and are of the twin-body type, shown in the accompanying diagram. The principal dimensions are as follows: Length over buffers, 84 ft.; width over-all, 9 ft. 10 in.; wheelbase, 28 ft. 10 in. The batteries are carried in isolated end compartments 8 ft. 10 in. x 8 ft. 2 in. The cars empty weigh from 54 to 55 metric tons.

The battery equipment of the new cars is intended for a run of 62 miles on one charge for a complete load of 62 metric tons and speeds up to 31 m.p.h. Under test conditions the most recent cars have shown a power consumption of only 21.7 watt-hours per metric ton-mile without exceeding a speed of 24.8 m.p.h. The storage-battery equipment per twin car consists of 168 Hagen cells, having a discharge capacity of 368 amp-hours at 350 volts. Either battery half can be operated independently. The normal motor equipment consists of two A.E.G. interpole 80-hp series motors which have shunt resistance next to the field coils to secure higher speeds on the last running points.



Plan of Prussian Storage Battery Car (Dimensions in MM.)

One accumulator car has been equipped with shunt-wound motors to test the value of recuperating energy on down grades. Acceleration is secured by grouping the cells in various combinations, but the car weighs about 10 tons more than those using series motors because four 50-hp motors are used. Nevertheless the maximum acceleration of the shunt-wound outfit is only 0.329 m.p.h.p.s. against 0.56 m.p.h.p.s. with the series motors. The amount of power returned to the battery is about 0.9 kw-hours per stop, but this result is gained at the expense of considerable electrical strain on the equipment. The economy of the method of starting by grouping the cells is shown in the following comparison between the shunt motor-car and the series motor-car: Shunt motors, stations 1.43 miles apart, average speed 20.5 m.p.h., power consumption 32.8 kw-hours per metric ton-mile; series motors, stations 2.05 miles apart, average speed 16.7 m.p.h., power consumption 20 kw-hours per metric ton-mile.

A feature of all the electric cars is the provision of a "dead-man's" handle as it is the eventual intention to operate these cars with one man only.

The gasoline-electric car is 55 ft. 7 in. long, 8 ft. 6 in. wide and weighs 83,270 lb. empty. The motive equipment is carried on the truck, the engine and generator being in the center, with one motor on each of the end axles, geared as in street railway service. The gasoline engine drives an interpole 80-kw generator whose voltage can be varied from 0 volt to 650 volts through a 2.5-kw, 70-volt exciter, which is also used to supply lighting and ignition current. The two motors are usually operated at 575 volts.

The Prussian Railways are also trying five steam cars. It is believed the Government railways will purchase more shunt-wound motor accumulator equipments and gasoline-electric cars. The several types of coaches installed were designed by Geheimer Oberbaurat Wittfeld.

HEARING BY MASSACHUSETTS COMMISSION ON NORTH READING FARES

The Railroad Commission of Massachusetts gave a hearing recently upon the petition of the Selectmen of North Reading, Mass., for a fare reduction upon the line of the Boston & Northern Street Railway between Reading Square and the North Reading-Andover boundary. The petitioners were represented by Solon Bancroft, Boston. H. E. Reynolds, assistant general manager, appeared on behalf of the company. The petitioners requested a fare reduction from 10 cents to 5 cents between Reading Square and the Andover line, in order to accommodate summer residents at Martin's Pond, a small body of water located in North Reading about ¼ mile south of the Andover line.

The company introduced a letter from Robert S. Goff, general manager, which stated that North Reading Junction and Elm Square are fare limits on the through Lawrence-Reading line. There are two special fare limits, in accordance with the board's policy, in the section referred to—one being between North Reading Center and the Boston & Main Railroad station, Reading, and the other between Walnut Corner and Reading Square. The service is at most half-hourly, and the income from local riding is comparatively small and certainly unprofitable. Such business as is derived from the section between Walnut Corner and the Reading-Andover line is solely from this small colony of campers who patronize the line during the summer season. Mr. Goff pointed out that under these conditions it cannot be reasonable for the company to reduce the fare solely for this transient trade. To do so would make the fare limits dependent either on some fancied natural attraction, or the business zeal of some real estate man. The matter has twice before been before the board with respect to Reading and Wakefield fares, and has been left undisturbed. Little reason appears which would justify a change in existing fare limits, and the condition of the company is not such as to warrant any reduction in its charges. The petitioners' claim that business would be increased by reducing fares does not appear tenable to the company.

Mr. Reynolds showed that the fares are entirely reasonable in relation to the distances to which they apply. A 5-cent fare covers the trip from Reading Square to Walnut Corner, 4.45 miles. From Walnut Corner to Elm Square, Andover, 5 miles, a 5-cent fare applies. The rate is only a little more than 1 cent per mile throughout the disputed territory. He contended that the permanent inhabitants of the district are all well accommodated. The proposed relocation of fare limits would upset the scheme of fare distribution in the country adjoining Andover and Reading. Chairman Hall intimated that the alteration of the fares as desired would lead to serious complications. There must always be a district just beyond a fare limit which feels itself aggrieved,

and it is not clear how the company can earn more money if the change is made.

In its finding the board said:

"It appeared at the hearing that substantially the entire settled portion of North Reading is at present served for a single fare, and that patrons were able to ride to and from North Reading Center and Reading Square, Reading, for the same amount. A ride is also obtainable from North Reading Center to and from Andover Square, Andover, for 5 cents. Viewing this territory as a whole, the board is of opinion that the fares now established by the company are reasonable and that it ought not to make any recommendation for a reduction or readjustment of fares."

PAY-AS-YOU-ENTER TRAILERS FOR THE NORTHERN TEXAS TRACTION COMPANY

The Northern Texas Traction Company, Fort Worth, Tex., has lately received from the American Car Company seven trailer cars of the rather unusual design shown in the two accompanying illustrations. These cars are of the pay-as-you-enter type, having an exit and entrance vestibuled platform at one end only. The cars are of straight sheathed-side construction and turtle-back roof, so that there are no monitor deck windows. They are 40 ft. 6 in. long over all and are divided into two compartments, the rear vestibule, which is flush with the rest of the car floor, being reserved for smokers. Slat seats are used in both compartments, those in the general passenger section being of the reversible type. The seating capacity is approximately 54. The principal dimensions are as follows: Length over dashing sheathing, 39 ft; width of sills over sheathing, 8 ft. 5 in.; inside height from top of floor to underside of headlining, 7 ft. 6 in.; wheel base of trucks, 4 ft. 6 in. The trucks are fitted with St. Louis 33-in. wheels, having 3-in treads and flanges ¾ in. deep by 1⅛ in. thick.



Pay-As-You-Enter Trailer for Northern Texas



Interior of Pay-As-You-Enter Trailer

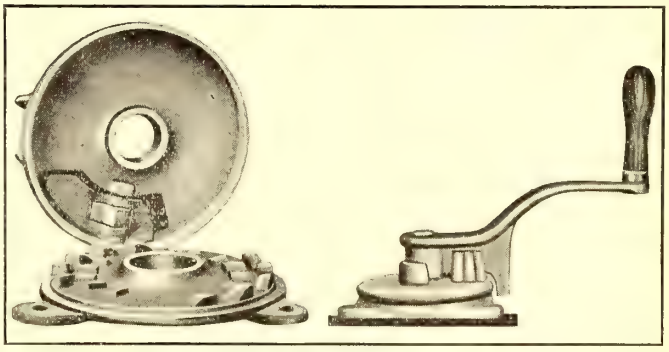
The bottom framing, except the side sills, is of white oak. The side sills are of 4½-in. x 7¾-in. long leaf yellow pine reinforced at the bolster by a 6-in. x 4-in. angle iron 5 ft. long and weighing 12.3 lb. per foot. The cross framing is tenoned into the side sills and reinforced on one side with a 3/16-in. x 4-in. steel plate for the full length. On the opposite side there is a ¼-in. angle iron bolted through the cross sills and side sills. The end sills are reinforced with steel plate. The bolsters are made of 1-in. x 8-in. steel, machine fitted and with cast fillers. The floor boards are 13/16-in. yellow pine. The body framing is of white oak. The outside panels are made of No. 14 sheathing steel fastened to the post and window rails with screws. The corner posts are 3¾-in x 4-in. and the side posts 2¼-in x 4-in. The inside finish of the car body is mahogany, except from the truss plank to the window rail, which is No. 18 sheet steel painted to conform with the interior finish. The ceiling is of Indestructible fiber board. The inside trimmings, including the sash locks, are of oxidized solid bronze, but the register and handstrap brackets are of painted malleable iron. Ventilation is provided by 6-in. ventilators in the roof.

The single platform is of the pay-as-you-enter type, 6 ft. 6 in. over the dasher sheathing, with doors and grab handles installed as illustrated. The windows are provided with Pantasote curtains made by the Curtain Supply Company. They are also provided with O. M. Edwards bronze sash lock and rack and compression rolls. Push buttons are installed at each side post.

The bodies are mounted on the J. G. Brill Company's trucks similar to the No. 420 design but of sufficient capacity to carry the car body with 2⅓ times the seating load. The cars were built under license of the Pay-as-You-Enter Car Corporation.

THREE CONTROLLER CHECKS

The Porter Railway Switch Company, Detroit, Mich., is making three designs of controller checks or regulators known respectively as the New York or type "A," the Wilson or type "B" and the Porter or type "C," of which "A" and "C" are illustrated. The outside casings of all are made of malleable iron and the single working piece of steel. No parts require lubrication or inspection. Type "A" is for use in connection with any controller and may be installed without any fitting whatever. The construction of this type is such that if the handle is withdrawn too far in releasing for the next stop, it will not permit the advance to the following stop. Thus, what is called the short drawback will not permit the motorman when in a hurry to withdraw the controller drum from its proper connections. This device is lighter than either of the two other styles and is strong enough for all ordinary work. Type "B" is like type "A" except that it is much heavier and stronger and intended for those who care to have a device which cannot be put out of order by any ordinary means. Both designs are considered entirely foolproof. Type "C" is a controller check with an operating part similar to that of the other regulators, but is so constructed that it will feed fast or slow; furthermore, a double time stop is caused on the last series position so that the motors have sufficient time to be accelerated properly before they are advanced to multiple position. This feature represents a most desirable improvement. The economies effected by devices of this kind in saving power and reducing equipment failures are evident.



Types C and A Controller Checks

ONE-SIDE CONVERTIBLE CARS FOR THE NORTHERN OHIO TRACTION & LIGHT COMPANY

The Northern Ohio Traction & Light Company, Akron, Ohio, has lately received six one-side convertible cars from the G. C. Kuhlman Car Company. As shown in the two accompanying illustrations, these cars are fully convertible on one side but have drop sash on the inner side, thus following the type designed by the Cleveland (Ohio) Electric Railway some years ago. The Akron cars are 44 ft. 2½ in. long over the sheathing and 35 ft. 6 in. over the car body proper. The maximum width is 8 ft. 6 in. The front platform is 4 ft. long and the rear platform 5 ft. long. The windows as well as the lower panels on the outside of the car are fitted with the Brill convertible car mechanisms so arranged that they will raise into the roof. The bronze trimmings, fixtures and push button circuit are all in accordance with the standards of the Cleveland Electric Railway. The general inside finish of the cars is in slightly stained cherry. The ceiling is of three-ply poplar veneer in the top deck and five-ply veneer on the side ceiling. It will be observed from the interior view that part of the rattan seating is detachable so that when the car is closed, the end portions can be turned at right angles to make up a longitudinal seat on one side.



Convertible Side of the Northern Ohio Traction Car

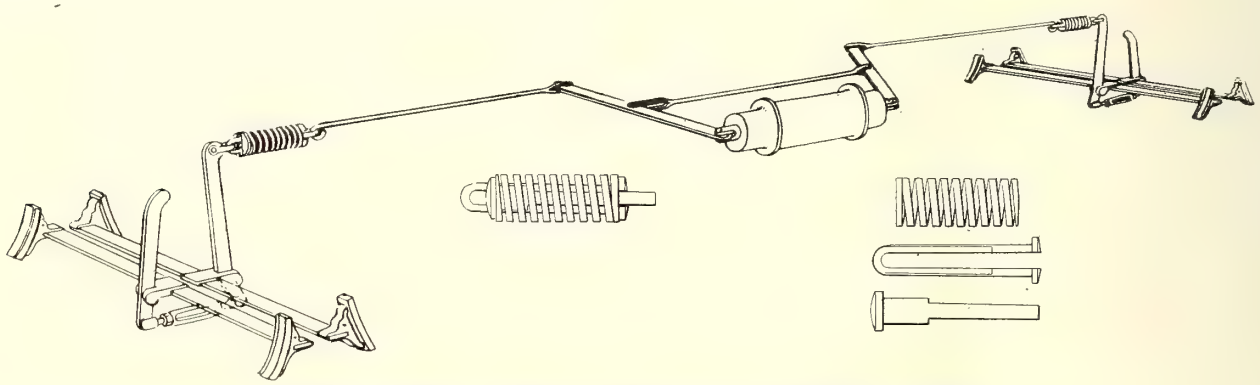


Seating Arrangement of Northern Ohio Car When Open

The cars are equipped with four Westinghouse No. 101 motors and M. P. lightning arresters, Peacock hand brakes, Dayton Manufacturing Company's U. S. headlights, Germer hot-air heaters and Eclipse fenders. All wiring was done in accordance with the requirements of the National Electric Code. Porcelain tubing is used for encasing wires wherever they pass through the floor.

RESILIATOR FOR ELECTRIC RAILWAY BRAKE RIGGING

The Johns-Streeter Company, New York, is making a novel brake rigging device called the Streeter resiliator, the object of which is to minimize the vibration of the cars from truck pounding. It is stated that when this shock absorber is applied to the pull rods of the brake rigging as shown in the accompanying drawing, the shoes will adjust themselves on the wheels. The latter feature tends to the elimination of skidding. The resiliator is made to receive most of the braking shock under all conditions so that the strains on the rigging should be reduced appreciably. The resiliator also prevents objectionable chattering and helps to give quick braking release.



Resiliator Applied to Brake Rigging; also Assembly and Parts

TANTALUM LAMPS FOR CHICAGO RAILWAYS CARS

The Chicago Railways Company, during the past six months, has made extensive tests of tantalum lamps for use in street cars. These tests were performed by equipping regularly operated cars with sample lamps and keeping accurate records of the car-miles, lamp-hours, voltage and replacements. Within the past few weeks all the cars on the Van Buren Street line, which are of the large pay-as-you-enter type, have been equipped with tantalum lamps. Different makes of lamps are being tried on other cars and if the results of the present tests are satisfactory the installation of tantalum lamps on all new and rebuilt cars of the Chicago Railways Company will be permanent.

The new pay-as-you-enter cars of the Chicago Railways Company are illuminated with a row of nine 16-cp lamps on each side of the car and three 32-cp lamps spaced along the center line of the upper deck. The circuits of the side lights includes a 16-cp lamp in an illuminated destination sign box. Each circuit of the 32-cp lamps includes a headlight lamp and a lamp over the conductor's head on the rear platform. Three forms of tantalum lamps are used in equipping each car. The lamp used in the headlight is a 32-40-cp, 70-watt tantalum with an extra small bulb; the platform and center lights are 32-cp, 70-watt tantalums, and the side and sign lamps are 16-cp, 35-watt tantalums. Several different forms of filament winding are under consideration with a view to obtaining a lamp with low breakage. Various arrangements of frosting on the bulbs have been tried and discarded in favor of clear glass. It has not been found practical to place tantalum lamps on some of the older cars having center fixtures, which hold the lamps at an angle greater than 15 deg. with the vertical.

News of Electric Railways

Cleveland Traction Situation

The hearings on the demand of the employees of the Cleveland Railway for an increase of wages to 32 cents an hour were begun during the week ended June 11, 1910, before Judge Willis Vickery of the Common Pleas Court, Elroy M. Avery, and Robert D. Beatty, receiver of the Eastern Ohio Traction Company, who constitute the board of arbitration. It was contended on behalf of the employees that the cost of living had increased to such an extent that the wages were not sufficient to support the men and their families; that the 2044 men in the employ of the company worked on an average of 7 hours and 21 minutes a day; that the average pay was $1.79 3-5 per day, or $655.54 a year, if the employee worked every day in the year, and that some of the men were compelled to be idle for several hours during the day between their runs.

At the opening session, G. M. Dahl, street railway commissioner, stated that an increase which could be paid out of the surplus earnings from operation could be granted by the company without going before the Council, but that if the men were allowed the 7½ cents which they asked, the matter would have to be taken before the City Council, as such an increase would make it impossible for the company to meet the expense of the increase at the present rate of fare without incurring a deficit. There should be no interference with the Tayler ordinance. The average wage received by the men now is 24½ cents an hour, which is higher than in most cities. Henry J. Davies, secretary of the Cleveland Railway, also presented some figures along this line. Mr. Davies said that if the increase which is now asked for had been in effect for March, April and May, the expenditures would have increased $102,068, or an equivalent of $1,109.37 per day, and that there would have been a deficit for these months of almost $21,000. The company would have had to increase the fare charge one-fourth of a cent per passenger to offset the loss.

On behalf of the men a comparison was made between the wages of the street railway employees in Cleveland and those received by workers in trades, and it was argued that the pay of the street railway men is insufficient. A table of expenses was prepared to show that the cost of living for a year for a family of man and wife and three children was $786.57, or $2.15 a day. Reference was also made to the wages paid on Vancouver roads, at Oakland, Cal., and at Butte, Mont., to street railway employees. Final arguments were made on June 11, and the board adjourned to meet at the call of Judge Vickery to consider the claims presented.

Transit Affairs in New York

The Interborough Rapid Transit Company has sent to the Public Service Commission a communication in which is embodied a proposition for the extension of its system. It purposes to third-track the Second Avenue, Third Avenue and Ninth Avenue elevated lines of the Manhattan Railway, and to build certain elevated extensions in the Bronx, one being an extension of the Third Avenue line through Webster Avenue, Gun Hill and White Plains Avenue, to Becker Avenues as a two-track line, with the privilege of hereafter building a third track; the other extension being in Jerome Avenue from about 149th Street and Eighth Avenue, across McComb's Dam Bridge, up River Avenue and Jerome Avenue to about 194th Street, with the privilege of hereafter building a third track all the way. It is also proposed that an arrangement be made for the operation of the Steinway tunnel under the East River, from the Grand Central Station, New York, to Long Island City, for a 5-cent fare to Long Island City, and for a connection over the Queensboro Bridge with the Second Avenue elevated line, so as to afford another through route with a 5-cent fare to Long Island City. Aside from making a connection between the Steinway tunnel and the subway in New York, at or near the Grand Central Station, the proposition does not embrace additional subway development or extension.

Particulars of the terms which the Brooklyn Rapid Transit Company is prepared to offer for the use of the Centre Street loop subway to run trains from the Williamsburg Bridge to the new Municipal Building have been received by the Public Service Commission. For the two western tracks, from the bridge to the terminus, the company submits two propositions: One per cent on $4,000,000, the estimated cost of that portion of the subway, for the first year and an advance of ½ per cent for each year up to five, and after that period interest and sinking fund not to exceed 5 per cent. The alternative is for the company to pay a rental basis on actual car miles operated, at the rate of 4½ cents a car-mile. This is based on an estimate of 4,562,000 car-miles a year. The company explains that if it cannot then use the tracks to the full capacity of 10-car trains, but must be restricted to the 6-car trains allowed on the bridge, it will reduce its offer in the same proportion from 5 per cent to 3 per cent. The Centre Street loop cost approximately $10,000,000, but the company figures that the portion it wishes to use could be built for a maximum of $4,000,000. The matter has been referred to the commission sitting as a body.

Mayor Gaynor has signed the bill which was passed by the Legislature at the session just closed to permit the transfer of the property of the New York & Long Island Railroad by the trustees to another company, so as to allow the tunnel of the company under the East River to Long Island City to be operated. Governor Hughes has also signed the bill, and it is expected that the property will be transferred to the Interborough Rapid Transit Company, or an allied company.

Program of Meeting of New York Association

The following program has been announced for the twenty-eighth annual meeting of the Street Railway Association of the State of New York, to be held at the Hotel Otesaga, Cooperstown, N. Y., on June 28 and 29, 1910:

JUNE 28, MORNING SESSION, 10:00 A. M.

Roll call.

Reading of communications and minutes of previous meetings, president's address, reports of executive committee, treasurer and secretary, and reports of committee

(a) City Rules,

(b) Classification of Accounts.

Paper, "The Problem of the 5-Cent Fare," by Henry W. Blake, editor of the ELECTRIC RAILWAY JOURNAL.

Discussion, On the advisability of adopting the Interurban Rules as promulgated by the American Street & Interurban Railway Association in October, 1909.

Miscellaneous business.

JUNE 28, AFTERNOON SESSION, 2:30 P. M.

Reading of communications.

Paper, "Latest Development in Car Wheels for Electric Railways," by V. S. Yarnell, of the Carnegie Steel Company.

Paper, "Standardization of Track Construction in Paved Streets," by T. E. Tilton, engineer of maintenance of way of the New York State Railways.

Discussion, informal. On street railway accounting system as promulgated by the Public Service Commission of the State of New York.

Miscellaneous business.

Appointment of nominating committee.

JUNE 29, MORNING SESSION, 10:00 A. M.

Reading of communications.

Paper, "Railway Motor Gears and Pinions," by F. W. Williams, of the General Electric Company.

Paper, "Recent Development in Multiple-Unit Control," by Clarence Renshaw, of the Westinghouse Electric & Manufacturing Company.

Miscellaneous business.

Report of nominating committee.
Election of officers.
Adjournment.

ENTERTAINMENT, JUNE 28

3:00 p. m., automobile ride for ladies; 5:00 p. m., baseball game, managers vs. supply men; 8:00 p. m., banquet, dancing.

ENTERTAINMENT, JUNE 29

10:00 a. m., bridge whist contest for ladies; 12:00 noon, boat trip on Lake Otsego; 2:00 p. m., luncheon for ladies at Five Mile Point Inn; 3:00 p. m., Clock golf, putting contest for ladies.

The banquet will be held on June 28, at 8:00 p. m. The speakers will be: James S. Sherman, Vice-President of the United States; John N. Carlisle, of the Public Service Commission of the First District of New York, and Ralph Birdsall, pastor of Christ Church, Cooperstown. Honorary, active and associate members, guests and the ladies will be provided with banquet tickets. Each allied member will also receive one ticket. Extra tickets will be sold at $5 each. Extra bars will be provided to association badges without charge by H. M. Beardsley.

Accommodation at the Hotel Otesaga can be arranged by communicating with J. D. Price, Hotel Bretton Hall, Eighty-sixth Street and Broadway, New York, N. Y. The Hotel Otesaga will open on June 23.

No provisions have been made for a general exhibit of appliances and apparatus by allied members, but any exhibit will be welcomed, and arrangements for space can be made directly with the manager of the hotel.

New Line Opened on Long Island.—The South Shore Traction Company, Patchogue, L. I., placed in operation on June 11, 1910, the part of its line between Babylon and Amityville, about 9 miles long.

Detroit United Railway Will Not Accept Webster Ordinance.—J. C. Hutchins, president of the Detroit (Mich.) United Railway, has replied to Mayor Breitmeyer's letter to the company about the Webster grant. Mr. Hutchins says that the company cannot accept the terms of the Webster ordinance with the value of the property of the company as reported upon by Mr. Barcroft written into the ordinance. Mr. Hutchins says that the total value as stated by Mr. Barcroft is a gross under-valuation of the company's property, and that the directors of the company would betray the trust imposed in them if they should agree to the Barcroft figures.

Railway Electrical Engineers at Buffalo.—The spring semi-annual convention of the Association of Railway Electrical Engineers, formerly the Association of Car Lighting Engineers, was held at the Statler Hotel, Buffalo, N. Y., on June 7 and 8, 1910. About 15 railroads were represented. The meeting was held for the purpose of reviewing and discussing the work of the committees and the progress made during the six months since the last convention in October, 1909. Among the matters transacted by the convention was the adoption of the Gibbs train connector as standard for establishing electrical connections from car to car. The Pullman Company has already equipped most of its cars with this type of connector, and many of the railroads are preparing to make their cars uniform with the standard practice. Other subjects considered were the change from 110 to 64 volts for head-end train-lighting systems, the use of 30-volt tungsten lamps for train-lighting and a standard classification of accounts.

Fire in Des Moines.—On May 26, 1910, at 3.50 a. m., fire started in the south half of the car house of the Des Moines (Ia.) City Railway at Second Street and Locust Street, Des Moines, where emergency line wagons and line construction headquarters were maintained. The night men were eating lunch, preparatory to starting early morning work when the fire started, and the flames gained such headway that it was possible to get only one car and 5 horses out of the building. One of the horses was badly burned and had to be shot. Twenty-one cars, of which 14 were double-truck passenger cars, all in regular service, four single-truck line cars, a wrecking car and single-truck passenger car were destroyed. The property was all insured, and a settlement has been made. Up to June 6, 1910, the company had not closed any orders for replacing the equipment destroyed. The company proposes to build some double-truck cars in its own shops, but if it is possible to get delivery within 60 or 90 days from the car-builders the company will place an order for 10 or 15 cars. The car house, a brick and frame structure, iron clad, 132 ft. x 132 ft., its contents, and the equipment, were a total loss, aggregating $80,000 to $85,000, with insurance between $40,000 and $45,000.

Arbitration Board Suggested to Fix Physical Values in Toledo.—Nau, Tanner & Rusk, Cleveland, Ohio, who are examining the books of the Toledo Railways & Light Company, Toledo, Ohio, for the city, recently asked to be furnished with a schedule or inventory of the property of the company. Under date of June 10, 1910, Albion E. Lang, president of the company, replied to the communication of Nau, Tanner & Rusk. Mr. Lang said substantially: "We beg to say that some of the information asked for by you is now shown on our books and monthly statements, such as the number of miles of track owned and operated and its location, also the number and type of all cars, number of power stations, car houses, etc. All this, together with the physical property itself, are open for your independent inspection. If the city authorities deem it necessary or desirable for the city of Toledo and this company to agree upon a method of reaching a valuation of our street railway property, as part of a comprehensive solution of the franchise question, we will be pleased to present to any board of engineers, upon whose selection we can both agree, all such detail, data and information as may be required by such engineers in making such valuation. We do not see that the furnishing of such schedule and inventory as you ask, independent of a method of reaching a valuation as above outlined, would make for progress."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The House has passed the bill which provides for an investigation of the common control by holding companies of the gas, electric light and street railway companies. The Senate bill to authorize the Boston Elevated Railway to purchase and hold the stocks and bonds of other street railways has been read a third time in the upper branch. Amendments to this bill provide that the leases of the Tremont Street subway, the Washington Street and East Boston tunnels shall, upon expiration, be extended to the original lessees, the Boston Elevated Railway. The Boston company is willing to accept extensions of these leases to the dates when the bonds issued by the City of Boston to pay for the construction of the subways and tunnels respectively become due, at a rate of rental in each case to be determined by the Railroad Commission and Boston Transit Commission, sitting jointly. The House bill to authorize the use by street railways of the tracks of steam railroads has been passed by the Senate to be engrossed. The resolution relative to the electrification of steam railroads in the Boston district has been passed to be engrossed by the Senate, with an amendment which exempts the Boston, Revere Beach & Lynn Railroad, a narrow-gage line. Governor Draper has signed the bill to permit the New York, New Haven & Hartford Railroad to purchase the stock of the Berkshire Street Railway. Under the terms of the act the company will expend approximately $2,000,000 on extensions and improvements. Governor Draper has also signed the bill to provide for an investigation by all the standard-gage steam railroads operating at Boston of the problem of electrification within the metropolitan district, the results to be reported to the Joint Commission on Metropolitan Improvements during the coming fall, to form the basis of a further report by the commission, this second report to be submitted to the Legislature of 1911 early in January. The House resolution to provide for an investigation of the common control of gas, electric light and street railway companies by persons, firms and corporations has been rejected by the Senate, as recommended by the committee on ways and means. The bill to authorize the Boston & Eastern Electric Railroad to build a tunnel under Boston Harbor has been passed to be engrossed. A resolution to provide for an expression of opinion by the voters of the State as to the desirability of steam railroad and street railways combining has been defeated in the House.

Financial and Corporate

New York Stock and Money Market

June 14, 1910.

Wall Street during the past week has been in a state of uncertainty and of conflict. Prices have been ragged and irregular; rumors have been plentiful and trading has been spasmodic. Dealing is done by professionals, and there is no evidence of outside investment or speculation.

Rates for money continue to be low and the banks are liberally supplied. It is not so easy, however, for small traders to borrow, as bankers are very conservative. Rates to-day were: Call, 2½ to 3 per cent; 90 days, 3¼ to 3½ per cent.

Other Markets

Tractions have been dull in the Philadelphia market during the past week. The report circulated to-day that Ladenburg, Thalmann & Company, New York, N. Y., had been buying Rapid Transit securities caused some activity in the stock, but the price did not materially advance.

In Chicago there has been some trading in Chicago Railways stocks—all of the series being dealt in. There have been only nominal changes in price. Other tractions have been neglected.

There continues to be some trading in Boston Elevated and the Massachusetts Electric issues in the Boston market, although it is not as active as a few weeks ago. Prices are barely being maintained at former levels.

United Railways stock has been selling in the Baltimore market in small lots at 13 to 13⅛. The market is beginning to take some interest in the issue. The bonds are still selling at old figures.

Quotations of various traction securities as compared with last week follow:

	June 7.	June 14.
American Railway Company	a44	a44¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	a60
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	a93
Boston Elevated Railway	a128	a127
Boston & Suburban Electric Companies	14	a14
Boston & Suburban Electric Companies (preferred)	a74½	a74¼
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a41	a41
Brooklyn Rapid Transit Company	78⅞	77½
Brooklyn Rap. Transit Company, 1st pref. conv. 4s	83½	83¾
Capital Traction Company, Washington	a131	a130
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a75	a80
Chicago Railways, ptcptg., ctf., 2	a19	a18½
Chicago Railways, ptcptg., ctf., 3	a9	a11
Chicago Railways, ptcptg., ctf. 4s	a5½	a6⅜
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a75	a76
Consolidated Traction of N. J. 5 per cent bonds	a104	a103½
Detroit United Railway	50½	*50½
General Electric Company	143½	146½
Georgia Railway & Electric Company (common)	a110	a107½
Georgia Railway & Electric Company (preferred)	a88	*88
Interborough-Metropolitan Company (common)	18⅞	18½
Interborough-Metropolitan Company (preferred)	51⅞	52¼
Interborough-Metropolitan Company (4½s)	78¾	79
Kansas City Railway & Light Company (common)	a25	a25½
Kansas City Railway & Light Company (preferred)	a76¾	a79
Manhattan Railway	130	136
Massachusetts Electric Companies (common)	a16½	a16¾
Massachusetts Electric Companies (preferred)	a82½	a83
Metropolitan West Side, Chicago (common)	*18	a21
Metropolitan West Side, Chicago (preferred	*56	a62¼
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	67¾	69⅞
Northwestern Elevated Railroad (common)	*17	a18
Northwestern Elevated Railroad (preferred)	*56	a57
Philadelphia Company, Pittsburg (common)	a47½	a48½
Philadelphia Company, Pittsburg (preferred)	a44	a43½
Philadelphia Rapid Transit Company	a18½	a19½
Philadelphia Traction Company	*85¼	*85¼
Public Service Corporation, 5 per cent col. notes	*96	*96
Public Service Corporation, ctfs.	a102	a101
Seattle Electric Company (common)	a111¾	a110½
Seattle Electric Company (preferred)	a102½	a101
South Side Elevated Railroad (Chicago)	a65	a62
Third Avenue Railroad, New York	5½	5¾
Toledo Railways & Light Company	*9¼	8½
Twin City Rapid Transit, Minneapolis (common)	109¼	109½
Union Traction Company, Philadelphia	a47¼	a46¼
United Rys. & Electric Company, Baltimore	a13	*13
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	a33¼	a34
Washington Ry. & Electric Company (preferred)	86½	a87½
West End Street Railway, Boston (common)	a88	*88
West End Street Railway, Boston (preferred)	a102½	*102½
Westinghouse Elec. & Mfg. Company	61¼	61
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	a125

a Asked. * Last Sale.

Plan for Merger of Chicago Railways and Consolidated Traction Company.

At the meeting held in New York on June 8, 1910, between the representatives of the Chicago (Ill.) Railways and the Chicago Consolidated Traction Company to consider the differences which were responsible for the appointment of receivers for the Chicago Railways, the consolidation of the companies was considered, and a committee, consisting of J. B. Payne, W. O. Underwood, L. C. Krauthoff, Andrew Cook, J. W. Hamer, Charles G. Dawes and Edward C. Kohlsaat was appointed to consider the matter and report at a meeting to be held in Chicago on June 14, 1910. The following tentative plan for the merger has been suggested, and is said to have been accepted as satisfactory by practically all of the representative parties involved:

"1. With a view to adjusting all complications and controversies and in the interest of the public and all concerned, the Chicago Railways is willing to purchase all of the lines and properties of the Chicago Consolidated Traction system (within and outside the city limits), free and clear of all liens, incumbrances and charges, and accompanied by the release of all claims, demands, and liabilities of every nature and character, in respect of said properties and of the holders of each and every outstanding security of said company and its constituents against the Chicago Railways, or any other corporation, person, or property.

"The above is upon condition that the necessary franchise ordinance will be passed or that the necessary amendments to the Chicago Railways ordinance will be made.

"The Chicago Railways will rehabilitate the properties within the limits of the city by means of bonds issued under a new rehabilitation mortgage, or if the same can be done, under its existing first (or rehabilitation) mortgage.

"2. The Chicago Railways, for the purpose of acquiring said properties and in consideration of said releases, will create:

"(a) A purchase money mortgage to secure an authorized issue of $——— of purchase money bonds. This mortgage will be a lien on the property purchased, subject to a mortgage securing rehabilitation bonds. The purchase money mortgage will also be a lien on the property of the Chicago Railways subject to existing first and consolidated mortgages.

"(b) A funding mortgage to secure an authorized issue of $——— income bonds. The principal obligation to be absolute, but the interest to be payable only out of the annual earnings of the two properties after paying prior charges. This mortgage will be a lien on the two properties, subject to the aforesaid purchase money, rehabilitation, and consolidated mortgages.

"3. The purchase money bonds to be issued:

"(a) For the principal of the underlying bonds of the North Side lines.

"(b) For the principal of the underlying bonds of the Cicero & Proviso Street Railway and Ogden Street Railway, to the extent of an amount equal to the same percentage on the valuation to be placed by the city on that portion of the lines of said companies which lie within the city limits, which the new bonds to be issued for the underlying bonds of the North Side lines may bear to the aggregate of the city valuation placed on said North Side lines within the said city.

"(c) To provide funds to pay allowances and charges in receivership proceedings, etc., say, $800,000.

"4. The funding bonds to be issued:

"(a) For 50 per cent of the stock of the North Shore Street Railway.

"(b) For 50 per cent of the principal of the bonds of the Evanston Electric Railway.

"(c) For 50 per cent of the principal amount of the general mortgage bonds of the Consolidated Traction Company.

"(d) For 50 per cent of the balance of the principal amount of the Cicero & Proviso Street Railway and Ogden Street Railway bonds, after deducting the amount of the purchase money mortgage bonds issued on account of said bonds.

"(e) For the accrued interest on the underlying bonds of the North Side Electric Railway and for the same proportion of the accrued interest of the Cicero & Proviso Street Railway and Ogden Street bonds as the percentage of

purchase money bonds to be issued on account thereof.

"5. The rate of interest on said purchase money mortgage shall be 4 per cent for the first five years and 5 per cent thereafter. The rate of interest on said funding income bonds, payable out of annual earnings as aforesaid, shall be 4 per cent per annum, noncumulative.

"6. This proposition is open until June 14, 1910, and during such longer period as the Chicago Railways may from time to time and in its discretion specify."

Philadelphia Rapid Transit Company Financing

Special meetings of the stockholders of the Philadelphia (Pa.) Rapid Transit Company and the Union Traction Company, Philadelphia, Pa., have been called for June 20, 1910, to authorize the directors to carry into effect the plans for financing the proposed loan of $5,000,000 which were prepared by a committee composed of J. J. Sullivan, Robert A. Balfour, George W. Elkins, William H. Shelmerdine and Clarence Wolf. In the Electric Railway Journal of June 4, 1910, page 1005, the statement of the Philadelphia Rapid Transit Company, giving a brief outline of the plans for refinancing, was published. The report by Messrs. Sullivan, Balfour, Elkins, Shelmerdine and Wolf says:

"The Philadelphia Rapid Transit Company at present is the owner of an insurance fund of a present value of upward of $1,750,000. This represents an investment of cash in the insurance business of but $250,000, which was charged to the capital account of the Union Traction Company in 1896, when the insurance fund was first started. The balance of the fund represents accumulations, or rather profits, which have accrued to the companies from having carried their own insurance, their payments into the fund never having been any greater than would have been required had the indemnity been carried in insurance companies. The wisdom of thus carrying insurance has been fully justified by the resulting profit of $1,500,000. But the requirements of the company to-day for improving its system and conducting transportation are such that it can no longer afford to tie up nearly $2,000,000 in a collateral business, however profitable.

"When this property was leased by the Union Traction Company to the Philadelphia Rapid Transit Company in 1902 the Union Traction Company received credit in the settlement for the full value of this fund as it then stood, $850,000, so that the fund to-day is the absolute property of the Philadelphia Rapid Transit Company. The lease, however, provides that the railroad property shall be kept insured by a fund and by policies in at least as large an amount as was carried at the time of the lease, and the clause of the lease referring to insurance vests with the boards of directors of the two companies the power to say to what extent this insurance shall be carried in companies and to what extent by the fund.

"It being so plainly to the advantage of the property at this time to use this fund for other purposes, and to substitute for the protection which it affords policies in accredited companies, the recommendation of this committee to both corporations is that additional insurance should be placed on the property to the extent of at least $1,850,000, whereupon the insurance fund should be released and the Philadelphia Rapid Transit Company, as the managing company, be permitted to use the securities as the basis of a loan or to sell the same, the money in either event to be applied to the general corporate requirements of the company.

"An additional method of financing recommended by your committee is for the Union Traction Company to purchase from the Philadelphia Rapid Transit Company all its rolling stock for $1,500,000, and then to lease the same to the Philadelphia Rapid Transit Company for 10 years, at a yearly rental of one-tenth of said purchase money and interest at 5 per cent, and at the end of said lease to sell the same to the Philadelphia Rapid Transit Company upon payment of $1. In order to obtain the money to make such purchase, the Union Traction Company will create a car trust on an assignment of said lease and a guarantee by it of the rentals payable thereunder. This equipment has already been inventoried and appraised by an expert selected by the fiscal agents of the Philadelphia Rapid Transit Company, Drexel & Company, the amount of the appraisement being upward of $2,000,000. Your committee has conferred with Drexel & Company, who are willing to purchase this issue of car trust certificates, amounting in the aggregate to $1,500,000, the certificates to carry a return at the rate of interest of 5 per cent per annum.

"The details of the car trust will be left in the hands of the attorneys for the two companies and the bankers, with instructions, however, that the papers are to be so drawn as to protect fully the Union Traction Company, both with respect to title and possession of the equipment, in case default should at any time be made by the Philadelphia Rapid Transit Company."

Atchison Railway, Light & Power Company, Atchison, Kan.—W. B. McKinley, Champaign, Ill., and his associates in the Illinois Traction System, have exercised the option which they secured recently on a controlling interest in the Atchison Railway, Light & Power Company. Mr. McKinley is reported to have said: "It is our intention to build an interurban railway to connect Atchison with St. Joseph and Leavenworth, but it is a little premature to announce exactly what we intend to do, as we have not decided."

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—The Chambersburg, Greencastle & Waynesboro Street Railway has filed a mortgage for $1,000,000 in favor of the Chambersburg Trust Company, Chambersburg, Pa., to secure an issue of bonds in that sum to retire $300,000 of first mortgage bonds and $300,000 of second mortgage bonds, the remainder to be used for improvements and extensions.

Connecticut Valley Street Railway, Northampton, Mass.—The stockholders of the Connecticut Valley Street Railway have voted to issue $100,000 of 6 per cent. cumulative preferred stock to be offered in exchange, at par, for an equal amount of the first and refunding bonds of the company due on June 1, 1929. The exchange is subject to the approval of the Railroad Commissioners.

Consolidated Railway & Power Company, Fayetteville, N. C.—The property of the Consolidated Railway & Power Company was sold under foreclosure recently to J. S. Newton, Fayetteville, N. C., and his associates, for $65,500. Henry T. Deshat, Philadelphia, Pa., representing the bondholders, bid $65,000 for the property. This is the second time the property has been offered for sale recently under foreclosure, the court not having confirmed the bid made at the previous sale.

Dayton, Covington & Piqua Traction Company, Dayton, Ohio.—Wirt Kessler, West Milton, Ohio, and W. A. Gibbs, Cambridge, Ohio, formerly division manager of the Ohio Electric Railway, have been elected directors of the Dayton, Covington & Piqua Traction Company.

Eastern Ohio Traction Company, Cleveland, Ohio.—On June 11, 1910, the eastern division of the Eastern Ohio Traction Company system was sold at auction by Robert D. Beatty, receiver of the company, to H. P. McIntosh, president of the Guardian Trust Company, as representative of the first-mortgage bondholders, for $755,334, which is about $5,000 more than the upset price. The holders of the $1,000,000 of bonds have agreed to accept $800,000 of new bonds and forego their interest for two years, so that the property may be rehabilitated.

Hammond, Chicago Heights & Southern Traction Company, Chicago, Ill.—The Hammond, Chicago Heights & Southern Traction Company, which has a 16-mile line under construction between Hammond and Lansing, has filed a first mortgage with the Western Trust & Savings Bank, Chicago, Ill., as trustee, to secure an issue of $250,000 of 5 per cent 30-year bonds.

Illinois Traction System, Champaign, Ill.—The McKinley interests, which control the Illinois Traction System, have purchased the property of the Marseilles Water & Light Company and the Marseilles Land & Water Company, Marseilles, Ill., which includes a hydroelectric station of 3000-hp capacity and a transmission line from Marseilles to Ottawa, paralleling the Chicago, Ottawa & Peoria division of the Illinois Traction System.

Massachusetts Electric Companies, Boston, Mass.—Curtis & Sanger, Estabrook & Company, Parkinson & Burr

and H. C. Wainwright & Company, Boston, Mass., are offering at 123½ and accrued dividends, yielding 4.85 per cent, the unsold portion of $403,000 of cumulative preferred stock of the Old Colony Street Railway, and $587,600 of cumulative preferred stock of the Boston & Northern Street Railway.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—The directors of the Norfolk & Portsmouth Traction Company have declared operative the plan for refinancing the company proposed by Middendorf, Williams & Company, Baltimore, Md., and have called for deposits of stock with the Trust Company of North America, Philadelphia, Pa. An abstract of the letter to the stockholders of the company announcing the plan was published in the ELECTRIC RAILWAY JOURNAL of May 28, 1910, page 957.

Northampton Traction Company, Easton, Pa.—James W. Fox, Howard Thomas, Charles E. Hoch and J. Fred Mooney have been elected directors of the Northampton Traction Company to succeed Chester Snyder, A. R. Dunn, W. J. Daub and F. S. Bixler.

Northwestern Corporation, Walla Walla, Wash.—The American Power & Light Company, New York, N. Y., which is controlled by interests identified with the Electric Bond & Share Company, New York, N. Y., has acquired from the Northwestern Corporation, through H. M. Byllesby & Company, Chicago, Ill., the electric railways in Walla Walla, the interurban electric railway from Walla Walla to Milton, the gas properties in Walla Walla and North Yakima, Wash.; Lewiston, Idaho, and Pendleton, Ore.; the electric light properties in Walla Walla, Pendleton and Athena, and other interests.

Owensboro (Ky.) City Railroad.—The Owensboro City Railroad has filed a mortgage with the American Trust & Savings Company, Evansville, Ind., to secure an issue of $200,000 of second mortgage bonds to be used for extensions and improvements.

Sedalia Light & Traction Company, Sedalia, Mo.—E. F. Swinney and William H. Powell have been appointed temporary receivers of the Sedalia Light & Traction Company. John P. Reynolds, Arthur Wainwright and Frederick J. Bradlee, Boston, Mass., have been appointed a committee of bondholders to receive deposits of bonds.

Sioux City (Ia.) Service Company.—N. W. Halsey & Company, Chicago, Ill., are offering for subscription at 97 and interest the $1,000,000 of first and refunding mortgage sinking fund gold bonds of the Sioux City Service Company, which they purchased recently, as noted in the ELECTRIC RAILWAY JOURNAL of May 7, 1910, page 846. These bonds are dated Jan. 1, 1910, and are due Jan. 1, 1928, but are redeemable at 105 on any interest date.

Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y.—The sale of the property of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad under foreclosure has been postponed until June 29, 1910.

United Railroads, San Francisco, Cal.—White, Weld & Company, New York, N. Y., and J. S. Wilson, Jr., & Company, Baltimore, Md., offer at par and interest equipment 6 per cent gold certificates of the United Railroads, guaranteed as to principal and interest by the United Railways Investment Company. The total issue of certificates is $400,000, dated July 15, 1910, and maturing $50,000 annually from July 15, 1911, to July 15, 1918, inclusive, without option of prior redemption. The certificates are secured on 80 pay-as-you-enter cars, which cost $500,000, $100,000 having been paid in advance in cash.

West Penn Traction Company, Connellsville, Pa.—An initial quarterly dividend of 1½ per cent has been declared on the preferred stock of the West Penn Traction Company, payable June 16, 1910, to holders of stock of record on June 15, 1910.

Youngstown & Ohio River Railroad, Salem, Ohio.—The Youngstown & Ohio River Railroad has sold to C. E. Denison & Company, Boston, Mass., and Cleveland, Ohio, $1,000,000 of an authorized issue of $2,500,000 of first mortgage 5 per cent bonds, dated April 1, 1910, and due on April 1, 1935, but subject to call after 5 years at 105 and interest. Interest is payable in April and October at the First National Bank in New York, or at the office of the Citizens' Savings & Trust Company, Cleveland, Ohio.

Traffic and Transportation

Trail Car Operation in Washington

The Interstate Commerce Commission, Washington, D. C., on June 11, 1910, ordered that Section 27 of the rules and regulations for the operation of trail cars in the District of Columbia be stricken out and that a new section be substituted to provide that after Jan. 1, 1912, no trail car shall be operated in the District of Columbia to carry passengers, unless it is equipped with double trucks and there is a separate conductor for each car of the train.

In connection with this matter the District Electric Railway Commission, under date of June 9, 1910, transmitted a letter to the Interstate Commerce Commission recommending the promulgation of this order. In this letter the District Electric Railway Commission said, in part:

"Subsequent to the promulgation by the Interstate Commerce Commission of the order of Feb. 18, 1910, requiring that each car operating in the District of Columbia shall be in charge of a separate conductor, and in obedience to a subsequent order of your commission, a communication has been received from each of the two principal companies operating trail cars, which communication sets forth in detail the plans of the respective companies relative to the trailer proposition. These communications state, among other matters:

"First: That both companies intend to cease operating trailers after Oct. 1, 1913.

"Second: That it has been the policy of both companies for some time past gradually to eliminate the trailer and that they propose to continue that policy as rapidly as circumstances may justify or means permit.

"Third: That the Washington Railway & Electric Company does not intend to extend the operation of trailers to any lines other than those on which this equipment is now being operated.

"Fourth: That on and after Oct. 1, 1910, the Washington Railway & Electric Company proposes to discontinue the operation of trailers on the regular all-day schedules on the Ninth Street and Georgetown lines, and limit the operation of trailers to tripper service and additional extra service during rush hours.

"Fifth: That in the case of the Capital Traction Company the remodelling of two car barns and an increase of power plant will be necessary before all the trains now in operation can be replaced with larger single equipment.

"Sixth: That the abandonment of the present double equipment, even in the time prescribed in their statement, will entail a heavy financial loss, especially in the case of the Capital Traction Company, the greater portion of which company's equipment is of the single truck motor and trailer type.

"Previous communications received from these companies contain statements concerning the cost of providing two conductors for all trains operated and the alleged danger of having two conductors, through the misunderstanding of signals.

"The Washington Railway & Electric Company has ordered for delivery by Aug. 1, 1910, 50 new double-truck pay-as-you-enter cars to replace the trains now in service on the Ninth Street and Georgetown lines, and the Capital Traction Company is remodelling its Georgetown car barn and has purchased a site for a new power station.

"After a most careful investigation this commission has concluded to limit the time in which the present single-truck double equipment may be operated in the District of Columbia, providing what is thought to be a reasonable period in which to secure substitute equipment, as well as means for housing and power to operate the same, and to specify certain conditions under which double-truck trailers only may be operated after the expiration of that period.

"This commission has the honor to recommend, therefore, that the order of your commission relative to the provision of a separate conductor for all cars operated in the District of Columbia, promulgated on Feb. 18, 1910, be rescinded, and that in lieu thereof, there be promulgated an order to the effect that after Jan. 1, 1912, no trail car shall be operated in the District of Columbia to carry passengers unless

it is equipped with double trucks and there is a separate conductor for each car of the train."

The communication then refers to improvements made by both the Washington Railway & Electric Company and the Capitol Traction Company, on their own initiative and at the suggestion of the commission, improvements in schedules and other matters that are largely of local interest, and concludes as follows:

"These and other improvements, together with the partial elimination of trailers, have added much to the comfort, convenience and safety of the traveling public, and this commission is pleased to note that there appears to be a general tendency on the part of the railways to continue this policy and maintain an efficient, safe and up-to-date service."

Bulletin to St. Louis Employees on Courtesy

In a bulletin addressed to its employees and posted in the car houses of the company, recently, the United Railways, St. Louis, Mo., says:

"1. All passengers are entitled to civil, polite treatment. Do not lecture nor scold, nor make sharp retort. Keep silent if you can not make courteous reply. All this, notwithstanding there may be provocation.

"2. Be patient and courteous, especially to women; do not offend a woman by word or act; do not lay your hands on a woman or child, except to save them from injury; do not have a woman arrested or in any way offer her an indignity.

"3. Stop for passengers; do not run by any one. Take them on in safety and land them safely. It is not humane to injure any one, nor is the responsibility for having done so pleasant. All the passengers place their comfort and safety and the pleasure of the ride in your hands; do not disappoint them.

"4. Be prompt, industrious and persistent in the collection of fare. Disputes as to payment of fare or the validity of transfers are unfortunate, but when the conductor has made every civil and respectful endeavor to set the matter right he has performed his duty—there being a possibility of error on both sides—and he will not go to the extreme of a quarrel, a fight or an ejection from the car.

"5. In making change, take pains to be accurate, and if the change given is unsatisfactory, give other change, and do not dispute over it; a very important part of your duty is to please every passenger."

Fare Change on New Hampshire Electric Railway.—The New Hampshire Electric Railways, Haverhill, Mass., is following again this year the plan adopted about a year ago whereby on certain lines it charges a 5-cent fare from May 1 to Nov. 1, and a 6-cent fare from Nov. 1 to May 1. This arrangement was made to accord with certain local conditions, and particularly with reference to pleasure traffic on certain branches of the company's system.

Increase in Wages on Lowell & Fitchburg Street Railway.—The Lowell & Fitchburg Street Railway, Ayer, Mass., which for some time has paid motormen and conductors in its employ a flat rate of 20 cents an hour, has recently established the following graduated scale of wages: First year, 20 cents per hour; second year, 21 cents per hour; third year, 22 cents per hour; fourth year, 23 cents per hour; fifth year, 24 cents per hour; thereafter, 25 cents per hour.

Change Proposed in Issuing Transfers in Tacoma.—The Tacoma Railway & Power Company, Tacoma, Wash., proposes to return to the system of having conductors issue transfers when passengers pay their fares, instead of having the conductors issue the transfers at junction points. The system of having conductors issue transfers at junction points has been in use for two years, and it is to be abandoned on account of the delay in car movement which is caused when a number of passengers desire to change at the same intersection.

Employees Accept Company's Offer in Detroit.—The employees of the Detroit (Mich.) United Railway have voted to accept the terms of service proposed by the company and to dissolve the board of arbitration, of which two members had been selected. The new schedule of wages calls for 23 cents an hour for the first six months, 26 cents an hour for one year and 28 cents an hour after eighteen months, whereas the former terms of service provided for 23 cents an hour for the first year, 25 cents for the second year and 27 cents after two years had been served with the company.

Fare Boxes in Pittsburgh.—On June 13, 1910, the Pittsburgh (Pa.) Railways put fare boxes in operation on its 40 new pay-on-entrance cars. Previous to putting these fare boxes in operation the company circulated among its patrons a leaflet describing the proper method of paying for the ride, and the suggestion was made that if they had the exact change or a ticket they could pass into the car quickly and, possibly, ahead of other passengers who had to wait for change. The result of this campaign of education was very satisfactory, and up to 8 a. m., with the 40 cars, only about $60 to $70 in change had been required.

Increase in Fare on Atlantic City Lines.—On June 1, 1910, the fare between Atlantic City and Pleasantville, on both the Atlantic City & Shore Railroad and the Atlantic & Suburban Railway, was increased. Heretofore there has been a straight 5-cent fare to Pleasantville, a distance of 7 miles, over the intervening marsh land between Pleasantville and Atlantic City, which provides practically no traffic. Under the new arrangement there are three rates of fare: Monthly commutation, 60 rides (within the month), $3.90; package tickets, six rides, 50 cents; cash fare, 10 cents. This increases the fare to Ocean City and intermediate points, but rates in the fare zones beyond Pleasantville have not been increased.

Handling Six-Cent Fares During Heavy Traffic.—On days when traffic was heavy the Hartford & Springfield Street Railway, Warehouse Point, Conn., experienced difficulty in taking up the 6-cent fare which it has been collecting for the last seven months. H. S. Newton, general manager of the company, has devised a plan of having a ticket agent start from the rear end of the car to sell 6-cent tickets, while the conductor starts in the usual manner and collects fares in the front of the car. By the time the two men meet about half the passengers on the car have been provided with 6-cent tickets, which are easily collected by the conductor. This method makes it possible to save time and to collect all fares on through lines. The use of ticket agents on the cars is confined to only three limits.

Traffic Agreement Between Schenectady and Albany Companies Approved.—The Public Service Commission of the Second District of New York has approved a traffic agreement made in 1908 between the United Traction Company, Albany, N. Y., and the Schenectady Railway in relation to the use of the tracks of the United Traction Company by the Schenectady Railway in Albany, Watervliet, Troy and Green Island, which provides that the Schenectady Railway may operate its passenger cars over the tracks owned by the United Traction Company in Albany, solely as agent of the United Traction Company, and that the Schenectady Railway as agent may operate its passenger cars over the tracks owned and leased by the United Traction Company in Watervliet, Troy and Green Island.

Interstate Commerce Commission Overruled.—The United States Circuit Court of Appeals has denied the jurisdiction of the Interstate Commerce Commission over street railways whose lines traverse adjoining cities which are in different states. In effect the decision restores the condition under which the Omaha & Council Bluffs Street Railway charged a 10-cent fare from either Omaha or Council Bluffs across the Missouri River bridge and into the loop district of either city, and an additional fare of 5 cents from the loop district to the outlying portions of the city. The complaint against the company was brought by the West End Improvement Club, and an abstract of the conclusions of the commission in the case was published in the Electric Railway Journal of Dec. 25, 1909, page 1281.

Steam-Electric Agreement Approved.—The Public Service Commission of the Second District of New York has approved an agreement between the Central New England Railway and the Poughkeepsie City & Wappingers Falls Railway which provides for passenger service over the Central New England Railway, from the freight station formerly occupied by the Poughkeepsie & Eastern Rail-

road to the Hudson River State Hospital, and from a point near the hospital to the junction of the Central New England Railway, with the main line of the New York Central & Hudson River Railroad in Poughkeepsie. The service is to be furnished by means of electric cars, which are to be operated by the Poughkeepsie City & Wappingers Falls Railway. They will replace the present steam cars operated over this branch.

Increase in Service Ordered on New York Line.—The Public Service Commission of the Second District of New York has ordered the New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y., to increase its passenger service between Highland and Highland Landing, and to restore the service recently discontinued between Highland Ferry and the crossing of the West Shore Railroad at Highland Landing. The company is ordered to operate a car between the ferry at Highland Landing and the east side of the West Shore Railroad to meet each train operating on the West Shore Railroad and to operate on each week day service leaving New Paltz for the ferry at Highland Landing, about 12 o'clock noon, and a car leaving Highland Landing about 12.45 p. m. for Highland, and one leaving the ferry at Highland Landing about 1.15 p. m. for New Paltz. This service is to begin on June 20, 1910.

Complaint Against New Haven Railroad.—The Public Service Commission of the Second District of New York has served upon the New York, New Haven & Hartford Railroad the complaint of Edwin Fiske, individually, and as Mayor of Mount Vernon, in which he alleges that the present passenger fares over the railroad have been in existence for 31 years; that the number of passengers carried by the railroad in 1880 was about 6,000,000, and is now about 90,000,000; that the population of Mount Vernon consists largely of the families of those who do business in New York City, and travel back and forth daily as commuters on the railroad; and that an increase over the present commutation or regular one-way fares would be unreasonable, unjust, excessive, and in violation of a contract made in 1879 by the defendant and a committee of persons whereby as a consideration for the discontinuance of certain proceedings the New York & New Haven Railroad acquired the right to build a part of its railroad in Westchester County, and the present rates of fares were fixed and agreed upon for the benefit of commuters in that vicinity. The commission has served the complaint upon the railroad with an answer returnable within 10 days.

Arbitration in Connecticut.—In the ELECTRIC RAILWAY JOURNAL of June 11, 1910, mention was made of the agreement entered into by the Connecticut Company and its employees to submit to arbitration the readjustment of the terms of service of the motormen and conductors in the employ of the company. The board of arbitration which is to consider the matter is to be composed of three members, one chosen by the company, one by the men, and the third by these two. Clarence Deming, one of the editors of the *Railway Age Gazette*, who is a resident of New Haven, has been selected by the company as its representative, and it is anticipated that the men will announce the appointment of their representative within a few days. The wages now paid by the company on its several divisions follow: New Haven and Hartford—21 cents the first year, 21½ cents the second year, 22 cents the third year, 23 cents the fourth year, 24 cents the fifth year, 25 cents the sixth year; New London, Stamford, Meriden, Bridgeport, Waterbury, Derby, New Britain, Norwalk and Putnam—20 cents the first year, 21 cents the second year, 22 cents the third year, 22½ cents the fourth year, 23 cents the fifth year, and 24 cents the sixth year; Middletown and Torrington—19 cents the first year, 19½ cents the second year, 20 cents the third year, 21 cents the fourth year, 22 cents the fifth year, 23 cents the sixth year. The men ask for a flat rate of 30 cents an hour, applicable to all divisions, with time and one-half for overtime. Each party to the arbitration is to pay the arbitrator chosen by it for his services, the services of the third arbitrator to be paid for jointly by the company and the men. All expenses of the board of arbitration are also to be borne jointly. The decision reached by the arbitrators is to be binding on the company and the men for not more than two years from June 1, 1910.

Personal Mention

Mr. J. Fred Mooney has been elected secretary of the Northampton Traction Company, Easton, Pa., to succeed Mr. A. R. Dunn, resigned.

Mr. Charles E. Hoch has been elected treasurer of the Northampton Traction Company, Easton, Pa., to succeed Mr. Chester Snyder, resigned.

Mr. A. L. Ruff has been appointed assistant freight and passenger agent of the Oregon Electric Railway and the United Railways, Portland, Ore.

Mr. Sherman Culp has been elected president of the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, to succeed Mr. G. A. Bartholomew.

Mr. S. S. Burtsfield has been elected general manager of the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, to succeed Mr. G. A. Bartholomew, who has retired as president and general manager of the company.

Mr. Horatio A. Foster, who has been associated with Mr. Bion J. Arnold in the appraisal of the property of the Detroit United Railways at Detroit, has recently moved to Pittsburgh, where Mr. Arnold has been engaged by the Mayor to study the traction situation.

Mr. G. A. Bartholomew has retired as president and general manager of the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, and Mr. Sherman Culp has been elected to succeed him as president of the company, and Mr. S. S. Burtsfield has been appointed general manager to succeed him.

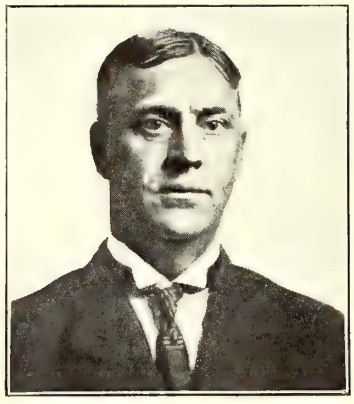
Mr. A. M. Courtney, who has been appointed superintendent of maintenance of way of the San Antonio (Tex.) Traction Company, was born in Clay County, Mo., in March, 1857. At the age of 17 years he left school to drive a six-yoke train of oxen from Los Animas, Col., to Santa Fé, New Mex. He was next employed by the Barlow & Sanderson Overland Stage Line Company. Returning to Missouri, through Iowa and Nebraska, he was employed by various railroads in construction work. Going west again, he entered the service of the Denver & Rio Grande Railroad. Next Mr. Courtney did some prospecting, and for two years was marshal of Liberty, Mo. In 1890 he entered the employ of the San Antonio Traction Company, and has served the company as motorman, conductor, timekeeper and track foreman.

Mr. W. B. Rockwell, general manager of the Syracuse & Suburban Railroad, Syracuse, N. Y., has resigned to accept the position of manager of the Eastern Pennsylvania Railways, Pottsville, Pa. He will assume the duties of his new position within a few days. Mr. Rockwell was one of the pioneers in electric traction, having taken an active part in the construction of one of the early Van Depoele roads in Scranton, Pa., in 1885. Subsequently he built other roads at Athens, Pa., and Middletown, N. Y. He also constructed the Staten Island Midland Electric Railway, and in 1895 planned and built Midland Beach on the southern shore of Staten Island, now one of the most popular beach resorts around New York City. He left Staten Island to become manager of the Syracuse, Lake Shore & Baldwinsville Railway and then of the Syracuse, Lake Shore & Northern Railway, resigning the latter position to become general manager of the Syracuse & Suburban Railroad. The general managers of the Eastern Pennsylvania Railways, with which Mr. Rockwell is now connected, are J. G. White & Company, Inc., New York, N. Y.

Mr. J. M. Boyer, who has been appointed superintendent of the Marion Railway, Light & Power Company, Marion, Ohio, to succeed Mr. Kade Neiswender, resigned, began his railway career as a motorman with the Columbus Railway & Light Company, Columbus, Ohio, on June 5, 1893. In 1902 Mr. Boyer resigned from the Columbus Railway & Light Company to become connected with the Columbus, Buckeye Lake & Newark Traction Company, operating an interurban railway from Columbus to Newark, Ohio, and continued with the company for more than three years. On March 1, 1905, Mr. Boyer entered the service of the Columbus, London & Springfield Railway. Later, the Columbus, London & Springfield Railway was purchased by the Ohio Electric Railway, with which company Mr. Boyer

continued in the freight department. From March 1, 1905, to March 1, 1907, Mr. Boyer was employed in the office of the Ohio Electric Railway, and from March 1, 1907 to Sept. 1, 1907, he was train dispatcher for the company. On Sept. 1, 1907, he became connected with the Buffalo & Lake Erie Traction Company, in charge of the interurban line from Erie to Westfield, N. Y. On March 1, 1910, he resigned from the Buffalo and Lake Erie Traction Company, and on June 1, 1910, was appointed superintendent for the Marion Railway, Light and Power Company.

Mr. M. E. Graston has been appointed general manager of the Indianapolis, New Castle & Toledo Traction Company, New Castle, Ind. Mr. Graston has been in railroad work for the last 21 years. He entered the service of the Cleveland, Cincinnati, Chicago & St. Louis Railway in 1889, and finally became station agent of the company at Wabash and at Rushville. In January, 1905, Mr. Graston became connected with the Indiana Union Traction Company, Anderson, Ind., as division freight and passenger agent, with headquarters at Indianapolis. He has resigned from the Indiana Union Traction Company to become connected with the Indianapolis, New Castle & Toledo Traction Company, and was to enter upon his duties with that company on June 15, 1910. Mr. Graston will have his headquarters at Indianapolis. The Indianapolis, New Castle & Toledo Electric Railway is a 40-mile electric railway under construction to connect Indianapolis, Greenfield, New Castle, Muncie, Richmond, Winchester and Toledo.



M. E. Graston

Mr. H. M. Adams, general freight and passenger agent of the Spokane, Portland & Seattle Railway, has also been appointed general freight and passenger agent of the Oregon Electric Railway and the United Railways, Portland, Ore., in which offices he will be assisted by Mr. A. L. Ruff, who has been made assistant freight and passenger agent of the Oregon Electric Railway and the United Railways. Mr. Adams was born at Clinton, Ia., on Jan. 3, 1867, and entered railway service in 1880 as a messenger with the St. Louis & San Francisco Railway at Cherryvale, Kan. Subsequently he served with the Kansas City, Fort Scott & Gulf Railroad and the Southern Kansas Railroad in various capacities, and in 1886 became chief clerk in the general baggage department of the Southern Kansas Railway. He continued with the Southern Kansas as clerk, and in other capacities, until October, 1887, when he entered the employ of the Oregon Railway & Navigation Company as chief clerk of the general baggage department. On Dec. 1, 1889, Mr. Adams accepted a position with the Union Pacific Railway at Portland. From June 1, 1890, to June 10, 1893, he was baggage agent of the United Carriage & Baggage Transfer Company at Portland. Mr. Adams then spent a year in South America. On his return he served consecutively as ticket clerk of the Union Pacific Railway and Oregon Railway & Navigation Company at Seattle, clerk with the Oregon Railway & Navigation Company at Portland, traveling freight and passenger agent of the Oregon Railway & Navigation Company, chief clerk of the general freight department of the company, general agent of the company at Spokane, assistant general freight agent of the company at Portland and assistant traffic manager of the Great Northern Railway at Seattle, Wash.

OBITUARY

A. R. Seagrave, formerly well known as a street and electric railway promoter, died at Toledo, Ohio, on May 31, aged 75 years. Mr. Seagrave was one of the officers of the Central Passenger Railroad, Toledo, which was absorbed by the Toledo Railways & Light Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Marysville & Colusa Railway, Colusa, Cal.—Incorporated in California to build a 30-mile railway from Marysville through Yuba City to Colusa. Capital stock, authorized, $1,500,000, of which $30,000 has been subscribed. Directors: Charles H. Hammon, Leon J. de Sabla, Samuel Lilienthal, George E. Springer and Herbert W. Furlong. [E. R. J., May 14, '10.]

***San Francisco & Transbay Railroad, Niles, Cal.**—Application for a charter has been made in California by this company to build a 70-mile suburban railroad from Niles to Dumbarton and crossing the bay with connections to Redwood City and Woodside through San Francisco. A branch is to run from Redwood to Woodside and from Dumbarton to Warm Springs. Capital stock, authorized, $1,500,000; stock subscribed, $70,000. Incorporators: E. Schnulenbaus, J. Comerford, A. Mulverhill and L. Block, San Francisco.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Chartered in Kansas to build an interurban electric railway to connect Bonner Springs and Kansas City, and with the ultimate purpose to extend the line to Lawrence and Topeka. It is expected to start construction within the next few months. This new company will take over the property of the Kansas City & Bonner Springs Railway, which has 5 miles in operation, and will connect with the Kansas City Western Railway from Bethel to Kansas City. Capital stock, $1,500,000. Headquarters, Bonner Springs. Incorporators: John W. McDanield, John C. Finney, Bonner Springs; A. L. Cooper and W. H. Caffrey, Kansas City, Mo., and Charles Knabb, Hiawatha. [E. R. J., Aug. 7, '09.]

***Horse Cave & Eastern Railway, Horse Cave, Ky.**—Application for a charter will be made by this company in Kentucky to build a 25-mile railway from Horse Cave, Ky., on the Louisville & Nashville Railroad, southeast via Hiseville and Knob Lick to Edmonton. The line will eventually be extended 25 miles southeast to Burkesville, on the Cumberland River. It is expected to use gasoline or gasoline electric cars for passenger and mail service, and steam will be used for handling freight. Surveys will be made in July. Louis Edwards, 1463 Arlington Avenue, St. Louis, Mo., is the promoter.

***Southern Pennsylvania Traction Company, Chester, Pa.**—Chartered in Pennsylvania to operate a railway in Delaware County. Capital stock, $10,000.

***Graham (Va.) Electric Railway.**—Incorporated in Virginia to build an electric railway in Graham. Capital stock, maximum, $50,000; minimum, $25,000. Officers: J. F. Dudley, president; William Mitchell, vice-president; R. B. Williamson, secretary, and C. W. Keister, treasurer, all of Graham.

Bellingham-Skagit Railway, Bellingham, Wash.—Incorporated in Oregon for the purpose of constructing an electric railway in Bellingham and Skagit County. Capital stock $1,000,000. Officers: Charles M. Drummond, president; Clark D. Chapman, Portland, treasurer. [E. R. J., June 11, '10.]

FRANCHISES

Alabama City, Ala.—H. H. Rogers, representing the Noccalula & Southwestern Railway, Gadsden, has been granted a franchise by the Council to build a railway in Alabama City. [E. R. J., May 14, '10.]

Santa Cruz, Cal.—The Union Traction Company has been granted a 50-year franchise by the Council to extend its railway in Santa Cruz to Laveaga Park.

Stockton, Cal.—The Central California Traction Company, San Francisco, has asked the Council for a 50-year franchise to build an electric railway over certain streets and highways of San Joaquin County. Samuel B. McLenegan, Stockton, general manager.

Moline, Ill.—The Tri-City Railway, Davenport, Ia., has been granted a 20-year extension of its franchise to build a railway in Moline.

Indianapolis, Ind.—The Indiana Union Traction Company, Anderson, has been granted permission by the Commissioners of Marion County to construct a double-track for about 2 miles west of Laurence, where a branch extends from the main line to Fort Harrison.

New Albany, Ind.—The Louisville & Northern Railway & Lighting Company, New Albany, has been given a franchise by the Board of Public Works of New Albany, Ind., to construct an addition to its line, giving transportation facilities to the fair grounds of the county.

Lansing, Mich.—The Detroit, Lansing & Grand Rapids Railway, Grand Rapids, has been granted a franchise by the Council to build a railway over certain streets in Lansing. This 156-mile railway will connect Plymouth, Northville, South Lyon, Brighton, Howell, Fowlerville, Webberville, Eagle, Portland, Saranac, Mulliken, Sunfield and Lake Odessa, with terminals at Detroit and Grand Rapids. F. A. Bean, chief engineer. [E. R. J., May 14, '10.]

St. Charles, Mo.—The St. Louis-Kansas City Electric Railway, St. Louis, has asked the Council for a franchise to build a railway over certain streets in St. Charles. This proposed 225-mile electric railway will connect St. Louis and Kansas City. [E. R. J., April 23, '10.]

North Tonawanda, N. Y.—James S. Simmons, Niagara Falls, representing the Frontier Electric Railway, has asked the Common Council for a franchise to build an electric railway within the city limits. This proposed railway, which is to connect Buffalo and Niagara Falls, has acquired all the rights to the old Buffalo, Thousand Island & Portland Railroad between Buffalo and Niagara Falls.

***Charlotte, N. C.**—It is stated that Cameron Morrison and P. C. Whitlock will ask the Board of Aldermen for a franchise to build a street railway in Charlotte to extend from the city limits to the Country Club, 5 miles east of Charlotte.

Napoleon, Ohio.—The Fostoria, Napoleon & Defiance Railway, Toledo, has asked the Council for a franchise to build an electric railway through Napoleon. This is part of a plan to build a railway through Seneca, Wood, Henry, Hancock and Defiance Counties. Charles A. Bliss, Bowling Green, president. [E. R. J., March 25, '10.]

Harrison, Pa.—The Tarentum, Brackenridge & Freeport Street Railway, Tarentum, will ask the Commissioners for a franchise to build an electric railway over certain streets in Harrison. This is part of a plan to build a railway through Allegheny County. [E. R. J., Jan. 29, '10.]

Brownsville, Tex.—B. G. Stegman advises that he and associates have obtained a 25-year franchise to operate a 4-mile street railway in Brownsville. Gasoline motor cars will be used. [E. R. J., June 4, '10.]

Cleburne, Tex.—P. E. Coons, representing Daniel Hewitt, will soon ask the City Council for a franchise to build a street railway in Cleburne. [E. R. J., May 7, '10.]

Richmond, Va.—The Richmond & Henrico Railway has been granted a six months' extension of its franchise by the City Council for completing its new Church Hill viaduct and proposed railway. [E. R. J., Jan. 29, '10.]

Sistersville, W. Va.—The Parkersburg & Ohio Valley Electric Railway, Parkersburg, has been granted a new franchise by the City Council to build a railway in Sistersville, with the provision that the line is to be completed by Sept. 1. This 4-mile railway, which connects Sistersville and Friendly, is being rebuilt and it is expected to extend it to Williamstown.

TRACK AND ROADWAY

Glendale & Eagle Rock Railway, Los Angeles, Cal.—This company has started work on the extension of its railway from Glendale to Verdugo Park, and it will probably be extended to La Canada and La Crescenta. E. D. Goode, president.

Corn Belt Electric Railway, Cornell, Ill.—H. W. Knight, it is said, has revived the plan to build an electric railway to connect Chicago, Plainfield, Platteville, Lisbon, Seneca, Ramsden, Budd, Blackstone, Cornell, Streator, Flanagan, Gridley, El Paso, Kappa, Hudson, Kerrick, Normal, Bloomington, Mackinaw and Peoria, and there meet St. Louis connections. [E. R. J., July 24, '10.]

Springfield & Jacksonville Railway, Springfield, Ill.—This company, which is building an electric railway between Springfield and Jacksonville, is said to be considering the building of an extension to Winchester and Quincy. [E. R. J., Feb. 19, '10.]

Oklahoma-Kansas Railway, Baxter Springs, Kan.—This company has retained as consulting engineers the W. K. Palmer Company, Kansas City, Mo., and will soon start surveys for its proposed 23-mile electric railway to connect Columbus, Galena and Baxter Springs, Kan., and Sunny Side, Lincolnville, Hattanville and Miami, Okla. C. F. Lambert, Kansas City, Mo., chief engineer. [E. R. J., March 12, '10.]

Topeka (Kan.) Railway.—This company has been offered the right of way of the West Side Circle Railway for the purpose of building an extension of its railway from Topeka to Gage Park. It is expected to start work in six months, and to finish the line in one year.

Covington, Big Bone & Carrollton Railroad, Covington, Ky.—This company, which was recently given a franchise to enter Covington, has given bond of $25,000 to the City Council of Covington to insure the completion of the work of the company. The company plans to build a 22-mile railway between Covington and Big Bone. M. J. Crouch is interested. [E. R. J., May 7, '10.]

Hagerstown (Md.) Railway.—This company is said to be considering plans for building an extension from Williamsport to Winchester, via Hedgesville. W. C. Hepperle, Hagerstown, purchasing agent.

United Railways & Electric Company, Baltimore, Md.—This company has decided to extend its Edmundson Avenue line to Orangeville.

Lansing, Mich.—J. W. Ewing and J. S. Mudge, it is said, are promoting a project to build an electric railway to connect Lansing and Grand Ledge. [E. R. J., Jan. 22, '10.]

Twin City Rapid Transit Company, Minneapolis, Minn.—This company is said to be considering plans for the construction of a direct line to Stillwater. W. J. Hield, Minneapolis, general manager.

Summit McComb Motor Line Company, Summit, Miss.—This company advises that it expects to incorporate within the next two weeks, and that its 5-mile railway is nearly completed. It will connect Summit and McComb City, reaching the Godbold Mineral Wells and Summit. It will operate four gasoline motor cars. Station and repair shops will be at Summit. Capital stock authorized, $40,000. Officers: Ted Blackmore, president and treasurer; Dr. V. Simmons, vice-president; Clem V. Ratcliff, secretary and general manager. [E. R. J., June 4, '10.]

St. Louis County Belt Railroad, St. Louis, Mo.—This company advises that it will probably start construction next year on its 30-mile railway circling St. Louis and passing through Maplewood, University City, Ferguson, Affton, Carsonville, Old Orchard, Redlight, Clayton and Prospect Hill. This proposed railway will cross eleven steam railways, ten electric railways and five railroads now under construction. The company intends to sell its treasury stock until enough money is raised to defray the expense of preliminaries. It will then organize an operating company, with a capital equal to the cost of building the railway. Capital stock, $300,000. Officers: Thomas M. Gallagher, president; Bert. H. Lang, vice-president; James E. Hereford, treasurer; Edward W. Rannells, secretary, and James D. Houseman, general manager. [E. R. J., Nov. 13, '09.]

***Lewiston, Mont.**—E. N. Begeman has announced his intention of building an electric railway between Lewiston and Holland. It is said that over $100,000 will be subscribed toward the project in Lewiston.

South Shore Traction Company, Patchogue, N. Y.—This company has opened its first section of its railway from Babylon to Amityville, a distance of 9 miles. When completed, it will run from Patchogue through Islip, Bay Shore, Babylon, Freeport, Rockville Centre and Lynbrook to Jamaica, thence across the Queensboro Bridge to Manhattan, a distance of 54 miles.

*Salisbury-Spencer Electric Company, Salisbury, N. C.—This company has been organized to build a railway between Salisbury, Concord and Spencer. Capital stock, $400,000. Officers: W. F. Snider, president and treasurer; T. H. Vanderford, vice-president; T. J. Jerome, secretary; H. W. Frund, superintendent. Clement & Clement and Jerome & Mannes, attorneys.

Wheeling, Cadiz & Tuscaramas Traction Company, Cadiz, O.—This company advises that it has awarded the contract for building its railway from Wheeling, W. Va., to Uhrichsville, Ohio, a distance of 60½ miles. It is the intention to extend the line to Newark so as to connect Wheeling with Columbus, Ohio. A. Evans Townsend, president. [E. R. J., Oct. 16, '09.]

Zanesville & Meigs Valley Traction Company, Zanesville, Ohio.—This company is preparing plans to begin work soon on its projected 26-mile railway to connect Zanesville and Beverly. [E. R. J., Jan. 1, '10.]

Welland, Ont.—C. J. Laughlin, who is securing a franchise to construct a street railway in Welland, states that the line will be completed in five months and will be built on both sides of the canal to Welland Junction. [E. R. J., March 26, '10].

Tarentum, Brackenridge & Freeport Street Railway, Tarentum, Pa.—This company has nearly completed the preliminary arrangements and work will soon be started on this proposed interurban electric railway to be built through Allegheny County. [E. R. J., Jan. 29, '10.]

Memphis (Tenn.) Street Railway.—This company has filed an application for an amendment to its charter covering new lines and extensions of existing lines to be built.

Houston (Tex.) Electric Company.—This company expects to begin work at once on its proposed 2½-mile extension in the Third Ward in Houston.

Temple Northwest Railway, Temple, Tex.—This company has secured all rights of way between Temple and Gatesville, and it is expected that the entire line between Temple and Hamilton will be ready for track laying Sept. 10. This proposed 100-mile railway will connect Temple and Comanche, via Bell, Coryell and Hamilton Counties. W. J. MacDaniel, president. Headquarters, Moss Rose Building, Temple. [E. R. J., April 16, '10]

Mount Adams Railway, White Salmon, Wash.—This company advises that it will start construction Sept. 1 on its proposed 40-mile electric railway to connect White Salmon, Bingen, Bristol, Pine Flat, Snowden, Timber Valley, Glenwood, and probably Trout Lake and Husum. Its power house will be located near White Salmon and will have a capacity of 10,000 hp. The repair shops will be in White Salmon. It will furnish power for lighting and for manufacturing purposes. Capital stock authorized, $50,000; bonds authorized, $800,000. Officers: Rudolph Lauterback, White Salmon, president; Tunis Wyers, vice-president; Theodore F. Shepler, secretary and general manager, and Hubert L. Simpson, treasurer. [E. R. J., May 21, '10.]

Fairmount & Pittsburgh Railway, Fairmount, W. Va.—This company has taken over the rights and franchises of the Waynesburg & Monongahela Electric Railway, which covered Waynesburg, Marianna and Carmichaels, on the Monongahela River. Another line has been secured from Morgantown to Blacksville, and also another one from Fairmount to Mannnington and Blacksville, on the State line, which passes through Greene and Washington Counties, via Waynesburg, Ten Mile, Lone Pine, Snodgrass and Bridgeville to Pittsburgh. The company will use the tracks of the Pittsburgh Railways within the city limits. Plans for construction are now being considered and work will soon be started. J. Fred Seatty, general manager. [E. R. J., March 19, '10.]

Union Utilities Company, Morgantown, W. Va.—This company reports it will build 2 miles of new track with 75-lb. T-rails.

Burnsville, Glenville & Parkersburg Company, Parkersburg, W. Va.—This company recently incorporated to build a railway from Burnsville to Parkersburg, via Glenville, has nearly completed surveys and will start construction shortly. It has organized by electing the following officers: M. J. Bartlett, Clarksburg, president; Henry Spies, Buckhannon, vice-president; C. E. Heiner, Buckhannon, secretary-treasurer, and L. W. Bartlett, general manager. [E. R. J., June 11, '10.]

Cincinnati Construction Company, Janesville, Wis.—This company has secured right of way and franchises, and contracts have been signed that provide for the completion within six months of its proposed railway to connect Madison and Janesville via Edgerton, Stoughton, Lake Kegonsa and Lake Waubesa. H. H. Zigler, Columbus, Ohio, president. [E. R. J., March 26, '10.]

SHOPS AND BUILDINGS

British Columbia Electric Railway, Victoria, B. C.—This company, it is said, will soon ask for bids for the construction of a proposed depot in New Westminster, B. C., to cost, it is estimated, $80,000. [E. R. J., Oct. 23, '09.]

Indiana Union Traction Company, Anderson, Ind.—This company has awarded to Thomas & Heaton, Tipton, Ind., the general contract for the erection of a one-story brick passenger and freight depot and substation on East Main Street, Elmwood. It will be 80 ft. x 100 ft., and will cost, it is estimated, $16,000. [E. R. J., March 5, '10.]

Wichita Railroad & Light Company, Wichita, Kan.—This company will start the construction of its new car house on North Waco Avenue, Wichita, about Aug. 1. It will be 110 ft. x 300 ft., and will contain office, quarters for the men, repair shops, paint shop and trackage for 45 cars. Two fire walls will run through building, making three complete and separate houses. A contract has been made with this company by the Arkansas Valley Interurban Railway, whereby the latter will be permitted to store its cars temporarily in the new structure.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company is planning to build a station and freight sheds at Humberstone. E. F. Seixas, general manager.

Pittsburgh (Pa.) Railways.—This company has asked bids for building its new car house to be located at Forbes Street and Craft Avenue, Oakland. [E. R. J., Feb. 19, '10.]

Galveston-Houston Electric Railway, Houston, Tex.—This company, which is building an interurban railway between Galveston and Houston, is reported to have purchased a site for its passenger station in Galveston which will have a front of 60 ft. on Twenty-first Street, running westward 165 ft. and between Post Office Street and Church Street. Negotiations are under way for a station site at Houston.

POWER HOUSES AND SUBSTATIONS

Pueblo & Suburban Traction, Pueblo, Col.—This company is installing new coal and ash handling apparatus, new pumps, condensers, cooling towers, boilers, stokers, etc., at its power plant.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company will install two additional 500-lb. Edge Moor water tube boilers in its power plant at Batavia this summer.

Evansville (Ind.) Railway.—This company has awarded a contract for building two new power stations, to be located at Rockport and Newburg, to the General Electric Company, Cincinnati. Work on the new stations will be begun on the arrival of the material.

Mt. Hood Railway & Power Company, Portland, Ore.—This company is building a power house at Bull Run. The plan will use water diverted across a peninsula from the Sandy River.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company will build a substation at Pen Mar to be 22 ft. x 32 ft. The company is installing a 500-kw Allis-Chalmers turbine in its power station at Waynesboro.

Richmond & Henrico Railway, Richmond, Va.—It is reported that this company has purchased a site for its power house at the foot of Louisiana Street, Richmond.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company will build an addition to its present power house, enlarging its capacity from 20,000 to 80,000 hp. Three 20,000-hp steam turbines will be installed.

Manufactures & Supplies

ROLLING STOCK

Columbus (Ga.) Railroad will probably purchase three single-truck semi-convertible cars, but it has not been definitely decided what type and size they will be.

Rockland, South Thomaston & St. George Railway, Rockland, Maine, expects to purchase a construction car with motors, a tower car, several snow plows and a number of fare registers.

Aurora, Elgin & Chicago Railway, Chicago, Ill., has received from the Niles Car & Manufacturing Company five city cars for local service in Aurora and four interurban cars for the Fox River division.

Des Moines (Ia.) City Railway proposes to build some double-truck cars in its shops, and, if it is possible to secure delivery within 60 or 90 days, to order 10 or 15 cars to replace equipment destroyed in the fire at its car house on May 26, 1910.

Philadelphia (Pa.) Rapid Transit Company, noted in the ELECTRIC RAILWAY JOURNAL of June 4, 1910, as contemplating the purchase of 20 new cars for its elevated division, has placed an order with the Pressed Steel Car Company for these cars.

Hudson & Manhattan Railroad, New York, N. Y., in conjunction with the Pennsylvania Railroad, will purchase 88 motor equipments for joint use on the main line of the Pennsylvania Railroad, which is to be electrified between Harrison and Jersey City.

Calgary (Alta.) Street Railway has placed an order with the Ottawa Car Company for three cars for immediate delivery. The Calgary Street Railway has recently received three 45-ft. cars from the Preston Car & Coach Company equipped for prepayment operation.

Illinois Traction System, Peoria, Ill., has ordered 10 interurban motor cars, five trailer observation cars and 29 single-truck city cars for prepayment operation from the Danville Car Company. Mention of the contemplated purchase of these cars was made in the ELECTRIC RAILWAY JOURNAL of May 14 and May 28, 1910.

Athens (Ga.) Electric Railway, reported in the ELECTRIC RAILWAY JOURNAL of March 19, 1910, as having ordered three semi-convertible cars from the American Car Company, has specified the following details for these cars:

Seating capacity	36	Couplers	Brill
Weight	17,000 lb.	Curtain fixtures	Acme
Length of body	25 ft. 4 in.	Gongs	Brill
Over vestibule	34 ft. 9 in.	Hand brakes	Brill
Width over sills	8 ft.	Heaters	Consolidated
Over posts at belt	8 ft.	Journal boxes	Brill
Body	wood	Motors	GE
Interior trim	bronze	Registers	Ohmer
Underframe	wood	Roofs	monitor
Air brakes	Nat. B. & E. Co.	Sanders	Brill
Axles	Brill	Seats	Brill Winner
Bolsters, body	Brill	Seating material	cane
Bolsters, truck	Brill	Side bearings	Brill
Brakeshoes	Brill	Springs	Brill
Bumpers	Brill	Trucks	Brill 39-E
Car trimmings	Brill	Varnish	Murphy
Center bearings	Brill	Ventilators	Brill

TRADE NOTES

H. H. Westinghouse has been elected president of Westinghouse, Church, Kerr & Company, Ltd., to succeed the late W. C. Kerr.

Consolidated Car Fender Company, Providence, R. I., has secured an order from the Coney Island & Brooklyn Railroad for 500 wheel guards.

Wisconsin Engine Company, Corliss, Wis., has appointed George B. Foster sales manager of its Chicago office, with headquarters in the Fisher Building.

William L. Austin, formerly vice-president of the Baldwin Locomotive Works, Philadelphia, Pa., has been elected president of the company to succeed the late John H. Converse.

Louis J. Costa, formerly district manager of the Jandus Electric Company, with office in Philadelphia, has resigned to accept a position with the Philadelphia office of the Allis-Chalmers Company.

Lord Manufacturing Company, New York, N. Y., announces the appointment of the Mathias-Hart Company, 514-516 Atlantic Avenue, Boston, Mass., as its agent for the New England territory.

Modoc Company, Fernwood, Pa., manufacturer of Modoc liquid car cleaner and brass polish, pure oil soap and soap powder, has just completed a building which enlarges its manufacturing facilities about 40 per cent.

Theo. G. Empie, Wilmington, N. C., reports that the trade in crossties has been quite active, and that there is a moderate movement in Southern white cedar poles. He has more than 15,000 poles, from 25 ft. to 70 ft., on hand for immediate shipment.

L. J. Wing Manufacturing Company, New York, N. Y., has recently sold the Delaware, Lackawanna & Western Railroad, for its Bliss and Auchincloss collieries at Nanticoke, Pa., 28 20-in. Typhoon turbine blowers for forced draft on 3500 hp of boilers.

A. D. McAdam, who was recently elected vice-president of the St. Louis Surfacer & Paint Company, St. Louis, Mo., and Western sales manager of the Ohio Malleable Iron Company, Columbus, Ohio, will have his headquarters at 1101 Fisher Building, Chicago, after July 1, 1910.

Ball & Wood Company, Elizabethport, N. J., is now building steam turbines of high pressure, low pressure and mixed flow, Rateau Smoot designs, 500 kw being the smallest size; d.c. generators, 500 kw, 600 kw, 750 kw and 1000 kw of the Smoot type. Alternators are built from 500 kw up.

Federal Storage Battery Car Company, New York, N. Y., reports that the first Beach car equipped with Edison storage batteries has been in operation on the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y., for 8534 miles up to May 31, in all kinds of weather and under all conditions of track.

Consolidated Car-Heating Company, New York, N. Y., has built a new all-steel, lightweight, ventilated core type of electric heater and switches for controlling same. It will be exhibited at Booth 460-1, Young's Million Dollar Pier, Atlantic City, N. J., at the Master Mechanics' and the Master Car Builders' conventions, June 15-22. A new safety door signal device will also be shown in operation.

C. G. Young, New York, N. Y., an engineering firm, which makes a specialty of compiling reports for financing, and is engaged largely in engineering and construction, devising plans, methods and the operation of public utilities and industrial companies, has taken additional office space, enlarging its present suite on the eighth floor of 60 Wall Street. Mr. Young sailed for Europe on June 15 on the *Lusitania* for a business trip.

Pay-Within Car Company, Philadelphia, Pa., calls attention to the fact that the prepayment cars to be installed on the Cleveland Railway's lines, and mentioned in the Cleveland notes in the issue of May 14, 1910, are to be built under the pay-within patents. The Cleveland Railway Company has taken out a license with the Pay-Within Car Company and has also purchased devices for equipping 100 cars under these patents. These cars are now being put through the shops at the rate of about one a day.

Westinghouse Machine Company, East Pittsburgh, Pa., shows in its annual report for the year ended March 31, 1910, a net income for the year of $875,845. The net income for the last quarter was at the annual rate of $1,321,145. This compares with an average annual net income for the last eight years of $720,543. The report also shows that the orders received during the fiscal year aggregated $5,123,612.52, an increase of $2,322,536.58, and that the billing in shop product for the fiscal year amounted to $4,065,618.74, an increase of $1,300,912.94.

Dorner Railway Equipment Company, Chicago, Ill., reports that it has just sold second-hand or rebuilt cars as follows: Oklahoma (Okla.) Railway, 10 double truck, open city cars; Menominee & Marinette Light & Traction Company, Menominee, Mich., two 20-ft. closed motor cars, mounted on Brill trucks, and three eight-bench, open trail

cars; Yazoo City Municipal Traction Company, Yazoo City, Miss., two 10-bench, open trail cars; Manitowoc & Northern Traction Company, Manitowoc, Wis., one 40-ft., double-truck closed car, fully equipped.

Edge Moor Iron Company, Edge Moor, Del., sold to the Cedar Rapids & Iowa City Railway & Light Company during the past year four 500-hp Edge Moor water-tube boilers. They are 15 tubes high, 17 tubes wide, have two drums, and are built for 225-lb. working pressure. Superheaters and chain grate stokers were furnished in connection with the boilers. One of the boilers was erected by the railway company during the winter and the other three are being erected at the present time.

Joseph Dixon Crucible Company, Jersey City, N. J., at the annual meeting of its stockholders re-elected the old board of directors, consisting of George T. Smith, William Murray, William H. Corbin, Edward L. Young, George E. Long, William H. Bumsted and Harry Dailey. The board of directors re-elected the former officers, namely, George T. Smith, president; William H. Corbin, vice-president; George E. Long, treasurer; Harry Dailey, secretary; J. H. Schermerhorn, assistant treasurer and assistant secretary. William H. Corbin was also re-elected as counsel.

Sterling Varnish Company, Pittsburgh, Pa., has brought out two new insulating varnishes, Sterling elastic and Sterling extra elastic, which, besides being both oil and waterproof and excellent insulators, have unusually high heat resisting properties. The elastic varnish will withstand heat equal to the boiling point of water for 15 days, and the extra elastic varnish will withstand the same heat for 30 days without affecting any of its properties. The Sterling Varnish Company is distributing samples of its extra elastic insulating varnish for testing purposes.

Beach Manufacturing Company, Charlotte, Mich., has organized the Beach Manufacturing Company, Grand Forks, N. D., and will manufacture steel for bridges, cast iron and corrugated metal culverts, wheel and drag scrapers, rod graders, road plows, etc. A new plant at Grand Forks is in operation. The Beach Manufacturing Company, Portland, Ore., has also been organized, and will manufacture at Portland, Ore., the same line of materials as the Beach Manufacturing Company at Grand Forks. The company's triple expansion cast iron culverts and its corrugated metal culverts are claimed to be well adapted for electric railway work, as it is easy to install them and they are said not to be affected by frost or traffic.

Harold U. Wallace, Chicago, Ill., has established offices in the Marquette Building, Chicago, as a consulting engineer. Mr. Wallace will report, examine or survey proposed steam, electric and hydraulic properties, and undertake to supervise their construction. An announcement by Mr. Wallace describes the large engineering works which he supervised during his connection of 11 years with the Illinois Central Railroad. Since 1905 he has been engaged in private practice and has supervised the construction of four d.c. and one single-phase line, four electric power stations, two irrigation dams and made examinations and surveys for various proposed irrigation projects, hydroelectric works and steam and electric railroads.

Neemes Brothers, Troy, N. Y., have recently installed three sets of their shaking and dumping grates, 7 ft. 6 in. x 9 ft. 8 in., in the new power plant of the Hartwick Power Company; also 20 sets of the same type in the power station of the Johnstown & Gloversville Railway. During 1908 Neemes Brothers equipped the new Smith Street power plant of the Coney Island & Brooklyn Railroad with six sets of their shaking and dumping grates, 12 ft. x 12 ft. 7 in. Recently they changed the rear half of these six sets of grates to a strictly dumping type of grate. One of the particularly striking installations of their grates is at the plant of the Hartford (Conn.) Electric Light Company, where there are two 1950-hp Bigelow-Hornsby water-tube boilers. The grates for these boilers are 8 ft. 8 in. x 24 ft. 8 in. in each boiler. This plant has also six Aultman Taylor, Babcock & Wilcox type water-tube boilers, which are likewise equipped with Neemes grates 7 ft. 6 in. x 12 ft. 7 in. The entire equipment of this plant is 952 sq. ft. of grate surface, or an average of 119 sq. ft. per grate, and the two large grates averaging 212 sq. ft. each.

Electric Service Supplies Company, Philadelphia, Pa., has recently greatly extended its long list of electric railway equipment supplies, and some of the new apparatus is described in Catalog No. 4, just issued. One of these devices is a new method of locking a controller handle to the controller shaft. The handle has a socket made on three sides to conform to the controller shaft. The fourth side is fitted with a downward tapering wedge which is adjusted by means of a thumb screw so as to take up all wear on both handle and shaft. The company has also increased the number of types of automotorneers which it manufactures for different controllers and can now supply this well-known device for practically every standard type of controller. The company has also added very largely to the appliances which it has made of the Keystone air valve for different purposes. These valves are now made to operate by foot, by hand and by cord, and in single and double types, and are useful for operating pneumatic sanders, gongs and whistles—in fact, all pneumatic car apparatus. Another interesting appliance recently brought out by the company is the Keystone electric block signal which is designed for hand operation on single-track lines with turn-outs. It is of the usual lamp form, but well constructed, with asbestos board frame, quick-break switches and enclosed fuses, and is of neat design and good workmanship. The company has also brought out a line of water-tight telephone boxes for use in locations subject to extreme moisture, such as in mines, subways, tunnels, etc. These telephones are also suitable for general outdoor use where apparatus is needed which is not only weather-proof but also water-tight.

ADVERTISING LITERATURE

R. S. Mueller & Company, Cleveland, Ohio, have issued a folder describing and illustrating their universal test clip.

Vilter Manufacturing Company, Milwaukee, Wis., has just issued a new catalog illustrating and describing its Corliss engines.

Sterling Varnish Company, Pittsburgh, Pa., has issued an 8-page booklet which is descriptive of Sterling elastic and extra elastic insulating varnishes.

De Laval Steam Turbine Company, Trenton, N. J., is now printing a new catalog in which its high efficiency centrifugal pumps will be fully described and illustrated.

Miller Improved Gas Engine Company, Springfield, Ohio, describes and illustrates its gas engines in a 24-page booklet. Miller engines are manufactured in sizes from 50 hp to 300 hp for use of natural or illuminating gas.

Russell Car & Snow Plow Company, Ridgway, Pa., has issued a catalog in which various types of snow plows and flangers for steam and electric railroad service are described and illustrated.

W. H. Matthews & Brother, St. Louis, Mo., have issued "Matthews' Book of Underground Conduit Specifications" for distribution among electric railway, light, power, telephone and telegraph companies.

Louis Blessing, Jackson, Mich., is mailing a circular in which his cantilever beam railway tie is described and illustrated. Experimental tests are being made with this type of tie by the Michigan Central Railroad.

Electric Service Supplies Company, Philadelphia, Pa., has issued a supplement to Catalog No. 4, Vol. II, in which are shown new and improved devices and revised lists of material covered in the company's general Catalog No. 4, Vol. II, of car equipments and supplies. The new publication is dated June 1, 1910.

Archbold-Brady Company, Syracuse, N. Y., engineers and contractors, has recently published in pamphlet form an article which appeared in the *Electrical World* for May 14, entitled "Supports for Transmission Lines." In this article the author, Mr. Wilkinson, describes a number of towers of different types used in high-tension transmission work.

Trussed Concrete Steel Company, Detroit, Mich., has issued a 16-page catalog outlining the standard types of the united steel sash. The catalog also contains tables of dimensions of the standard sizes of the united steel sash. The Trussed Concrete Steel Company is also distributing a Kahn system pocket scale, accompanied by a typical example showing the use of the scale.

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Semi-Annual Index

This number contains the index of articles contained in Volume XXXV of the ELECTRIC RAILWAY JOURNAL, or that concluded with this week's issue. A short statement will be given of the principles followed in compiling this index, for the benefit of those who are not familiar with it through past use. The index is both a geographical and a subject index. In the geographical entries each road is indexed under the name of the city in which its principal office is located. In the subject entries the effort has been made to include not only all articles but portions of longer articles which treat of different topics to any considerable extent. The compiler of the index has made an earnest effort to anticipate the wants of every user of the index, and cross references have been introduced freely, but as it is probably not possible to do this completely, suggestions for the future improvement of the index will be welcome.

Sick and Death Benefit Societies

The increasing number of sick and death benefit societies even among the smaller companies, shows that American electric railways are beginning to appreciate the value of such organizations for attracting and retaining good men. In the United States such protection of the employees is still in the infant stage when compared with the results attained in northern Europe through the co-operation of the employer, employee and the State. For all that, it is to be hoped that equally beneficial results can be secured in this country without the aid of or compulsion by the Government. Most American railway sick and death benefit corporations are supported by dues from the employees and occasional contributions from the companies to make up deficits or to insure a good reserve fund. In a self-sustaining body the dues average 50 cents a month to cover medical attention and supplies, in addition to a daily sick benefit payment of $1, which usually begins the fourth or fifth day after illness. In some cases the medical provision includes the member's dependents, with or without extra dues. The death benefit payment, which varies from $50 to $100, is covered by the dues or by special assessments. While these societies are simple in character and scope, most of them have succeeded in gaining the general adherence of the men. This has resulted from the wise policy followed by the companies of permitting the employees to control these bodies, while they advise in the investment of the funds, furnish a meeting room or clubhouse, etc. It is very easy for organizations of this kind to grow into trade unions unless the management constantly shows that it is vitally concerned in the welfare of its men. In general, however, the sick and death benefit society typifies an excellent idea which could well be supplemented by paying more attention to other features of electric railway employment than is now generally the case.

Printed Explanations of Forms

There has been considerable discussion in this paper in regard to the proper use of blank forms and emphasis has been laid upon the possibility of economizing both in the charge for printing and stationery and also in the time of those who use the blanks, by periodical revisions of the forms in use. There is no doubt that the actual waste caused by improper forms amounts on many systems to an appreciable sum in the course of a year. The suggestion has been made that a brief memorandum giving instructions as to the use of each form should be printed on the blank itself. A modification of this plan is now under consideration by the Massachusetts Electric Companies, the extent of whose system makes the subject of the standardization and proper use of forms very important. This plan consists of the publication of a printed folder of explanation upon the proper uses of the forms and the plan should tend toward economy of time and high-priced clerical labor. Without some standard instructions of this kind there is danger that incomplete entries will be made at different local points where the blanks are used with resulting confusion and waste of time at the headquarters of the mechanical and accounting departments. The larger the number of forms, the more necessary that the entries should be accurate. Although questions can be asked and answered quickly by the aid of the telephone, delays are inevitable if requisitions and other forms are not properly filled out. It is just as desirable to minimize the amount of correcting conversation which passes over a company's telephone system as it is to cut down the inter-department correspondence to the limits consistent with intelligent administration of a railway property.

Diplomacy In Car Signs

It is well to know the difference between brusqueness and brevity when the text for car signs is being prepared. Nothing is gained by the use of terms which will be resented by the passenger because they seem like a command when the same requests can be stated politely. For example, such expressions as "absolutely prohibited," "penalty of the law," "must under no circumstances" are more apt to rouse the reader's ire than to soothe him into compliance with a reasonable regulation. Injunctions of this kind recall the traveler's perennial joke that in Germany the principal word seen in public is "verboten," or forbidden. There should be no difficulty in so wording most announcements that they will offend no reasonable person. A good instance of what the spirit of car signs ought to be is offered by the practice of the United Railways & Electric Company of Baltimore. The route of a line is never changed arbitrarily. It is done only after the company finds that the change suits the needs of the majority of the users of that line. Hence the expression: "In response to the wishes of our patrons" is perfectly proper and is correctly employed. The devotee of the weed is not told that he must not smoke in open cars except at the rear, but is cordially informed that "Smoking is permitted on the three rear seats," whereby the granting of a privilege is implied. Even the spitting ordinance is easily disposed of by a sign reading only "Spitting is unlawful" with no hint of dire penalties. This company now operates one pay-as-you-enter line, but the passengers on the other routes have already been educated to leave by the front way. They are told that "Good service depends somewhat on you. Kindly move forward and leave by the front door. Travel will be pleasanter and quicker." As the car notices which a railway issues from time to time offer the only insight which the public gets as to the personality of the management, too much cannot be done to create the most favorable impression possible in this inexpensive manner.

ANALYZING FEEDER CONDITIONS

If the ease with which the operating conditions on railway feeders can be investigated were more generally appreciated it is certain that studies of distribution economy would take a new lease of life on systems where the traffic is undergoing constantly shifting changes of large magnitude. It is an interesting thing to look into the load factor of the feeder, if the term may be applied in a somewhat general sense. On roads of small or medium size, where there is but a single power plant in service, the usual practice of installing an ammeter in each feeder line at the main switchboard establishes conditions favorable to a perpetual test, and while the practice of keeping feeder records is not perhaps necessary in routine operation, it is well worth while to attempt to compare the average and maximum loads carried with the capacity of the outgoing lines, particularly in relation to the voltage available under various conditions at the motors.

Where several power stations feed a given district with more or less cross-connecting on the positive side of the system through tie lines the situation is susceptible usually of some pretty extensive analysis before it is safe to assume that the delivery of energy is being effected on the most economical basis feasible. It is doubtless some trouble to make instrumental connections on outside lines, but the rewards of a thorough study of current distribution and voltage conditions beyond the reach of the ordinary switchboard measuring apparatus are sometimes considerable. It does not do to assume that because a feeder was loaded close to its capacity in the heavy hours of last month that the same conditions will prevail three or four months hence. Every time that the operating department establishes a new schedule or alters an old one the feeder system feels a definite although invisible effect, and after half a dozen or so such changes have been set in motion it is easily within the possibilities that the distribution of copper on the system may not be the one best calculated to deliver the requisite voltage conditions with the minimum loss consistent with the investment.

There is, of course, a decided difference between the average and the maximum demands of a given schedule upon a feeder system, and in practical railway operation the requirements of the morning and evening peaks have the right of way. The current must be supplied at a voltage which will permit the maintenance of the schedule without overheating the motors. As the number of distributing points increases, however, the relations of tie lines become more and more flexible, even where there are certain arbitrary boundaries enforced in the overhead network to prevent the overloading of any particular power plant or substation. By making a careful study of the loading and voltage results at different points simultaneously, or even at about the same time, on days when the loads and schedule situation are roughly similar to those obtaining on the preceding day, much can be learned about the effectiveness of the overhead lines in handling the traffic. The redistribution of two or three miles of 500,000 circ. mil feeder will go a long way toward paying for a year's analyses of the kind above outlined, including the instruments and the relocation of the conductors.

WEAR OF WHEELS BY BRAKE SHOES

The relation between wheel wear and brake shoe wear has been up to the present time one of the unknown factors in the brake problem. Brake shoes are comparatively cheap and easily renewed when worn out and from the standpoint of cost the best brake shoe is the one which will wear the wheel the least and at the same time show the smallest loss of weight itself per 100,000,000 ft. lb. of work done in stopping a car. The coefficient of friction is technically important because it affects the braking power and smoothness of stop. The Master Car Builders' Association previous to 1907 confined its investigations of brake shoes to a study of their frictional qualities only, but in 1908 its committee on brake shoe tests extended its work to include an investigation of brake shoe wear. No conclusions were reached during the first year's study of this phase of the subject owing to the lack of experimental data showing the reciprocal wear of the wheels on which the brake shoes were tested. This year, after considerable experimenting, a scale was designed and built which is strong enough to weigh a 700-lb. wheel and delicate enough to show differences in weight of less than 0.001 lb. The data obtained by the use of this scale were reported by the committee last week at the Atlantic City convention of the association. An abstract of the report of this committee is printed elsewhere in this issue.

Contrary to expectations the report shows that of 14 shoes tested, all of which were taken from cars in service, none produced appreciable wear on a cast-iron wheel and only two produced slight wear on a steel-tired wheel. The committee says in its report that from the results of these tests it has concluded "that no serious wear of wheels is to be expected from the action of any shoes now in ordinary service . . . and the reassurance which proceeds from this conclusion is ample return for the effort and expense entailed by the investigation." As a result of this somewhat surprising discovery the committee recommends the adoption of a limit of brake shoe wear which can be met under test by the existing types of brake shoes and therefore will not encourage the development of other types of shoes which might show less wear at the expense of the wheels. For shoes used on cast-iron wheels the committee recommends a limit of wear of 0.8 lb. per 100,000,000 ft. lb. of work done and per steel-tired wheels a limit of 4 lb. per 100,000,000 ft. lb. of work done. The higher limit of wear for shoes used on steel-tired wheels is due to the much higher braking pressure employed in the tests outlined approximating that used in passenger service when making stops from an initial speed of 65 m.p.h.

In general, the conclusions of the committee can be applied equally well to the formulation of specifications for electric car brake shoes. Rail conditions in city streets are much worse at times than on steam railroad tracks, but so far as the action of the shoe on the wheel is concerned there is little difference. Under moderately heavy braking pressures most of the dirt and grit picked up by the wheel is rubbed off at the heel of the shoe during the first few revolutions. In high-speed interurban service the conditions are almost exactly the same as in steam railroad passenger service. Standardization of brake shoe patterns has made good progress among electric railways and standardization of brake shoe efficiency should logically follow. The results already accomplished by the Master Car Builders' Association afford an excellent basis for a standard specification.

MAKING THE MOST OF THE TIME CLOCK

In repair shops and car houses where time clocks are being installed for the purpose of securing more systematic and punctual work it is of considerable importance to recognize the conditions which must be met in order to secure good operating results. While much depends upon the design of the clock system in relation to the convenience of its service, it is desirable to familiarize all employees with the rules and handling of the equipment for some time before the pay-roll begins to be based on the new installation. A free discussion of any proposed sets of rules by heads of departments before the regulations are put into effect will accomplish a great deal in the direction of avoiding friction and the natural hostility which accompanies the introduction of a mechanical time recorder.

Before any thoroughly modern system can be applied it is necessary for all heads of departments to understand how to handle the registration of regular, overtime, holiday, Sunday, night and outside work under all the conditions which may be foreseen in operation. On a large system where some of the employees of the mechanical department are constantly being called upon to work outside their normal quarters, either on emergency jobs, helping on tasks in different car houses, power plants or in claim department affairs, the number of exceptions to the usual routine registrations of in and out at morning, noon and night is surprisingly large. The forms and cards used must be either numerous enough or of sufficient individual scope to cover the entire range of service—otherwise the auditing department immediately falls into a morass of slipshod records which soon leads to demoralization. Even the apparently simple process of stamping the cards in the clock cannot safely be left to chance, for double registration, mistakes in ringing in or out, the selection of cards of the wrong color or form, careless impressions and sometimes bent or dented mechanism occur when a set of inexperienced "clock punchers" attempt to inaugurate a system of this kind without definite supervision in the early stages of the game.

The provision of card racks with clearly numbered and readily accessible spaces for each employee is important, with the plain establishment of locking and unlocking times. If cards of differing colors are used too much care cannot be taken in seeing that the right selections are made for the different classes of work. The location of the time clock is important, the best for an ordinary car house being the pit room, and care should be taken to see that the card rack covers open away from the clock to avoid interference with its service. In some cases the stock room must be utilized for the clock location, but this is objectionable when night work is carried on with the room closed for a portion of the period. Placing the responsibility for clock winding, adjustment and oiling upon a single employee works well. The main causes of complexity, however, are the unusual or irregular conditions to be handled, like overtime work in the morning hours by a night shift, traveling time or outside work, returning of men to other points than headquarters upon completion of outside jobs, changes during the day from a day-work to a piecework job, and the like. Some of these conditions may require the notation by the department foreman over his initials of exceptional circumstances, but with thorough planning of the system and frank discussions and criticisms invited in advance and during operation the intricate details of electric railway maintenance can be systematically classified and recorded.

THE TRANSPORTATION DEPARTMENT OF THE METROPOLITAN STREET RAILWAY, NEW YORK

A series of recent articles* in this paper has described the present methods of construction and operation employed in the Engineering Departments of the Metropolitan Street Railway of New York and the improvements and economies introduced under the management of Adrian H. Joline and Douglas Robinson, receivers. The same policy of systematic study of cause and effect which has proved so fruitful of beneficial results in the various activities of the engineering departments has also been brought to bear by General Manager Root in the transportation department, a branch of the service which is often considered as less susceptible to such treatment. Nevertheless, the experience of the past two and a half years has shown that the fundamental principles of the operation of cars are equally capable of scientific analysis as those of any other branch of the service. An account of the work which has been done in improving the transportation methods of the company will conclude the series of articles which have appeared in this paper on the Metropolitan Company.

ORGANIZATION OF THE TRANSPORTATION DEPARTMENT

In the organization of the Metropolitan Street Railway system, the responsibility of determining the requirements of the service and of regulating the movement of cars in accordance therewith rests upon the superintendent of transportation. His duties, broadly speaking, call for a constant and thorough analysis of traffic requirements, the regulation of time tables to meet the changing conditions and the supervision of the many details, which influence the ends sought. The accompanying chart illustrates the organization of the department.

At the time when the company passed into the hands of receivers, the appointment department and the transportation department were independent of each other, but within a few months, an improvement in the organization was effected in that the appointment department was placed under the jurisdiction of the superintendent of transportation. The result has been a marked increase in efficiency due to a closer co-operation than had previously been practicable.

The time table bureau of the transportation department was created at about the same time. This bureau is in close touch with the statistical bureau of the company and the men charged with the arranging of the schedules are able to perform their work more intelligently because of their close association with the employees who secure and arrange the data upon which the time tables must necessarily be based.

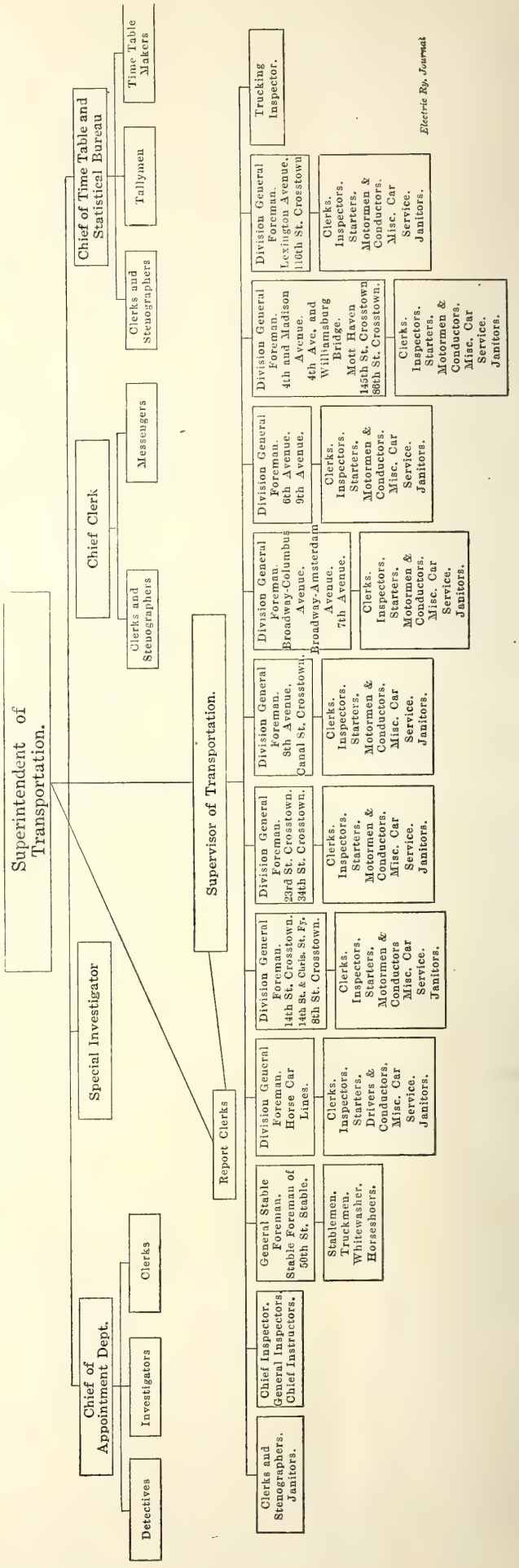
SUPERVISOR OF TRANSPORTATION

The supervisor of transportation is immediately in charge of the operation of the cars, and, because of the character of his duties, must necessarily be out on the lines during the greater portion of his time. It is his duty to see that the service is regulated in accordance with the general theory which has been laid down, or to be in a position by reason of his experience and knowledge of the situation, to recommend such changes in the time tables as are required. In this work he is of course aided to a material extent by his immediate subordinates, the division general foremen, who report directly to him and by the general inspectors, line inspectors and starters. Upon him personally also rests the responsibility for the discipline of the employees engaged in the running of the cars.

REPORT CLERK

The duties of the report clerk are performed by three men, each of whom works for an eight hour shift so that the office will be open continuously. All matters relating to any interference with the operation of the cars are promptly telephoned to the report clerk, through whom, in cases of emergency by night or by day, the activities and direction of the entire transportation department are handled and co-ordinated with those of the other departments. Certain phases of the duties of the

*See Electric Railway Journal, March 26, April 2, April 9, April 16, April 23, May 7, May 14, May 21 and May 28, 1910.



Metropolitan Street Railway—Organization Chart of the Transportation Department

report clerk were mentioned in the article on Snow Organization of the Metropolitan in the issue of April 23, 1910, and on page 730 of that issue a chart was printed indicating the relationship of the report clerk to the various officials and subordinates of the entire system.

Manhattan Island that 70 per cent of the track over which the Metropolitan's cars are operated can be reached by a wagon within five minutes; 20 per cent can be reached from within five to 10 minutes, and the remaining 10 per cent in from 10 to 20 minutes from the time the report clerk receives word that

Form 167 9-'09—500.

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers

METROPOLITAN STREET RAILWAY COMPANY

REPORT CLERKS' RECORD OF EMERGENCY WAGON CALLS

Date ..... Sheet No. .....

LOCATION	Report Number	REASON FOR CALL	CALL MADE BY	Rec'd by	DELAY			Time Call was Rec'd	Wagon Sent	Sent by	Time Sent	Time Notified High Tension	Time Wagon Returned	Time of Receiving Notice	Nearest Return Rec'd by
					Direction	From	To								

Metropolitan Street Railway—Reports of Emergency Wagon Calls

Form 369. 3-'10-25 000

ADRIAN H. JOLINE, DOUGLAS ROBINSON, Receivers,
METROPOLITAN STREET RAILWAY COMPANY.

DELAYS—ACCIDENTS.

Number.....
Date .....
Div. Time .....
Location.....
Run..... Car ..... Style ..... Direction.....
Length of delay.....

REPORT.

Received at..... M., by.....
Reported by.....
Gen. Mgr. Notified at..... M. Person Notified..... by
Supt. Trans. " " " " " "
Claim Dept. " " " " " "
Engr. M. of Way " " " " " "
Gen. Line Fore'n " " " " " "
Supt. R. S. & S. " " " " " "
Supr. Trans. " " " " " "
Chief Inspector " " " " " "
Gen'l Foreman " " " " " "
Starter " " " " " "
" " " " " "
High Tension " " " " " "
Ind. Insp. Bureau " " " " " "

..... Emergency wagon sent ..... M. Returned ..... M.

Metropolitan Street Railway—Reports of Accidents or Delays

Any occurrences which require the assistance of the emergency wrecking wagons are telephoned to the report clerk over a special wire (1000 Columbus), used solely for this purpose. This number, and "2800 Columbus," the call used for other



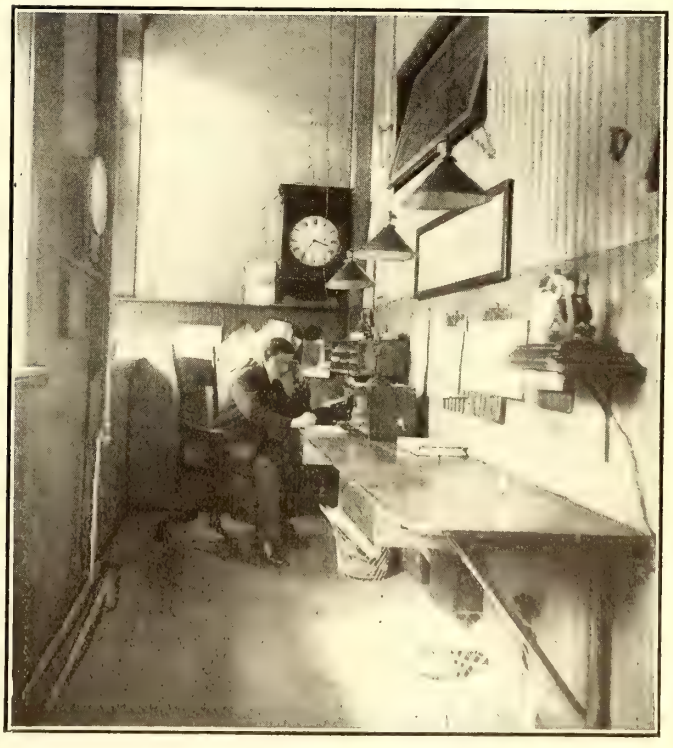
Metropolitan Street Railway—146th Street Emergency Wagon

telephone reports not made over the private system, are printed on the day cards, and known to every motorman, conductor, inspector, starter and other employee of the transportation department.

The emergency wagons, seven in number, are so located on

trouble has occurred. The wagon calls are entered by the report clerk on form No. 167, shown on this page. The time consumed by the report clerk from the moment he receives the message until he communicates its import to the proper emergency wagon station is usually less than 30 seconds, the message being sent over the Metropolitan's private telephone system. The report clerk also has a direct wire to the high tension switchboard in the Ninety-sixth Street power station and to the track department in the office of the engineer of maintenance of way. Reports of accidents or delays are made by telephone by conductors, motormen, inspectors and starters through the public telephone service or over the company's private telephone system, and the substance of the report is typewritten by the report clerk on form No. 369, herewith.

The report clerk is immediately made aware of the occurrence of a fire by means of a gong and ticker in his office, by which alarms are recorded simultaneously with the sounding of the alarms at the headquarters of the city fire department. In this way, while the engines are on the way to the scene the report clerk is sending a message to the general foreman and



Metropolitan Street Railway—Office of Report Clerk

starters of the division or divisions affected, or to the supervisor of transportation and superintendent of transportation, if the case is such as to demand it, stating where the fire is and how many alarms have been sounded. The emergency wagon is promptly sent out with tripods and tackles for supporting the fire hose so that the cars may pass, as soon as the fire has been

placed under control to such an extent as to warrant the procedure in the judgment of the fire department. Overhead hose supports are necessary because if the ordinary hose bridges were used they would be fouled by the conduit plows.

When an accident occurs, the claim department is briefly and promptly advised of the facts over the telephone by the report clerk, and in many instances before the injured person has left the scene of the accident a representative of the claim department arrives and is in a position to obtain the facts while the circumstance is still fresh in the minds of the witnesses.

A view of the interior of the office of the report clerk is shown in one of the engravings on page 1089. On the left between the windows is seen the automatic thermometer which records instantaneously any changes in temperature. Directly in front of the report clerk is his typewriter, his telephone switchboard and his three telephone receivers. Above the desk on the right is the map of Manhattan Island which is subdivided to show the territory covered by each emergency wagon, while at the right-hand side is the fire alarm ticker, which records the sounding of alarms simultaneously with their receipt at the city fire headquarters. The various files of delay and accident reports, emergency wagon calls, etc., are also shown.



Metropolitan Street Railway—One of the Shower Baths at the Ninth Avenue and Fifty-fourth Street Car House

HEATER REGULATION

Another of the duties of the report clerk is to send out instructions by telephone in the winter in regard to the position of the heater switch controlling the heat supplied in the cars. To assist him in intelligently regulating this matter a recording thermometer is installed in his office, indicating the variations of the outside temperature as soon as they occur.

TIME CLOCK FOR STARTERS

Formerly it was the custom for the depot starters in charge of dispatching the crews to sign the day cards of the men when the latter were commencing or finishing their work. This was an undesirable arrangement because it distracted the starter's attention from the handling of the service. It also afforded opportunity for inaccuracies, because of the haste with which it was incumbent upon the starter to certify to the day cards, particularly when a number of cars was being placed in service or run off the line. The plan was finally adopted of using a clock with a mechanical stamping device to indicate on the day cards the hour when the men took the cars and the time when they left them. The advantages of this plan have been found to be as follows:

The establishment of a closer check on the platform men around the depot.

A more accurate record of the actual time spent on the cars is obtained, with corresponding greater accuracy in the payment of the men.

There is a closer check on the efficiency of the starters in their handling of the men around the depot and the length of the swings allowed.

A marked improvement in the efficiency of the starters is secured because there is more time at their disposal for the performance of their other duties.

Greater accuracy and rapidity in the performance of work by the pay-roll clerks is also secured.

Notwithstanding the fact that the time stamping system has involved the employment of additional clerks at the starter's office, the additional expenditure has been more than offset by the results secured and the yearly net saving as compared with the former plan is estimated to be over $50,000.

The men who stamp the day cards also keep a record of the cars passing the depot, and thus a check is obtained on the service, which is being operated.

FILE OF TRANSPORTATION RECORDS

Improvements in the system of filing and keeping the records of the transportation department in the various division offices have also been effected. In particular a very desirable arrangement has been made in the establishment of a central record room, to which are sent all of the records, not only of the transportation department, but of every other department of the system. This record room is located in a fire-proof building and contains all records which are not needed for actual daily operation, but whose preservation for future reference is necessary or desirable. The plan has not only effected a reduction of the fire hazard, but it also secures the orderly arrangement of important papers which are easily accessible at

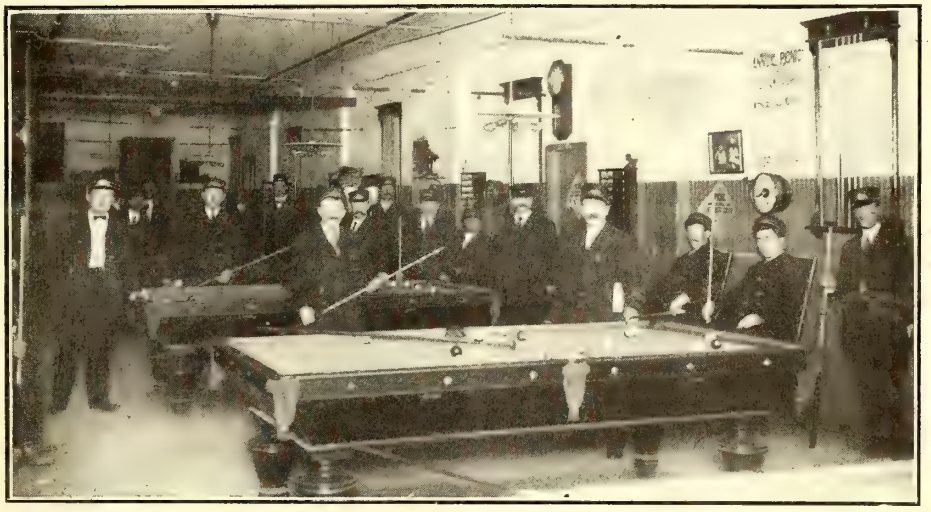
any time to persons who present the proper authority and sign a receipt for the documents in question.

TRAINING OF EMPLOYEES

A systematic plan of education of employees has been inaugurated and is now being observed with the specific purpose of developing latent ability among the minor officials, especially in connection with the handling of the service and the discipline of their subordinates. Vacancies in the positions of starter or inspector are filled by means of oral examinations held by a board of three officials of the department, and the men are required to attain a certain grade in the examination and to pass through a period of probation before being eligible for final appointment. Every effort is also made to impress upon the inspectors and starters the fact that the management looks to them to carry out its policy of fair and just treatment to the employees and of uniform courtesy toward the public.

Twice a year all of the motormen and conductors on each division of the system are addressed by the division foreman, in regard to the general conditions existing on the line to which they are assigned, and particular stress is laid upon subjects which the experience of the foreman indicates should be emphasized in order that the service may be bettered. Of course all platform men, as well as the starters and inspectors are also provided with printed copies of the regulations applicable to their respective duties. But as the management believes that no compilation can cover every possible contingency which may arise, the company has adopted a policy of supplementing the printed rules by oral instructions to the men, from time to time.

Experienced instructors have also been assigned to the task of systematizing the duties of the various division office clerks and pointing out to them the methods by which economy of



Metropolitan Street Railway—Association Pool Room at Fiftieth Street and Seventh Avenue



Metropolitan Street Railway—Lunch Room at 146th Street and Lenox Avenue Car House

time and labor may be secured and the clerks themselves have become more efficient in the performance of their work.

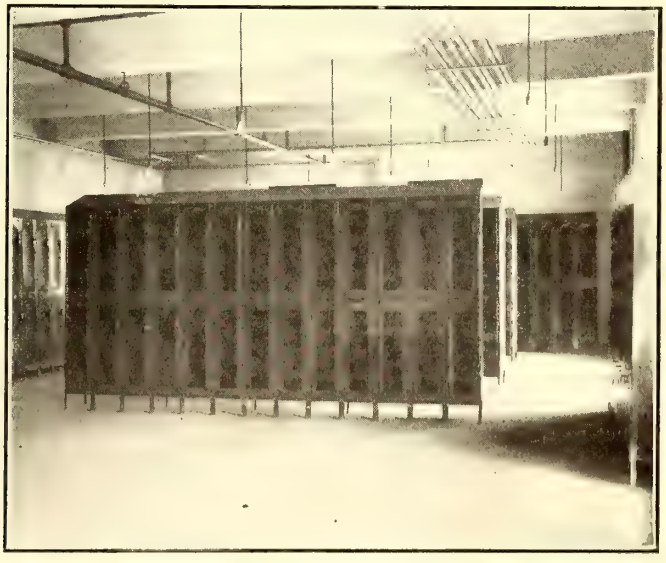
INSTRUCTION OF NEW EMPLOYEES

The company believes that the time to impress an employee with a realization of what is expected of him is when he enters the service. Care is exercised in the selection of those motormen and conductors who are to act as instructors of new men and a special series of talks is given them from time to time upon the necessity for earnest and sincere effort on their part in breaking in new men, so that the latter may become efficient employees as well as be a credit to the men who instruct them. All instructors are paid at the rate of 25 cents per day while so employed, in addition to the wages which they would otherwise receive. By these means, the management has been very successful in enlisting the co-operation of these employee-instructors for their important duty.

All motormen and conductors are carefully trained before they are permitted to begin work on their own account. Their final instructions before being put in charge of a car are given by the division general foremen, but they are called in subsequently to receive supplementary instructions from these same officials at meetings which they are required to attend once a month during the first three months of their employment.

COURSE OF INSTRUCTION

The motormen, of course, are put through a course of in-



One of the Locker Rooms at 146th Street and Lenox Avenue

struction with regard to the electrical equipment of a car, and this instruction is supplemented by actual operation of cars on the road, under the tutelage of a competent instructor. As an illustration of the thoroughness of the course which all platform men have to take, the fact may be cited that prospective employees are drilled in the proper use and handling of a

telephone. Another important feature of the practical instruction of motormen consists in showing them how to stop a run-away car on a hill. This information is imparted by the chief instructor under conditions which are precisely analogous



Metropolitan Street Railway—Barber Shop in the Car House at Ninety-ninth Street and Lexington Avenue

to those which would exist were the occurrence the result of an accident instead of a feature of the instruction.

Still another point upon which motormen are given practical experience in their schooling is in regard to the rate of speed of their cars and the respective distances in which cars may be stopped when moving at various rates of speed. These are points about which their knowledge is often very hazy. To give them the facts they are placed on a car equipped with a speed indicator and under the direction of the chief instructor or one of his assistants are required to operate the car at different speeds and read the indicator. Then they are obliged to estimate the speed without looking at the indicator. Finally they are instructed to make emergency stops at different speeds and to measure for themselves the distances traversed by the car between the application of the brakes and the point at which the car comes to rest. It has also been found desirable to instruct the men as to the length of cars, the widths of different streets, the length of a city block, distance between elevated railway pillars, etc. The significance of these precautionary measures in connection with the accident situation is too apparent to require comment, since it is a well known fact that a motorman who has no accurate idea of distances is likely when subjected to skilful cross-examination in a damage suit to become so hopelessly confused that all of his testimony is apt to be discredited.

INSTRUCTION ON ACCIDENTS

One of the most important steps along the line of education has been that made possible by the active and effective co-operation of the legal department and the transportation department in regard to accidents.

From time to time the motormen and conductors of various divisions are assembled in groups of 75 or 100, and are addressed by representatives of the legal department of the company. Those attorneys are selected as speakers whose familiarity with accident litigation has rendered them peculiarly fitted to explain to the platform men, in simple language, the necessity for the exercise of care—first, in preventing accidents, and second, in handling accidents after they have occurred. The men are encouraged to ask questions, and the meetings are attended by the officials of both the legal and transportation departments. The aim has been to impress the men (1) that all reasonable care should be exercised to prevent accidents; (2) a systematic procedure is to be followed in caring for the injured person and raising the resulting blockade; (3) the salient facts in regard to the accident must be secured; and (4) a prompt and accurate report must be rendered. Emphasis is laid on the observance of courtesy toward the public and the avoidance of altercations and disputes. The motormen and conductors are paid at the regular platform rates for the time spent by them in listening to these addresses, which are not too long to confuse or tire them. The policy was adopted only a relatively short time ago and thus far has met with most gratifying results. The men give evidence of a far better appreciation than before of the serious consequences of carelessness or heedlessness on their part. Accidents of a serious character appear to be of less frequent occurrence and there has been a marked increase in the number of witnesses secured per accident. On one division the average number of witnesses per accident in January of this year was five, while in April of this year, on the same division, the average was 11 witnesses per accident.

INSPECTION AND DISCIPLINE

In addition to the educational methods described for increasing the efficiency of the service the company has a well organ-



Metropolitan Street Railway—Lunchroom at Ninety-ninth Street and Lexington Avenue

ized inspection department, which has recently been conducting a campaign against dishonest conductors. General knowledge of this fact has apparently resulted in an improvement in the character of men making application for employment, be-

cause men who are inclined to steal fares are as a rule, not seeking to incur the risk of imprisonment.

During the first eight months of this campaign 27 arrests were made for stealing, and 19 convictions secured. Of the 19, eight conductors were paroled in the custody of probation officers, and 11 sent to jail for periods ranging from seven days to three months. Fines were imposed in addition, in a few instances. The leniency of the punishment imposed by the courts has constituted a serious handicap to the effect which the prosecution would otherwise have produced, but the results obtained have at least been positive in their character and the policy will be vigorously continued.

Special steps are taken to educate the men, particularly new employees, regarding the serious consequence of this offense and a plan is being worked out in detail so that the men may appreciate how prompt and certain will be their detection and punishment if they fail to register their fares.

Another campaign has been directed against applicants who have made false statements in submitting their applications for employment, and several men have been prosecuted under the law which is now on the statute books of the State, penalizing the making of such statements and the result has undoubtedly been to deter undesirable men from endeavoring to enter the service under false pretenses.

The system of general inspection of men has also been put on a more systematic basis recently so that a greater thoroughness and frequency of inspection has been secured.

LUNCH ROOMS, BARBER SHOPS AND RECREATION ROOMS

The welfare of employees has not been overlooked. Lunch counters have been opened at a number of the important depots and placed in charge of men long in the service who have become incapacitated for active work on the cars, either because of injuries received in the performance of their duties or from other causes. These men pay a nominal sum for rent. The water, heat and light are furnished free by the company, as are also most of the fixtures. As a result, wholesome food may be obtained by the railway employees at these lunch counters more cheaply than it can be procured elsewhere. These lunch counters are well patronized and are doing an excellent business. The railway management exercises supervision over them and regulates the prices charged.

Two barber shops have recently been opened and, as in the case of the lunch counters, the terms for rent are made merely nominal to the lessees so that the employees of the company may obtain the benefit in the form of the reasonable prices of 10 cents for a shave or three for 25 cents and 15 cents for a hair cut or two for 25 cents.

The question of providing suitable and adequate accommodations for the men at all of the depots, in the way of lounging rooms, etc., has been the subject of careful study. Improved toilet facilities have been provided, shower baths installed and new and improved metal lockers substituted for the less desirable wooden closets. All have added to the comfort of employees.

These improved facilities are but a part of the general plan which the Metropolitan management has in mind, and which is more extensive in its scope than is indicated by what has already been accomplished, but under the conditions incident to the receivership it has not been practicable to develop the plan in its entirety as there are certain phases involved relating to general policy which can only be decided by the purchasers of the Metropolitan property. For that reason further extension of the welfare plan which the Metropolitan management now has under consideration must necessarily be deferred until after the sale of the property has taken place.

METROPOLITAN STREET RAILWAY ASSOCIATION

While membership in the Metropolitan Street Railway Association is not limited to employees of the transportation department, the benefits of that association are derived to a greater extent by the transportation employees than by those of any other department for the reason that about 80 per cent of the members of the association are transportation employees.

The association was organized in February, 1897, for the mutual benefit of its members, who pay an initiation fee of $1.00 and monthly dues of 50 cents, in return for which the members receive; free medical attendance when ill; medicine at cost; a cash benefit of $1.00 a day when incapacitated for work; a life insurance policy of $300; the use of the library and pool tables of the association; free monthly entertainments from May to November, inclusive.

The affairs of the association are managed by the employees with the assistance of the officials of the company, and the association is supported financially by the members of the association and by donations which are made by the company and other friends from time to time.

Members of the association, furthermore, are eligible to a pension when, because of physical infirmities due to advancing age the men are obliged to cease from working. For the purpose of taking care of such men the pension system was founded to supplement and continue the work of the association, that is, when a man becomes too old to work the company steps in, through the pension system, and contributes towards his support during the remainder of his life; in other words, the association has for its object the mutual benefit of employees while they are in the active service of the railway company and the pension system cares for the interest and welfare of the men from the time they cease working for the company until they die. At the present time there are 20 men on the pension roll, drawing monthly pensions varying in amount from $15.00 to $28.17 each.

In the next issue the regulation of service on the Metropolitan system will be considered.

ADDITION OF MECHANICAL REVERSER THROW

The Inter-Urban Railway Company, Des Moines, Iowa, is equipping its cars with a mechanical connection between the master controllers and the electrically operated reversers of the type M control. J. E. Welsh, master mechanic of the Des Moines city and Inter-Urban Railway companies, relates the following as a reason for the added mechanical connection:

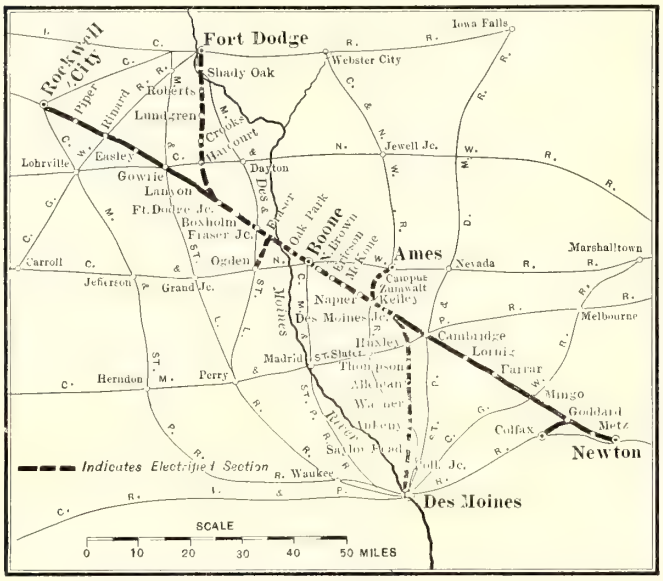
A short time ago the trolley pole on an interurban car broke while the car was running at good speed. The motorman then applied the air and the main-brake rod also broke. At this time the car was on the down grade and it was not stopped until it had run 8 miles, because the reversers could not be thrown. Fortunately, the motorman on an opposing car saw the runaway car approaching when it was a long distance away but coming toward him at a fairly high speed. He immediately reversed his car, running it backward just as fast as he thought safe with the trolley in the reverse position. The runaway car finally overtook the car that was backing up and bumped into it, but little damage was done to either car. Both were alike and had heavy M. C. B. couplers.

The possibility of the occurrence of such an accident brought about the addition of the mechanical reverser to the cars equipped with type M control. All of the cars are built for single-end operation and the reverser is placed under the right-hand side of the body. A crank made of fiber ½ in. x 2 in. in section and long enough to afford ample clearance, is fixed to the spindle of the reverser. From the end of this crank a flat bar of iron ⅜ in. x 1 in. in section extends to a bell crank under the front end of the car at the right-hand corner. Another rod connects this bell crank with a similar one under the left-hand front end of the car and this crank in turn is connected with a ⅞-in. rod which extends up into the motorman's cab, as far as the left of the controller. To the upper end of this rod a lever is attached parallel with the reverse handle and these two are connected by a link made of 1¼ in. x ⅜ in. iron, the length of which depends on the distance apart of the lever at the top of the ⅞-in. vertical rod and the reverse handle.

By this train of parts the reverser is thrown both mechanically as well as electrically. Mr. Welsh states that there is no difficulty in operating the reverser thus coupled with the reverse handle and believes it is an important safety feature.

TRAFFIC AND PHYSICAL DEVELOPMENT OF AN IOWA RAILROAD

The Ft. Dodge, Des Moines & Southern Railroad Company operates a combination steam and electric railroad with terminals at Des Moines, Newton, Ames, Boone, Ogden, Ft. Dodge and Rockwell City, Ia. A map of the system is shown. The electrified section of this road extends northward from Des Moines to Des Moines Junction, 25.5 miles; thence north-



Fort Dodge, Des Moines & Southern—Map

west to Ft. Dodge Junction, 38 miles; thence north to Ft. Dodge, 23 miles. That section of the road between Des Moines Junction and Ft. Dodge Junction is used jointly by steam and electric trains. The steam run is from Newton, 37 miles northwest, to Des Moines Junction; thence over the combination steam and electric line from Des Moines Junction to Ft. Dodge Junction, 38 miles; thence northwest to Rockwell City, 27 miles. In addition to 150.3 miles of main line track the company has two branch lines operated electrically; one from Keiley to Ames, 8 miles, and one from a point near Fraser at the center of the road to Ogden, 6 miles.

This road was built and is operated by steam railway men and therefore a description of some of its traffic and transportation methods may be of particular interest from the electric railway viewpoint, in addition to the article published in the Street Railway Journal of Nov. 30, 1907, and the Electric Railway Review of May 25, 1907. The operating organization is as follows: Reporting to the general manager are a superintendent of transportation, general freight and passenger agent; superintendent of maintenance of way, auditor and claim agent. The work of the transportation department, in charge of the superintendent, is subdivided among a trainmaster, to whom the chief dispatcher, trainmen and station agents report; a master mechanic in charge of the electric and steam rolling stock equipment, an engineer in charge of the power station and substations and an overhead line foreman. Reporting to the general freight and passenger agent are the traveling freight and passenger, commercial and general agents. The organization under the superintendent of maintenance of way includes an assistant superintendent, an engineer and track and bridge foremen. Thus it is seen that the operating organization of this road is established along the general lines found acceptable by steam railroads.

TRACK AND ROADWAY

The track and roadway and rolling-stock equipment has been designed and built to handle heavy freight traffic as well as to do fast passenger service. For its electric service the company owns a private right of way 86 miles long from the north limits of Des Moines to Ft. Dodge. The steam service is operated on a single-track road of modern construction. The cars on the electric division use the tracks of the local company in entering the city of Des Moines. Except for the terminals in the business districts of Des Moines and in Ft. Dodge the tracks are wholly on private right of way. At these terminals only the passenger service is operated in the street, as freight yards are provided on company property.

The track is laid with 70-lb. rail well ballasted and drained. Interlocking plants are provided at all crossings. There are six interlockers on the electric route and four on the steam divisions. The track rails were bonded in 1907 with soldered bonds, part of which were placed on the head of the rail and part on the base. The bonds soldered to the base of the rail had a large contact area and have proven satisfactory. The bonds soldered to the head of the rail are being replaced with American Steel & Wire twin-terminal bonds.

Current is distributed to the cars through No. 0000 trolley wire, which is hung 21 ft. 6 in. above the rails to provide clearance for steam trains. Six substations connected by a 23,000-volt transmission line feed the trolley wire at 650 volts. During the past year 25 miles of aluminum feeder of 350,000 cir. mil and 500,000 circ. mil equivalent cross-section have been installed to supplement the original trolley feeders. Nine miles of additional feeder wire are being erected. The country through which the electrified portion of the line operates is subject to severe lightning discharges and to protect the transmission line a No. 6 galvanized iron ground wire has been installed on iron bracket arms extending above the transmission



Fort Dodge, Des Moines & Southern—Freight Yard at Local Station

wire on the tops of the poles. This wire is grounded at intervals of 10-pole lengths. The transmission system is fed from a turbo-generating station located at Fraser on the Des Moines River and at about the midpoint of the line.

TRAIN SERVICE

Passenger-train service is operated only on the electrified division. On the steam divisions passengers are accommodated on mixed passenger and freight trains. The two principal lines of electric passenger service are between Ft. Dodge and Des Moines, 86 miles, and between Ames and Des Moines, 36 miles. Eight trains are operated daily in each direction over both of these runs. In the Ft. Dodge-Des Moines service are two southbound limited trains, one leaving Ft. Dodge at 6:00 and one at 11:30 a. m., and one northbound limited train leaving Des Moines at 5:20 p. m. The limited trains make the trip of 86 miles in 3 hours. Local trains make the trip in 3 hours and 45 minutes. The limited trains make only the station stops. Daily mail trains are operated between Ft. Dodge and Des Moines, one leaving Ft. Dodge at 5:00 p. m. and one leaving Des Moines at 5:50 p. m.

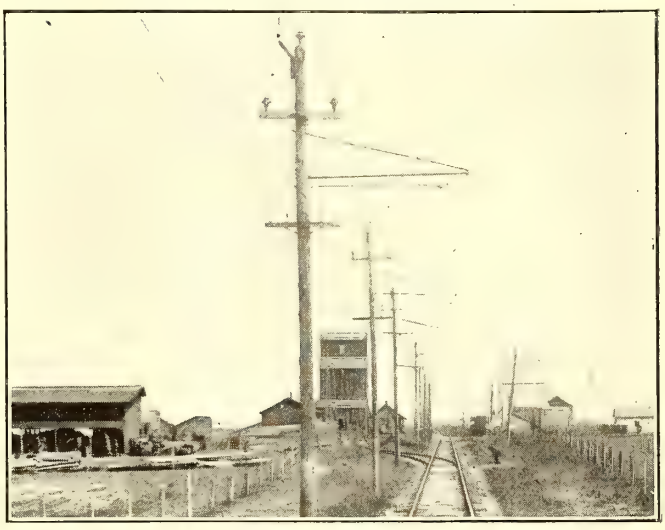
The trains between Ames and Des Moines are spaced between the Ft. Dodge-Des Moines trains and thus an hourly service is given on the south half of the road between Des Moines Junction and Des Moines, and a two-hour service on the north end. Trains which carry U. S. mail and the American Express Company's matter are provided with compartment cars and messengers.

Steam railroad operating rules and practice are used. It is the belief of the management that it is better to adhere strictly to the steam railway operating rules than to make any innovations on account of difference in motive power. At junction points between the steam and electric divisions the trainmen on the steam trains get clearance from the dispatcher, thus saving the time of the electric passenger trains. Such orders read, "All trains due at Ft. Dodge Junction have cleared," or "All trains due at Ft. Dodge Junction except No. 9 have cleared."

FREIGHT TRAFFIC DEVELOPMENT

The Ft. Dodge, Des Moines & Southern Railroad receives 60 per cent of its revenue from freight traffic. The fact that this road formerly was a steam railroad places it in an enviable position with regard to the interchange traffic with intersecting steam trunk lines and connections and interchange arrangements exist with every steam railroad crossed. Among the roads intersected are the Chicago-Omaha divisions of the following: Illinois Central, Chicago & Northwestern, Chicago, Milwaukee & St. Paul, Chicago Great Western, Chicago, Rock Island & Pacific. In addition to these east and west trunk lines the Ft. Dodge, Des Moines & Southern intersects seven steam lines which extend across the State in a north and south direction. The electric railroad stations are included in the tariffs and through routes of all intersecting steam roads. About 500 cars of freight are delivered or received monthly from connecting steam roads.

The Ft. Dodge, Des Moines & Southern Railroad has a freight and passenger department which is wide awake in developing new industries along the route. The bulk of the freight traffic is made up of coal, gypsum products, grain, clay and livestock. The coal traffic originates at several different points along the electric and steam routes. At one point a subsidiary company owns three mines with a combined output of 1000 tons a day. Another mine at Colfax has a daily output of 2500 tons; still other mines at Boone, which is the geographical center of the road, are located on spur tracks and the electric railroad obtains a switching charge for the coal delivered to the steam roads as well as the regular charges for handling it over the Ft. Dodge, Des Moines & Southern. Current is furnished some of the mines for driving the coal-mining and handling machinery, the power being delivered at trolley voltage. During the past winter the 6-mile branch to Ogden was completed and thus connections are afforded with another coal mining center. There are five large gypsum plants near Ft. Dodge; all are served by the railway company and an electric switching engine is kept in use all the time inside the yard limits of Ft. Dodge.



Fort Dodge, Des Moines & Southern—Two Grain Elevators on the Route

GRAIN ELEVATORS

The territory served by the Ft. Dodge, Des Moines & Southern Railroad is for the most part a rich agricultural district producing great quantities of grain and live stock. The electric railway has found it profitable to install frequent sidings and stands ready at all times to assist the farmers in handling their grain and stock. Fifteen grain elevators have been built on the electrified division of the road and a like number on the steam-operated section. These grain elevators are man-



Fort Dodge, Des Moines & Southern—One of Six Coal Mines Near the Line



Fort Dodge, Des Moines & Southern—Sub-Station Near Des Moines

aged by farmers' co-operative associations. Practically all of the grain stored has no other transportation outlet than by this railway. On an average the elevators built at the smaller towns ship from 80,000 to 100,000 bu. of grain per year. The grain associations also undertake to handle farm implements, tile, fuel, etc., and thus each elevator means about 150 carloads of freight per year. Double-end sidings from 800 ft. to 1000 ft. long are built at all elevators.

The new town of Alleman furnishes an example of the growth of a community when assisted by the railway. Three years ago at the present location of this town there was only a highway crossing flag stop with a steam railway line about 5 miles distant in either direction on the intersecting highway.



Fort Dodge, Des Moines & Southern—Standard Motor Car

The electric railway traffic department urged the erection of a grain elevator at this point, which was built by an association of farmers. Since that time a small town with a bank, two elevators, general store, lumber yard and stockyards has sprung up here and a substantial traffic is obtained in and out of this station.

The railroad company has built stockyards at each of the towns along its route. These stockyards are not makeshift pens, but are designed to give stock buyers a good place in which to keep animals while they are collecting them for shipment. The little additional money required to build good accommodations for the cattle is found to be an excellent investment because it encourages the development of the stock-handling business. Another source of considerable traffic is the excellent quality of shale and clay found in the valley of the Des Moines River at Fraser. This clay is delivered direct to gondola cars by industrial railways extending from the electric railway tracks back to the face of the cliffs. The shale and clay are handled about 50 miles to a tile-making plant from which the finished product is again shipped.

PASSENGER RATES

The agents of the Ft. Dodge, Des Moines & Southern sell through tickets in connection with the Chicago Great Western, Minneapolis & St. Louis, Wabash and Illinois Central Railroads. The local fares on the electric line are based on a rate of 2 cents per mile for one-way tickets, 1¾ cents per mile for round-trip tickets and 1½ cents per mile for mileage books. An additional charge of 10 cents is collected when the fare is paid on the train, except at stations where tickets are not available. Baggage not to exceed 150 lb. is carried on each full-fare ticket, and no piece weighing more than 250 lb. will be received, but must be sent by express or as freight. The regular steam railroad storage charges are made for undelivered baggage. The company maintains baggage and freight stations in the business district of Des Moines.

The operating headquarters of the Ft. Dodge, Des Moines & Southern Railroad are at Boone, Ia., where the company has a large brick station building. The first floor of this structure is occupied by passenger, freight and baggage rooms and a rotary converter substation. The second floor is furnished for the various operating departments.

POWER STATION IMPROVEMENTS

The generating station which supplies electrical energy for the operation of the Ft. Dodge, Des Moines & Southern Railroad cars is located at Fraser, a mining town of about 2000 inhabitants near that point where the combined steam and electric line crosses the Des Moines River. The principal units of this plant are two Westinghouse-Parsons 1250-kw. 3-phase, 2300-volt, 25-cycle turbo-generators which are operated condensing. The original condenser equipment had a cooling surface of 2000 sq. ft., and now two Alberger condensers each with 4800 sq. ft. of cooling surface and new circulating pumps are being installed. Cooling water is taken from the Des Moines River and the supply for the original condenser installation was drawn through a 20-in. cast-iron pipe. Now, to provide a generous supply of water for the new condensers a 36-in. conduit and discharge pipe of like size are being placed. The conduits are 300 ft. long and connect a well 25 ft. from the building with an oak crib built in the bank of the river and sunk to a level 2 ft. below the low water mark. The well near the power house will be fed by gravity and water normally will stand at a level 24 ft. below the boiler-room floor. The new intake and discharge conduits are of particular interest because they are being constructed of corrugated pipe made of American ingot iron, which is said to be proof against destruction by rust for at least 35 years. The two conduits, each 36 in. in diameter, will be buried side by side and have a protecting covering of concrete 2 in. thick.

Two of the 400-hp Aultman-Taylor boilers originally were equipped with Green grates. The other pair of boilers is now being supplied with similar grates and with water backs. The coal-handling equipment includes a traveling crane outside of the boiler house. One rail of the crane runway is supported on the boiler-house pilasters and the other on a steel support. The crane runway spans two tracks on which coal is delivered. This power plant operates 20 hours per day and has an average daily output of 15,000 kw-hours. The power station improvements are being made under the direction of Sargent & Lundy, consulting engineers, Chicago, who designed the plant.



Fort Dodge, Des Moines & Southern—Typical Live Stock Yards and Freight Siding

ROLLING STOCK

The rolling stock equipment includes 10 interurban passenger motor cars, two motor express cars, three Baldwin-Westinghouse electric locomotives, 150 miscellaneous freight cars and 150 new gondola cars. On the city lines which the company operates in Ft. Dodge and Ames are seven local cars, two of which are designed for fare collection in Ft. Dodge under the license of the Pay-as-You-Enter Car Corporation. The freight service on the steam-operated section of the line is performed by eight Schenectady locomotives. The passenger motor cars are 53 ft. 4 in. long and 9 ft. 4 in. wide, representing a high type of construction built by the Niles Car & Manufacturing Company. The car bodies are mounted on Baldwin trucks with 36-in. steel wheels carrying four Westinghouse No. 112 motors. End doors provide passage between cars coupled in trains. Each motor car weighs 40 tons without passengers. In ordinary service a motor car makes about 350 miles a day and

consumes on an average 2.50 kw-hours per car-mile. The average for the entire mileage, freight and passenger, is 4.25 kw-hours. The total daily motor-car mileage for the electrified section is 2000 miles. The three Baldwin-Westinghouse electric locomotives are equipped each with four 150-hp Westinghouse motors provided with low gears. Each locomotive has a capacity for handling a 1000-ton train at 15 m.p.h. The company now has under consideration the purchase of additional electrical freight locomotives.

Acknowledgment is made to J. L. Blake, general manager, and Frank Arnold, superintendent, for courtesies extended in the preparation of this article.

IMPROVEMENTS ON THE AURORA, ELGIN & CHICAGO RAILWAY SYSTEM

The continued growth of traffic on the Aurora, Elgin & Chicago Railway, which operates a third-rail system connecting Aurora, Batavia, Geneva and Elgin—the four western terminals—with Wheaton and Chicago, has warranted the erection of new passenger stations and has required additional power and substation equipment.

In addition to other improvements the company shortly will erect an attractive station and general office building at Wheaton, Ill. This building will be two stories and a half high and 40 ft. x 130 ft. in ground dimensions. The first floor will be subdivided into waiting rooms and a ticket office, and the second floor will be equipped for the operating and executive officials of the railway company. The design of this station follows the Elizabethan style of architecture, using texture brick to cover the foundations and rough stuff or plaster for covering the exterior of the structure. The roof will be of red tile or slate; the side walls will be gray and other trimmings will be green, thus combining colors and style of architecture which will be in keeping with the high-class suburban residences of Wheaton.

New waiting stations are planned and partly under construction at Ardmore, Villa Park, Spring Road, High Lake, Chicago Golf Club and Elmhurst. The stations are being built of dark red and buff texture brick laid with various types of bonds to present unique and pleasing exteriors and afford weatherproof shelter for intending passengers. The railway company has employed a Chicago firm of landscape gardeners to beautify the grounds around all stations. A comprehensive plan of gardening has been laid out and part of the planting was done this spring.

Additions at the power generating station at Batavia include a 3000-kw Curtis turbo-generator which will be delivered shortly, a Worthington condenser and additional Edgemoor boilers with Green traveling link grates. An addition to the boiler house, 47 ft. x 66 ft. in ground dimensions, is being erected. The Curtis turbine will be of the exhaust type and will be located in the center of the present engine-room, and at the middle point of a row of four 1500-kw revolving-field a.c. generators driven by cross-compound Corliss engines. The piping from the exhaust ports of these engines will be arranged so that the turbine may be operated in connection with either two of the engine units.

Current from this power station is fed at 24,600 volts to six rotary-converter stations over an aluminum-wire transmission circuit, which has the form of a large triangle with one substation at each apex and the power station on one side. The transmission lines extend from each of the three corners to three other substations which feed the third-rail system and thence to other interurban roads which purchase power from this company. The increased train service of the Aurora, Elgin & Chicago has necessitated the installation of a third 500-kw rotary converter in three of the substations. The other three substations have each two 500-kw rotaries.

The shop facilities at Wheaton are being enlarged by the addition of a 36 ft. x 60 ft. two-track section, which is being built adjacent to the present paint shop.

THE MASTER CAR BUILDERS' ASSOCIATION IN ATLANTIC CITY

The forty-fourth annual convention of the Master Car Builders' Association was held in Atlantic City, New Jersey, June 15 to 17. The attendance of railway officers was large and much interest was shown by those present in the attractive display of railway apparatus and equipment which was exhibited on the Million Dollar Pier. Included among the committee reports presented at the convention were the following subjects of interest to electric railways.

CLASSIFICATION OF CARS

A committee appointed in 1908 to prepare a broad classification of railway cars in order to facilitate the work of car distribution presented an outline classification which included the following types of electric railway cars under the general classification letter E.

"EA"—Electric Street Railway Service Car, direct current, for transportation of passengers; without automatic couplings.

"EP"—Electric Passenger Car, for long hauls or suburban service, multiple unit and fitted with automatic couplings and air brakes. Third rail, trolley or pantagraph contact.

"EB"—Electric Baggage Car, for long hauls or suburban service, multiple unit with automatic couplings and air brakes and suitable for the transportation of baggage. Third rail, trolley or pantograph contact.

"EM"—Electric Mail Car, for use in United States Mail Service, fitted with side doors, with or without mail hook, and suitable apparatus for the sorting and classifying of mail en route. With or without end doors or windows.

"EC"—Electric Combined. A car for long hauls or suburban service, multiple unit with automatic couplings and air brakes. This car is made up of two compartments, separated by bulkhead, one suitable for the transportation of baggage and the other fitted with seats or chairs for the use of passengers. Third rail, trolley or pantograph contact.

"EG"—Gasoline Motor Propelled Car, for inspection or private use, or use in suburban service, hauling one or more trailers.

"ED"—Gasoline Motor Car. Gasoline engine or engine serving to run dynamo to furnish electricity for axle motors. Car to be used for inspection, private use, or as motive power to haul trailer or trailers; fitted with storage cells and with or without booster.

This report was approved and the proposed classifications were referred to letter ballot for adoption as recommended.

STANDARDS AND RECOMMENDED PRACTICE

The committee on standards submitted only a few recommendations for changes in the standards and recommended practice of the association. Under standard axles the committee suggested some changes in the radii of fillets, the present and proposed standards being as follows:

Axle.	Journal Fillet.	Dust-guard Fillet.	Wheel-seat Fillet.
A. (40,000 lb.)			
Present	¼ inch	¼ inch	¾ inch
Proposed	¼ inch	¼ inch	¾ inch
B. (60,000 lb.)			
Present	⅝ inch	¼ inch	¾ inch
Proposed	⅝ inch	⅝ inch	⅝ inch
C. (80,000 lb.)			
Present	¾ inch	¼ inch	¾ inch
Proposed	¾ inch	¾ inch	¾ inch
D. (100,000 lb.)			
Present	¾ inch	¼ inch	¾ inch
Proposed	¾ inch	¾ inch	¾ inch

Under brake beams the committee suggested advancing to standard the following present recommended practice "That brake beam hanger brackets shall be attached to some rigid portion of the truck."

The third important suggestion was that the present recommended practice regarding the use of a kunckle-throwing device in automatic couplers which will throw the knuckle completely open and operate under all conditions of wear be advanced to standard.

All of these recommendations will be referred to letter ballot for adoption.

MOUNTING WHEELS

The following report on mounting pressures for various sizes of axles and kinds of wheels was presented:

To specify certain mounting pressures for wheels and not specify the workmanship in boring the wheels and turning the wheel seats of the axles would be only incomplete information. A very careful study has been made in one of the larger railroad shops, covering the entire operation of machining and mounting wheels and axles, with the idea of improving the work, and, if possible, reducing the cost. It developed that proper mounting of wheels depends on the grade of workmanship in turning the wheel seats and boring the wheels. It has been demonstrated further that the work can be done properly without any additional cost over a lower grade of workmanship and with the same grade of men as ordinarily employed. The men employed on this class of work usually become experts and can, if properly instructed, turn out work of the best character.

Good work cannot be performed without good tools. Proper shop practice will not permit lathes and boring mills to get in bad repair. Lathe centers out of line or the V's worn may allow an axle to be turned tapered, while lathes in proper repair will insure wheel seats being turned straight. A tapered wheel seat with the wheel bored straight cannot be expected to make a proper fit at any mounting pressure. A very satisfactory test for lathes is to take two or three light cuts from an axle wheel seat, say 7 in. long, and measure the diameters with micrometer calipers. Good practice indicates that there should not be a variation in diameter exceeding 0.002 in. The same attention given to lathes should be extended also to boring mills to see that they are in proper condition to turn out good work.

The general tendency has been to finish axles with too rough a wheel seat, which results from too coarse a feed. This makes only partial contact between the wheel seat and axle. While axles may hold satisfactorily under these conditions, there is always an element of uncertainty, which can be eliminated by better practice. The axle roughly turned in this way cannot be accurately calipered, and this is essential for good fitting and security. Furthermore, in mounting the wheel, the high ridges obtained with a roughly turned wheel seat are pushed off, principally at the outer end of the axle, reducing its diameter and making the turning of the wheel seat necessary when preparing the axle for mounting wheels at a later time. There is, also, a bad moral effect on men, who, if permitted to carry out this practice, will extend it to journals as well.

It has been demonstrated that with fairly rigid lathes axles can be turned at a speed of 40 r.p.m. to 50 r.p.m., the limit of speed being the chattering of the tool rather than the cutting speed. With this high speed and with a fine feed, an axle can be turned in about the same time as by slow speeds and coarser feed. The higher speed results in better work without increased cost.

Having secured straight and true wheel seats and wheel bores, the next necessity is for the proper diameters necessary in secure mounting. Micrometer calipers are necessary for several reasons. The axles and wheels can be calipered more quickly and more accurately than by machinist's calipers or snap gages. The "draw" or difference in diameter of wheel seat and bore which has been determined for a proper fit can be secured without difficulty. The difference between diameters of wheel seat and bore of wheel expressed in thousandths of an inch can be measured accurately, whereas with ordinary calipers it is a question of skill of the workman and with snap gages the same is true to a lesser degree.

For shop inspection, certain limits can be set between which the axle or wheel may vary and be good enough for all requirements. The inspector having set limits is not permitted to use judgment, which is always liable to error; if the work is within the limits he must pass it. If not, it must go back to the man who did the work, and he, knowing his work must meet certain definite requirements determined by the proper measuring instrument, naturally endeavors to turn out good work rather than take the chance of doing it over without pay.

To successfully use, for wheels and axles, the ordinary trade micrometer caliper takes time and a certain amount of skill. To reduce this time and skill to the minimum, micrometer calipers have been designed and used successfully. Such a caliper for wheel seats consists of an iron yoke on which are mounted an ordinary micrometer head that can be bought in the open market, an anvil, a fixed stop set square with a line through the micrometer head and the anvil and an adjustable stop on the top of the yoke arranged so that the distance between the face of the stop and the diameter connecting the anvil and the micrometer head can be made approximately equal to the radius of the wheel seat. In using this caliper it is placed over the axle with the adjustable stop resting on top of the wheel fit. The fixed stop and the anvil are then brought up firmly against the side of the wheel seat. The micrometer is screwed up by a ratchet stop until the ratchet clicks. The caliper is then removed and read. On a trial, eight axles were measured in five minutes and 12 wheels were measured in the same space of time. Each wheel seat was measured at three points, the average taken and size chalked on the axle. The wheel seats had not been previously measured and but few were of the same size. This is much more rapid than calipering by other means, especially for axles varying in diameter.

A similar caliper for the wheel bore consists of a T-forging on which are mounted a micrometer head graduated for internal measurements, an anvil diametrically opposite, a fixed stop set at right angles to the diameter connecting the head and the anvil and an adjustable cross stop or guide consisting of right- and left-hand threaded nuts turning together on a common shaft. In calipering a wheel the adjustable stop screws are roughly adjusted somewhat smaller than the bore of the wheel. The anvil and fixed stop are brought against the bore and the micrometer screwed out until the ratchet clicks. On a trial five wheels were calipered and size chalked on wheel in five minutes. The measuring was done by an apprentice, who was able to do it in an entirely satisfactory manner after about one hour's instruction. This method of calipering and marking each wheel seat with the points and the further calipering of the bored wheels with the sizes marked upon them permits the proper selection of wheels at wheel seats for mounting, in order to secure the pressures necessary. As to mounting pressures, the committee recommends the following, in conjunction with the character of workmanship already referred to, as being essential.

M. C. B. Axle.	Size of journal.	Wheels—Cast Iron, tons. Maximum.	Cast Iron, tons. Minimum.	Steel, tons. Maximum.	Steel, tons. Minimum.
A	3¼ in. x 7 in.	44	36	66	54
B	4¼ in. x 8 in.	44	36	66	54
C	5 in. x 9 in.	55	45	83	68
D	5½ in. x 10 in.	55	45	83	68

The following general specifications, which have been quite thoroughly tested, are submitted for consideration:

Axle Wheel Pit.—Must be turned as smooth as possible with lathe tool having flat cutting edge. Finishing cut must not be taken with lathe feed coarser than 16 pitch. Taper on axle wheel seat for entering wheel must not exceed ½ in. in length and must be turned with broad, straight-faced tool, making regular taper without ridges or rings. Wheel fits to be calipered at three points, namely: One in. from each end and middle and other points if indications point to excessive variations in diameter.

Axles shall not be considered as suitable for mounting where there is a difference in diameter between any two measurements exceeding 0.003 in. This, however, shall not be construed to mean that wheel seats on each end of axle are to be of one size. Each tenth axle from each lathe shall be measured for soundness. No axle varying over 0.001 in. when measured at two points 90 deg. apart on circumference at equal distance from end shall be considered as suitable for mounting.

Wheels.—To be bored smooth. Finishing cut shall be made with tool or tools having a cutting face at least 3/16 in. wide. Feed not to exceed 8 pitch. To be bored with a rough and finishing cut. The finishing cutter when taking the finishing cut must not be cutting when roughing tool is also rough boring, unless the finishing tool is supported independent of roughing

tool, the latter to prevent spring of roughing tool being transmitted to finish tool, causing an irregular bore.

Wheels to be calipered with micrometer caliper. A wheel varying over 0.002 in. in any two diameters will not be considered satisfactory for mounting.

Mounting presses to be provided with recording pressure gages. All wheels not mounted within limits given, or wheels that are forced against shoulder, to be withdrawn.

One other point should receive attention. It would be very desirable if all shops were to adopt one angle for lathe centers. Generally, lathe centers used for ordinary work are 60 deg., including angle. If this were adopted for all axle work, it would result in the axles running true on centers, reducing the amount of material necessary to turn away when truing up axles that have been previously turned.

The report was accepted and ordered to be printed in the Proceedings, but the recommendations will not be submitted to letter ballot for adoption as standard or recommended practice.

BRAKE SHOES

The standing committee on brake shoe tests presented an elaborate report recommending among other things revised specifications for brake shoes covering coefficient of friction and shoe wear. During the year the committee made use of a new scale designed to weigh car wheels before and after braking tests in order to determine the wear on the wheel caused by the brake shoe.

Fourteen shoes submitted to the laboratory at Purdue University were tested to determine the wear under repeated applications to both cast-iron and steel-tired wheels. The shoe wear and wheel wear tests were run under the following conditions:

A. On the cast-iron wheel.—At a constant speed of 20 m.p.h. and at a shoe pressure of 2,808 lb.

B. On the steel wheel.—At a constant speed of 20 m.p.h. and at a shoe pressure of 2,808 lb.

C. On the steel wheel.—In effecting stops from an initial speed of 65 m.p.h. and at a shoe pressure of 12,000 lb.

During the tests at the lower pressure most of the shoes were applied 300 times to the wheel, while the wheel was kept running at a constant speed of 20 m.p.h. These applications of the shoe to the wheel were made by means of an automatic device on the testing machine which operates to keep the shoe in contact with the wheel for about one minute, while the interval between contacts is about three minutes. At the end of each 100 applications, both the shoe and the wheel were weighed to determine the metal lost by abrasion.

The tests on the steel wheel at the higher pressure (condition C) were made by a process similar to that employed in determining the coefficient of friction. In most cases, nine stops were made from an initial speed of 65 m.p.h., after which both the shoe and the wheel were weighed to determine their loss.

At a shoe pressure of 2,808 lb., the only shoe which produced an appreciable wear on the cast-iron wheel was a Congdon shoe. It is somewhat significant that this shoe showed the least shoe wear. During the tests on the steel wheel, at a pressure of 2,808 lb., only two shoes caused any considerable wear of the wheel. These were both Congdon shoes. One shoe, which was given 300 applications to the wheel, cut four V-shaped grooves about 1/32 in. deep and several smaller ones around its entire circumference. The other shoe scored the wheel in a similar manner with five grooves after 100 applications. During the tests on the steel wheel at a pressure of 12,000 lb., only two shoes produced any wear whatever on the wheel, and this was quite inconsiderable in amount. These were both Pittsburgh composition shoes. They did not score the wheel, however.

The results seem to warrant the conclusion that none of the ordinary shoes in service are likely to cause any appreciable wear on the cast-iron wheel. The wear on the steel wheel, while greater than on the cast-iron wheel, is likewise almost inconsiderable, except in the case of the two insert shoes above cited. The committee regards the scoring of the wheel in these two cases as more or less accidental, and experience with insert shoes in service seems to warrant this opinion. After consideration of all the facts here presented, the committee has concluded that no serious wear of the wheel is to be expected from the action of any of the shoes now in ordinary service, and it, therefore, considers any recommendation concerning wheel wear to be unnecessary.

The committee regards the reassurance which proceeds from such conclusions as ample return for the effort and expense which have been entailed by its research concerning the effect of brake shoes upon the wheel.

The committee recommends concerning shoe wear that on the cast-iron wheel the shoe wear be determined by making 100 applications of the shoe to the wheel, under a pressure of 2,808 lb., and at a constant wheel speed of 20 m.p.h.; at each application the shoe to be in contact with the wheel during 190 revolutions and out of contact during the succeeding 610 revolutions.

That, under these conditions, the shoe shall lose in weight not more than 0.8 lb. for each 100,000,000 foot-pounds of work done.

That, on the steel-tired wheel, the shoe wear be determined by making 10 stops from an initial speed of 65 m.p.h., and under a shoe pressure of 12,000 lb. That, under these conditions, the shoe shall lose in weight not more than 4 lb. for each 100,000,000 foot-pounds of work done.

The committee believes that inserts should be made as thick as the processes of manufacture will permit, and it recommends that in no case should the thickness of the insert in a new shoe be less than one-half of the total depth of the shoe.

The committee presented the following summary of its suggestion concerning brake shoe tests, and recommended that they be adopted as standards of the association:

1. That the present specifications for brake shoes be replaced by the following:

a. Shoes shall be tested for coefficient of friction and for wear upon the Master Car Builders' Association testing machine, or upon a machine with equivalent characteristics.

b. Shoes shall develop upon the cast-iron wheel, in effecting stops from an initial speed of 40 m.p.h., a mean coefficient of friction of not less than 22 per cent when the brake-shoe pressure is 2,808 lb., 16 per cent when the brake-shoe pressure is 6,840 lb.

c. Shoes shall develop upon the steel-tired wheel, in effecting stops from an initial speed of 65 m.p.h., a mean coefficient of friction of not less than 12½ per cent when the brake-shoe pressure is 6,840 lb., 11 per cent when the brake-shoe pressure is 12,000 lb.

d. No limitation is placed upon the rise in coefficient of friction at the end of the stop.

The recommendations were referred to letter ballot for adoption as standard.

MANUFACTURERS' ASSOCIATION ATLANTIC CITY EXHIBIT ARRANGEMENTS

The American Street & Interurban Railway Manufacturers' Association has issued a convention circular calling upon manufacturing companies planning to exhibit at Atlantic City to make prompt application for space. The general arrangement of the space on Young's Million Dollar Pier for the exhibit will be the same as in October, 1908. At that time about 200 exhibitors used over 60,000 sq. ft. of space. The circular states that applications should be in by July 15. Those received on or before that date will be considered as having been received on that date and all such will have equal preference as to location. Applications received after that date will be given space as received in order of time. The rate this year is fixed at 30 cents per foot. The exhibit committee will hold a meeting in New York on Friday, July 22, when space will be assigned for all applications received. Applications should be mailed either to K. D. Hequembourg, vice-president, Dunkirk, N. Y., or George Keegan, secretary, 165 Broadway, N. Y. Those who are not members of the association, however, should apply to Charles C. Castle, chairman of the membership committee, or George Keegan, secretary, 165 Broadway. The circular of the

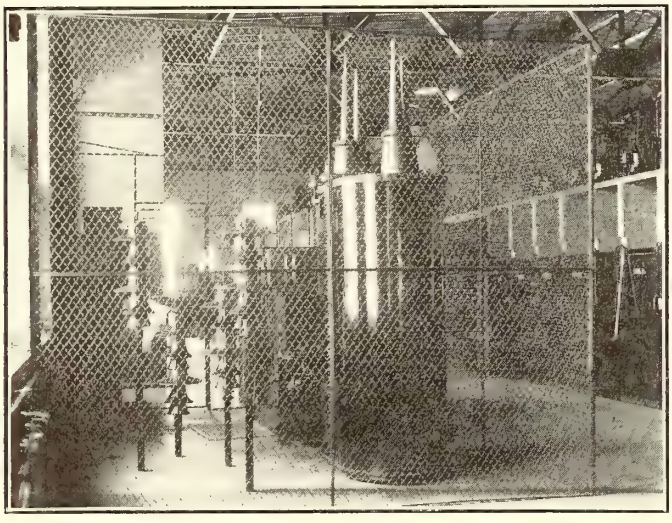
association is accompanied by a plan of the pier with the sizes of the booths indicated and by information relating to shipping, trucking and installation of exhibits.

At a meeting of the executive committee of the Manufacturers' Association, held in Atlantic City, June 18, the Marlborough-Blenheim was selected as the official headquarters of the association during the convention. The following gentlemen were appointed to constitute a transportation committee, to cooperate with the corresponding committee of the American Street & Interurban Railway Association: William H. Heulings, Jr., assistant secretary, J. G. Brill Company, Philadelphia, Pa.; Arthur S. Partridge, president, Arthur S. Partridge & Company, St. Louis, Mo.; J. W. Porter, first vice-president, Electric Service Supplies Company, Chicago, Ill.; C. S. Hawley, vice-president and general manager, Consolidated Car Heating Company, New York; Charles C. Peirce, manager railway department, General Electric Company, Boston office, Boston, Mass.

Charles C. Castle, formerly of the Hildreth Varnish Company, has been re-elected a member of the executive committee and vice-president in charge of entertainments, as the representative of the United States Metal & Manufacturing Company, with which he is now connected.

OIL-DRYING PLANT

The Winnipeg Electric Railway Company has established in its main receiving substation an oil-drying and testing plant. Fifteen days' time would be required for getting samples of transformer oil tested by the eastern manufacturers, and even a longer time, of course, would be needed for obtaining a new supply of dry oil. The large transformers in the receiving station and the similar equipment at the generating station contain much oil which, in connection with the supply needed for smaller transformers in the lighting and power service, has made the oil-drying installation and testing plant a valuable addition to the electrical equipment. A system of large tanks located in the basement of the receiving station and provided with heating coils serves to dry the oil. Periodical tests are made of the oil in use and all oil is tested before it is put into a transformer case. If the oil does not meet the requirements it is put through the drying tanks, in which it is first



High-Voltage Testing Outfit

allowed to settle so that the excess water may be drained from the bottom, and then it is heated to complete the process.

An illustration of the oil-testing plant within its screened enclosure is presented. This plant includes a 100,000-volt transformer of 25-kw capacity. Current for testing is furnished through a potential regulator supplied from the 110-volt circuit. The regulator varies the potential of the current fed to the large step-up transformer through the range from 110 to 1000 volts. The circuit is connected with a two-scale voltmeter indicating from zero to 60,000 volts, and from zero to 120,000 volts, and an ammeter indicating from zero to 80 amp. From the secondary side of the step-up transformer the high-voltage wires are carried on line insulators arranged in pairs one above the other, to provide double insulation for the 100,000-volt circuit. This circuit leads to terminals for the oil-testing cylinder. It is the practice to withdraw oil for testing from the bottom of the transformer case or drying tank and to test it with a fixed gap of 0.2 in. As a precautionary measure the gate leading into the high-voltage testing case is interlocked with the line switch of the testing set in such a way that the current is cut off from the testing apparatus whenever the gate is opened.

THE OMAHA DECISION

The full decision of the United States Circuit Court for the District of Nebraska enjoining the Interstate Commerce Commission from exercising jurisdiction over the Omaha & Council Bluffs Street Railway Company, and the Omaha & Council Bluffs Railway & Bridge Company, is available. This decision was mentioned on page 1078 of last week's issue of this paper. The decision, which was rendered by Judges Sanborn, Hook and Adams was as follows:

"Whereas, the complainants are street railway companies engaged in operating street cars for the transportation of passengers on the streets of Omaha and Council Bluffs and are not commercial railroad companies engaged in the general transportation of freight and passengers, and the Interstate Commerce Commission by its order dated Nov. 27, 1909, required them to cease demanding or receiving their fares of 15 cents per passenger for the transportation of passengers from Council Bluffs, not including Courtland Beach, Ia., to points on complainants' lines in Omaha, Neb., or from points on defendants' lines in Omaha, Neb., to Council Bluffs, Ia., not including Courtland Beach, Ia., and also required them to establish and to maintain for two years a less rate.

"And, whereas, the judges are of the opinion that the Congress never intended that the act to regulate commerce of Feb. 4, 1887, 24 Stat. Chap. 104, page 379, 3 U. S. Comp. Stat., page 3154, or its amendments, 34 Stat. Chap. 3591, page 584, should apply to, and they are of the opinion that they do not apply to, such street railway companies, that no power has been delegated thereby to the Interstate Commerce Commission to regulate or affect the rates of transportation of such companies and that the order of the Interstate Commerce Commission was beyond its powers and ought not to be enforced during the pendency of this suit. Louisville & Portland Ry. Co. v. Louisville City Ry. Co., 2 Duv. (63 Ky.) 175, 178; Funk v. St. Paul Ry Co., 61 Minn. 435, 437, 441; State v. Duluth Gas & Water Co., 76 Minn. 96, 108; Manhattan Trust Company v. Sioux City Cable Ry. Co., 68 Fed. 82, 86; *Congressional Record*, Vol. 17, Part IV, page 3274; Railroad Commissioners v. Market Street R. R. Co., 132 Cal. 677, 678-9, 682, 683, 64 Pac. 1065; Gyger v. West Philadelphia Ry. Co., 136 Pa. St. 96, 108; State of Kansas v. Grant Cain, 69 Kan. 186, 189, 190; Railroad Company v. Railroad Commissioners, 73 Kan. 168, 169, 173; Sams v. St. Louis (etc.) Ry. Co., 174 Mo. 53, 64, 69, 74-77, 81; Thompson-Houston (etc.) Co. v. Simon, 20 Ore. 60, 75, 25 Pac. 147, 149; Front Street Cable Ry. Co. v. Johnson, 2 Wash. 112, 25 Pac. 1084, 1085; Riley v. Galveston City R. R. Co., 35 S. W. 826, 827.

"It is hereby ordered that the aforesaid order of the Interstate Commerce Commission of date Nov. 27, 1909, be, and the same is hereby, suspended and the commission, its attorneys, agents and employees are hereby restrained and enjoined from enforcing it until the final decision of this suit or the further order of the court.

"This order shall take effect upon the filing with the clerk of this court of a bond in the sum of ten thousand dollars ($10,000) approved by one of the judges of this court and conditioned that the complainants will pay any and all damages which result from the making of this order in case the order shall not be sustained."

PROGRESS OF NEW WORK ON ILLINOIS TRACTION SYSTEM

The large program of development work for the Illinois Traction System property, which was outlined in the issue of Jan. 22, 1910, is being carried forward at a satisfactory rate. The work of chief interest is located in and near St. Louis, Mo. As earlier stated the Traction company is making preparations for handling local and heavy fast freight and passenger service into the heart of the business and hotel district of St. Louis over new double tracks and a new bridge over the Mississippi River. The track work of the main line from Granite City to the St. Louis terminal site, is now ready for operation awaiting the completion of the McKinley bridge. Owing to the wrecking of falsework for the middle span due to high water and the continued high stage of the river since January, it has not been possible to complete the two remaining river spans on schedule time. It is expected, however, that these can be made ready for service early in the fall.

When completed this bridge will comprise three river and five shore spans with a total length of 2500 ft. and structural steel approaches 3200 ft. long. Thus, the total steel structure is more than a mile in length. It will have a normal carrying capacity of 10,000 lb. per lineal foot for each of its two tracks and 3000 lb. per lineal foot for each of its two 16-ft. driveways. The bottom chords of the three 520-ft. river spans are 75 ft. above low-water level. At the western end the approach structure terminates at Broadway and Salisbury streets, where the tracks lead onto the private right of way of the Illinois Traction Company. At this point a 2-story brick station is well along toward completion. The station is 65 ft. wide by 150 ft. long, built of concrete and red paving brick. The lower floor, which is at the street level, contains the offices, waiting rooms, express rooms and general facilities. Elevators and stairways will give access to loading platforms which are located directly over the waiting rooms.

The downtown terminus of the new double-track line extending into St. Louis is 2.5 miles from the Broadway station and is located at Twelfth and Lucas streets, near the Jefferson Hotel. Plans are under way for the erection of a 12-story passenger station and office building on this terminal property, and contracts have just been let for an express station 263 ft. long by 88 ft. wide, two stories in height. This building will be constructed wholly of fireproof materials, will be ornamented with cut stone, and will have a tile roof. The construction and equipment of the express terminal only, call for the expenditure of about $100,000. The detail plans of the passenger station and office building have not yet been announced, but it is stated that this structure will resemble a high-class city office building which will cost approximately $500,000.

The terminal property of the Illinois Traction System includes 24 acres of river frontage property at the Missouri end of the McKinley bridge. An incline from the elevated bridge structure to the terminal freight yard below is now being built. A brick and concrete freight warehouse and loading station is nearly completed on this property. This building is located under the Missouri approach to the McKinley bridge and is about 40 ft. x 200 ft. in ground dimensions. Plans are now being made for laying teaming and warehouse tracks on the freight terminal property.

On the east side of the river the new power station, which is to have an ultimate capacity of 28,000 hp, one-half of which will now be developed, is being erected at a satisfactory rate. The structural framework of the building is about finished and the boilers and stacks are being installed.

A new car shop, 250 ft. x 60 ft. in ground dimensions and with a height of 34 ft. below roof trusses, has been built in Granite City, Ill., about a mile east of the new power plant. It will serve as headquarters for the 30 bridge-service cars which were described in this paper May 28, 1910. These cars will operate between St. Louis and the densely populated manufacturing center north of East St. Louis on the Illinois side of the river. The new shop also will care for the interurban cars operating in and out of St. Louis over the Illinois Traction lines. Three new substations, which will include office and passenger waiting rooms, are now under construction. These structures conform to the standard type of the Illinois Traction System illustrated on page 143 of the issue of Jan. 22.

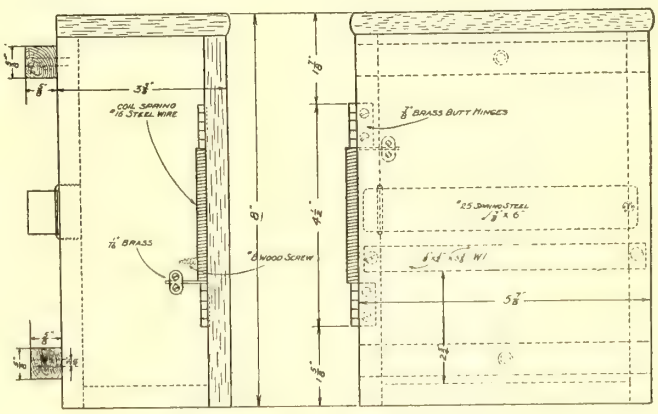
To handle the greatly increased freight business expected from the opening of the McKinley bridge across the Mississippi River, trucks and motors have been received for equipping six large electric locomotives, which will be employed in the freight service, and practically all the sidings on the entire 600-mile interurban system are being lengthened so that they will accommodate 15-car trains.

The new locomotives will each have a drawbar pull of 25,000 lb. The motors for the equipment are the G. E. 69-C type mounted on American Locomotive Company trucks. The bodies will be 36 ft. long, built of steel and designed to accommodate the control and air-compressor apparatus. Each locomotive will weigh 50 tons and will be equipped with the Bosenbury type of M. C. B. coupler, which is standard on the Illinois Traction System, with M. C. B. steel wheels and with 7-in. axles with 5½ x 10-in. journals and a special type of locomotive motor control furnished by the General Electric Company. The four motors under each locomotive are rated at 200 hp each and are geared for slow-speed work. A special type of contactor control is provided, having 39 contactors and 18 points on the controllers with running positions at points Nos. 7, 13 and 18. In the first position the four motors will be connected in series; in the second position the four motors will be connected in series-parallel, and in the third position all four motors will be in parallel. In this way it is planned to accelerate heavy freight trains without drawing a greater current from the line than now is taken by one of the quadruple G. E. 73 or G. E. 205 limited passenger-car motor equipments.

The new woodworking shop earlier announced as being under construction close to the main repair shop of the interurban system located at Decatur, Ill., has been completed. This building, which includes excellent facilities for carpentry, mill and overhauling work, will be described in a later issue. Acknowledgement for the foregoing interesting information is made to H. E. Chubbuck, executive vice-president, Illinois Traction System.

CONDUCTOR'S TRANSFER BOX USED BY THE VIRGINIA RAILWAY & POWER COMPANY

The average conductor finds the carrying of three or four transfer pads in his pockets a rather irksome task and is likely to deposit the extra pads and other papers in some place like the sand box. To avoid this, the Virginia Railway & Power Company, Richmond, Va., has installed a transfer box in every one of its cars. As shown in the accompanying drawing, the box is 8 in. x 5⅞ in. x 3⅜ in. in size. It is made of 7/16-in. wood to match the inside finish of the car. The door is made self-closing through the medium of a coil spring of No. 16 steel wire.



Conductor's Transfer Box

POWER PLANT IMPROVEMENTS OF THE CAIRO (ILL.) RAILWAY & LIGHTING SYSTEM

The Cairo Railway & Light System, one of the McKinley Syndicate properties in Illinois, has recently equipped a new power plant located at Thirty-eighth and Sycamore streets in Cairo, Ill. The old plant on Ninth Street has been dismantled. The boiler-house equipment of the new power plant includes three 400-hp Stirling boilers, two of which are fired with Green stokers fed by coal conveyors. The engine-room equipment includes one 500-kw, 2300-volt, Curtis steam turbine, one 500-hp upright Lake Erie engine connected to a 500-kw Siemens & Halske railway generator on one side and a 500-kw, 2300-volt, 60-cycle, Bullock generator on the other side. The switchboard is of Westinghouse manufacture, and serves the generating equipment and also a 300-kw Westinghouse motor-generator set and two 50-light, mercury-vapor, arc-lamp converter sets.

ENGINEERS IN PENNSYLVANIA HOLD EXHIBIT IN HARRISBURG CAR HOUSE

A very successful exhibit was held in the large new concrete car house of the Central Pennsylvania Traction Company, at Cameron and Forster streets, Harrisburg, Pa., on June 1, 2, 3 and 4, 1910, in connection with the annual meeting of the Engineers' Society of Pennsylvania. The entire program for the meeting, as outlined in the Electric Railway Journal of May 21, 1910, page 917, was followed, with the exception of the trip to the McCall Ferry plant of the Pennsylvania Water & Power Company on June 4, which was not made on account of rain. The interior of the car house, converted into an exhibit hall, was decorated in gold and white. More than 300 tungsten lights of 100 cp each were used to light the building. The largest spaces at the exhibit were taken by the Pennsylvania Steel Company, the Westinghouse Machine Company, the Westinghouse Electric & Manufacturing Company, the Dauphin Electric Supplies Company and the Western Electric Company. On a temporary siding outside of the exhibit hall the Pressed Steel Car Company and the American Car & Foundry Company exhibited cars built by them, and a short distance from the car house, the Pennsylvania Railroad exhibited one of the electric locomotives intended for service on the New York division. On June 2 a party of railroad officials and engineers witnessed a test of the locomotive made under the direction of Leroy J. Kirby, of the Westinghouse Electric & Manufacturing Company, of Pittsburgh, with power supplied by the Central Pennsylvania Traction Company,

The exhibit was formally opened on the morning of June 1 with an address by Mayor Meals of Harrisburg. None of the exhibits attracted more attention perhaps than that of the Call Automatic Switch Company, Denver, Col. Ira A. Call, inventor of the switch, and C. C. White, general manager, demonstrated the advantages of the device. The company purposes to erect a plant in the East. Other exhibits which attracted particular attention were those of James Boyd & Brother, Philadelphia, electric hose and rubber rotating turbine valves, etc.; Harrisburg Pipe & Pipe Bending Company, Harrisburg, pipe coils, gas cylinders and feed water heaters; Hunter & Dickson Philadelphia, valves and fittings; Henry, Millard & Henry Company, York, Pa., engines; Keystone Chemical Company, Philadelphia, pressure filters and water purifying systems; J. H. Jolly & Company, Philadelphia, magnolia metal; York Engineering Company, York, Pa., steam supplies, pumps, etc.; Standard Scale & Supply Company, Philadelphia; scales, concrete mixers, etc.; Ford & Kendig, Philadelphia, valves, etc., including the Lunkenheimer specialties; H. C. Roberts Electric Company, Philadelphia, arc lamps, etc.; Dauphin Electrical Supplies Company, Harrisburg; Sloan, Havell & Company, Philadelphia, railroad, mill, mine and contractors' supplies; Geo. Oldham & Son Company, Philadelphia, pneumatic tools; Strong Machinery & Supply Company, New York, packing; The Nachod Signal Company, Philadelphia, automatic signals for electric railways. The exhibit of the working of the prepayment car likewise attracted much attention.

John Price Jackson, dean of the Engineering School of the Pennsylvania State College and chairman of the convention, announced that the college intended to inaugurate a campaign of instruction in fuel economy to cover Pennsylvania. The school of engineering had an exhibit, and demonstrations of the system of smoke prevention and fuel economy were made at the hall by Prof. A. H. Gill, who will instruct engineers, firemen and men employed in allied capacities upon both stationary and locomotive engines. The exhibit will be taken directly into industrial plants and the proper and improper ways of firing will be explained to those interested.

MEETING OF COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIME TABLES

A meeting of the committee on construction of schedules and time-tables of the American Street & Interurban Railway Transportation & Traffic Association was held at the New York headquarters of the American Street & Interurban Railway Association on Thursday, June 16. The committee members present were N. W. Bolen, chairman, superintendent of transportation, Public Service Railway, Newark, N. J.; William Siebert, superintendent of surface lines, Brooklyn Rapid Transit Company, Brooklyn, N. Y.; and J. J. Doyle, general superintendent, Washington, Baltimore & Annapolis Electric Railway. A. Jackson, superintendent of time-tables, Public Service Railway; L. H. Palmer, superintendent of transportation, Metropolitan Street Railway, New York, and J. L. Downs, private secretary to Mr. Bolen, were also present to assist the committee. P. N. Jones, general superintendent of the Pittsburgh Railways Company, Pittsburgh, Pa., member of this committee, was not present at the Thursday session, but spent the preceding day at the association headquarters to prepare his suggestions concerning the committee's queries.

The first order of business was on suggested changes in questions for the city data sheet to be sent out by this committee. Timothy Connell, time-table clerk, Boston Elevated Railway, Boston, Mass., and James Bricker, superintendent of transportation, Philadelphia Rapid Transit Company, Philadelphia, Pa., contributed several suggestions as committee members. Secretary H. C. Donecker was present at the meeting and assisted in the discussion.

Among the subjects taken up were determination of running time, changes in running time at different periods of the day, definitions of straight and swing runs, passenger counts, time-table construction, stormy weather schedules, lay-over practice, short-line cars, use of "patches" on time-tables for alterations in service, and average speeds with and without lay-overs. There were also presented for discussion several additional questions relating to schedule departments and schedule advertising, working night crews, use of train numbers, observation of character and amount of vehicular traffic, seating efficiency of cars and summaries of daily traffic.

Following the talk on city traffic matters, Mr. Doyle presented for discussion a series of questions on interurban schedule practice and cognate matters. The interurban queries will be sent out as a separate section. Mr. Doyle's list included single and double track mileage, schedule mileage operated daily, number of trains operated daily, maximum number of cars required for schedule, distance between sidings on single track and between cross-overs on double track, average speeds, time allowance for connections at junctions, branch line or shuttle service, train numbering, scheduling of freight trains, lay-over practice, passenger transfering versus through train operation, payment on time, trip or mileage basis, headways, proportion of straight runs, detention reports, passenger records, signal system and transfer table color changes.

The municipality of Poltava, Russia, is said to be considering the advisability of constructing an electric railway in that city.

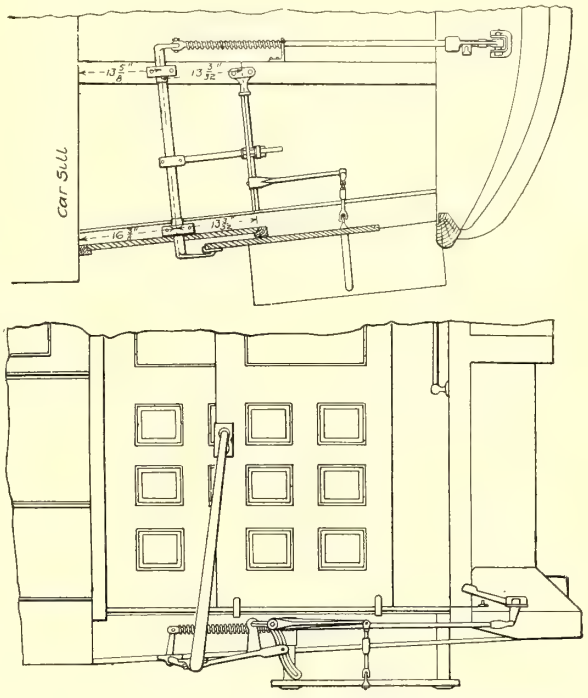
RECONSTRUCTING CARS FOR NEW YORK SUBURBS

The Third Avenue Railroad Company, New York, has rebuilt in its shops 344 cars for operation on its allied roads, the Union Railway Company and the Westchester Electric Railroad. The cars were turned out at the average rate of four a day. The most interesting feature of this rolling stock is that the cars have been converted so that they can be operated to use a combination of vestibule doors and folding steps without making any alterations whatever in the body proper. Practically all of the changes have been confined to the platforms which have been lengthened from 4 ft. to 6 ft. and completely enclosed with a combination of rebuilt Sjoberg and Brill vestibules; a single sliding door with a 24-in. opening, which is normally closed when not operated by the motorman for exit purposes, and a two-leaf sliding door normally open with the step down when used for entrance and exit at the conductor's platform, but closed with the step up when running. The old hood, platform and vestibule material was re-used to such advantage that the cost for converting each car was much less than it would have been otherwise.

The original platforms had no vestibule doors, but were furnished with a pantograph gate on the inner side of the platform. The principal fittings on the rebuilt platforms comprise a vertical dividing rail for entrance and exit at the rear, mechanisms for the door and step combinations and a curved platform rail which separates the incoming and outgoing passengers besides affording the usual space for the conductor. This curved rail alone is expected to separate the exit and entrance streams as the old 32-in. opening double sliding doors at each end of the 28-ft. body have been retained. It will be understood that this door arrangement has not only made it possible to leave the longitudinal seating unchanged, but, furthermore, the total seating capacity has been increased by a three-passenger bench which is let down on the inner side of the front platform.

The lengthening of the platforms involved the reinforcement of the end body sills with an angle iron to enable them to carry the heavier platforms, the ship-splicing and reinforcement of the platform sills and the lengthening of the hood and the installation of new dashers. All of this work as well as the railing construction was carried out in the company's shops.

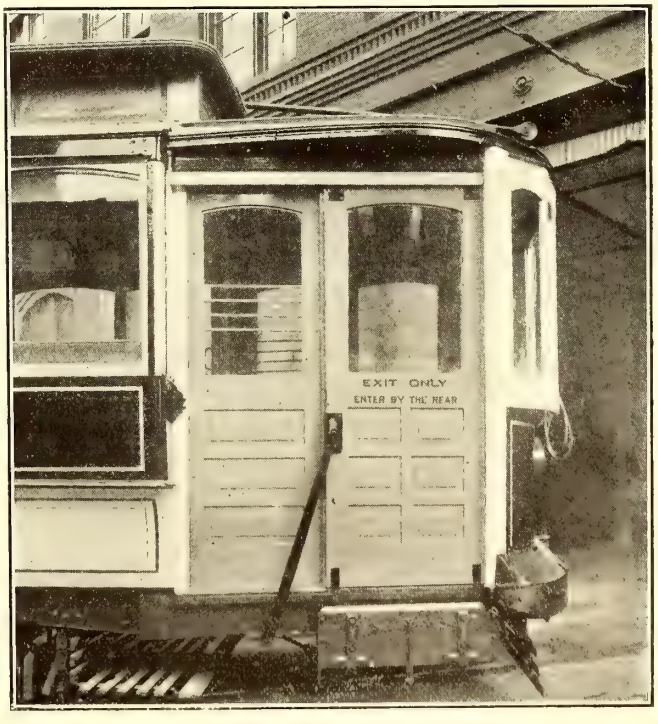
The door and step mechanism, which was invented by J. S. McWhirter, the company's superintendent of equipment, has two features which are very important from the standpoint of accident prevention. The sliding exit door is closed by the motorman who depresses a heavy pedal which is otherwise at an angle of about 45 deg. to the platform. When the door is closed, the pedal is locked in a catch on the platform floor so that, unlike other door-opening devices, the passenger cannot possibly open the exit door himself. The step mechanism provides also a delay action to the step so that the latter does not fold up until the exit door is more than half closed. This latter feature prevents injury to passengers who may leave the car while the door is closing. The mechanism is arranged so that the door is closed against a compression spring, and, when, the locking mechanism is unlocked, the door is automatically opened by the release of the spring.



Plan and Side View of Door and Step Mechanism



View Showing the Point Where the Step Starts to Go Up



Vestibule Door Closed with Step Up

Following the plan used in most of its shop work, the company established a number of piece-work contracts covering the dismantling of the platforms, the reconstruction of the vestibules, touching up, etc. The prices established on some of these contracts were as follows:

Contract.	Per car.
Stripping sign lights, bonnets, vestibules and inside trim	$2.00
Stripping cars, pulling off platform bumpers, dashers, nigger-head castings, etc., including bumper shields	3.50
Stripping cars, pulling off platform bumpers, dashers, nigger-head castings, etc., without bumper shields	3.00
Getting out complete set of 12 posts in the mill room, including finishing, cutting, boring, etc.	3.50
Getting out eight pieces or one complete set of spliced knee beams in the mill room	1.40
Splicing knee beams, including putting on reinforcing irons	4.00
Installing and bolting up knee beams, complete	4.50
Installing platform posts, including vestibule and bonnets	17.00
Hanging all doors, putting in combination door and step devices and other hardware	15.00
Plugging all old holes for knee beams and boring new ones	2.50 & 2.00
Making two conduit dividing railings	1.20
Installing bumper shield blocks	1.00
Installing dashers, including the installation of headlight bolts	1.00
Installing bumpers and nigger-head castings, complete	2.50
Installing wooden bumper blocks	1.50
Installation of iron moldings and bumper shield irons	3.00
Lengthening and splicing bonnets	3.00
Making new bonnet, complete	4.50
Shortening and repairing two vestibules	4.50
Installing the step-raising device	3.50
Trimming and setting back old moldings, replacing broken glass, putting on all hardware, replacing seat backs, etc	6.00
Installing steps and step shields	1.50
Lengthening power cables	2.25
Putting up circuit-breakers	.40
Putting up controllers	.95
Connecting up and installing overhead trolley	1.25
Connecting kicking coils	2.50
Installing controllers and controller blocks	.60
Connecting lightning arresters	2.40
Bringing out headlights and connecting up	1.65
Ringing out and changing lights from four-light clusters to two-light clusters in center of car wired so that two lights per platform would be obtained	1.25
Blackening off, partly lettering and striping and applying "Rebuilt" sign inside car	2.20
Varnishing, first coat on cars to be repainted all over	1.65
Completely striping and lettering	5.25
Painting trucks	.70
Painting roof	.75
Lettering one set of six box signs, complete, with two coats	3.30
Varnishing outside of car, complete, including inside of vestibule and all doors	2.75
Varnishing inside of car body, but not vestibules	1.25
Shellacing doors	3 cents each
Painting first coat of door	4 cents each
Painting second coat of door	4 cents each
Varnishing door	9 cents each
Stencilling wording "Exit Only" and "Enter by the Rear"	6 cents each

THE PONTEDECIMO-BUSALLA ELECTRIFICATION

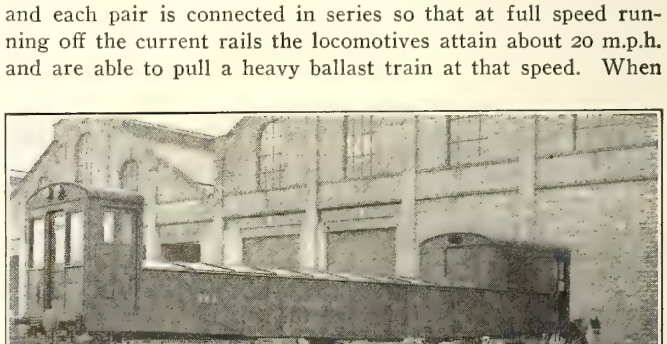
The Italian Westinghouse Company has received a contract from the Italian State Railways for the three-phase electrification of a 12½-mile double-track main line extending from Campasso to Genoa, via Pontedecimo and Busalla. This section has grades of 3½ per cent and a 12,000 ft. tunnel with grades of 2.9 per cent. The contract prescribes that a 380-ton train must be hauled over the maximum grade at 28 m.p.h. It is estimated that the electrified line will be capable of carrying twice the tonnage possible with steam. The average 18-ton trains are to consist of 21 cars and will be run on 15-minute headway, but a 10-minute headway may be operated eventually.

Power at 13,000 volts, 15 cycles, will be transmitted from Genoa. The generating equipment first will comprise two 5000-kw turbo-alternators with a 100 per cent overload capacity for five minutes, with space for a third unit. The regeneration of energy when the three-phase trains are going down grade will be an important element in the power economy. There will be four brick and concrete transformer stations, each of which will contain a 3000 k.v.a., oil-cooled transformer to reduce the transmission potential to 3000 volts. The transformers are built for an ultimate difference of potential of 22,000 volts to handle the 22,500-volt transmission which will be used when the power station contains three turbo-alternators. The overhead construction will consist of steel poles carrying two 5/16-in. steel wires over each track; the third conductor will be formed by the rails. The 40, 2000-hp locomotives ordered weigh 60 tons each, representing a capacity of 33.3 hp per ton. These locomotives have five coupled axles and 42-in. diameter wheels. The two end axles have a lateral play of ⅞ in. The central wheels have no flanges. This arrangement is to allow free running around 1200-ft. radius curves. Each locomotive is to have two 1000-hp motors which will receive 300-volt current from transformers.

STORAGE BATTERY LOCOMOTIVE, LONDON, ENG.

The following are some particulars of two storage-battery locomotives used on the Metropolitan District (underground) Railway, London, England. One of these is shown in the accompanying cut. These locomotives were built to replace steam locomotives for taking breakdown trains from Lillie Bridge yard and for switching permanent way material, etc., in the same yard. The Lillie Bridge yard is not fitted with conductor rails. These locomotives are also used for hauling ballast trains at night. They are equipped with a special control apparatus so that they may be worked from the current rails when current is available or from the accumulator when the current is switched off the line after traffic hours. The total weight of each locomotive is approximately 70 tons; the accumulator itself weighs 32 tons.

Each locomotive is mounted on two motor trucks, each fitted with two G.E.-69 motors. When running off the current rails the motors are connected all four in series when starting. For higher speeds the motors are connected in pairs and each pair is connected in series so that at full speed running off the current rails the locomotives attain about 20 m.p.h. and are able to pull a heavy ballast train at that speed. When



London Storage Battery Locomotive

working off the batteries only two motors are used, these being connected in series when starting and in parallel for the higher speeds. The maximum speed when running off the battery is 7 m.p.h. when hauling a train of 100 tons on the level.

The accumulators for these locomotives were supplied by the Chloride Electrical Storage Company, London, England, and are of their "C" type. Each battery is capable of giving a discharge of 179 amp for eight hours, and can discharge for short periods up to 800 amp. Each battery consists of 80 cells, each containing 21 plates. The normal battery potential is 150 volts to 155 volts. A motor-generator for charging these locomotives is installed at Ealing Common Works, and current is also obtained for charging at Lillie Bridge from a similar motor-generator in the works belonging to the Great Northern, Piccadilly & Brompton Railway. The locomotive bodies were constructed by Renshaw, of Stoke-on-Trent, England, from designs supplied by the mechanical engineering department of the Metropolitan District Company. The electrical equipment, including motors, was supplied by the British Thomson-Houston Company and is of its Sprague-Thomson-Houston type. Practically all of the control apparatus is at one end of the locomotive. Westinghouse quick-acting air brakes are installed. The compressed air is supplied by a small air compressor driven from the accumulator.

Renewable spring buffers are fitted at each end of these locomotives for coupling to ordinary ballast cars, and automatic center couplings are also fitted so that the locomotives may couple up to the company's electric passenger stock for convenience in hauling disabled cars at breakdowns.

REPRINTS OF CENTRAL ELECTRIC ASSOCIATION PAPERS

The Central Electric Accounting Conference has reprinted in pamphlet form the article "The Central Electric Accounting Conference," contributed by William H. Forse, president of the conference, to the ELECTRIC RAILWAY JOURNAL of Jan. 1, 1910, the report of the committee of the conference on "Uniform Practice in the Treatment of Car-Miles and Car Houses," submitted at the meeting of the conference in Dayton, Ohio, on Dec. 11, 1909, and the papers "Conductors' Fare Collections," by Charles E. Thompson, auditor of the Chicago & Milwaukee Electric Railroad, and "Accounting Features of the Corporation Tax Law," by E. D. Gault, auditor of the Mahoning & Shenango Railway & Light Company, both of which were also presented at the meeting of the conference on Dec. 11, 1909.

CINCINNATI ACCIDENT BOOKLET FOR CHILDREN

A valuable booklet entitled "To Help Children Avoid Accidents" has been prepared for use in Cincinnati public schools through the collaboration of William Wallace, chief city street car inspector, Department of Public Service; Thomas Fitzgerald, assistant general manager of the Cincinnati Traction Company; and F. P. Goodwin, professor of civics at the Woodward High School. The pamphlet is prefaced by a note from Frank B. Dyer, superintendent of schools, in which attention is called to the fact that there should be developed in children the wholesome habit of caution when in the streets; and by a note from a teachers' committee in which attention is called to the increasing number of wagon, automobile and street-car accidents within the past few months, despite the fact that in no cases were the accidents due to imperfect car equipment. A large proportion of the pamphlet explains what constitutes a danger zone in front and alongside of cars, under different conditions of track, line and rolling stock, skilfulness of motormen and weather. A number of clippings from Cincinnati newspapers describing typical accidents to children are also reproduced, together with the following list of warnings which the teachers are asked to impress upon their pupils:

CAUTION

Don't cross the street when a car is coming within the square.

Don't roller skate on streets where there are car tracks.

Don't play ball on streets where there are car tracks.

Don't get on or off a car until it stops.

Don't ride on the rear platform of a car. This is dangerous.

Don't touch any loose wire that you see in the street. It may be charged and hurt you.

Don't send your little brother or sister across the street to buy candy.

Don't forget the instructions of your teacher and parents.

Don't jump on or hang on any wagon or other vehicle in the street. This is extremely dangerous.

Don't cross any street until you first ascertain if any fast vehicles are approaching.

Don't get off of a car backwards. Always face the front end.

Don't cross the street directly behind a car. You are liable to be run over by a car going in the opposite direction.

Don't throw snowballs or rocks at a car. You are liable to injure someone.

Don't tease irresponsible persons on the street. They may throw at you and cause you to run in front of a car at the risk of your life.

Don't roller skate behind vehicles by holding onto same. This is very dangerous.

Don't hitch the rope of your sled to any car or other vehicle when you sled ride in winter.

Don't hold on to cars or wagons when you are riding a bicycle. This is very dangerous.

Don't ride your Irish mail down hill on streets that cross a car track; and don't ride it in streets on which street cars run.

THINGS YOU SHOULD DO

Tell your playmates to be careful when crossing a street and look out for all kinds of vehicles.

Tell your mother and sisters to wait until a car comes to a full stop before getting off or on.

Tell your mother and sisters always to get off a car facing the front end.

Tell your playmates that you will not play ball or roller skate in streets where there are car tracks. It is dangerous.

Tell your playmates to keep away from all wires that they see hanging in the street.

If you see a wire in the street emitting sparks or flashes, get away. It is very dangerous, especially in damp weather.

Always hold to your mother's hand when crossing a street with her.

ASSOCIATION CIRCULAR ON EXPRESS AND FREIGHT TRAFFIC

P. P. Crafts, chairman committee on express and freight traffic, American Street & Interurban Railway Transportation & Traffic Association, has sent out through Secretary Donecker's office data sheet No. 59 for confidential information on matters relating to the handling of express and freight traffic. The members are asked to explain how they credit earnings in their accounts and what basis and method they use for their estimates. A series of questions is also presented with reference to charging off the expense of operating the express and freight departments in various branches such as track and roadway, power, rolling stock, operation, buildings, dispatching system, management, etc. The companies are also asked to give their interest and depreciation charges, to explain what classes of traffic are termed "Freight" and "Express" respectively and to state if they handle any of this traffic by steam.

MEETING OF COMMITTEE ON INTERURBAN RULES

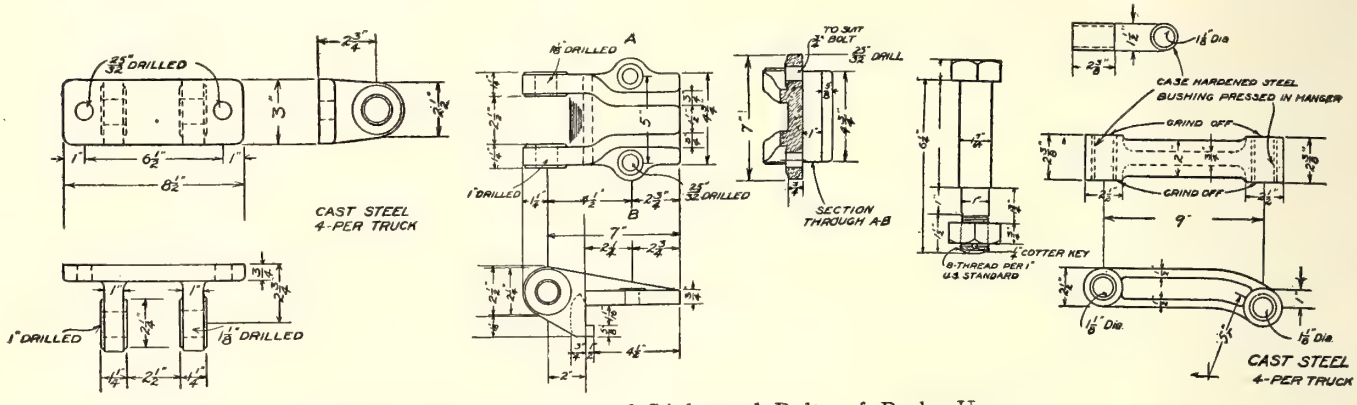
The committee on interurban rules of the American Street & Interburban Railway Transportation & Traffic Association held a meeting at the Hotel Hollenden, Cleveland, Ohio, on June 22. There were present: C. D. Emmons, Fort Wayne & Wabash Valley Traction Company, chairman; J. E. Duffy, Syracuse Rapid Transit Railway Company; W. R. W. Griffin, East Liverpool Traction & Light Company; J. W. Brown, West Penn Railways; H. A. Nicholl, Indiana Union Traction Company, and C. F. Handshy, Illinois Traction System.

Mr. Emmons read some correspondence which he had had with a number of steam railroad officials regarding a conference with them to discuss the subject of rules. The committee then took up the consideration of the code of interurban rules adopted last October at the Denver convention, beginning with the rules covering the movement of trains by train order. The changes proposed and accepted by the committee consisted largely in adopting the wording of the American Railway Association's standard code of rules. There was considerable discussion on the subject and the committee decided to add a few rules necessary for the operation of interurban cars by telephone dispatching and to permit of direct communication between the dispatcher and the train crews. In the afternoon the committee took up the forms of train orders and adopted the forms given in the American Railway Association standard code with a few slight additions and modifications.

The traffic of the municipal street railways of Liverpool, England, for 1909 was as follows: Mileage, 11,952,373; passengers, **121,532,940; receipts, $2,727,767,** which left a net profit of $400,-242, while the contribution of the system to the city relief fund amounted to $133,411. The experiment of cars wholly first class was initiated on one of the routes in 1908. Experience proved the necessity of reserving the inside of the cars only for first-class traffic, while utilizing the upper deck at the usual prices. First-class fares have been extended to a second route, the fare to be 4 cents for any distance.

BRAKE HANGERS IN RICHMOND

The accompanying drawings show the details of the brake hanger designed by the mechanical department of the Virginia Railway & Power Company, Richmond, Va., to take the place of various hangers originally furnished with the trucks. The original hangers were superseded because whenever any part, such as the upper casting, lower casting or hanger links, wore out, it was necessary to scrap the entire hanger. In this new hanger a case-hardened pin, made with a shoulder, locks rigidly against the upper castings so that nothing can wear on the latter. This pin is locked in the lower casting in the same way so that the lower casting is also saved from wear. The hanger links between the two castings are provided with case-hardened bushings both top and bottom to take up all hanger abrasion.



Top and Bottom Castings and Links and Bolts of Brake Hanger

When these bushings are worn out, nothing more than a hammer is necessary to knock out the old bushings and press in a new one. It will be seen that only the pins and bushings of this brake hanger require renewal, so that the most costly parts need be made only once.

EFFECT OF COLLISION ON A SYRACUSE CAR

A rather interesting example of sturdy car construction is shown in the accompanying illustration of a standard city car of the Syracuse (N. Y.) Rapid Transit Railway Company. The view was made from a photograph taken after the car had been struck by a locomotive and carried on its side for about

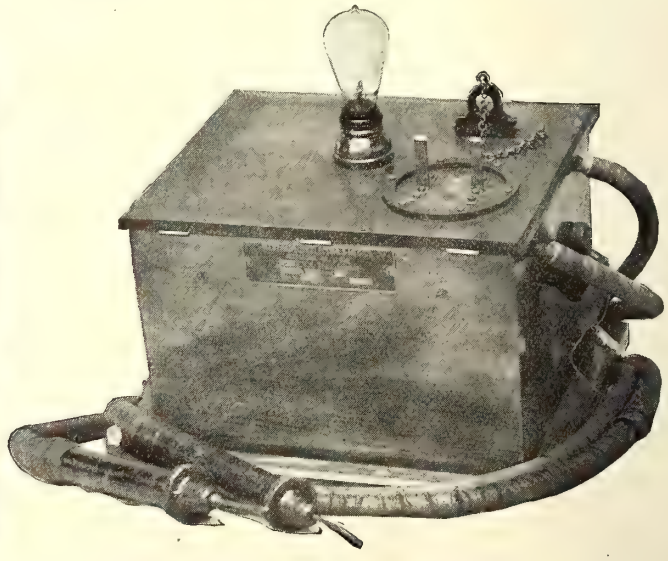


Car Struck by a Freight Train

25 ft. The collision occurred on April 22 when the car was hit at an angle of 58 deg. by the head of a train consisting of a head-on locomotive, 40 freight cars and a pusher engine. The illustration shows the side which received the impact. Only one panel was entirely destroyed while but two others received any damage. The opposite side of the car remained practically intact. It was remarkable also that not a single window was broken nor were any of the 11 passengers seriously injured. The car was returned to the car house on its own trucks. This car was of standard Brill construction with wood frame, the only reinforcing being a 15 x ¼-in. steel plate running the length of the car along the side sills. This received the impact on one side only, but it was not necessary to remove it for straightening. The train was stopped in less than 50 ft.

A LOW-TENSION PORTABLE TESTING OUTFIT

The Westinghouse Electric & Manufacturing Company has recently developed a portable testing device that will give an alternating voltage sufficiently high to test armature coils, meters, switches, and other details that are used in low-tension systems and require an insulation test varying from 500 to 2000 volts. It has a rating of 0.5 kw, and gives testing voltages up to and including 2000 volts in 100-volt steps. It is designed for circuits of any frequency from 25 cycles up. The box, in which the testing transformer is mounted, is approximately 9½ in. x 12½ in. x 14¾ in., and weighs 60 lb. The testing voltage is varied by two small rheostat dials which with the high-tension binding posts are mounted within the box. The taps from the high-tension winding of the transformer are brought to the contacts of the dial. When the hinged cover is lifted to change the dial setting, the low-tension primary circuit is automatically opened, so that the box is absolutely fool-proof against any touching of the dials, binding posts, etc., while the transformer is excited. Two high-tension testing leads, which consist of rubber-covered cable, passing through rubber tubing, are brought out of the box and provided with heavily insulated terminals so that they may be handled with perfect safety. A pilot lamp indicates when the primary circuit is closed.



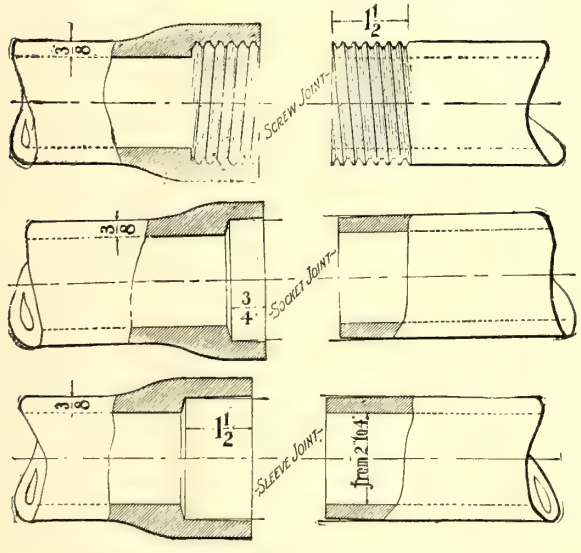
Low-Tension Portable Testing Set

FIBER CONDUIT FOR UNDERGROUND CABLES

The cable conduit recently placed on the market by the H. W. Johns-Manville Company, New York, known as J-M fiber conduit, is made of indurated fiber, a material which has been used very extensively for insulating purposes, such as third-rail coverings, controller linings, battery boxes, etc. In making this conduit, the fiber is molded into shape under high temperature and immense pressure, and is entirely without grain or laminations. This process gives each length of conduit a solid, ⅜-in. one-piece homogeneous wall, with a tensile strength that is remarkable when compared with the light weight of the conduit. However, the most interesting feature of this conduit lies in the bell joints illustrated. One end of each section is belled out with an opening as large as the outside diameter of the opposite end of the next section. Any two sections fit together without any reduction in the wall thickness of either section at the joint.

In laminated fiber conduit, half the wall thickness at the ends of each length must be cut away in order that one length may fit or screw into the other. This, of course, reduces the strength of the joint by half.

The manufacturer has also arranged to make this new conduit with straight line joints, which are machine-moulded and



Three Types of Fiber Conduit Bell Joints

are perfectly smooth inside. Each length of the conduit is also smooth throughout its bore. This greatly facilitates the insertion of cables and saves them from abrasion. It is asserted that since there are no seams or roughness at the joints and as the air-tight joints prevent particles of concrete from seeping through, a No. 6 wire can be pushed through each duct from manhole to manhole, doing away with the ropes and rods necessary with ordinary conduits. The smooth, tight joints and the smooth bore of this conduit should add greatly to the life of cable.

Tests made of this conduit with ⅜-in. thickness of wall show that it has an average puncture voltage of 40,800 volts dry and 33,000 volts after 40 hours immersion in water. Danger of electrolysis should therefore be practically eliminated by the use of this conduit. This conduit weighs only about one-sixth as much as stone. This makes it easier to handle and cuts down the freight charges. Breakage with this conduit is also reduced to a minimum because of the great tensile strength of its walls. A variety of fittings such as bends, elbows, tees, etc., provide for bends and curves in the trenches. Two, three and four-way junction boxes provide for branch and service connections.

The Adawara (Japan) Electric Railway proposes to expend about $2,000,000 on the extension of its Kozu-Yumato line to Gotemba.

EXHIBITS AT THE ATLANTIC CITY CONVENTIONS

The exhibits of railway equipment and supplies made this year at the Atlantic City conventions of the Master Mechanics and Master Car Builders' Association exceeded in number and space occupied those of any previous conventions. A total of 71,453 sq. ft. of floor space on Young's Million-Dollar Pier was occupied by the exhibit booths of 228 companies. The booths were all of uniform design and many were elaborately decorated with rugs and flowers. All of the machine tools and most of the other heavy exhibits were grouped on the south side of the pier near the entrance. Among the manufacturers of electric railway supplies who exhibited were the following:

Acme White Lead & Color Works, Detroit, Mich., showed samples of railway paints, enamels, colors and varnishes.

Adams & Westlake Company, Chicago, Ill., had an exhibit of electric, gas and oil car lighting fixtures, basket racks, car hardware, white Ajax metal washstands, signal lamps and lanterns.

American Brake Company, St. Louis, Mo., exhibited its automatic slack adjuster.

American Brake Shoe & Foundry Company, Mahwah, N. J., had a display of samples of locomotive brake shoes, brake heads, coach brake shoes, car brake shoes.

American Car & Foundry Company, New York, N. Y., had a booth reserved for social purposes only.

American Car Screen Company, Pittsburgh, Pa., showed adjustable car ventilators.

American Mason Safety Tread Company, Boston, Mass., exhibited Mason safety treads; Empire carborundum treads; Karbolith composition floors for coaches and buildings.

American Nut & Bolt Fastener Company, Pittsburgh, Pa., displayed a stand showing application of multiple and wood fasteners, and other designs of Bartley fasteners.

American Radiator Company, Chicago, Ill., exhibited steam and hot-water boilers, radiators, tank heaters, hot blast heaters, improved car heaters, packless valves, temperature regulators and automatic air valves.

American Railway Steel Tie Company, Harrisburg, Pa., exhibited a new design of steel tie.

American Steel Foundries, New York, N. Y., exhibited Susemihl side bearings, springs, brake beams, Davis steel wheels, miscellaneous steel castings.

American Vanadium Company, Pittsburgh, Pa., had samples of vanadium alloys; vanadium iron and steel products, such as railway machinery and engineering steels, vanadium steel forgings, vanadium steel castings, vanadium brass, bronze and aluminum.

Anchor Packing Company, Philadelphia, Pa., showed metal and fibrous packings and mechanical rubber goods.

Bird & Company, J. A. & W., Boston, Mass., showed samples of Ripolin enamel, signal joint packing; Rex refrigerator felt; red and black rope car insulating paper; car roofing.

Bowser & Company, Inc., S. F., Ft. Wayne, Ind., displayed an oil storage system complete; long distance, self-measuring pumps; power pumps; automatic registering oil meters; oil storage tanks of all sizes and shapes, with pumps for handling and measuring all kinds of lubricating, paint and other oils, including gasoline, etc., suitable for storehouses, machine and paint shops.

Boyle & Company, Inc., John, New York, N. Y., exhibited bayonne roof and deck cloth, a scientifically treated cotton duck for car roofing; cotton ducks, cotton drills and sheetings for head linings, upholstering, etc.

Brill Company, J. G., Philadelphia, Pa., had on exhibit a Brill No. 27-M. C. B. 3 truck; woven cane, canvas lined and unlined, for car seats.

Buck Boring Bar Company exhibited the Buck boring bar.

Buckeye Steel Casting Company, Columbus, Ohio, showed couplers, truck and body bolsters, truck frames, journal boxes.

Buffalo Brake Beam Company, New York, N. Y., had samples of brake beams for all classes of cars, locomotives and electric equipment.

Burroughs Adding Machine Company, Detroit, Mich., ex-

hibited the Burroughs adding machine, electrically driven, for railroad accounting.

Carborundum Company, Niagara Falls, N. Y., displayed samples of Carborundum and Aloxite wheels, sharpening stones, rubbing bricks, Carborundum paper and cloth, garnet paper, Carborundum valve grinding compound.

Carnegie Steel Company, Pittsburgh, Pa., exhibited a section of standard railway track laid with 100-lb. rails and Duquesne joints on steel cross ties, with various type fittings; a section of portable track for industrial railways laid on steel cross ties; various samples of rails, cross ties and Duquesne joints; 34-in. Schoen steel wheel for street railways; 34-in. Schoen steel wheel for interurban railways.

Central Electric Company, Chicago, Ill., showed samples of Okonite wires, cables, cords and tapes, car fans, wall, oscillating and exhaust; car lamps, tungsten, tantalum and Gem; shallow flush switches.

Chase & Company, L. C., Boston, Mass., had a display of Goat brand car plushes in plain and frieze effects, Angora mohair showing process of manufacture; Chase's car seat duck.

Chicago Pneumatic Tool Company, Chicago, Ill., had an exhibit of air compressors and special drills.

Chicago Varnish Company, Chicago, Ill., had several car sides, showing "Ce Ve Process' of painting cars.

Chisholm & Moore Manufacturing Company, The, Cleveland, Ohio, exhibited a complete line of cyclone high-speed chain hoists from ½ ton to 30 tons inclusive; Matchless I-beam trolleys.

Clow, James B. & Sons, Chicago, Ill., had an exhibit of automatic closets, drinking fountains, lavatories, Buena radiators.

Coe Brass Manufacturing Company, The, Ansonia, Conn., showed samples of extruded metals in great variety of intricate designs especially adapted to railway car construction and ornamentation; also for use in electrical and other apparatus.

Coe Manufacturing Company, W. H., Providence, R. I., exhibited Coe's ribbon gold leaf and Coe's gilding wheels.

Commonwealth Steel Company, St. Louis, Mo., distributed catalogs describing its cast-steel products.

Consolidated Car Heating Company, Albany, N. Y., showed electric heaters and switches for 600 and 1200-volt operation, automatic safety train signal, Consolidated buzzer system, electric boilers.

Cooper Hewitt Electric Company, New York, N. Y., had on exhibition mercury vapor lamps and rectifier for operating same.

Crane Company, Chicago, Ill., displayed Cranetilt steam traps, motor operated valve, Crane blow-off valve, brass valves of all kinds, malleable and cast-iron fittings.

Crosby Steam Gage & Valve Company, Boston, Mass., exhibited safety valves, gages and blow-off valves, testing instruments.

Curtain Supply Company, The, Chicago, Ill., showed sample curtain fixtures and a full line of curtain materials.

Davis-Bournonville Company, New York, N. Y., exhibited samples of oxy-acetylene welds.

D. P. Company, New York, displayed dust guards.

Dearborn Drug & Chemical Works, Chicago, Ill., exhibited water treating preparations for the prevention of scale, leaking, foaming and corrosion in boilers.

Dixon Crucible Company, Joseph, Jersey City, N. J., displayed samples of graphite products especially adapted for railroad work, including Dixon pure flax lubricating graphite, graphite greases, silica-graphite paint, crucibles, belt dressings and pencils.

Dressel Railway Lamp Works, The, New York, N. Y., showed headlights, train tail lamps, coach lamps, switch lamps, semaphore lamps, station lamps, gage lamps.

Duff Manufacturing Company, The, Pittsburgh, Pa., had an exhibit of Barrett track jacks, automatic lowering jacks, geared ratchet jacks, Duff ball-bearing screw jacks, Duff-Bethlehem hydraulic jacks, independent pump hydraulic jacks.

Duntley Manufacturing Company, Chicago, Ill., showed Duntley pneumatic enroute car cleaner, Duntley air purifier for passenger coaches.

Durbin Automatic Safety Car Coupler Company, The, Fort Scott, Kan., exhibited an automatic safety car coupler or drawbar.

Edwards Company, The O. M., Syracuse, N. Y., exhibited car window fixtures, sash balances, shade rollers, metal trap doors, sheet metal specialties and railroad padlocks.

Electric Hose & Rubber Company, Wilmington, Del., had samples of braided fabric rubber hose.

Electric Storage Battery Company, The, Philadelphia, Pa., showed storage batteries for car lighting, signal, vehicle propulsion and automobile ignition service.

Fairbanks, Morse & Company, Chicago, Ill., displayed gasoline section and inspection motor cars, telescopic standpipe and sectionalized valve, chain hoists, tools, rail drills, line of geared ratchet and cone bearing screw jacks and hydraulic jacks.

Flower Waste & Packing Company, New York, N. Y., showed samples of resilient journal packing.

Ford & Johnson Company, The, Michigan City, Ind., exhibited car seats of various types, cane webbing used in car seats, reed and fiber rush chairs for railroad service.

Forsyth Brothers Company, Chicago, Ill., had an exhibit of press-steel doors, Brinkerhoff side construction for passenger car, pressed-steel mouldings and sash.

Franklin Manufacturing Company, Franklin, Pa., displayed 85 per cent magnesia boiler lagging and pipe coverings, asbestos pipe coverings and asbestos supplies, "Springtite" corrugated copper gaskets, composition metallic gaskets, "Chapman" circular glass cutter, Perfection journal box packing, wool and cotton waste.

Galena Signal Oil Company, Franklin, Pa., had a large reception booth.

Garlock Packing Company, The, Palmyra, N. Y., showed samples of throttle packing, air pump packing, new process sheet packing, new process gaskets, metal packing, hydraulic packing and steam hammer packing.

General Electric Company, Schenectady, N. Y., exhibited a portable air compresser (100 lb. pressure) with pressure regulator, 12-amp G. I. flaming arc lamps, 6½-amp multiple magnetite arc lamps, 6½-amp intensified arc lamps, "Mazda" lamps, Curtis turbo-generator for car lighting, cabinet containing an exhibit of train lighting lamps, mercury arc rectifier, 25-kw hardening furnace, emery grinder, motor generator set with starting and field rheostats, soldering irons, glue pot, solder melting pot, oil tempering bath, GE-212 railway motor, motor-driven machine tools, switchboard.

General Railway Supply Company, Chicago, Ill., showed the stub end of a vestibuled passenger car and samples of metallic (steel) sheathing; National steel trap doors; Flexolite composition flooring; Imperial car-window screens; Perfection sash balances; Resisto insulation; roller deck sash ratchets; National standard roofing; National vestibule curtain catches.

Gilbert & Barker Manufacturing Company, New York, N. Y., exhibited self-measuring pumps; oil storage tanks; oil storage systems for oil houses, storerooms, etc.; siphons; transfer pumps; storage indicators and lubricating oil tanks.

Gold Car Heating & Lighting Company, New York, N. Y., had a display of car heating and lighting apparatus and car ventilators.

Goldschmidt Thermit Company, New York, N. Y., exhibited materials required for making welds on broken wrought-iron and steel sections; samples of welds made on steel bars, trolley rails; standard and extra heavy pipes, etc.; metals free from carbon produced by the Thermit process; cans of heating thermit for making semi-steel; cans of titanium thermit for purifying molten iron.

Green, Tweed & Company, New York, N. Y., showed samples of Palmetto packing and reversible ratchet wrenches.

Grip Nut Company, Atlantic City, N. J., exhibited Grip nuts of all sizes.

Hale & Kilburn Manufacturing Company, The, Philadelphia, Pa., exhibited seats for all standard types of railway cars; all-

steel seats for steel cars; steel interior finish; steel doors; steel sash.

Harrington, Son & Company, Inc., Edwin, Philadelphia, Pa., showed Peerless hoists; screw hoists; differential hoists; plain and geared travelers to run on lower flange of I-beam.

Heywood Brothers & Wakefield Company, Wakefield, Mass., had a display of a complete line of Universal car seats, showing pressed-steel features.

Independent Pneumatic Tool Company, Chicago, Ill., exhibited Thor piston air drills; pneumatic riveting, chipping, caulking and flue-beading hammers.

International Correspondence Schools (Railway Department), Scranton, Pa., had a booth attended by students from various Southern railway apprentice instruction classes exhibiting specimens of the work of the students in mathematics and mechanical drawing.

Jenkins Brothers, New York, N. Y., displayed samples of brass globe valves, regular and extra heavy; automatic Graber gages; radiator valves and air valves; iron-body globes, gates, etc.; safety car disks; "96" packing; pump valves and Jenkins disks.

Johns-Manville Company, H. W., New York, N. Y., exhibited high and low-pressure sheet packings; high and low-pressure pipe coverings; insulating cements; steel passenger car insulation; asbestos roofings, car and engine cab roofings; asbestos lumber; electrical fiber conduit; underground pipe covering; J-M sanitor seats and tanks; vulcabeston packing; vitribestos pipe coverings; bridge deckings; J-M asbestos sill covering; train pipe coverings; furnace cements.

Joliet Railway Supply Company, Joliet, Ill., exhibited brake beams; Perry passenger and freight roller side bearings.

Joyce-Cridland Company, The, Dayton, Ohio, showed several types of railroad jacks.

Kerite Insulated Wire & Cable Company, New York, N. Y., displayed samples of Kerite insulated wires and cables; Kerite tape.

Keystone Lantern Company, Philadelphia, Pa., exhibited the Casey standard railway hand-lantern.

Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio, had a track exhibit of an automatic M. C. B. air dump construction car.

King Automatic Car Platform Company, Inc., Washington, D. C., showed models of sliding platform extensions for passenger coaches.

Lackawanna Steel Company, New York, N. Y., exhibited rails; rail joints; tie plates; beams; channels; angles; steel plate; steel forgings; corrugated and deformed bars; twisted squares; the Abbott base plate; sheet piling.

Lehon Company, The, Chicago, Ill., showed Roofrite roofing for coaches, refrigerator cars, locomotives and railroad shops; also dry-art insulating paper.

Linde Air Products Company, Buffalo, N. Y., had an exhibit of oxy-acetylene welding and oxy-coal gas cutting apparatus and wrecking equipment.

Love Brake Shoe Company, Chicago, Ill., displayed Armbrust brake shoes for driver brakes, passenger, freight and coach brakes; also motor brake and traction brake shoes.

Lunkenheimer Company, Cincinnati, Ohio., exhibited engineering specialties, including brass and iron gate, globe, blow-off and swing check valves.

Lupton Sons Company, David, Philadelphia, Pa., exhibited Lupton rolled-steel skylight; Lupton steel sash; Pond continuous sash and Pond operating device for pivoted sash.

Macleod & Company, Walter, Cincinnati, Ohio, showed lights for wrecking outfits and construction work; portable oil burners; sand-blast machines; oil furnaces; tire heaters; water-softening apparatus.

McConway & Torley Company, The, Pittsburgh, Pa., exhibited freight couplers; Pitt passenger coupler; a new swivel-head coupler with McConway centering device as applied to new steel passenger coaches of the Pennsylvania Railroad; Buhoup steel truck side frame; Buhoup three-stem coupler, and the McConway steel wheel.

McCord & Company, Chicago, Ill., showed several types of journal boxes; National equalizing wedge; McCord draft gear; and McCord spring dampener; McKim gasket. Models of Universal windows for wood and steel cars; Universal weather-stripping; gravity wedging sash locks; Universal wedging sash locks; Universal extension sash locks; one special design metal sash; Universal deck sash ratchets.

McGraw Publishing Company, New York, N. Y., distributed copies of ELECTRIC RAILWAY JOURNAL; *Electrical World; Engineering Record;* electric railway directories.

Midvale Steel Company, The, Philadelphia, Pa., exhibited rolled-steel wheels.

Milburn Company, The Alexander, Baltimore, Md., had on exhibit a railroad construction light, 5000 cp; lights for wreckers, cranes, steam shovels, etc.; fire lights; miners' lights.

Modoc Soap Company, Philadelphia, Pa., showed samples of Perfectol car cleaner.

Nachod Signal Company, Philadelphia, Pa., exhibited Nachod automatic block-signal, type C, connected up with miniature track to show operation; high-speed trolley contact switch.

National Lock Washer Company, The, Newark, N. J., exhibited sash locks; curtain fixtures, sash balances; spring parallel sash guides and lock washers; chain attaching device for sash balances.

Newhall Engineering Company, George M., Philadelphia, Pa., showed photographs of wrecking and locomotive cranes; pillar and transfer cranes; pile drivers; transfer tables; rail saws. etc., as manufactured by the Industrial Works, Bay City, Mich.

Nickelized Casting Company, Pittsburgh, Pa., exhibited nickelized chilled car wheels cast from open-hearth furnace and double annealed.

Niles-Bement-Pond Company, New York, N. Y., exhibited several large machine tools.

Norton Company, Worcester, Mass., had a large showcase containing an assortment of alundum grinding wheels and India oil stones; alundum in grains.

Norton, Incorporated, A. O., Boston, Mass., exhibited high-speed ball-bearing lifting jacks.

Okonite Company, The, New York, N. Y., showed specimens of all kinds of cables and wires for electric light, power, transmission, telephone, telegraph, etc.; also specimens of crude fine Para rubber.

Osbun Company, B. M., Chicago, Ill., showed samples of the new "Boss" nut lock.

Pantasote Company, New York, N. Y., displayed Pantasote curtains and materials; Pantasote upholstery fabrics; Agasote millboard for headlinings, interior trim, etc.

Pay-Within Car Company, Philadelphia, Pa., had a working exhibit of a center side door for the Interborough subway cars of New York.

Pennsylvania Steel Company, The, Steelton, Pa., displayed switch stands; models of frogs and switches; pictures of material made by the frog and switch and bridge and construction departments; samples of rivet steel; samples of "never slip" switch plate.

Pressed Steel Car Company, Pittsburgh, Pa., displayed photographs of its various products.

Railways Materials Company, The, Chicago, Ill., had a reception booth.

Rapp Company, John W., New York, N. Y., exhibited steel car doors and moldings.

Restein Company, Clement, Philadelphia, Pa., showed samples of fibrous packing for steam, water, ammonia, hydraulics, oil, gases, acids, etc.

Revolute Machine Company, New York, N. Y., exhibited a continuous electric blue-printing machine.

Rockwell Furnace Company, New York, N. Y., exhibited furnaces for railroad shops.

Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., exhibited cast-steel bolsters and truck side frames.

Scully Steel & Iron Company, Chicago, Ill., exhibited blow-off valves; journal-box jacks; boiler tools; expanders, etc.

Sherwin-Williams Company, Cleveland, Ohio, displayed panels showing Sherwin-Williams passenger coach painting systems.

Spencer Turbine Cleaner Company, Hartford, Conn., exhibited a 5-hp, vertical, direct-driven turbine cleaner; new pressed-steel vacuum cleaning tools.

Sprague Electric Company, New York, N. Y., displayed flexible steel-armored air-brake hose; flexible steel-armored signal hose; flexible steel-armored steam, pneumatic, hydraulic and water hose and fittings for shop use; electric conduit supplies; electric fans.

Standard Car Truck Company, Chicago, Ill., displayed Barber roller-bearing center plates.

Standard Coupler Company, New York, N. Y., exhibited steel platforms; friction draft gears and Standard slack adjusters.

Standard Steel Car Company, Pittsburgh, Pa., had a reception booth.

Standard Steel Works Company, Philadelphia, Pa., had a reception booth.

Strong, Carlisle & Hammond Company, Cleveland, Ohio, exhibited Randall graphite sheet lubricator; Strong's steam specialties, including steam and vacuum traps, pressure-reducing valves, steam separators, and the Handy wrench.

Symington Company, The T. H., Baltimore, Md., had a large exhibit of journal boxes; flexible dust guards and roller side bearings.

Templeton, Kenly & Company, Ltd., Chicago, Ill., exhibited Simplex car and track jacks.

Tindel-Morris Company, Eddystone, Pa., Paragon cold saw machine; standard and structural type "Tindel" inserted tooth cold saws; saw grinder.

Titan Steel Casting Company, Newark, N. J., showed samples of body and truck bolsters; manganese steel gears and pinions.

Underwood & Company, H. B., Philadelphia, Pa., exhibited several portable machine tools.

Union Spring & Manufacturing Company, Pittsburgh, Pa., had a display of elliptic and coil springs; pressed-steel spring plates and journal box lids; all-steel Kensington journal boxes; steel castings.

U. S. Metal & Manufacturing Company, New York, N. Y., exhibited diamond tapered steel pole; Owen-Cochran pressed-steel journal box; Barol wood preservative; St. Louis surfacer paint panels; Columbia lock nuts.

Vanadium Metals Company, Pittsburgh, Pa., showed samples of vanadium metals, comprising vanadium bronze shown in castings of bells, brasses, cold-drawn rods and sheets; Vanadium non-corrosive silver metal shown in ornamental fittings; Vanadium anti-friction metal.

Van Dorn Company, W. T., Chicago, had a very interesting exhibit at the Reading Terminal of one of the Van Dorn solid piece steel ends for freight cars. The end was one recently ordered and purchased by the Southern Pacific Railway Company and was exhibited at Atlantic City with the permission of that company.

Von Kokeritz & Company, R. G., New York, N. Y., exhibited durable high-pressure sheet packing and gaskets; Heather high-pressure piston packing; Hydra hydraulic packing; Cosmos paint; Glardon clips.

Walker & Bennett Manufacturing Company, New York, N. Y., exhibited simplified car seats.

Watson-Stillman Company, The, New York, N. Y., showed shop jacks; wrecking jack; journal-box jack; outside and inside pump and independent pump type jacks; telescopic motor lift jack; portable hydraulic beam punch; hydraulic T-rail bender; 125-ton crankpin press; 200-ton motor-driven hydro-pneumatic wheel press; 30-ton portable axle bearing press; portable shaft straightener.

West Disinfecting Company, Inc., New York, N. Y., displayed samples of soap dispensers; disinfectants; disinfecting appliances for toilet rooms; fumigating apparatus.

Westinghouse Air Brake Company, Pittsburgh, Pa., had in operation a seven-car passenger train rack, equipped with the P. C. equipment; in connection with this rack is an electric sign showing braking power and deceleration curves for the purpose of comparing the P. C. equipment with the high-speed equipment in the stopping of modern passenger trains; empty and load brake equipment as applied to cars.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., showed motors, controllers, transformers, switchboards and arc lamps. It also exhibited one of the new side-rod electric locomotives built for the New York terminal of the Pennsylvania Railroad. This locomotive was shown on the track on Mississippi Avenue.

Westinghouse Lamp Company, Bloomfield, N. J., exhibited railway incandescent lamps; tungsten and carbon filaments.

Westinghouse Machine Company, Pittsburgh, Pa., exhibited the Le Blanc condenser and vacuum pump, turbine-driven.

Wheel Truing Brake Shoe Company, Detroit, Mich., displayed samples of abrasive brake shoes.

Whipple Supply Company, New York, N. Y., had a reception booth.

Williams Company, J. H., Brooklyn, N. Y., exhibited samples of drop forgings.

Wilson Remover Company, New York, N. Y., exhibited a varnish remover and instruments.

Wood, Guilford S., Chicago, Ill., had an exhibit of Wood's flexible nipple end hose protector; monogram bracket and samples of rubber tiling.

Wright Wrench Manufacturing Company, The, Canton, Ohio, showed Wright monkey and pipe wrenches.

Yale & Towne Manufacturing Company, New York, N. Y., exhibited electric hoists; triplex chain blocks; I-beam trolleys; electric triplex hoists; padlocks; car-door checks; night latches; builders' hardware.

A BOILER PLATE CULVERT

The possibility of making practical use in one department of material discarded by another is illustrated in one instance by the Augusta-Aiken Railway. Some time ago it was necessary



Culvert Made of Old Boiler Shells

to install a 24-ft. culvert over a creek near Langley, along the interurban line to Aiken. The material used for this purpose consisted of the shells of two old Babcock & Wilcox boilers each 6 ft. in diameter and 12 ft. long. Concrete was placed over the intersection of the two shells while the rest of the structure was built up of brick as shown in the accompanying cut.

As a means for supplying steam with which to soften wood for bending during the summer, when it is not economical to operate the shop boiler plant, the shop forces of the Illinois Traction System have installed just outside the wood mill at the Decatur shops a Peter Smith No. 2-B heater. Connected above this heater is a steam drum with a water gage and leading from the drum are connections to a steaming box within the shop and a section of pipe placed close outside the shop wall in which long pieces of wood may be steamed.

News of Electric Railways

Cleveland Traction Situation

At a meeting of the directors of the Cleveland Railway on June 18, 1910, J. J. Stanley, president of the company, submitted a report which shows that there was a deficit of $68,298.19 for the quarter ended May 31, 1910, although the monthly reports made according to the Tayler ordinance indicate a surplus of $70,494.16. The allowance made under the Tayler grant for maintenance and renewal is said to be inadequate. A portion of the track on Superior Avenue has been renewed and the track on Payne Avenue has been rebuilt, and the cost has been incorporated in the expenditures made for the period named. The amount expended for maintenance and renewal was $409,466.22, while the allowance under the Tayler ordinance was $250,706.80. The number of car-miles operated was 23,941,101 last year, while in 1907 the number was 25,590,566. No remarks or suggestions were made in the report, and the directors took no action, other than to file it.

Mr. Stanley stated that the expenses for the quarter were about normal. For June, July and August the allowance for maintenance and renewals will be 6 cents a mile, but this will hardly cover the deficit for the quarter. It is probable, however, that the company will go through the second quarter without taking any action on this matter, as it is desired to ascertain the results of operation under the additional allowance. If it is shown that the allowance is insufficient, then the Council must make some provision for the additional necessities. No tracks less than 20 years old have been renewed, this being the average life of track agreed upon during the settlement negotiations.

The statement for the first quarter, prepared according to the Tayler ordinance, follows:

Gross earnings from operation		$1,449,661.22
Maintenance	$250,706.80	
Operating expenses	720,782.06	
Total operating expenses, 15.50 cents per car-mile		971,488.86
Net earnings from operation		$478,172.36
Miscellaneous income		6,510.75
Gross income, less operating expenses		$484,683.11
Taxes		80,328.52
Income, less operating expenses and taxes		$404,354.59
Interest		333,860.43
Surplus		$70,494.16

The statement prepared by Mr. Stanley for the directors follows:

Gross earnings from operation		$1,449,661.22
Maintenance (actual)	$409,466.22	
Operating expenses (actual)	700,814.99	
Total operating expenses, 17.71 cents per car-mile		1,110,281.21
Net earnings from operation		$339,380.01
Miscellaneous income		6,510.75
Gross income, less operating expenses		$345,890.76
Taxes		80,328.52
Income, less operating expenses and taxes		$265,562.24
Interest		333,860.43
Deficit		$68,298.19

The report for May, prepared in accordance with the plan in the Tayler grant, shows a surplus of $26,355.29. It is believed that a readjustment of the allowance for maintenance and renewals and the rate of fare is inevitable.

The board of arbitration which recently heard arguments on the demand of the motormen and conductors for an increase of wages to 32 cents an hour flat, has reported an agreement on 27 cents for the first year and 30 cents thereafter. The present scale provides for a range of wages from 23 cents to 26 cents per hour. The decision of the board says in part:

"The arbitrators have come to an agreement that the rate of wages of motormen and conductors for the first year of service should be 27 cents an hour, and that the rate for the second year and thereafter should be 30 cents per hour.

"Further, that the scale of wages herein provided shall be in force and take effect from and after June 15, 1910."

Elroy M. Avery, who was a member of the board of arbitration, said that the arbitrators did not take into consideration the effect that the increase of wages would have on the fare. Their work was based upon the contract made by the Cleveland Electric Railway in 1906, and was done wholly with a view to giving the men what the arbitrators considered fair. The increased expense will have to be arranged by the company and the city. Mr. Stanley estimates that the new wage scale will increase operating expenses $216,000 a year. He is not opposed to the advance except upon the principle that it will destroy the possibility of operating at the fare that has been fixed by the City Council. Both the rate of fare and the allowance for maintenance and renewals are subjects of arbitration in case the company and the City Council cannot agree upon terms.

Transit Affairs in New York

Justice Brady, of the Supreme Court, has dismissed the charge of criminal contempt of court brought by him against William R. Willcox, chairman of the Public Service Commission, for an alleged statement by the latter which Justice Brady took as a reflection on the court. The version of Mr. Willcox's statement to which Justice Brady took exception was printed in a newspaper, whereas the full statement of the Public Service Commissioner, as submitted in writing to the court, differed materially from the newspaper article. The proceeding brought by Justice Brady was the outgrowth of a suit by the Public Service Commission against Frederick W. Whitridge, as receiver of the Union Railway, for $750,000 for alleged failure to equip cars with wheel guards. The case came before Justice Brady for trial. At the outset he explained that he was a stockholder in the Third Avenue Railroad, of which Mr. Whitridge is also receiver, at the same time expressing some hesitation about presiding over the trial of the case. Counsel for plaintiff and defendant agreed to try the case before Justice Brady. A few days later, on the motion of counsel for Mr. Whitridge, the justice dismissed the suit on a technicality.

The Public Service Commission, by a majority vote, has approved an opinion prepared by Commissioner McCarroll relating to the route of the Fourth Avenue subway, Brooklyn. The commission recently adopted a resolution asking the Board of Estimate to authorize the widening of Ashland Place, Brooklyn, by 10 feet, so that the subway would be shifted 10 feet west of the present plan, and so avoid possible danger to the Academy of Music. At that time Commissioners Bassett and Maltbie submitted a memorandum, in which they advocated the abandonment of the present planned line north of Atlantic Avenue and proposed that it be deflected to the westward through Atlantic Avenue and the tunnel under the East River so as to connect at the Battery with the Broadway-Lexington Avenue subway. In the opinion made public on June 6, 1910, Commissioner McCarroll advocates the present route and he is supported by Chairman Willcox and Commissioner Eustis. The final conclusion is that, considering the great delay which is likely to be caused by attempting to secure authorization for a new route it would be a great mistake to abandon any part of the Fourth Avenue subway, already under construction, even though the cost would be greater than estimated.

Quarterly Meeting of the Central Electric Accounting Conference

The regular quarterly meeting of the Central Electric Accounting Conference will be held on board the White Star Line steamer *Greyhound* leaving Toledo, Ohio, for Detroit on June 25, 1910, at 8:30 a. m. The following program will be carried out in the smoking room on the hurricane deck of the steamer at 9 o'clock:

Business session.

Remarks by H. S. Swift, president of the American Street & Interurban Railway Accountants' Association.

Paper, "Park Accounting," by E. L. Schmock, assistant secretary-treasurer of the Cleveland, Painesville & Eastern Railroad.

Paper, "Comparative Statements," by W. B. Wright, auditor of the Indianapolis & Cincinnati Traction Company.

Discussion, "Interline Baggage," led by Walter Shroyer, auditor of the Indiana Union Traction Company. Adjournment.

The *Greyhound* will leave Toledo at 8:30 a. m. on June 25, and arrive at Detroit at 1 p. m. The fare is 75 cents one way or $1.25 round trip, good returning any time during the season. The return may be made the same day if desired, the boat leaving Detroit at 4:30 p. m. and arriving at Toledo at 8:30 p. m. It has been suggested that members of the conference have their wives accompany them to the meeting. Particular attention is called to the fact that H. S. Swift is to address the conference.

Receiver Whitridge Replies to a Criticism

Frederick W. Whitridge, receiver of the Third Avenue Railroad, New York, N. Y., has addressed the following letter to James N. Wallace, president of the Central Trust Company, New York, chairman of the committee of bondholders of the company, in reply to a letter which Mr. Wallace received from a bondholder who objected to Mr. Whitridge's attitude toward the Public Service Commission of the First District of New York:

"Referring to Mr. ——'s letter to you of the first instant, protesting against the animosity being engendered between the Public Service Commission and myself as receiver of the Third Avenue Railroad system, I beg to say that my own feeling about the members of the Public Service Commission is entirely impersonal, and that I do not consider that I am responsible for any animosity that they may cherish toward me or anybody else.

"There are about 2000 printed pages of correspondence between the commission and myself, and with the exception of two short letters, there is not a line in the whole 2000 pages from me except by way of reply to some order or communication from the commission.

"The commission has brought nine suits against me, each of which in my judgment as a lawyer was without reasonable foundation. All of them have been dismissed or decided in my favor, and the commission now appears to have entirely lost its temper over its defeat and has begun to be merely personally abusive.

"I think Mr. —— should consider these matters and I have only to say that on the slightest intimation from you or from any considerable number of bondholders that my services are imperiling their property I shall be only too happy to retire.

"And having said that, Mr. —— will pardon me for saying that his letter seems to me to be an excellent instance of that pusillanimity of the American people, and of capitalists in particular, which causes them to bow before all public officials and to be willing to submit to almost anything from them. This unwillingness on the part of the people—and particularly of corporations—to stand up for their rights has for years seemed to be one of the causes why this country has to submit to so much bad government.

"In this case the commission seems to share the widespread notion, engendered by politicians and newspapers, that corporations and everybody connected with them are neither law-abiding, truthful nor honest. That, in some cases, may be true. It is not true of me. And I find the state of mind of the Public Service Commission toward most of the things with which they have to deal in this district to be stupid and insolent.

"I long ago made up my mind that, so far as I was concerned, it was my duty as a citizen to uphold my own interest, and anybody else's interest intrusted to me, against any sort of governmental aggression or incompetency, and that it was my duty to treat every official as his character required that he should be treated—and not otherwise. That course I intend to continue to pursue. I think in the long run it will be found beneficial to the interests intrusted to me. But if anybody thinks otherwise, I shall, as I say, be only too happy to retire from the position I now hold."

Company Asked to Outline Plan of Settlement in Detroit.—Mayor Breitmeyer, of Detroit, has asked J. C. Hutchins, president of the Detroit (Mich.) United Railway, to outline in detail a plan along the line of his suggestion of a settlement of the street car question, contained in the letter of Mr. Hutchins to the Mayor, mention of which was made in the Electric Railway Journal on June 18, 1910.

Strike in Yonkers.—The employees of the Yonkers (N. Y.) Railroad went on strike on June 15, 1910. They have demanded a flat rate of pay of 30 cents an hour instead of the present sliding scale of wages of from 21 cents to 25 cents an hour. Leslie Sutherland, who is operating the property as receiver, requested the men to return to work pending an adjustment of the wage question. This the men declined to do, and Mr. Sutherland has stated that the cars will be permitted to remain in the car house until the men return to work.

Meeting of Wisconsin Electrical Association.—The executive committee of the Wisconsin Electrical Association met at the office of Clement C. Smith, president of the association, in Milwaukee, Wis., on June 15, 1910, and preliminary arrangements were made to hold a midsummer meeting of the association at the Oshkosh Yacht Club, on June 28 and 29. J. P. Pulliam, general manager of the Wisconsin Electric Railway, Oshkosh, Wis., is chairman of the entertainment committee, and will make hotel reservations. The program will be devoted largely to a discussion of rate problems. A luncheon and outing at Electric Park are planned.

Outing of the New England Street Railway Club.—The July outing of the New England Street Railway Club will be a ladies' day and will be held on July 1, 1910, at Narragansett Bay, R. I. A special train will leave Boston at 9:30 a. m., and arrive at Providence at 10:30 a. m., and at 10:50 a. m. the steamer *Warwick*, of the Providence & Fall River Steamboat Company, will leave Providence for Narragansett Bay. The *Warwick* will dock at Tiverton, R. I., at 1 p. m., and at 1:20 p. m. a Rhode Island clambake will be served at Island Park. At 2:30 p. m. the *Warwick* will proceed down Sakonett River, around Newport, and return through Narragansett Bay to Providence, at 7 p. m. A special train for Boston will leave Providence at 7:35 p. m. and arrive at Boston at 8:35 p. m. Tickets for the day's entertainment, including transportation from Boston, dinner, etc., are $3 each. Tickets to members who join the party at Providence and do not use the transportation ticket between Providence and Boston are $1.75.

Trains to the New York Convention.—The Street Railway Association of the State of New York mailed with the program of the convention of the association at Cooperstown, N. Y., on June 28 and 29, 1910, published in the Electric Railway Journal of June 18, 1910, a time-table of trains between New York and Cooperstown and between Buffalo and Cooperstown over the New York Central & Hudson River Railroad and the Otsego & Herkimer Railroad, and between Albany and Cooperstown over the Delaware & Hudson Railroad. In traveling over the New York Central & Hudson River Railroad change has to be made to the Otsego & Herkimer Railroad at Herkimer. Over the New York Central & Hudson River Railroad and the Otsego & Herkimer Railroad trains leave New York daily at 10:30 a. m. and 12:03 a. m., and arrive at Cooperstown at 5:30 p. m. and 10:30 a. m., respectively. Returning trains leave Cooperstown at 7:19 a. m., 11:19 a. m., 6:19 p. m. and 8:48 p. m., and arrive in New York at 3:45 p. m., 8:33 p. m., 5:05 a. m. and 5:05 a. m., respectively. Over the New York Central & Hudson River Railroad and the Otsego & Herkimer Railroad trains leave Buffalo at 1:45 a. m., 4:10 a. m., 7:55 a. m. and 10:00 a. m., and arrive at Cooperstown at 10:30 a. m., 11:54 a. m., 3:45 p. m. and 5:54 p. m., respectively. Returning trains leave Cooperstown at 6:19 a. m., 7:19 a. m., 12:19 p. m. and 1:19 p. m., and arrive at Buffalo at 1:20 p. m., 4:20 p. m., 8:05 p. m. and 8:45 p. m., respectively. Over the Delaware & Hudson Railroad, trains leave Albany at 7:30 a. m., 10:00 a. m., 3:20 p. m. and 4:30 p. m., and arrive at Cooperstown at 10:55 a. m., 1:20 p. m., 7:30 p. m. and 7:30 p. m., respectively. Returning trains leave Cooperstown at 6:00 a. m., 9:10 a. m., 11:15 a. m., 3:25 p. m. and 5:45 p. m., and arrive at Albany at 9:20 a. m., 12:15 p. m., 2:00 p. m., 6:35 p. m. and 10:50 p. m., respectively.

Financial and Corporate

New York Stock and Money Market

June 21, 1910.

Wall Street has rarely had duller weeks than the one just passed. There was practically no outside trading and the dealing among the professionals was very limited. In spite of this stagnation there was an extremely healthy tone to the market and prices were remarkably well sustained. The passage of the railroad bill has relieved the uncertainty.

The money market continues to be easy with the banks abundantly supplied with funds. Quotations to-day were: Call, 2½ to 3 per cent; 90 days, 3½ per cent.

Other Markets

After having displayed some strength earlier in the week and advancing to 21½, Rapid Transit, in the Philadelphia market, to-day took a down turn and dropped to 19½. Although the market was otherwise lifeless, there was considerable desire to sell this issue and about 4000 shares changed hands in the day's trading. Other tractions are quoted at former figures.

In the Chicago market there has been some activity in Elevated shares owing to the prospect that the merger plans will be carried through. Both Northwestern and Metropolitan have been active, and the preferred issue of the former has advanced 10 points. Metropolitan preferred has also recorded good advances.

There has been very little activity in traction securities in the Boston market and quotations are practically unchanged.

In Baltimore there has been limited trading in both the bonds and shares of the United Railway Company, but prices have only fluctuated fractionally.

Quotations of various traction securities as compared with last week follow:

	June 14	June 21.
American Railway Company	a44¼	a43¾
Aurora, Elgin & Chicago Railroad (common)	a60	*60
Aurora, Elgin & Chicago Railroad (preferred)	a93	*93
Boston & Suburban Electric Companies	a14	a14
Boston & Suburban Electric Companies	a14	a14
Boston & Suburban Electric Companies (preferred)	a74¼	a74
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a41	a41
Brooklyn Rapid Transit Company	77½	79
Brooklyn Rap. Transit Company, 1st pref. conv. 4s	83¾	83⅞
Capital Traction Company, Washington	a130	a129½
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a80	a75
Chicago Railways, ptcptg, ctf., 2	a18½	a19
Chicago Railways, ptcptg., ctf., 3	a11	a11
Chicago Railways, ptcptg., ctf. 4s	a63⅜	a61½
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of N. J. 5 per cent bonds	a103½	a103
Detroit United Railway	*50½	*50½
General Electric Company	146½	147
Georgia Railway & Electric Company (common)	a107½	a108½
Georgia Railway & Electric Company (preferred)	*88	a87
Interborough-Metropolitan Company (common)	18½	19¼
Interborough-Metropolitan Company (preferred)	52¼	51⅞
Interborough-Metropolitan Company (4½s)	79	79¾
Kansas City Railway & Light Company (common)	a25½	a25
Kansas City Railway & Light Company (preferred)	a79	a72
Manhattan Railway	136	130⅞
Massachusetts Electric Companies (common)	a16¾	a16
Massachusetts Electric Companies (preferred)	a83	a81
Metropolitan West Side, Chicago (common)	a21	*24½
Metropolitan West Side, Chicago (preferred)	a62¼	a71
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	69⅛	69
Northwestern Elevated Railroad (common)	a18	a22
Northwestern Elevated Railroad (preferred)	a57	66
Philadelphia Company, Pittsburg (common)	a48½	a48½
Philadelphia Company, Pittsburg (preferred)	a43½	a43½
Philadelphia Rapid Transit Company	a19½	a20
Philadelphia Traction Company	*85¼	a84½
Public Service Corporation, 5 per cent col. notes	*96	*96
Public Service Corporation, ctfs.	a101	a101
Seattle Electric Company (common)	a110½	*110½
Seattle Electric Company (preferred)	a101	*101
South Side Elevated Railroad (Chicago)	a62	a72
Third Avenue Railroad, New York	5¾	7⅛
Toledo Railways & Light Company	8½	9¼
Twin City Rapid Transit, Minneapolis (common)	109½	110½
Union Traction Company, Philadelphia	a46¼	a46⅞
United Rys. & Electric Company, Baltimore	*13	a13¾
United Rys. Inv. Co. (common)	*37	32
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	a34	a35
Washington Ry. & Electric Company (preferred)	a87½	a89
West End Street Railway, Boston (common)	*88	a88
West End Street Railway, Boston (preferred)	*102½	a101
Westinghouse Elec. & Mfg. Company	61	65¼
Westinghouse Elec. & Mfg. Company (1st pref.)	a125	*125

a Asked. * Last Sale.

Earnings of the Chicago City Railway for Quarter

For the three months ended April 30, 1910, the Chicago City Railway (including the Southern Street Railway) reports earnings as follows:

Quarter Ended April 30.	1910.	1909.
Passenger	$2,266,453	$2,130,713
Mail	6,573	5,947
Advertising	26,610	26,667
Interest on bank deposits	1,886	1,542
Miscellaneous earnings	10,332	9,696
Gross earnings	$2,311,854	$2,174,565
Expenses.		
Maintenance and renewals	* $351,026	$287,863
Operation of power plants	223,717	228,194
Operation of cars	665,316	619.049
General expense and taxes	363,159	371,949
Total expenses	$1,603,218	$1,507,055
Net earnings from operation	$708,636	$667,510

* Includes $31,755.31, being 8 per cent of gross earnings, April 16 to 30, inclusive, set aside in a separate fund as required by Section 16 of the ordinance for renewals and depreciation.

Report of Interborough Rapid Transit Company for Eleven Months

The Interborough Rapid Transit Company, New York, N. Y., reports earnings as follows for the 11 months ended May 31, 1910:

	1910.	1909.
Gross operating revenue	$26,666,568	$24,352,626
Operating expenses	10,079.379	9,867,885
Net operating revenue	$16,587,189	$14,490,741
Taxes	7,591,196	1,655,381
Income from operation	$14,995,992	$12,835,359
Non-operating income	*379,060	919,518
Gross income	$15,375,052	$13.754,877
Interest, rentals, etc., including Manhattan Ry. guarantee	9,673,219	9,520,937
Net corporate income	$5,701,833	$4,233,939
Dividends on $33,000,000, Interborough Rapid Transit Company capital stock for 11 months ended May 31, 1910, at the rate of 9 per cent per annum	2,887,500	2,887.500
Surplus	$2,814,333	$1,346,439
Operating per cent	37.80	40.49
Passengers carried	517,856,049	472,928,296

* The decrease in non-operating income is largely due to the policy inaugurated on July 1, 1909, of not crediting to the income of the company the interest upon the advances made for the construction of the New York & Long Island Railroad Tunnel.

American Cities Railway & Light Company, New York, N. Y.—The American Cities Railway & Light Company has declared a semi-annual dividend of 1¾ per cent on the common stock of the company, payable on July 1, 1910. This is an increase of ¼ of 1 per cent over the previous disbursement.

Burlington County Railway, Mt. Holly, N. J.—The property of the Burlington County Railway was sold under foreclosure in Mt. Holly on June 16, 1910, to A. Merritt Taylor, Philadelphia, Pa., president of the New Jersey & Hudson River Railway & Ferry Company and the Philadelphia & West Chester Traction Company.

Chicago (Ill.) Railways.—The committee of security holders of the Chicago Railways and the Chicago Consolidated Traction Company has been reduced from the eight men chosen at the conferences in New York to three men, Andrew Cooke, Charles G. Dawes and John Barton Payne. The plan for the exchange of securities, mentioned in the ELECTRIC RAILWAY JOURNAL of June 18, 1910, page 1075, will, it is stated, be modified. Two bodies of the security holders of the Chicago Consolidated Traction Company are expected to remain outside of the plan for the exchange of the securities.

City & Elm Grove Railroad, Wheeling, W. Va.—John A. Howard, president of the City & Elm Grove Railroad, has sold his interest in the company to Joseph Speidel, A. S. List, J. N. Vance, J. L. Dickey, L. E. Sands and H. S. Sands. Joseph Speidel has been elected president of the company to succeed Mr. Howard.

Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has amended the decree ordering the sale of the property of the Forty-second Street,

Manhattanville & St. Nicholas Avenue Railway under foreclosure on July 1, 1910, by directing that the successful bidder, irrespective of how much he may have deposited in the bidding, shall in making good his bid pay $350,365 in cash, the amount of the surplus income invested by Frederick W. Whitridge, the receiver of the company, in 75 convertible pay-as-you-enter cars.

Gary & Interurban Railway, Gary, Ind.—The Gary & Interurban Railway has authorized an issue of $10,000,000 of refunding and first mortgage 5 per cent gold bonds. Part of the proceeds will be used to redeem the first mortgage bonds now outstanding. Only $1,500,000 of the new bonds will be issued at this time.

International Traction Company, Buffalo, N. Y.—A committee consisting of Robert L. Fryer, Thomas De Witt Cuyler, Lewis Cass Ledyard, Thomas E. Mitten and Charles Steele, has been appointed to protect holders of the $30,000,000 of 50-year 4 per cent collateral trust bonds of the International Traction Company. The main security for the bonds is the stock of the International Railway, all of which is owned by the International Traction Company. The International Traction Company has issued all of the bonds under the collateral trust indenture reserved for extensions and betterments, and there remain unissued $11,665,000 bonds reserved for the acquisition or retirement of underlying bonds secured by liens on the property of the railway company. Many of these underlying obligations mature in the near future and they cannot be provided for by the collateral trust bonds of the International Traction Company, which have a limited market and are selling much below par. It is proposed to have the new company put out an issue of 5 per cent first mortgage bonds and to offer the right to the holders of the existing collateral trust bonds to exchange them for the new bonds at 80 or to accept 70 per cent in cash with accrued interest in full. This, the committee points out, would give the bonds a cash value in excess of the present market price.

Mexico, Santa Fé & Perry Traction Company, Mexico, Mo.—The Mexico, Santa Fé & Perry Traction Company has filed a mortgage with the Fidelity Trust Company, Kansas City, Mo., as trustee to secure an issue of $1,600,000 of bonds, issuable at $15,000 per mile of road and an additional amount for power stations on its line between Mexico and Perry, 27 miles distant.

Ocean Shore Railway, San Francisco, Cal.—The sale of the property of the Ocean Shore Railway under foreclosure has been ordered to be held at San Francisco on Sept. 1, 1910.

Owensboro (Ky.) City Railroad.—C. H. Battin and Arthur Funkhouser, Evansville, Ind., have been elected directors of the Owensboro City Railroad.

Philadelphia (Pa.) Rapid Transit Company.—On June 20, 1910, the stockholders of the Philadelphia Rapid Transit Company and the Union Traction Company authorized the directors to carry into effect the plans for financing the proposed loan of $5,000,000 which were prepared by a committee composed of J. J. Sullivan, Robert A. Balfour, George W. Elkins, William H. Shelmerdine and Clarence Wolf. The report of this committee was published in the Electric Railway Journal of June 18, 1910, page 1076.

Philadelphia & Chester Railway, Philadelphia, Pa.—The sale of the property of the Philadelphia & Chester Street Railway to L. A. Eisenthal, A. W. From and R. I. D. Ashbridge, representing the bondholders, of which mention was made in the Electric Railway Journal of June 11, 1910, page 1041, has been confirmed in the United States Circuit Court in Philadelphia.

Public Service Corporation of New Jersey, Newark, N. J.—The Public Service Electric Company has been incorporated with a capital stock of $15,000,000 to manage the electric light and power properties of the company, in accordance with the plan of separating the railway, electric light and power and the gas departments.

Sedalia Light & Traction Company, Sedalia, Mo.—A second protective committee of the bondholders of the Sedalia Light & Traction Company, consisting of Otto T. Bannard and Robert T. Sheldon, New York, N. Y., with David H. Clark as secretary, has requested the deposit of bonds of the company with the New York Trust Company as depository.

Traffic and Transportation

Report of Brooklyn Employees' Association

The annual report of the Brooklyn Rapid Transit Employees' Benefit Association for the year ended April 30, shows a total credit balance as of May 1, 1910, of $31,610. Of this $400 is in the hands of G. W. Edwards, president and secretary of the association, as an emergency fund; $1,210 is deposited at 3 per cent, and $30,000 is invested in guaranteed real estate mortgage, on which the return varies from 4½ per cent to 5½ per cent. The statement shows that $2,356 was paid out in benefits, etc., to members in excess of the dues and initiation fees received. The benefit fund statement shows that $2,815 were received from initiation fees and $37,337 from monthly dues, making the total receipts from members $40,152. The sum of $42,509 was disbursed to members, making these disbursements $2,357 in excess of the receipts. Receipts from sources other than initiation fees and dues amounted to $15,461, and as the administration expenses were only $9,820, there remained a credit balance of $3,284 for the year after charging off the deficit due to disbursements made to members. On May 1, 1909, there was a credit balance of $28,325, making the total credit balance on May 1, 1910, $31,610. The receipts which make up the special fund of the association, which include returns from sale of ball, picnic and excursion tickets, rent from restaurants, etc., amounted to $13,678, and the disbursements made for education, entertainments, etc., were $12,681, leaving a balance of $997. The receipts which make up the clubhouse fund of the association, which include returns from billiard rooms, bowling alleys, the sale of tobacco, cigars and candy, the rent of barber shops, etc., were $19,428, and the disbursements for wages of clubhouse employees, repairs and renewals were $20,737. The balance credited to this fund on May 1, 1909, was $15,372, so that the credit balance on May 1, 1910, was $14,063. The report is issued in the form of a pamphlet and is a very interesting exhibit, particularly to those interested in employees' associations.

Tickets Over Indianapolis & Louisville Traction Company's System to Northern Indiana.—The Indianapolis & Louisville Traction Company, Louisville, Ky., is selling tickets to points north of Indianapolis, including such places as Ft. Wayne, Peru, Logansport and South Bend.

Massachusetts Farming Special.—The Detroit, Lansing & Grand Rapids Railway, Detroit, Mich., has republished in pamphlet form, with illustrations, the article "Trolley Farming Special Operated in Massachusetts," which appeared in the Electric Railway Journal of April 23, 1910.

Fares in Lawrence, Mass., to Be Investigated.—The Railroad Commission of Massachusetts has received a petition from citizens of Lawrence asking for a hearing upon fares and service upon the Prospect Hill line of the Boston & Northern Street Railway. The commission will hear the case on June 22, 1910.

Arbitration in Connecticut.—The members of the board of arbitration which is to consider the readjustment of the terms of service of the motormen and conductors in the employ of the Connecticut Company have all been selected. As previously stated in the Electric Railway Journal, Clarence Deming will represent the company. David E. Fitzgerald has been selected to represent the employees, and William S. Case has been selected by Mr. Deming and Mr. Fitzgerald as the third member of the board.

Handling a Circus on the Illinois Traction System.—The traffic and transportation departments of the Illinois Traction System, Peoria, Ill., are fulfilling a contract for handling the property of the Jones Brothers' Carnival Company, which is exhibiting a circus in the principal cities in Central Illinois. A train of 16 cars is required to carry the circus equipment, and the contract made by the circus with the Illinois Traction Company provides for moving this train daily for 23 days over the company's lines on a car mileage basis.

Proposed Freight Service of the Boston & Northern Street Railway.—The Boston & Northern Street Railway, Boston, Mass., proposes to establish freight service to Hudson and Nashua, N. H. The company has already secured freight rights in Burlington, Billerica, Danvers, Dracut,

Gloucester, Georgetown, Groveland, Hamilton, Haverhill, Lowel, Lynnfield, Methuen, Essex, Middleton, Newbury, North Andover, North Reading, Newburyport, Rowley, Reading, Tewksbury, Wilmington, Wakefield, Wenham, West Newbury, Rockport and Lawrence. A petition to carry freight in Stoneham is pending.

Arbitration in Albany.—The representatives of the United Traction Company and the representatives of the employees of the company have agreed on the general terms of service to govern the men in the employ of the company, but did not agree on the question of wages and the length of time the new agreement should be in force. The company has proposed that any agreement entered into between the company and the men shall continue for three years, and this subject and the demand of the men for an increase in wages from 25 cents an hour to 30 cents an hour will be considered by a board of arbitration, to consist of three members, one chosen by the company, one by the representatives of the employees and the third by the other two.

Chicago Suburban Railway Guide.—The Interstate Guide Company, Chicago, Ill., is publishing monthly for free distribution a guide and time table to the Aurora, Elgin & Chicago Electric Railroad, Bloomington, Pontiac & Normal Railway, Chicago & Milwaukee Electric Railroad, Chicago & Joliet Electric Railway, Joliet & Eastern Railway, Aurora & Elgin Traction Company, Calumet & South Chicago Railway, Chicago Consolidated Traction Company, Chicago, Lake Shore & South Bend Railway, Elgin & Belvidere Electric Railway and the Rockford & Interurban Railway, all of which operate in the vicinity of Chicago. The guide is distributed by the electric railways at their ticket offices and is placed in the guide racks at the principal hotels. It is also sold at all news stands in Chicago for 5 cents, and is mailed to every factory and more than 1000 business houses in Chicago and vicinity.

New Through Route in Chicago.—The Chicago (Ill.) Railways and the Chicago City Railway have established service over the first through route to be operated according to the franchises of 1907. This route, which is called Route No. 2, is about 15 miles long, and 26 through cars are operated in addition to the local service of each company. The route extends from Riverview Park, in the northwestern part of the city, along the Claybourn Avenue line of the Chicago Railways to the business center of the city; thence south over the Clark Street and Wentworth Avenue line of the Chicago City Railway to Seventy-ninth street and Wentworth Avenue; thence west to the Seventy-ninth Street and Halsted Street. The through-route cars are furnished by each company in proportion to the mileage of its section of the route, the Chicago Railways supplying 10 cars and the Chicago City Railway 16 cars. This 15-mile ride with the privilege of transfer to the cars of either company may be made for a 5-cent fare.

Observation Parlor Cars Between Peoria and St. Louis.—The Illinois Traction System, Peoria, Ill., has ordered five observation cars from the American Car Company for use as trailers in fast limited service between Peoria, Ill., and St. Louis, Mo., a run of 175 miles. Arrangements for handling traffic with the new cars have not been fully completed, but it is expected that an excess fare, probably ½ cent per mile, will be charged for the superior service offered by the observation cars. These cars will each seat 36 passengers. At the word end there will be an enclosed Pullman smoking compartment, seating eight passengers, two toilet rooms, and then two fixed-seat sections with tables for card-playing. These sections will be set off by an ornamental grille, from the main or observation section, which will be fitted with movable easy chairs. The floors will be carpeted. The rear bulkhead will include a large window and a swinging door at one side leading to an observation platform.

Map of Baltimore.—The United Railways & Electric Company, Baltimore, Md., has issued as part of its annual report a map showing Baltimore and the interesting points in its vicinity and how they can be reached by the lines of the company. The map is a bird's-eye view, divided into squares by letters and numbered lines, similar to maps in standard atlases. A key makes it easy to locate all places of interest, and the user of the map can very easily determine what line is the most suitable to reach any point, as the cars of each line in Baltimore are indicated by a number which shows their destination. The sheet on which the bird's eye map of the city is printed also contains a map of Baltimore, on which the principal streets, buildings, parks, prominent institutions, etc., are indicated. The company has printed several thousand of these maps, to be hung up in steam railroad stations, hotels and prominent public resorts. Many of the maps and advertising folders of the company are sent by the Baltimore wholesale houses to their country customers, for the convenience of the latter when they visit the city.

Complaint Filed Against Rates in Oregon.—Complaint has been filed with the Railroad Commission of Oregon, charging that the rates now in effect over the line of the Portland Railway, Light & Power Company between Oregon City and Portland are unreasonable and discriminatory to the patrons of the Oregon City division of the Portland Railway, Light & Power Company and in violation of the Railroad Commission Act of 1907. It is set forth in the complaint that the fare charged between First Street and Alder Street in Portland to Canemah, Park Place and Oregon is 25 cents, and to other points on the line, such as to Gladstone, Fern Ridge, Meldrum, Jennings, Roethe, Naef and Concord, 20 cents; that no transfers are issued or transfer privileges allowed a passenger to travel between any of the points named and Portland, and that passengers who desire to travel from Oregon City or any other point in Clackamas County to points beyond First Street and Alder Street, Portland, must pay an additional fare of 5 cents. It is further charged that patrons of the Oregon City division must pay a greater fare or charge per mile than patrons of the Springwater division.

Folder of the Boston & Northern Street Railway and the Old Colony Street Railway.—The passenger department of the Boston & Northern Street Railway and the Old Colony Street Railway, Boston, Mass., has issued a folder for 1910, which has an especially attractive cover distinctive of trolley travel. The folder proper consists of 24 pages of interesting and instructive matter about the various trips which can be taken over the 908 miles of track comprised in these two systems, as well as trips upon connecting lines. The book is illustrated with halftone engravings of attractive sights along the lines. Aside from the information about the distances, the fares, the running time and the places where cars are to be taken, and where changes are necessary, there are two special departments, one devoted to the principal points of interest along the lines, and the other to the more important pleasure places by the shore, inland and by lakes and rivers. At the back of the folder is a new four-color map of southern New Hampshire, Rhode Island and Massachusetts east of Worcester, covering the lines of the Boston & Northern Street Railway and the Old Colony Street Railway and the lines of all street railways operating throughout that district and the steam railroads.

New Arrangement in New Jersey for Transporting Letter Carriers.—An agreement has been entered into between the Public Service Railway, Newark, N. J., and the United States Government for carrying postmen on the cars of the company, under the terms of which the Government will pay a lump sum per year based upon an estimate of the number of carriers in the service and the number of rides each carrier would ordinarily be called upon to make in performing his duties. The company agrees to transport any letter carrier in uniform who carries his mail pouch, the pouch to indicate that the man is on duty. The postal authorities have agreed to require all mail pouches to be left in the post office at the conclusion of each man's work. In this manner the company will be protected against carrying letter carriers to and from work. Prior to the execution of the new contract, which went into effect on June 1, 1910, the Government purchased tickets from the company and supplied them to the carriers according to their needs. In a number of instances the carriers abused the transfer privileges by exchanging the transfers with other carriers. They would then ride on the transfers and use the tickets when they were off duty or give them to others to use. This was one of the principal reasons for the change in the agreement between the company and the Government.

Personal Mention

Mr. W. A. Carson has been appointed general manager of the Owensboro (Ky.) City Railroad.

Mr. P. M. Lott has been appointed master mechanic of the Ocean City Electric Railroad, Ocean City, N. J.

Mr. L. M. Levinson has resigned his position with the Salt Lake & Ogden Railway, Salt Lake City, Utah.

Mr. S. H. Dailey has resigned as general superintendent of the Geneva & Auburn Railway, Seneca Falls, N. Y.

Mr. A. S. List has been elected treasurer of the City & Elm Grove Railroad, Wheeling, W. Va., to succeed Mr. W. C. Handlan, resigned.

Mr. Carl B. Gilbert has been elected assistant secretary and assistant treasurer of the Meridian Light & Railway Company, Meridian, Miss.

Mr. Henry L. Doherty has been elected president of the Meridian Light & Railway Company, Meridian, Miss., to succeed Mr. A. J. Paterson.

Mr. Paul R. Jones has been elected secretary and treasurer of the Meridian Light & Railway Company, Meridian, Miss., to succeed Mr. C. S. W. Price.

Mr. Edward Lucas has been appointed publicity agent of the Northern Indiana Railway, South Bend, Ind., with the traffic department of the company.

Mr. Russell Palmer has been elected first vice-president of the Meridian Light & Railway Company, Meridian, Miss., to succeed Mr. William H. Ambrecht.

Mr. Joseph Speidel has been elected president of the City & Elm Grove Railroad, Wheeling, W. Va., to succeed Mr. John A. Howard, who has disposed of his interest in the company.

Mr. Harrie P. Clegg, president of the Dayton & Troy Electric Railway, Dayton, Ohio, contributed to the Dayton *Daily News* recently an article entitled "Dayton the Center of the First and Most Important Chain of Interurban Roads."

Mr. C. E. Armstrong has resigned as general superintendent of the Cairo Railway & Light System, Cairo, Ill., to assist in organizing and establishing the firm of Maddox & Armstrong, Peoria, Ill., engineers and manufacturers' agents.

Mr. J. L. Adamson has been appointed general superintendent and purchasing agent of the Geneva & Auburn Railway, Seneca Falls, N. Y., to succeed Mr. S. H. Dailey, resigned. Mr. Adamson has been chief clerk and assistant to the superintendent of the company for the last four years.

Mr. Charles Pearson has been appointed agent of the Indianapolis, New Castle & Toledo Electric Railway, New Castle, Ind., at New Castle. Mr. Pearson was formerly assistant agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., at New Castle, Ind.

Mr. L. C. Bradley, the retiring general manager of the Eastern Pennsylvania Railways, Pottsville, Pa., was given a gold watch, chain and an engraved charm by the employees of the company at a smoker held recently, as a token of esteem. Mr. Bradley has been appointed manager of the Galveston (Tex.) Electric Company, which operates both the electric railway and the electric lighting properties in Galveston.

Mr. F. A. Healy, secretary and treasurer of the Ohio Electric Railway, Cincinnati, Ohio, will study street railway operations and fire insurance protection in Kansas City, Topeka, Oklahoma City, Enid, Pueblo, Colorado Springs, Denver, Salt Lake City, Ogden, Los Angeles, San Diego, San Francisco, Portland, Seattle and Tacoma this summer, and return via Vancouver over the Canadian Pacific Railway to Montreal, visiting Buffalo, Cleveland, Detroit and Toledo.

Mr. John P. Jones, formerly master mechanic of the United Railroads, San Francisco, Cal., has been appointed superintendent of rolling stock of the company. Mr. Jones has been connected with the mechanical department of the United Railroads since August, 1902. He was appointed master mechanic of the company in February, 1907, to succeed Mr. H. E. Farrington. Mr. J. M. Yount has been appointed to succeed Mr. Jones as master mechanic, as noted in the Electric Railway Journal of June 11, 1910, page 1044.

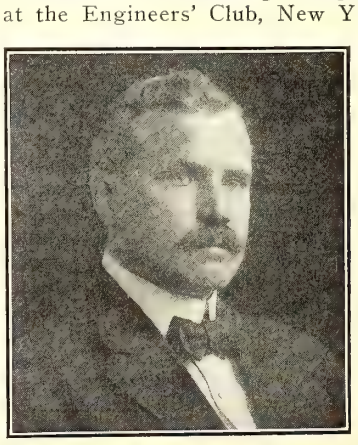
Mr. A. L. Ruff, who has been appointed assistant general freight and passenger agent of the Oregon Electric Railway and the United Railways, Portland, Ore., was formerly in the employ of the Spokane, Portland & Seattle Railway, which he served for a year as general agent in Spokane, Wash. Previous to that he was in the service of the Great Northern Railway at Seattle for three years as chief clerk to the assistant traffic manager. Mr. Ruff's railroad experience covers a period of 14 years, during which he has been in the employ of the Northern Pacific Railway, Great Northern Railway and Chicago, Milwaukee & St. Paul Railway at Seattle in various capacities, and with the Southern Pacific Railroad at San Francisco and the Spokane Falls & Northern Railway, now a branch of the Great Northern Railway at Rossland, B. C.

Mr. August G. Snell, who for six years has been chief clerk to Mr. C. A. Baldwin, superintendent of transportation of the Indiana Union Traction Company, Anderson, Ind., has been appointed division passenger and freight agent of the company, with headquarters in Indianapolis, to succeed Mr. M. E. Graston, who has been appointed general manager of the Indianapolis, New Castle & Toledo Traction Company, with headquarters in Indianapolis. Mr. Snell was born in Muncie, Ind., on Aug. 24, 1876, and was educated at Culver Academy in northern Indiana. Mr. Snell began service with the Indiana Union Traction Company in the shops at Muncie 12 years ago. Shortly after entering the service of the company he became connected with the transportation department, which he served in various capacities, acting for seven months as a trainman on the line between Muncie and Indianapolis.



A. G. Snell

Mr. James M. Wakeman, retiring first vice-president of the McGraw Publishing Company, was given a luncheon at the Engineers' Club, New York, on June 21 by his recent associates and other social and business friends. Mr. Wakeman was one of the incorporators of the McGraw Publishing Company and its vice-president from its organization up to the first part of this year, when he resigned on account of ill-health. He plans to return to England, his old home, about the middle of next month and to remain abroad for at least a year. Mr. T. C. Martin, formerly editor of the *Electrical World,* and now executive secretary of the National Electric Light Association, presided at the luncheon, and among the speakers were: Mr. John A. Hill, of the Hill Publishing Company; Mr. Arthur Warren, of the New York *Tribune;* Mr. Hugh M. Wilson and Mr. James H. McGraw, of the McGraw Publishing Company. At the conclusion of the luncheon Mr. Wakeman was presented a large silver loving cup and a set of the works of Mark Twain. The former was the gift of the outside men on the papers with which Mr. Wakeman has been connected; the latter was from all of his associates in the McGraw Publishing Company.



J. M. Wakeman

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Ft. Wayne & Winona Traction Company, Ft. Wayne, Ind.**—Incorporated in Indiana to build a 40-mile interurban railway to connect Ft. Wayne, Arcola, Coesse, Columbia City, Larwell, Pierceton, Wooster, Winona and Warsaw. It will also furnish electricity for light, heat and power purposes. Capital stock, $100,000. Headquarters, Ft. Wayne. Directors: J. A. Barry, Edward G. Hoffman, Ralph A. Barry, E. W. Cook and G. M. Leslie, Ft. Wayne.

***Southern Oregon Railway & Power Company, Albany, Ore.**—Incorporated in Oregon to build electric railways, power plants, etc., through the Rogue River Valley and Southern Oregon. Capital stock, $3,000,000. Incorporators: J. R. Allen, J. Vilas and S. V. Beckwith.

***Harriman, Knoxville & Eastern Railway, Harriman, Tenn.**—Incorporated in Tennessee to build a railway to be operated by steam or electricity in Roane County. Capital stock, $10,000. Incorporators: Warren A. Rockwell and Henry M. Winslow. Headquarters, Harriman.

***Northwestern Railway, Naples, Tex.**—Chartered in Texas to build a 25-mile railway to be operated by either steam or electricity in Titus County, from Naples to Sylvania. Capital stock, $10,000. Incorporators: Max Kosse and F. T. Atkinson, Cincinnati.

FRANCHISES

San Francisco, Cal.—A. J. Pon has been granted a 25-year franchise by the Board of Supervisors to build a line on Gough Street to connect the Fillmore-McAllister Street line and the Market Street lines, in San Francisco. The United Railroads will build and operate this new line.

Marion, Ill.—The Egyptian Traction Company, Eldorado, will shortly ask the Council for a franchise to build an electric railway in Marion. G. E. K. Hixon, general manager. [E. R. J., June 4, '10.]

Hammond, La.—The Hammond (La.) Interurban Railway will ask the City Council for a franchise to build an electric railway in Hammond. L. D. Spencer is interested. [E. R. J., May 28, '10.]

Excelsior Springs, Mo.—The Kansas City, St. Joseph & Excelsior Springs Electric Railway, Kansas City, has been granted an extension of one year on its franchise to construct a line through Clay County. This proposed 110-mile railway will connect Kansas City, St. Joseph, Excelsior Springs and Liberty, Mo. William J. Knapp, Kansas City, secretary. [E. R. J., May 8, '10.]

University Place, Neb.—The Omaha, Western & Lincoln Railway, Lincoln, has been granted a franchise to build a railway in University Place. This is part of a plan to connect Omaha, Hastings and Lincoln with an electric railway 219 miles in length. Frank F. Schaff, president. [E. R. J., June 4, '10.]

***Las Cruces, N. Mex.**—Isidore Armijo and Samuel Reynolds, Las Cruces, have been granted a franchise by the Town Board to build a 2-mile narrow-gage street railway to College Heights and Mesilla Park.

Saratoga Springs, N. Y.—The Hudson Valley Railway, Glens Falls, has been granted a franchise by the Town Board to build a railway in East Avenue, in Saratoga Springs, for the purpose of connecting the Glens Falls and Troy divisions, and thus forming a direct route from Troy to Warrensburg.

Salem, Ohio.—The Salem Electric Company has asked the Council for a 50-year franchise to operate a railway in Salem.

Baker City, Ore.—Anthony Mohr, representing the Baker Interurban Railway, has asked the City Council for a 50-year franchise for a street railway in Baker City. This is part of a plan to build an interurban railway from Baker City to North Powder and Rock Creek. [E. R. J., Jan. 8, '10.]

***McKeesport, Pa.**—The Jefferson-Wilson Street Railway Company has asked the Council for a franchise to construct a street railway between McKeesport and West Elizabeth.

***Amarillo, Tex.**—N. A. Brown has been granted a franchise by the City Council to build a 2-mile street railway from Amarillo proper to San Jacinto Heights.

Houston, Tex.—The Houston Electric Company has been granted a 25-year franchise by the Commissioners' Court to extend its South End line 2 miles to the Rice Institute and Bellaire, also to build double tracks where traffic justifies.

Palestine, Tex.—It is stated that George W. Burkett and associates will soon ask the City Commissioners for a franchise for the construction of an electric railway over certain streets in Palestine. The proposition provides for early construction of the line; 2 miles to be completed the first year and 2 miles each succeeding year thereafter until 8 miles have been built. [E. R. J., March 13, '10.]

Port Orchard, Wash.—The Bainbridge Development Company, Port Orchard, has been granted a 50-year franchise by the County Commissioners of Kitsap County for the construction of an electric railway on Bainbridge Island, in connection with a ferry service to Seattle. One line will run from Eagle Harbor to Fletcher Bay and Manzanito, and another line connecting Eagle Harbor with Port Blakeley and Pleasant Beach. About 28 miles of track will be built. Work will be started within six months. M. B. Jackson, Jr., president. [E. R. J., June 11, '10.]

TRACK AND ROADWAY

***Mobile, Ala.**—William D. Bullard and R. A. Roberts, Scranton, Miss., are said to be interested in a plan to build a 40-mile railway from Mobile, Ala., to Scranton, Miss.

Northern Electric Railway, Chico, Cal.—Press reports state this company will build an extension from a point a little west of Ben Ali, on the American River, into Fair Oaks.

Los Angeles-Pacific Company, Los Angeles, Cal.—This company is considering plans for extending its line from Hollywood over Cahuenga Pass to Lankershim. Citizens of Lankershim are raising a bonus for the project.

Peninsular Railway, San José, Cal.—Right of way has been secured and plans have practically been completed by this company for the extension of its railway from Mayfield, through the Stanford estate to Redwood City, San Carlos, Belmont and San Mateo. It is said construction will soon be started. F. E. Chapin, general manager.

Connecticut Company, New Haven, Conn.—This company plans to build a 9-mile extension from Torrington to Litchfield and thence to the Bantam Lakes. This new line will be an extension of the Torrington & Winchester Street Railway, which is controlled by this company.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company has purchased material to double-track two miles of its main line through Honolulu.

***Idaho Falls, Idaho.**—George H. Lawrence states he has succeeded in financing a proposed electric railway to connect Idaho Falls and Hizer Hot Springs. It is expected to start construction July 1.

Illinois Traction System, Champaign, Ill.—This company is now installing 94 miles of No. 0000 round copper feeder, in addition to a similar feeder and a single trolley wire, between Springfield and Venice, Ill.

Rock Island-Southern Railroad Company, Monmouth, Ill.—This company has practically completed its new interurban extension between Monmouth and Rock Island. It is expected to have the line in operation this month.

Evansville (Ind.) Electric Railway.—This company will extend its line from Rockport to Grandview. Work has already been started on the Grandview end of the line. H. W. Cast, New Albany, has charge of the construction.

Valparaiso & Northern Railway, Valparaiso, Ind.—This company has started construction of its proposed interurban railway in Valparaiso. This is part of a plan to connect Valparaiso with Chesterton, and ultimately with Gary, Laporte and Michigan City. Lewis E. Woodward, secretary. [E. R. J., July 3, '09.]

Iowa City (Ia.) Electric Railway.—This company reports that contracts will be awarded within 10 days, and that it will begin construction of its 38-mile railway in July. Capital stock authorized, $100,000; issued, $16,000. Bonds authorized, $65,000. Power will be purchased and the company expects to operate five cars. Officers: J. O. Schulze, president and general manager; John H. Rober, vice-president, and D. A. Reese, secretary and treasurer. [E. R. J., June 11, '10.]

***Conway Springs, Kan.**—J. M. Frantz, Conway Springs, is said to be interested in a project to construct an interurban railway to connect Hutchinson, Haven, Mt. Hope, Andale, Goddard, Viola, Conway Springs and Arkansas City; a spur between Wichita and Goddard and a branch running from Conway Springs to Anthony, via Milan, Argonia, Danville and Harper.

Louisville & Eastern Railroad, Louisville, Ky.—This company has practically completed the 23-mile extension of its railway from Beechwood to Shelbyville, and it is expected that the entire line between Louisville and Shelbyville will be placed in operation not later than Aug. 1, 1910.

New Orleans Railway & Light Company, New Orleans, La.—This company has ordered 425 tons of steel rails from the Carnegie Steel Company.

St. Joseph & Savannah Railway, St. Joseph, Mo.—This company has awarded the contract for the construction of its proposed 15-mile interurban railway to the J. L. Flick Construction Company, Chicago. This railway will connect St. Joseph and Savannah. [E. R. J., Feb. 5, '10.]

Southwestern New York Traction Company, Bolivar, N. Y.—This company has awarded a contract for 800 tons of steel rails to the Carnegie Steel Company. In addition it has ordered, from the Illinois Steel Company, 4000 tons of Bessemer and 24,000 tons open hearth rails. [E. R. J, June 4, '10.]

Brooklyn & Jamaica Bay Railway, New York, N. Y.—This company advises that construction will be started on its proposed line as soon as it obtains a franchise. The line will be 3 miles in length, and will be operated wholly in Brooklyn, connecting with the Brookyn Rapid Transit Company and terminating at Old Mill, Jamaica Bay. Capital stock authorized, $100,000. Its repair shop will be located at its terminal, in Jamaica Bay. Officers: Horace J. Subers, 25 Broad Street, New York, president; Nelson S. Easton, vice-president, and Ogden R. Pell, 54 New Street, New York, secretary and treasurer; Frederick B. Langston, engineer. Headquarters: Temple Court, New York. [E. R. J., June 11, '09.]

Rochester Belt Line Railroad, Rochester, N. Y.—This company, which was recently incorporated to build a 15-mile freight belt line around Rochester, making connections with various steam and electric railways, reports that its organization has been effected by the election of the following officers: John F. Alden, president; Clifford D. Beebe, vice-president; Frank A. Dudley, second vice-president; Harold C. Beatly, secretary, and W. A. Holden, treasurer. [E. R. J., June 11, '10.]

Buffalo & Williamsville Electric Railway, Williamsville, N. Y.—This company expects to build soon 1 mile of new track with 85-lb. T rails and brick pavement.

Isothermal Traction Company, Rutherfordton, N. C.—This company has completed the surveys from Rutherfordton towards Gastonia, via Carolien, Shelby and Cherryville. Another survey will now be made from Rutherfordton to Asheville, via Chimney Rock and Fairview, crossing the Blue Ridge at Hickory Nut Gap. The necessary franchises have nearly all been secured, and rights of way are now being obtained. Connections will be made with the Seaboard Air Line, the Southern Railway and the Carolina Clinchfield & Ohio Railway. K. S. Finch, Charlotte, general manager. [E. R. J., March 26, '10.]

Fifth Avenue Railway & Light Company, Columbus, Ohio.—This company, recently incorporated, reports that it has not yet completed its organization. It proposes to build a 7-mile railway in Columbus. It also expects to furnish power for lighting. Capital stock, $10,000. Headquarters: 35 West Fourth Avenue, Columbus. Incorporators: A. C. Wolfe, E. W. Gantes, W. Cushing and J. W. Jennings, all of Columbus. [E. R. J., June 11, '10.]

Oklahoma (Okla.) Railway.—This company has ordered 1100 tons of rails from the Carnegie Steel Company.

Peoples Railway, Berlin, Ont.—This company will receive bids until July 15 for clearing and grading 29 miles of its proposed railway, construction of five bridge piers and one 400-ft. bridge, also for the following material for the same length of the line: Ties, 70-lb. T-rails, spikes, bolts, rail bonds, grooved trolley wire, trolley messenger wire, 50 miles of fence wire, gates and fence posts. A. N. Warfield, Berlin, general manager. [E. R. J., June 5, '09.]

Toronto (Ont.) Railway.—This company has been ordered by the Ontario Railway and Municipal Board to build 15 miles of new track in Toronto. The City Council has passed the resolutions which were endorsed by the Board of Control, consenting to the company making the extensions.

Mahoning & Shenango Railway & Light Company, New Castle, Pa.—This company has secured rights of way to construct an extension from Youngstown to Mineral Ridge, a distance of five miles. M. E. McCashey, Youngstown, general manager.

***Gresham, Pa.**—Howard Conover and James Hancox, Gresham, are reported to be interested in a plan to build a railway from Titusville to Meadville, via Gresham, Diamond, Fauncetown, Townville, Guys Mills and Blooming Valley, Pa.

Slippery Rock & Grove City Railway, Grove City, Pa.—This company has secured rights of way, and surveys have been completed between Slippery Rock, Butler, West Liberty, Isle, Prospect and Mount Chestnut and Grove City. Bids will soon be asked for the construction of this line between Slippery Rock and Butler. Connection with the Pittsburgh, Harmony, Butler & New Castle Railway will be made in Butler. H. B. Graves, chief engineer. [E. R. J., May 21, '10.]

Pittsburgh, McKeesport & Westmoreland Railway, McKeesport, Pa.—This company has made arrangements with the Pittsburgh Railways for the use of its lines from McKeesport, to a point in Glassport at which a bridge will be built across the Monongahela River to connect with Wilson borough, passing through West Elizabeth, Glassport, Wilson and Clairton. Franchises will soon be asked for to build a railway through these cities.

Ardmore & Llanerch Street Railway, Philadelphia, Pa.—This company expects to double-track its railway from Llanerch to Ardmore. This is a branch of the Philadelphia Traction Company.

Tower City, Reiner City & Johnstown Street Railway, Pottsville, Pa.—This company advises that preparations are well under way for starting work on this proposed 3-mile railway to connect Reiner City, Tower City and Johnstown. It will operate four gasoline motor cars and will be operated as part of the Schuylkill & Dauphin Traction Company. Capital stock authorized, $100,000. Officers: Joseph W. Moyer, Pottsville, president; Edgar D. Rank, Williamstown, secretary and treasurer; W. E. Harrington, St. James, Philadelphia, general manager and chief engineer; W. T. Corbresier, Williamstown, superintendent and purchasing agent. [E. R. J., June 11, '10.]

Sylvan Dell Park Company, Williamsport, Pa.—This company advises that construction will be started within the next few months on its proposed 3½-mile electric railway to connect Williamsport and Sylvan Dell Park. Capital stock, authorized, $24,000; issued, $7,000. Headquarters, 129 West Fourth Street, Williamsport. Power station and repair shops to be located at South Williamsport. Officers: H. W. Whitehead, 129 West Fourth Street, Williamsport, president; W. B. Stuart, vice-president; Charles G. Whitehead, secretary, and E. M. Bates, treasurer. [E. R. J., June 11, '10.]

Houston-Bay Shore Traction Company, Houston, Tex.—This company is said to have completed preliminary arrangements, and work will soon be started on its proposed 25-mile railway to connect Houston, Harrisburg and La Porte. A. Foster, Irwin, Houston, president. [E. R. J., May 14, '10.]

Salt Lake & Ogden Railroad, Salt Lake City, Utah.—It is stated that this company, which recently electrified its

railway, expects to double-track its entire line at once, a distance of 50 miles.

Graham (Va.) Electric Railway.—This company, recently incorporated, is considering plans for building a two-mile railway from East Graham to West Graham. One bridge will be built over the Bluestone River. Necessary equipment will be purchased. James F. Dudley, president. [E. R. J., June 18, '10.]

Milwaukee Western Electric Railway, Milwaukee, Wis.—This company has started to survey the right of way of its proposed extension from Fox Lake to Green Lake. It is also intended to continue the line through to Ripon and Berlin, and perhaps connect with Oshkosh or Fond-du-Lac. W. E. Elliott, general manager.

POWER HOUSES AND SUBSTATIONS

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company has recently placed orders for 840 hp additional boiler capacity and an order will be placed shortly for an engine and generator with 1000 kw capacity. C. G. Ballentyne, Honolulu, general manager.

Oskaloosa (Ia.) Traction & Light Company.—This company advises that within the next six weeks it will place contracts for building an extension to its boiler house in Oskaloosa. It also expects to purchase one 250-hp boiler and one 1000-gal. hot-water pump. H. W. Sarner, purchasing agent.

Milford & Uxbridge Street Railway, Milford, Mass.—This company has purchased one 225-hp Whelan boiler for installation at its power house at Milford. [E. R. J., May 7, '10.]

Buffalo & Williamsville Electric Railway, Williamsville, N. Y.—This company is installing a 300-kw converter and transformer at its power house in Williamsport.

Johnstown (Pa.) Passenger Railway.—This company has started on extensive improvements to its power house on Baumer Street, Johnstown. It will install two large boilers, which will furnish an additional 800 hp.

Burlington (Vt.) Traction Company.—This company has purchased from W. Seward Webb the Otter Creek water power rights at Vergennes. Formerly the company obtained its power from the Winooski River at Winooski. It is expected the falls will develop 6000 hp in high water.

SHOPS AND BUILDINGS

Los Angeles (Cal.) Railway.—This company will build a new paint and repair shop between Fifty-fourth Street and Fifty-fifth Street in Los Angeles. The structure will be 644 ft. x 122 ft., of reinforced concrete construction. It will contain 36 separate tracks.

Connecticut Company, New Haven, Conn.—This company has completed plans and let the contract for alterations to be made to the repair shops at Grand Avenue and Blatchley Avenue. An additional story of brick construction is to be added and the general layout of tracks is to be changed so that there will be four pairs of tracks. The cost of improvements will be about $10,000.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company is now constructing a new car house in Honolulu, which will have 1120 ft. of storage track.

Bloomington & Normal Street Railway, Bloomington, Ill.—This company has started work building a new station at the corner of North Street and School Street in Bloomington. The structure will be 52 ft. x 24 ft.

Chicago & Joliet Electric Railway, Joliet, Ill.—This company is receiving bids for the construction of a one-story brick car house, 50 ft. x 200 ft., at Summit.

Philadelphia (Pa.) Rapid Transit Company.—This company expects to build a new freight station at Hatboro.

Blue Ridge Light, Power & Railway Company, Staunton, Va.—This company reports it expects to build within the next 60 days a new car house in Staunton.

Virginia Railway & Power Company, Richmond, Va.—This company has awarded a contract to W. L. Ragland & Company, Richmond, to erect two car houses, paint shop and oil house in West End, Richmond. The structure is to be of brick and concrete construction. The estimated cost is $50,000.

Manufactures & Supplies

ROLLING STOCK

Capital Traction Company, Washington, D. C., has ordered 150 closed cars from the Jewett Car Company.

Shreveport (La.) Traction Company has placed an order with the American Car Company for three 20-ft. 8-in. closed cars.

El Paso (Tex.) Electric Company is preparing specifications for several new cars which it intends to purchase in the near future.

People's Railway, Berlin, Ont., will receive bids until July 15 for several car bodies and trucks. A. N. Warfield, Berlin, general manager.

Jersey Central Traction Company, Keyport, N. J., has purchased 10 dump cars from the Kilbourne & Jacobs Manufacturing Company.

Morris County Traction Company, Morristown, N. J., has ordered five 28-ft., semi-convertible cars from the John Stephenson Company.

Saginaw Valley Traction Company, Saginaw, Mich., has placed an order with the G. C. Kuhlman Car Company for six 28-ft., semi-convertible, pay-as-you-enter cars.

Rockford & Interurban Railway, Rockford, Ill., has ordered four 22-ft. closed cars and two 28-ft., semi-convertible, pay-as-you-enter cars from the G. C. Kuhlman Car Company.

Syracuse (N. Y.) Rapid Transit Railway has ordered 25 30-ft. 11-in., semi-convertible cars from the G. C. Kuhlman Car Company. The cars will be equipped each with four 50-hp General Electric motors.

Knoxville Railway & Light Company, Knoxville, Tenn., noted in the ELECTRIC RAILWAY JOURNAL of June 11, 1910, as contemplating the purchase of 15 closed cars, is reported to be considering the purchase of 15 additional cars.

Philadelphia (Pa.) Rapid Transit Company, noted in the ELECTRIC RAILWAY JOURNAL of June 18, 1910, as having placed an order with the Pressed Steel Car Company for 20 elevated cars, has specified Brill 27 M. C. B. trucks for these cars.

Interborough Rapid Transit Company, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of April 2, 1910, as having ordered 75 steel passenger cars from the Pressed Steel Car Company, has included the following in its specifications for this equipment, which is to be ready for October, 1910, delivery:

Seating capacity.....52	Bumpers.....Hedley anti-climber. Lack. Steel Co.
Weight (car body only) .....28,000 lb.	Car trimmings, Dayton Mfg. Co.
Bolster centers, length..36 ft.	Center bearings, annealed steel
Length of body....39 ft. 4 in.	Curtain fixtures, Nat. Lock Washer Co.
Over vestibule.....49 ft. 9 in.	Curtain material...pantasote
Width over sills...8 ft. 6¾ in.	Destination signs, Col. Mach. Wks.
Over posts at belt.8 ft. 6¾ in.	Hand brakes..bevel gear type
Height from top of rail to sills.....3 ft. 2⅛ in.	Heaters .....Consol.
Body .....metal	Paint.....Flood & Conklin
Interior trim.....metal	Roofs.....Pressed Steel
Underframe .....metal	Seats .....Heywood
Air brakes, West. Trac. Brake Co.	Seating material...Heywood
Bolsters, body, Carnegie rolled steel plate	Ventilators, swing sash, I. R. T.
Brakeshoes, Nat. Brake Shoe Co.	

TRADE NOTES

Griffin Wheel Company, Chicago, Ill., is planning to build four new buildings at its South Tacoma, Wash., plant at a total cost of $125,000.

Emergency Car Brake Company, Cumberland, Md., maker of the Fresh emergency car brake, is now being refinanced to permit manufacture of this brake on a large scale.

Pelton Water Wheel Company, San Francisco, Cal., has recently shipped two 2000-hp Pelton impulse units to be

installed in an extension of the power house of the Dunedin (New Zealand) Municipal Tramway System.

W. M. Wampler, who was for some time in charge of the electric railway truck department of the American Locomotive Company, has accepted a position with the sales department of Forsythe Brothers Company.

Dodge Manufacturing Company, Mishawaka, Ind., has completed the installation of Dodge rope drives on two 1000-hp generators in the hydraulic power plant of the Winchester & Washington Railway at Millville, Md.

Lord Manufacturing Company, New York, N. Y., announces the appointment of John S. Parmalee as assistant manager. Mr. Parmalee has had many years of experience in the manufacturing, operating and selling departments of the electrical field.

Falkenau Electrical Construction Company, Chicago, Ill., was the electrical contractor and carried out the change in motive power on the Salt Lake & Ogden Railway, Salt Lake City, Utah, from steam to electricity. Regular service with electric cars is now being given between Salt Lake City and Ogden, a distance of 55 miles.

Lackawanna Steel Company, New York, N. Y., has decided to move its principal offices from New York to its works at Lackawanna, near Buffalo, N. Y., as soon as the necessary additions to its present office building at Lackawanna can be completed. Selling offices necessary for local business will be maintained at the present location, 2 Rector Street, New York.

Lucius I. Wightman, New York, N. Y., who has been advertising manager of the Ingersoll-Rand Company for the past six years, has resigned his position, effective Aug. 1. Mr. Wightman will open an office in New York as an independent specialist in machinery advertising, handling the accounts of manufacturers of machinery and engineering products.

Allis-Chalmers Company, Milwaukee, Wis., has secured from the United States Steel Corporation additional orders for six gas-engine-driven electrical units, which will increase the corporation's generating equipment at Gary, Ind., by 25 per cent. In addition the Allis-Chalmers Company has secured from the American Steel & Wire Company orders for two large gas engines for its central furnaces at Cleveland, Ohio, of the same rating as the engines for the Gary plant.

Cooper Heater Company, Dayton, Ohio, is removing its plant from Dayton to Carlisle, Pa., and will be at this location after July 1. It is now introducing on the market a car heater made entirely of pressed steel which is seamless, being welded with the oxy-acetylene process. The Cooper Heater Company also announces the appointment of W. R. Crawford as sales engineer in charge of the entire Western territory. Mr. Crawford was formerly sales engineer of the air brake and railway motor department of the Allis-Chalmers Company.

Universal Safety Tread Company, Boston, Mass., has recently supplied its safety treads to the following railways: Third Avenue Railroad, New York, 100 cars; Chicago (Ill.) Railways, 350 cars; Chicago (Ill.) City Railway Company, 187 cars; Benton Harbor & St. Joe Railway & Light Company, Benton Harbor, Mich., 11 cars; Toledo Railways & Light Company, Toledo, Ohio, 12 cars; Lincoln (Neb.) Traction Company, 7 cars; Clinton Street Railway, Lyons, Ia., 5 cars; Mason City & Clear Lake Railway, Mason City, Ia., 5 cars; Kokomo, Marion & Western Traction Company, Kokomo, Ind., 5 cars.

Paragon Sellers Company, Chicago, Ill., has taken over the business of the Durant Electric Supplies Company and F. W. Pardee, who have been marketing among other specialties, the Paragon ground cone. The Paragon cone consists of a small cone of heavy-gage copper either tinned or bare, with numerous perforations which act as discharge points. The cone is equipped with a laced cable hollow and of 61,968 circ. mil cross section into which the ground wire may be run and soldered. It is filled with charcoal, which tends to insure at all times a perfect ground. To install the cone, it is only necessary to use a post-hole auger. Among the users of the Paragon cone are the Chicago & Milwaukee Electric Railway and several steam railroads.

Keystone Varnish Company, Brooklyn, N. Y., reports that it has furnished several thousand gallons of "Keystona" paint for inside work on the New York terminal of the Pennsylvania Railroad. This paint is a development of a product of zinc known as "Lithopone," which was discovered some 20 years ago. As a paint pigment it is claimed to have double the density of any other white pigment for painting purposes. It had the objectionable feature, however, of turning gray under sunlight. It is asserted that this defect was eliminated about a year ago. The company has secured control of this product for the United States, and is making it under the name of "Keystona" for outside as well as inside work.

Anthracenol Wood Preserving Company, New York, N. Y., had an interesting exhibit at the Atlantic City convention of the Master Car Builders' Association, consisting of samples of wood impregnated with Barol—coppered carbolineum—wood preservative. Samples of the preservative were also shown in glass tubes filled with water to demonstrate the fact that water has no effect on the preservative. Arrangements have been entered into by this company with the United States Metal & Manufacturing Company, New York and Chicago, to handle its products in the Eastern and Central Western States. For the further extension of this company's business arrangements have been completed to carry Barol in stock in New York, Chicago, St. Louis, Atlanta, New Orleans and Providence, R. I.

ADVERTISING LITERATURE

Ingersoll-Rand Company, New York, N. Y., has printed a catalog describing and illustrating Class OC duplex Corliss steam-driven air compressors.

Nashville Carbon & Oil Company, Nashville, Tenn., is mailing a folder referring to Durbon paint for steel cars, trolley poles, stacks, bridges, roofs, electrical apparatus, etc.

Fitchburg Steam Engine Company, Fitchburg, Mass., has printed a 48-page catalog on Fitchburg engines. It contains detailed descriptions and illustrations of the principal parts of the engine.

Northern Water Softener Company, Madison, Wis., has printed bulletin No. 6, which contains illustrations of representative installations of Bartlett water softeners. In bulletin No. 5 the type C Bartlett water softener is described and illustrated. Bulletin No. 3, issued by the company, explains the economy in using softened water for boiler feed.

Anthracenol Wood Preserving Company, New York, N. Y., has prepared a pamphlet describing the composition, effects and varied uses of Barol, a wood preservative compounded from heavy anthracene oils and antiseptic copper solutions. The same company is also selling agent in the United States for Steelflex anti-corrosive metal paint, and this product is described in another catalog just issued.

Edison Storage Battery Company, Orange, N. J., has issued a 48-page catalog describing and illustrating its new type A storage battery. It also contains tables of data and a price list of cells and their parts. Another catalog issued by the company contains useful hints and information relating to the care and operation of the Edison storage battery. The Edison Storage Battery Company is also distributing in circular form a reprint of an article in the *Electrical World* for April 28, 1910, entitled "The Edison Storage Battery—Its Pre-eminent Fitness for Vehicle Service," by Walter E. Holland.

The interests in Connecticut in favor of a measure to create a public utilities commission are arranging to make the subject a prominent issue before the Legislature of 1911, there being no legislative session in Connecticut this year. The State Business Men's Association met in Hartford recently, and as a result that body is circulating among its members a tentative act for the regulation of public service corporations which is to be reported on at subsequent meetings of the association. The measure favored by the association would substitute for the present Railroad Commission a commission of five residents of the State to be appointed by the Governor, each member to serve for five years at a salary of $7,500 a year. The commission would have power to require the establishment of joint rates and through routes, and to order such increases in the plant, equipment and service of companies which would come under its jurisdiction as might be deemed necessary. Issues of securities would also be subject to the approval of the commission.

Annual Statistical Number

ELECTRIC RAILWAY JOURNAL

A CONSOLIDATION OF

STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

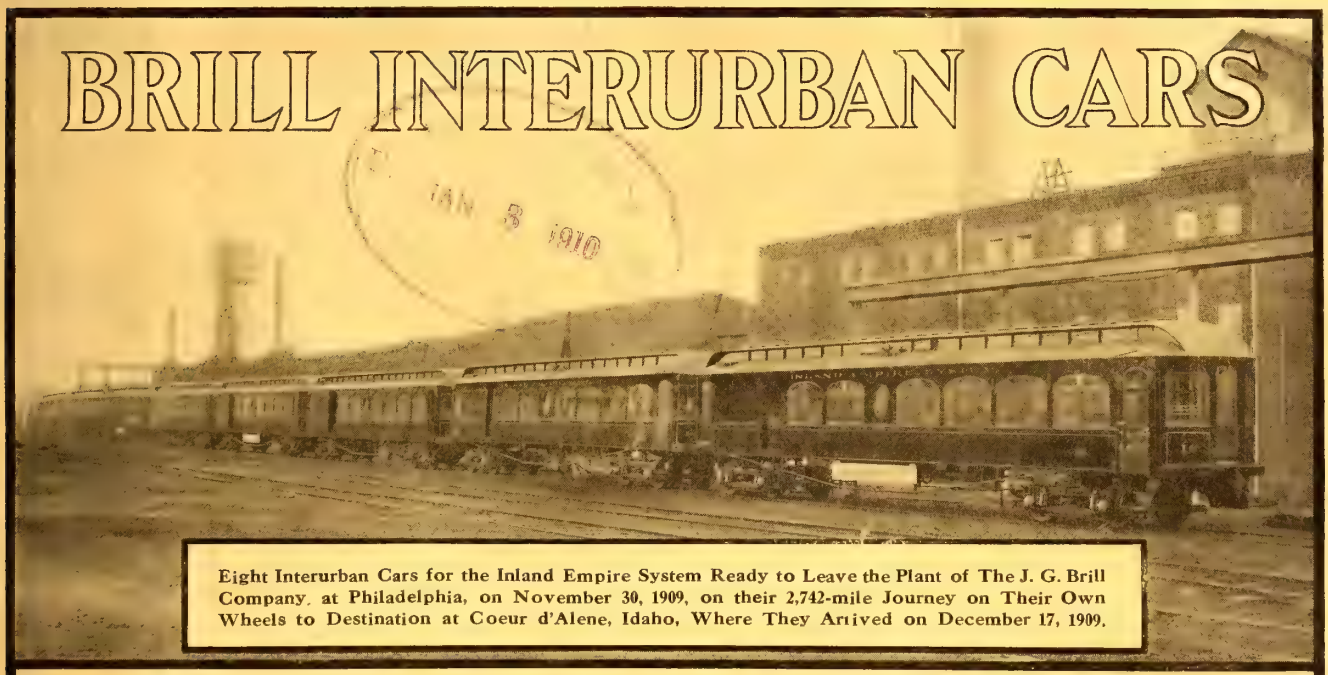
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Vol. XXXV. **JANUARY 1, 1910** No. 1

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Eight Interurban Cars for the Inland Empire System Ready to Leave the Plant of The J. G. Brill Company, at Philadelphia, on November 30, 1909, on their 2,742-mile Journey on Their Own Wheels to Destination at Coeur d'Alene, Idaho, Where They Arrived on December 17, 1909.

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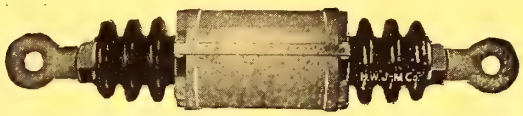
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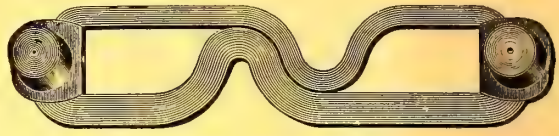
H.W. Johns-Manville Co.

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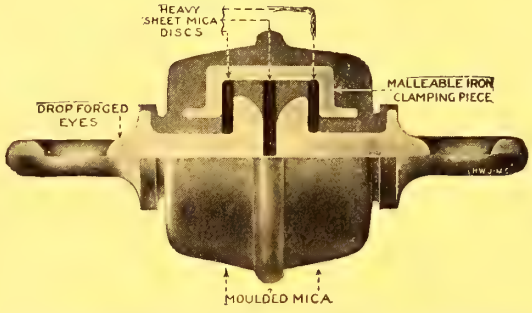
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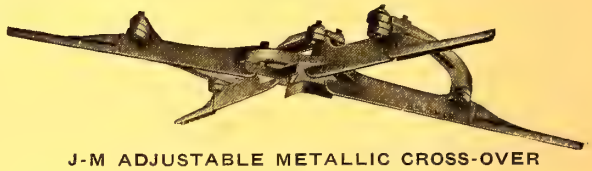
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The cut-out pressure may be adjusted anywhere between 15 and 200 pounds, and the difference between the cutting-in and cutting-out pressures may be from 5 pounds up. The adjustments can be made accurately, without removing any parts or breaking any pipe joints. This governor can be used on either direct-current or single-phase alternating-current circuits.



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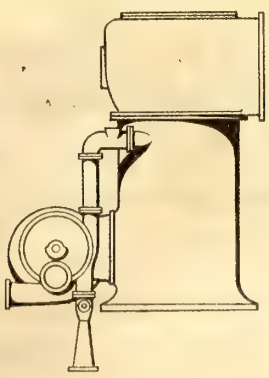
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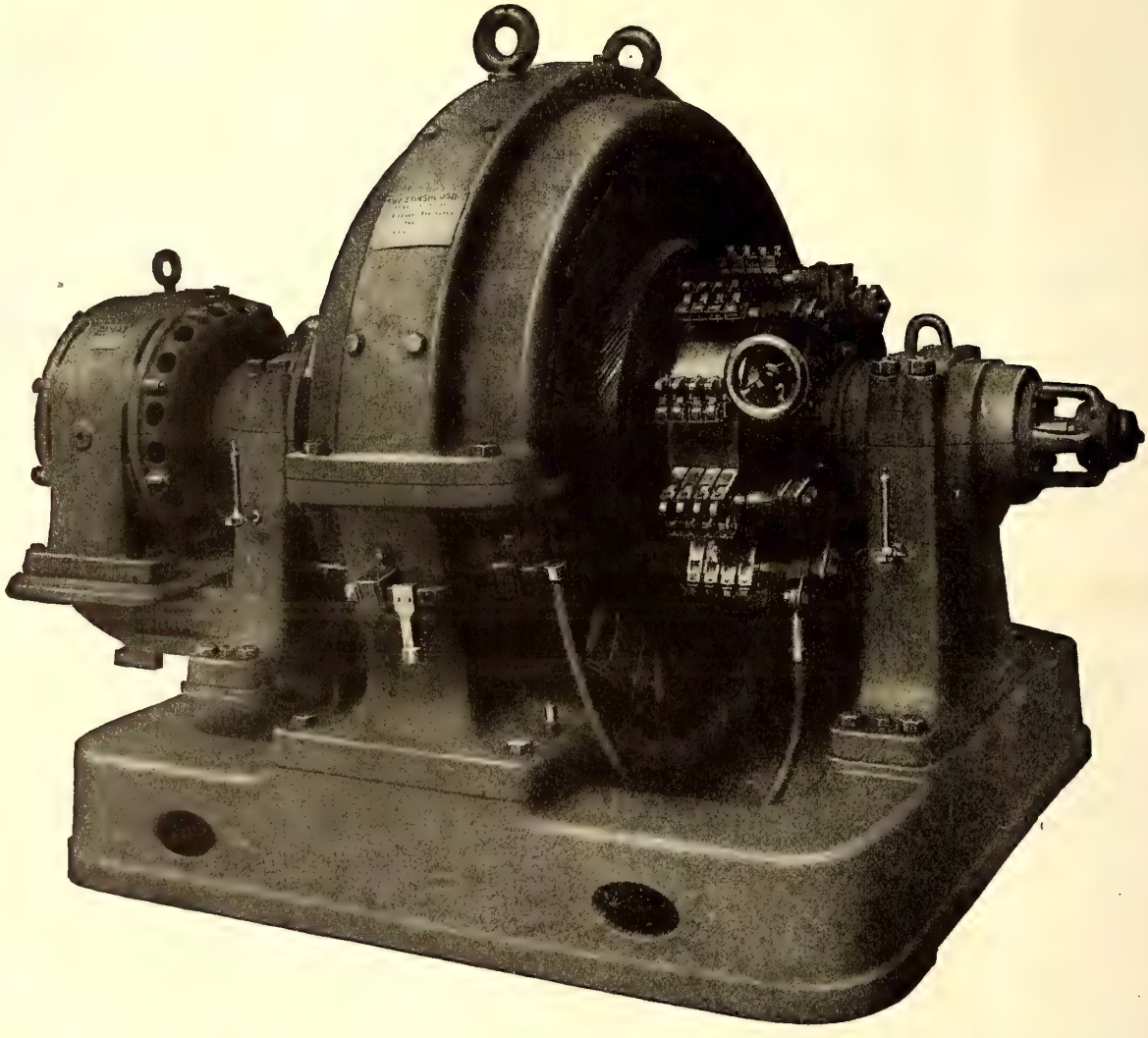


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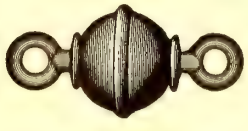
Main Office: Cincinnati, Ohio 2

The Macallen Company

FOUNDRY AND DIVISION STREETS
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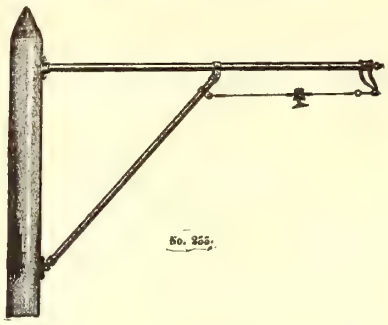


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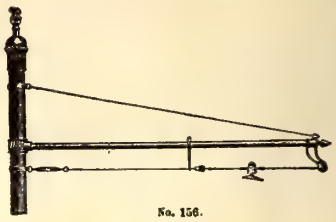
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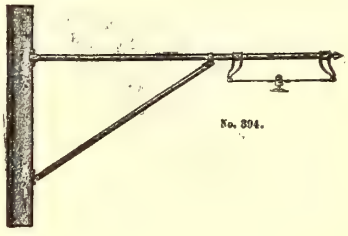

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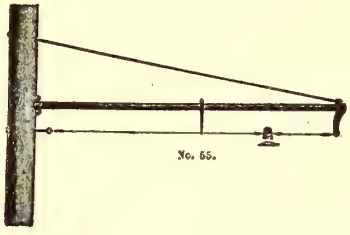
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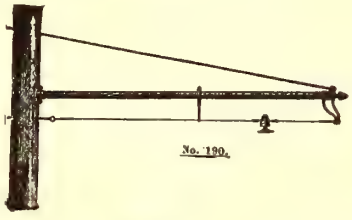
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No. 394.


No. 55.

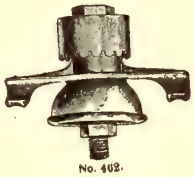

No. 190.

POLE LINE FITTINGS

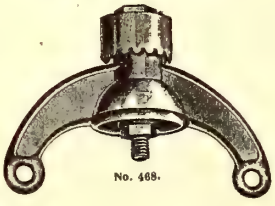
Pole Tops Pole Bands

MALLEABLE IRON CROSS ARMS

Pole Steps Pole Collars


No. 402.


No. 466.


No. 468.

Creaghead Trolley Line Material

EARS FROGS

HANGERS CROSSINGS

STRAIN INSULATORS

SECTION INSULATORS

INSULATED CROSSINGS

Complete Equipment for Overhead Line Construction


No. 1344


No. 238.


No. 242.

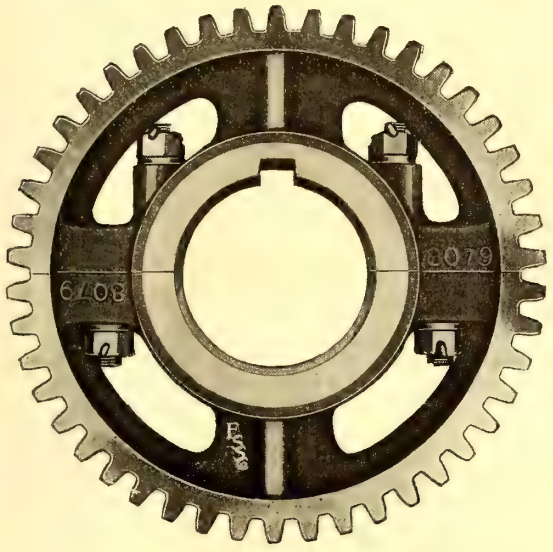

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The Creaghead Engineering Co.

344 Main Street, Cincinnati, Ohio

Your Particular Service Requires Particular Gears

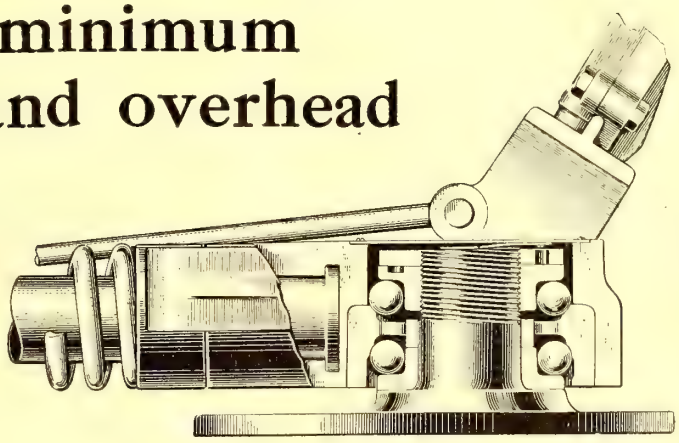


"Any gear for any service," has proven to be an expensive fallacy in street railway operation.

Gears and pinions are now designed and manufactured to meet the special conditions for which they are to be used. The Nuttall Company, the pioneer in the manufacture of railway gearing, have special grades of gears and pinions adapted to every kind of service.

Tell us the types of motors you are using, the approximate weight of your equipment, the average life you are receiving from your present gearing, and let us make some suggestions toward increased life and lower cost for motor gearing.

Ball bearing trolleys for long life and minimum wear on wheels and overhead



The sensitive action of the Nuttall ball bearing trolley bases will show savings which at first may not be apparent to you.

The alleviation of all friction and binding at the base swivel allows the trolley wheel to easily follow the slightest curvatures in the trolley wire. The base swivels equally well with the pole at any angle between vertical and horizontal.

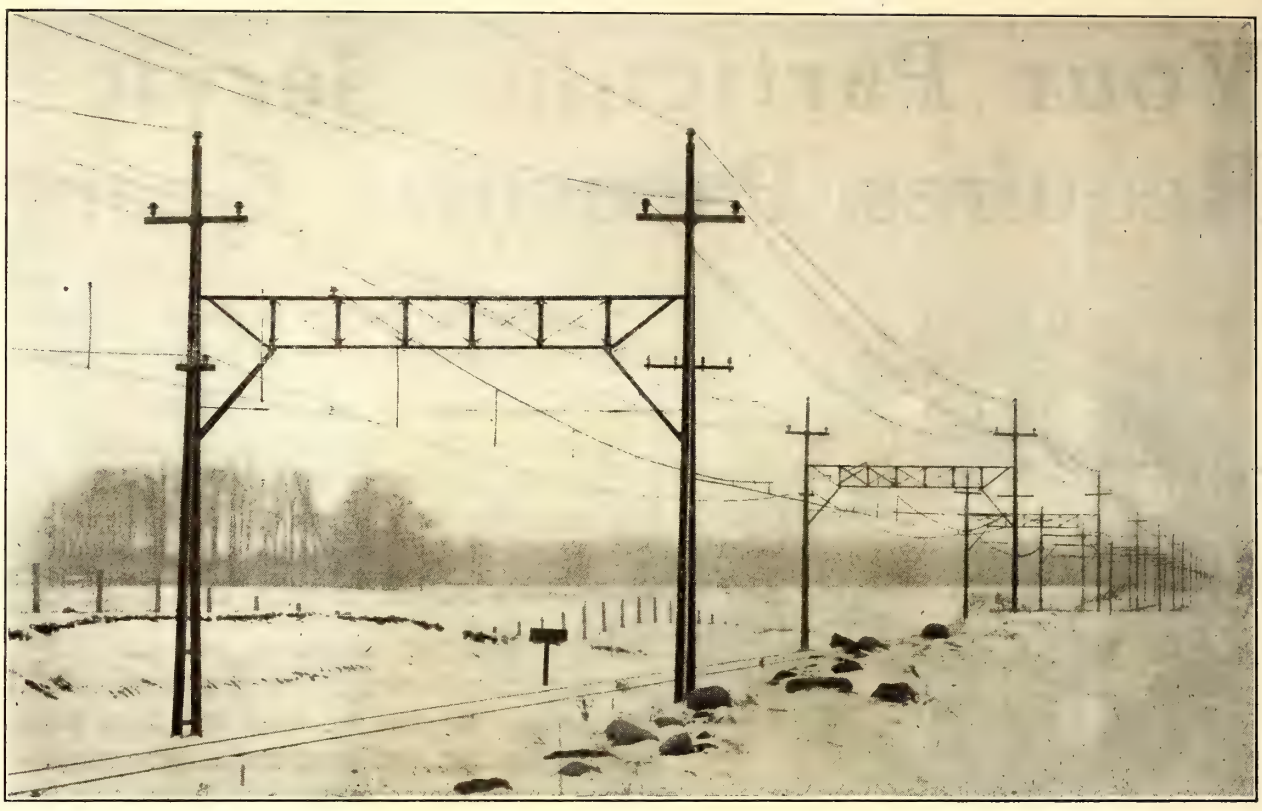
The ball bearing base not only lasts longer than an ordinary base, but also increases the life of trolley wheels and overhead construction.

By the way, have you a copy of our 650-page car equipment catalog, describing these, as well as hundreds of other car equipment specialties? Send for it.

ELECTRIC SERVICE SUPPLIES CO.

Railway Material & Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
1020-1024 Filbert St.	Hudson Terminal	303-305 Dearborn St.



The Difference in Cost

of catenary construction on our steel bridges with concrete foundations over the cost of ordinary trolley construction was only about $200.00 per mile of double track road on the Rochester, Syracuse & Eastern Railroad.

We illustrate above a line of the bridges on the Syracuse, Lake Shore & Northern Railroad which were of the same design as the three hundred and seventeen we furnished for the R., S. & E. R. R. Mr. Thomas H. Mather, Onondaga County Savings Bank Building, Syracuse, N. Y., was the chief engineer of both properties. Their standard construction from Rochester to Weedsport was ordinary trolley on wooden poles and the excess cost of our construction over the old-style construction was so small and the advantage so great that they changed their standard.

The impression prevails in some quarters that this type of construction is a luxury, but while relative costs may vary, in many cases the difference between the two classes of construction is small.

Can you afford to use temporary wooden pole construction when you can have permanent overhead construction any more than you can afford to use wooden trestles instead of steel bridges or concrete arches?

Write for detailed information.

Archbold-Brady Company

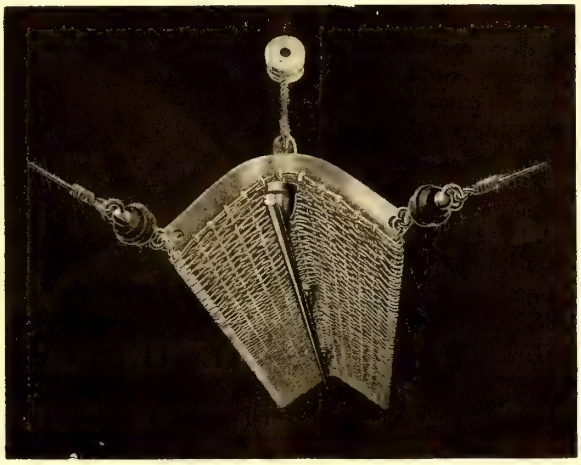
Engineers and Contractors

Syracuse, N. Y.

Little to Install

100,000 FEET IN ACTUAL OPERATION

5,000 Feet Sold Within the Last Six Weeks



National Trolley Guard

has been in successful service for eight years and has proven its merits beyond a doubt; never one complaint and every foot working satisfactorily.

We guarantee it to be the only guard that absolutely protects trolley cars at steam grade crossings.

It is fully protected by patents, and we will protect our customers against any patent litigation.

Write for descriptive pamphlet and revised price list. Write to our customers, they know.

The National Railroad Trolley Guard Co.

General Sales Office: 37 Wall Street, New York Works: Olean, N. Y.

Authorized Agents { The Ohio Brass Company, Mansfield, Ohio
The Electric Service Supplies Company, Philadelphia and Chicago

Nothing to Maintain



A Happy New Year

is assured if you use

Aetna Insulation Line Material

It has been in use by a large majority of the electric railways in this country and abroad for more than twenty years. Can any similar product show such a record?

Get details from our nearest office.

Albert & J. M. Anderson Mfg. Co.

(ESTABLISHED 1877)

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Philadelphia, 427 Real Estate Trust Bldg.
London, Moorgate Station Chambers

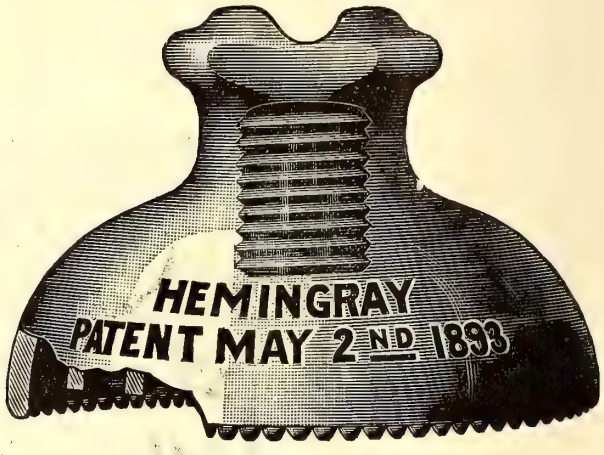
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San Francisco, Eccles & Smith Co.
St. Louis, T. C. White
Toronto, A. H. Winter Joyner
Birmingham, Ala., L. M. Robertson
Pittsburg, Doubleday-Hill Electric Co.
Kansas City, Moss and Satterlee

SEE THE

Teats on the Petticoat

They take all the moisture from the inner and outer surface of the insulator and keep the pin dry

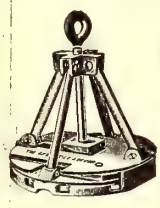


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Established 1848 } Covington, Ky.
Incorporated 1870 }

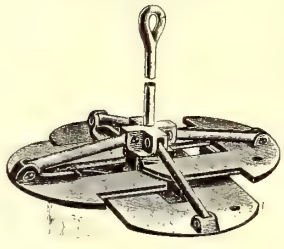
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4-Way Closed



To Guy Anchor Users

4-Way Expanded



We want you to sit up and take notice of The Everstick Anchor.

No Anchor before has ever made such a phenomenal growth in same time (less than three years) as has The Everstick.

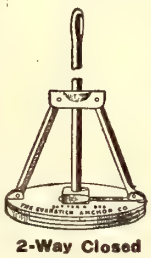
It is our opinion that during 1909 there were more Everstick Anchors sold than was sold of any other make.

Judging from contracts made and the number of large companies recently adopting Everstick Anchors, there will be more Everstick Anchors sold during 1910 than the combined sales of all other mechanical Anchors on the market.

The cost of installing Everstick Anchors is very slight. Eversticks installed cost less per square inch of holding surface and holds more per square inch than any other Anchor.

The Everstick possesses unusual merit worthy of your consideration.

Write for Booklet and Prices



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St. Louis, Mo.



2-Way Closed

2-Way Expanded

1500 Lightning Arresters



supplied one satisfied customer during 1909 and not one of these proved defective. Other large buyers are on our books in the same class. What class are you in? Ask the Lord Electric Co. if you want results. That's satisfaction. Get it from the Lord Electric Co.

Bulletins H and I describe them.

LORD ELECTRIC COMPANY

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1/1/10

New Type

DOSSERT CABLE TAP

Aluminum contact on aluminum feeder cable.
Copper contact on copper branch cable.



Dossert & Company, 242 W. 41st St. New York

GOLD TROLLEY WIRE

would wear faster than Copper and cost more.

Copper wears faster than Copper-Clad and costs more too.

Use a larger feeder and a small Copper-Clad trolley wire. The feeder doesn't wear out.

The combination

SAVES MONEY

TRADE MARK



WELD CLAD

DUPLEX METALS CO.

Singer Building 149 Broadway

NEW YORK

To Demonstrate:

You string No. 4/0 Copper Trolley for conductivity and strength.

Area - - - - -	211,600 c. ms.
Elastic limit - -	4,986 lbs.
Cost per mile - -	$490.00
Cost of renewal -	$490.00



No. 4/0 Copper

By the time it is worn out it is reduced 50%.

Area - 105,800 c. ms.

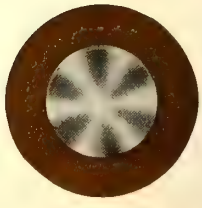


Using a No. 1 Copper Feeder and No. 0 COPPER-CLAD TROLLEY:

Equivalent combined copper area (when new) - - -	125,890 c. ms.
After trolley is worn 50% -	104,790 c. ms.
Elastic limit of trolley - -	4,707 lbs.
Combined cost per mile - -	$423.00
Cost of renewal - - - -	$230.00



No. 1 Copper Feeder



No. 0 COPPER-CLAD Trolley

N—1036—12—09—10.6M.

A Trolley Wire Certainly Comes In For Very Hard Service—

At intersections, on the main line, at turnouts, it gets hard knocks from the trolley wheel or shoe; all sorts of pounding and wrenching, occasional vicious arcing, heating from overloads and accidental short circuits—For economical maintenance you need the toughest trolley wire you can procure.

"Phono-Electric" Trolley Wire has stood these tests with the most remarkable results. It means a permanent, *reliable overhead construction*—a wire you can depend upon.

Every Street Railway Manager is interested in producing the lowest cost of maintenance for his overhead construction—Let us show you why "Phono-Electric" is the best trolley wire to use. Write us.



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253 Broadway, New York



Mills: Bridgeport Conn.

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OKONITE

TRADE MARK
Registered U. S. Pat. Office

The
STANDARD
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RUBBER
INSULATION

RAILWAY FEED WIRES insulated with OKONITE are unequaled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. **OKONITE** is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE—MANSON TAPE—CANDEE WEATHERPROOF WIRES—CANDEE PATENTED POTHEADS

Samples and Estimates on Application

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The Waclark Wire Co.

Manufacturers of

Trolley Wire

ROUND, GROOVED and FIG. 8

Cables

BOTH BARE AND WEATHERPROOF
ALL SIZES — FOR ALL PURPOSES

Copper Wire

BARE—TINNED—STRANDED

Material furnished to conform to the highest specifications

The Waclark Wire Co.

New York Office:
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Works located at
Elizabeth, N.J.

ROEBLING

Trolley Wire

Wire Rope **Wire Strand**

John A. Roebling's Sons Company
TRENTON, NEW JERSEY

ALUMINUM

Railway Feeders

And all kinds of **Electrical Conductors**

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed.

Write for prices and full information.

Aluminum Company of America
PITTSBURGH, PA.



Insulated
WIRES
and
CABLES

ASK THE PEOPLE WHO HAVE USED THEM. :: ::

For Feeders, A.C. and D.C. Transmission, Signals, Telephone, Telegraph, Car Wiring and Car House Wiring.

"The Insulation which has withstood successfully the test of half a century"

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INCORPORATED BY W. R. BRIXEY

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Western Representative

WATSON INSULATED WIRE CO.

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American Electrical Works

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RUBBER COVERED WIRE AND CABLE, MAGNET WIRE, WEATHERPROOF WIRE AND CABLE, OFFICE WIRE, ANNUNCIATOR WIRE

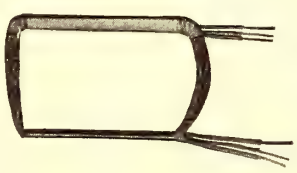
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SAN FRANCISCO OFFICE, 438 Market St.

The National Conduit & Cable Co.
Executive Offices: 41 PARK ROW, NEW YORK, N. Y.

Trolley Wire
Copper Transmission Wire and Cable
Weatherproof Feeder Wire and Cable
Paper Insulated Transmission and Feeder Cable

BOSTON PHILADELPHIA CHICAGO SAN FRANCISCO



COILS WON'T BURN OUT IF MADE OF
"Deltabeston" Magnet Wire
Fire-Proof—Moisture-Proof—Uniform—Flexible
D & W FUSE CO., PROVIDENCE, R. I.



Round—Square—Flat
MAGNET WIRE
ALL INSULATIONS
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BOSTON NEW YORK PHILADELPHIA PITTSBURGH, PA. CHICAGO ST. LOUIS SAN FRANCISCO

It is a paying investment to carry an advertisement in every issue of the Electric Railway Journal.

Western Electric

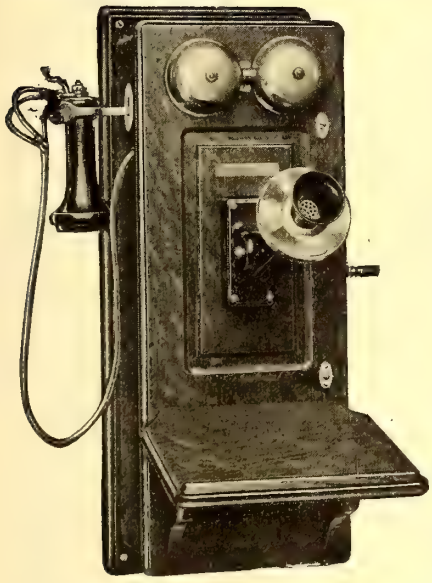
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FOR

Electric Railway Work

have the

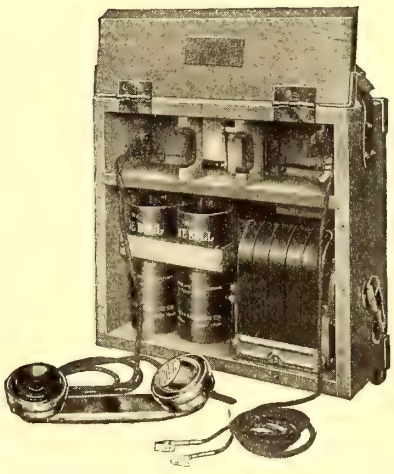
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Our railway telephones are made in all practical types, both the portable and the well-known stationary telephones for sidings and protected stations.



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Western Electric telephones will increase the efficieney of your system. They are durable and guaranteed to give satisfactory and lasting service.

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Full information and the services of our special railway telephone engineers are at your disposal. Write our nearest house.

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Poles Any Length—25 to 80 Feet

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35,000 6″ × 8″ × 8 ft. ties ready for immediate shipment.

Let us bid and save you money.

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SPECIAL PRICES ON SMALL STOCK

C. H. WORCESTER COMPANY

PRODUCERS OF WHITE CEDAR PRODUCTS

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Cedar Poles TIES and POSTS

Direct from the stump to the consumer.

KAYE & CARTER, - - Minneapolis, Minn.

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Manufacturers and Shippers of All Sizes

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Shipping Ports: Brunswick, Ga.; Fernandina, Fla.; Jacksonville, Fla.

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We are the largest producers and contractors in **Oak and Chestnut Cross Ties** east of the Mississippi River and will give your inquiries prompt attention. We are prepared to bid on any contracts large or small, so write us your requirements and let us name you a price for the delivered stock. 50,000 to 100,000 ties in stock all the time.

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Cedar Poles, Ties & Posts

Being Producers, we can, perhaps, supply you with Poles, Ties and Posts at more favorable prices than you have been paying.

Our Cedar is the finest quality of Michigan White Cedar. We can make prompt shipments and shall be glad to quote you delivered prices.

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Send itemized list for special delivered prices.

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TRIPARTITE STEEL POLES

Practical, Permanent, Overhead Construction

FRANKLIN STEEL COMPANY, Franklin, Penn.

CEDAR POLES

Northern White and Idaho Red

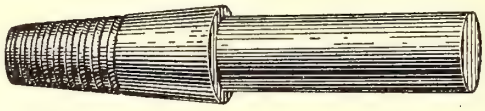
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First Class Stock Prompt Delivery
Right Prices

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There are none better than I can produce and ship in any quantity desired.
Let me quote you.

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The largest stock of Railroad Supplies West of Chicago.

We want a few active specialties to add to our line.

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JACKSONVILLE, FLA.

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DIMENSION
BRIDGE TIES
RAILROAD CROSS TIES
SWITCH TIES
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REGISTERED U. S. PATENT OFFICE
(COPPERED CARBOLINEUM)

The only perfect wood preservative
FOR
Railroad Ties, Poles, Cross-arms, Trestles, etc.
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Creosoted Poles, Ties, Bridge and Trestle Timbers
Correspondence Solicited Our Prices Will Interest You

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Creosoted Timber of All Kinds
CAPACITY:—50,000,000 Feet B. M. per Annum



Maintenance Cost of Overhead Equipment

is greatly reduced when poles are treated with

"C. A. Wood Preserver"

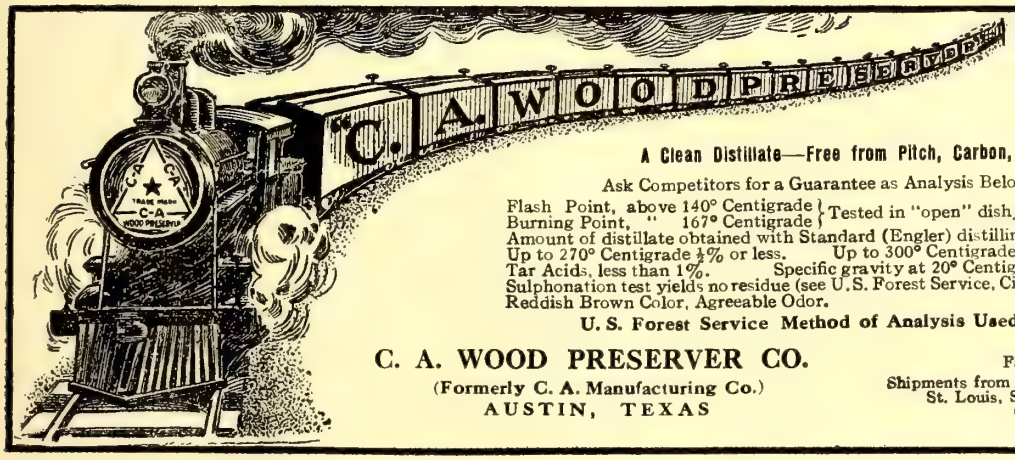
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We have a complete plant, of large capacity, at Minnesota Transfer. We can sell you Michigan or Western Cedar Poles, either treated or untreated—also Cedar Ties, Piling, etc. Send us your list and let us estimate.

The Valentine-Clark Co.

234 La Salle Street (3) **CHICAGO**



"C. A. Wood Preserver"

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A Clean Distillate—Free from Pitch, Carbon, Petroleum, or Similar Adulterations

Ask Competitors for a Guarantee as Analysis Below:

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Burning Point, " 167° Centigrade }
Amount of distillate obtained with Standard (Engler) distilling flask:
Up to 270° Centigrade ½% or less. Up to 300° Centigrade 8% or less.
Tar Acids, less than 1%. Specific gravity at 20° Centigrade, 1.138.
Sulphonation test yields no residue (see U. S. Forest Service, Cir. 112).
Reddish Brown Color, Agreeable Odor.

U. S. Forest Service Method of Analysis Used

C-A TRADE MARK C-A WOOD PRESERVER

Reg. U.S. Pat. O. Nos. 22396-51987

C. A. WOOD PRESERVER CO.

(Formerly C. A. Manufacturing Co.)

AUSTIN, TEXAS

Factories in Germany

Shipments from stocks at New York, New Orleans, St. Louis, San Francisco Salt Lake City, Galveston and Denver

Terse Talks on Timber Treatment

(Talk FOUR)

BECAUSE it is a pure Coal-tar oil especially treated to secure greater "body" and increased antiseptic power.

BECAUSE it does not distill below 300 C. (572 Fahr.)—will not evaporate from wood even under tropical heat.

BECAUSE of its heavy weight and insolubility it is not dissipated by torrential rains or submersion in water.

BECAUSE it contains all of the non-volatile, insoluble, pungent and acrid antiseptics of Coal-tar oil in their most active form, which makes it not only a germ-excluder but a germicide that exerts its influence permanently.

BECAUSE it positively reduces the inflammability of the wood to which it is applied. (Creosote is highly inflammable.)

BECAUSE it means maximum results from timber treatment with all of the bother and uncertainty left out.

These are a few of the reasons why you should ally yourself with progress by insistently specifying

Antiseptine

Registered.

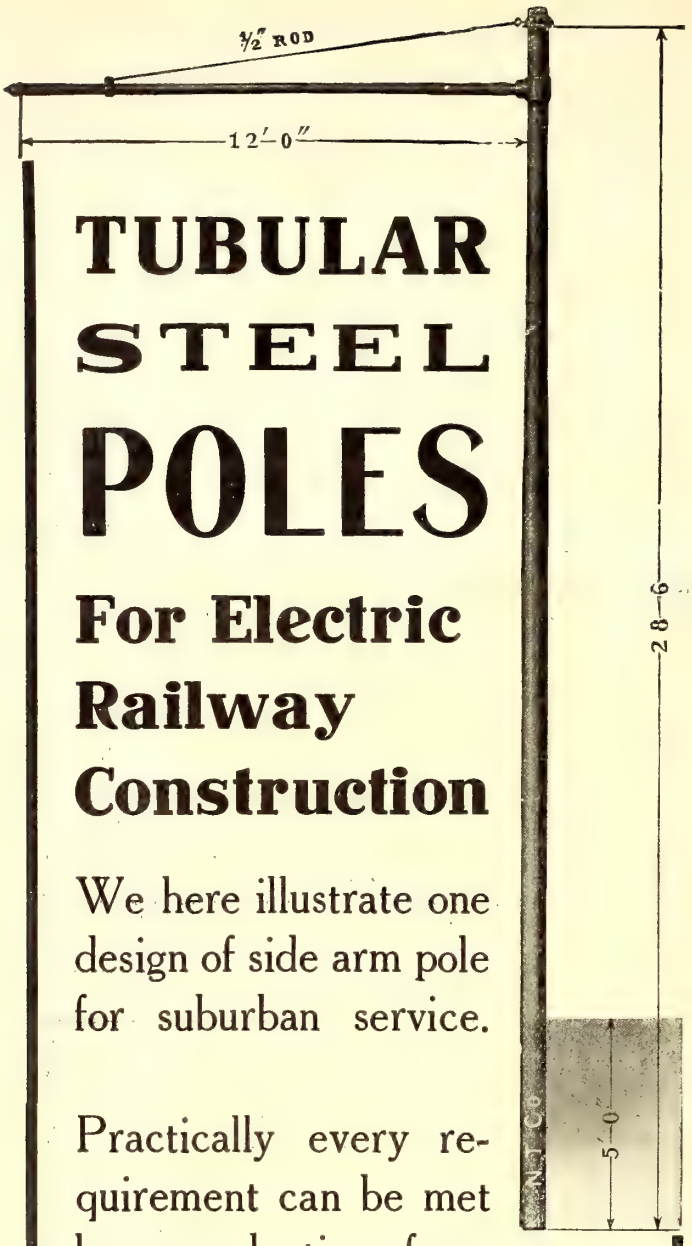
"The Wood-preserver that stays put."

If you are from Missouri, let us show you—if you're not, let us show you anyway. Read Prof. Gellert Alleman's official analysis of Antiseptine. It tells its own story.

Don't wait until the "good old summer-time." Lay this journal down right now and write us.

Incorporated 1892

AMERICAN WOOD-PRESERVING COMPANY, The Rookery, CHICAGO



TUBULAR STEEL POLES

For Electric Railway Construction

We here illustrate one design of side arm pole for suburban service.

Practically every requirement can be met by a selection from our wide variety of plain and ornamental styles.

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STEEL POLES

FOR

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These poles have no transverse joints—no unsightly features. They cannot telescope and they have uniform strength for entire length.

Special bracket designs furnished to match existing work or to carry out new ideas.

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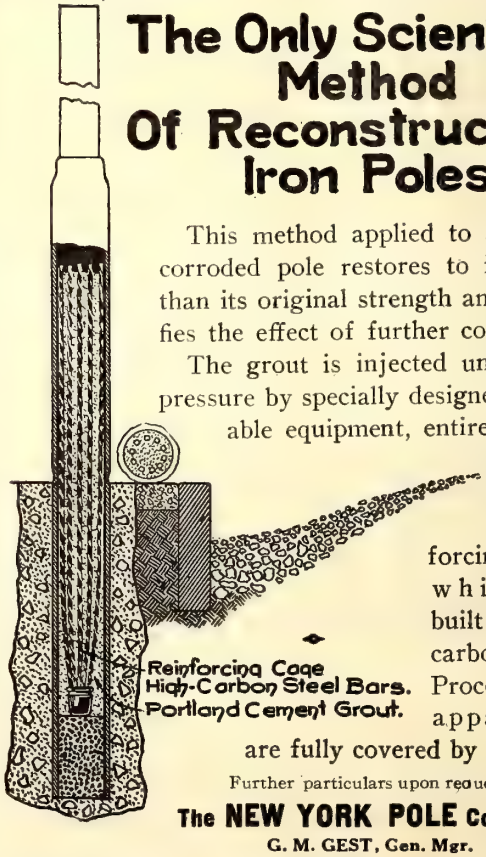
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165 Broadway NEW YORK

(1)

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The Only Scientific Method Of Reconstructing Iron Poles



This method applied to a badly corroded pole restores to it more than its original strength and nullifies the effect of further corrosion.

The grout is injected under air pressure by specially designed portable equipment, entirely surrounding the reinforcing cage, which is built of high carbon steel. Process and apparatus are fully covered by patents.

Further particulars upon request

The NEW YORK POLE Company

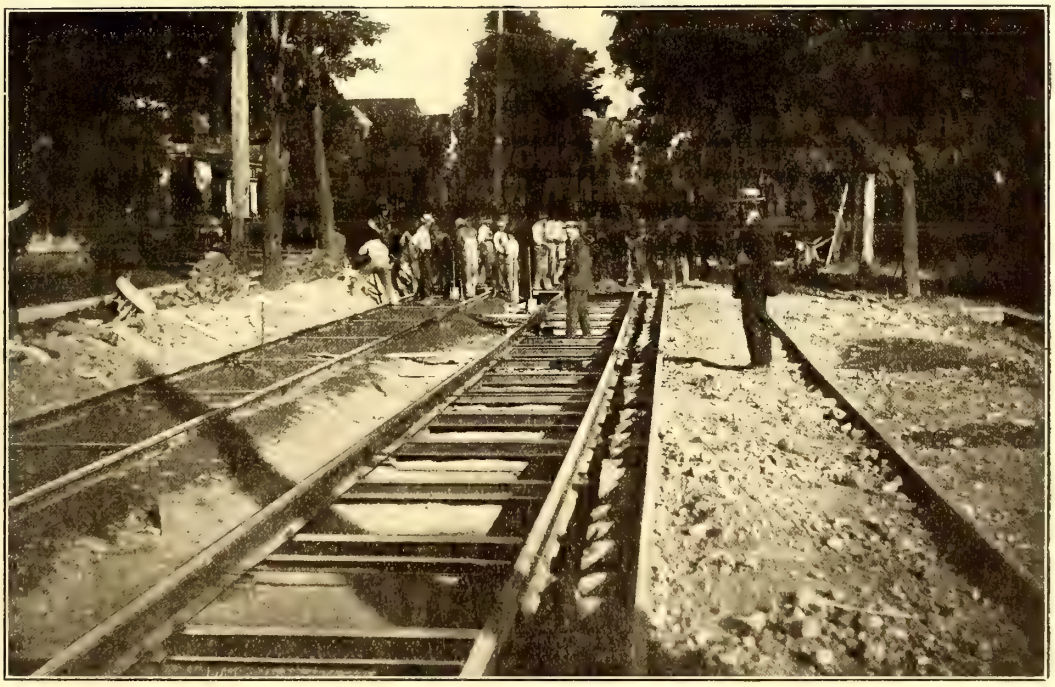
G. M. GEST, Gen. Mgr.

NEW YORK	CINCINNATI	CHICAGO
277 Broadway	Union Trust Bldg.	Monadnock Block

Carnegie Steel Company

Pittsburgh, Pa.

Steel Cross Ties



INSTALLATION OF STEEL CROSS TIES, CORTLAND, N. Y.

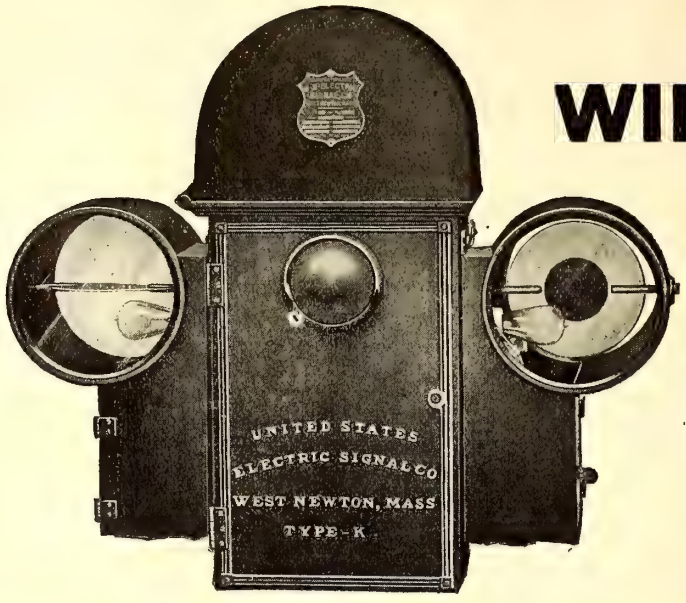
THE INITIAL EXPENSE FOR CONCRETE CONSTRUCTION WITH STEEL CROSS TIES IS NO GREATER THAN THAT FOR WOOD TIES. THE ULTIMATE SAVING IS IN FAVOR OF STEEL CROSS TIES.

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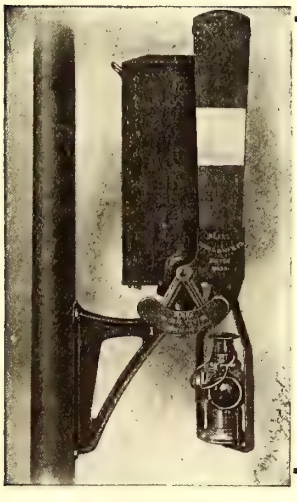
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UNITED STATES ELECTRIC SIGNAL CO.
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Send for Bulletin No. 3.



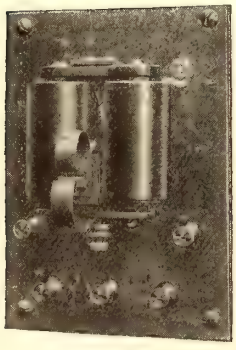
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Blake Dispatcher's Signals

now. You cannot afford to be without them. They will enable you to handle more traffic with more safety and convenience to the public and at less expense.

Write *NOW* for further information.

Blake Signal & Manufacturing Co., BOSTON MASS.



The Relay That Does the Work

National Crossing Signals

give positive, visible and audible protection against accidents at highway crossings.

The National Relay is a simple practical solution of the relay problem for high voltage—it is positive in action, non-arcing, and has long life.

The National Bell is a heavy, non-arcing, loud-ringing gong, which requires no delicate adjustment. It is the only bell on the market which is efficient on circuits varying from 500 to 800 volts.

The National Signal System is simple, easily installed and inexpensive to maintain—fully proven by four years' successful service.

Will you have details?

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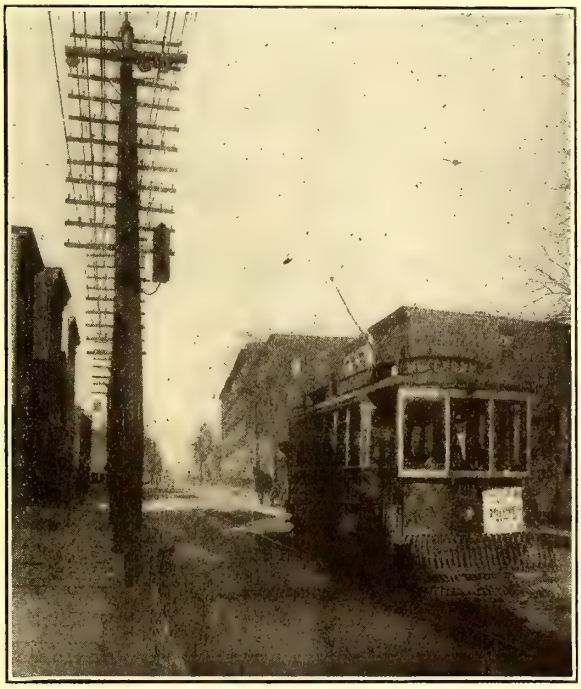
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Insure Safe Single-Track Operation

by equipping your entire line with the

Kinsman Block Signal

Operated Through the Rail
Eliminates Overhead Switches

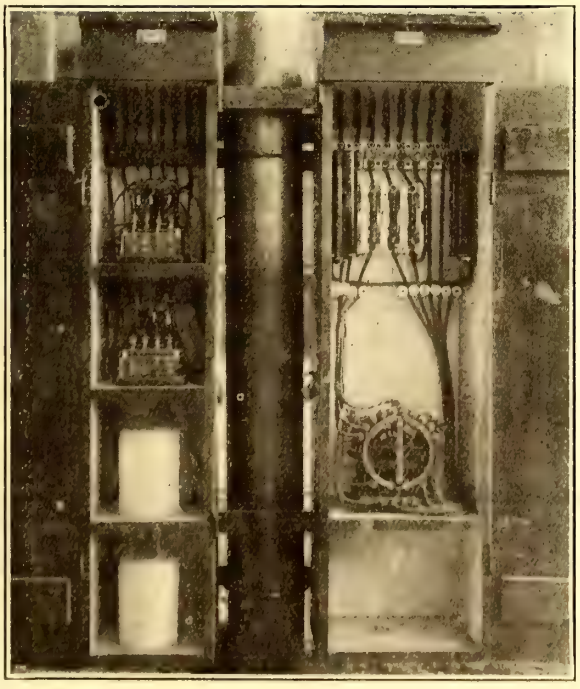


When a car enters a clear block, it sets a cautionary signal for following cars and a danger signal for opposing cars. The step-by-step mechanism of the signal allows following cars to enter the block without changing the signals set by the first car. As each car leaves the block, the step-by-step mechanism moves back one tooth, until the last car out restores the safety signals and extinguishes the danger and caution signals.

In the installation shown here 17 cars can enter the block.

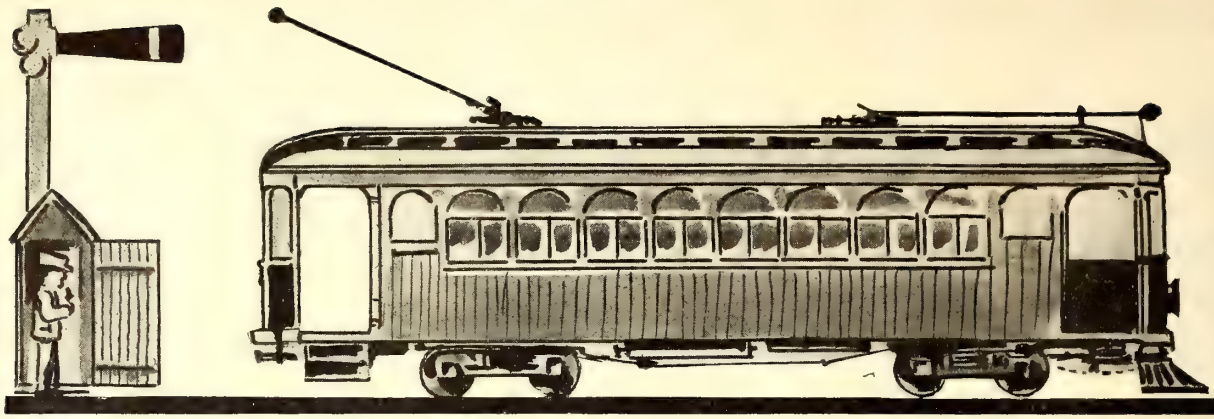
Full particulars are yours upon request.

Write!



Kinsman Block System Co. 50 Church Street

NEW YORK



Collisions Are

when the dispatcher can change or enforce

STROMBERG

Despatching

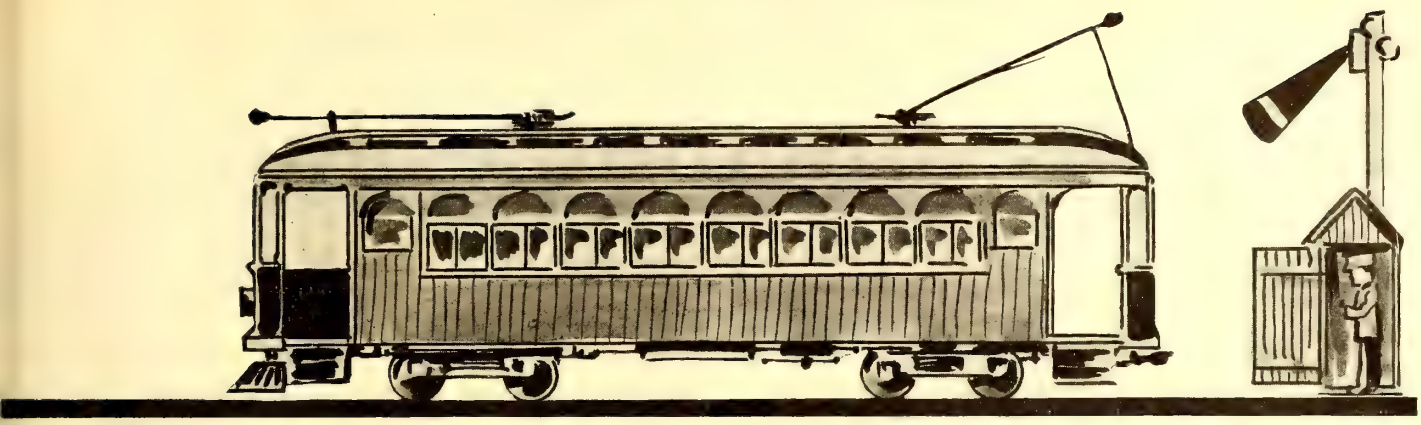
is of the very greatest practical value in handling regular trains on inter-urban roads, in wild-catting special cars, or in increasing the number of cars to handle unusually heavy traffic—its emergency value is beyond estimation. At each siding or meeting point, a booth with a single blade semaphore is installed. The movement of the semaphore is controlled by a simple, reliable mechanism, operated by the dispatcher in his office. When he determines the proper meeting place for two cars, he plugs in on the selected number in his master machine, thus setting the semaphore at the selected point to the stop position. When the semaphore is thrown to full stop, the fact is recorded on the dispatcher's tape register.

Just Out—Bulletin No. 1001- —Send For It !

STROMBERG-CARLSON TEL.MFG.CO

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.



Impossible

his orders to car crews at meeting points.

CARLSON Signal System

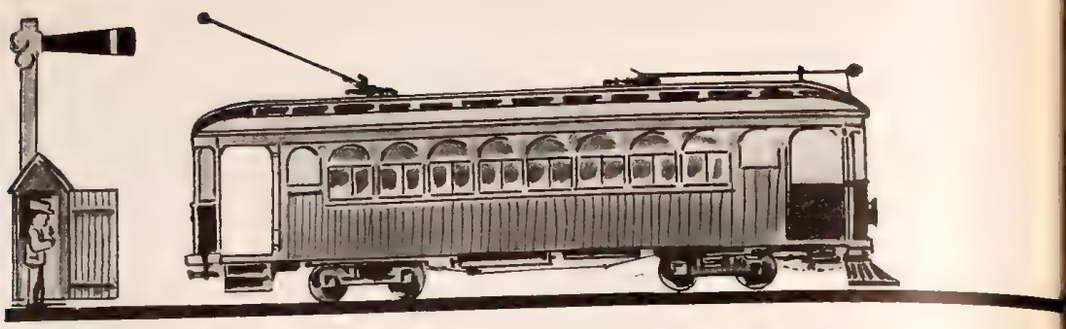
Since the dispatcher has full control of the signals at meeting points, he can stop any car or train anywhere along the line, call the conductor to the telephone, and verbally change or reinforce his orders.
While the Stromberg-Carlson Despatching Signal System greatly facilitates traffic and adherence to schedules, its chief value to any interurban road is in the prevention of accidents. Any day—any hour—any minute—your motorman may lose or forget the wording of a written order, causing distressing loss of life and heavy damage expense. Stromberg-Carlson Despatching Signals compel obedience to orders. Our catalog gives full particulars of its construction and operation. Shall we send a copy?

Sixteen Pages of Useful Information—Bulletin No. 1001-A

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ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.



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when the dispatcher can change or enforce

STROMBERG

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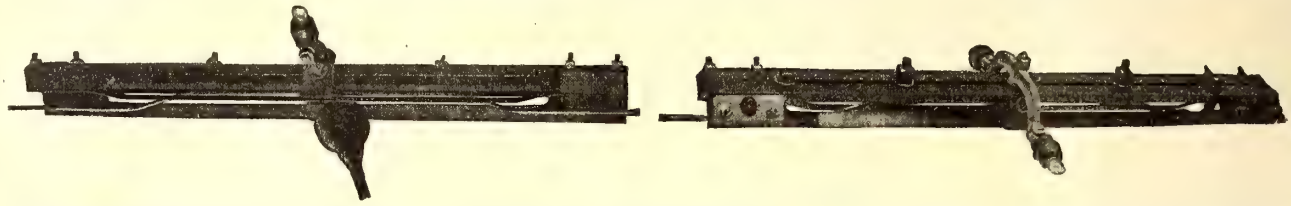
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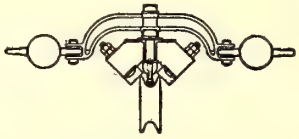
The Trolley Switch in the

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is very simple, has no moving parts, does not project below the wire. A light angle iron frame supports at its ends, the insulated contact strips which are inclined to each other.



One strip connects to trolley, the other to signal box. The wheel merely bridges them,



the wire being raised above its path. Could anything be simpler? There is no shock to trolley, and the contact strips extending lengthwise combine flexibility with great wear.

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Send Us a Timetable

and a rough sketch of your road, and we will submit an estimate for installing the

Simmen System

—the signal system that will make your road SAFE. In operation on the Toronto and York Radial Railway, it produced 88,734 indications during July, and showed an efficiency of 99.993%.

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2

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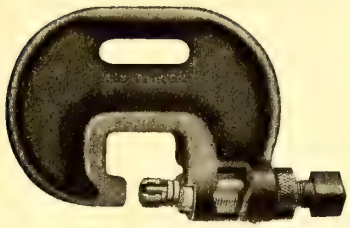
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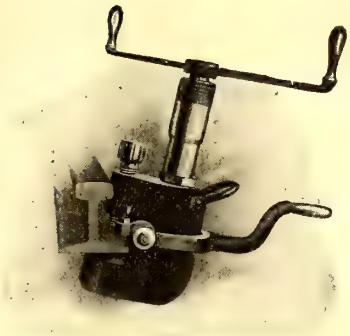
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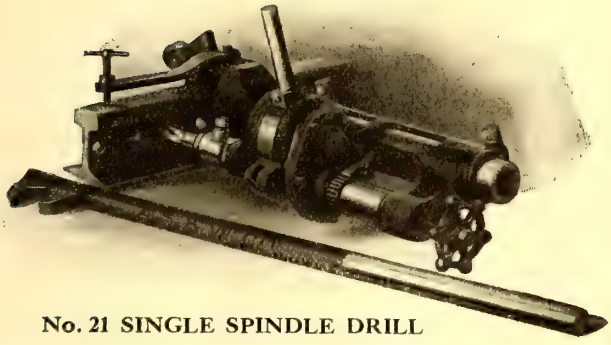
SPECIAL TRACK WORK FOR ELECTRIC RAILWAYS



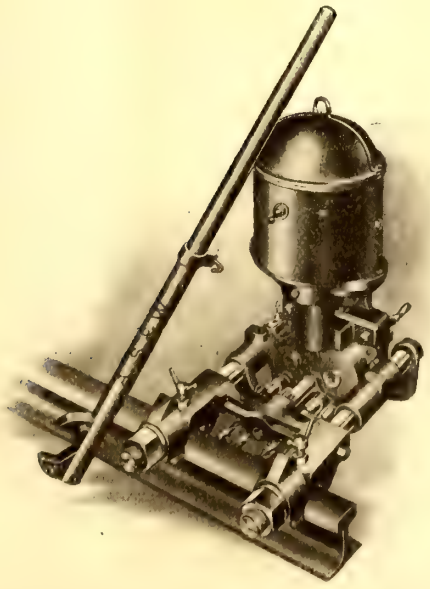
No. 40 SCREW COMPRESSOR



HYDRAULIC SCREW COMPRESSOR No. 68



No. 21 SINGLE SPINDLE DRILL



DOUBLE TWIN MOTOR DRIVEN DRILL No. 24M

The Service you get from Rail Bonds

is largely dependent upon the tools you use in installing the bonds.

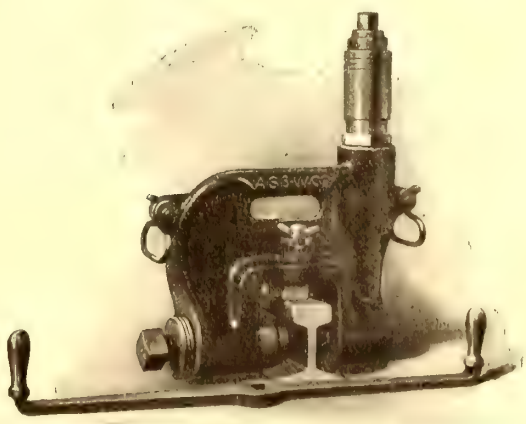
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We go further—expert superintendence. Also expert investigations—this at our expense.

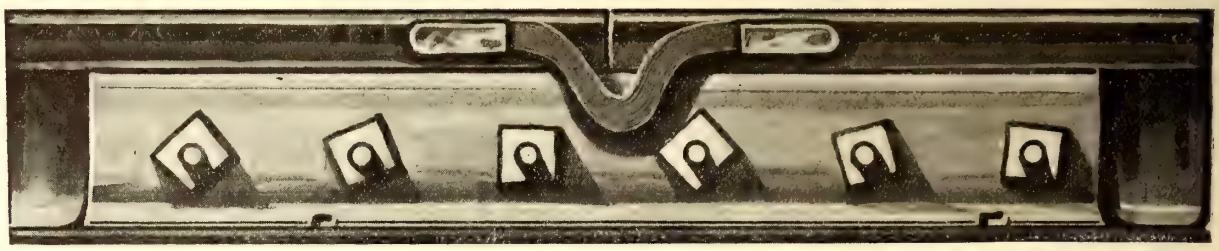
AMERICAN STEEL & WIRE CO.

CHICAGO NEW YORK WORCESTER
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Export Representatives:
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No. 61 SCREW HYDRAULIC COMPRESSOR



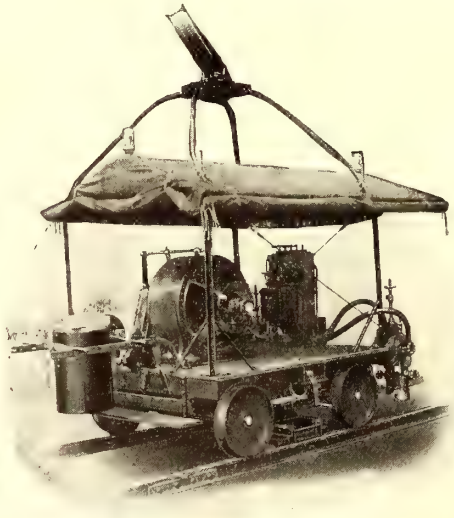
Electric Weld Bon

Cost of Rebonding Per Joint With Electric Weld Rail Head Type Bond.

Opening and repaving per joint, 25c,		$ .25
Applying 4/0 rail head type bond,		.50
Total cost per bond installed.		$ .75
Rebonding sixty per cent of the protected bonds, per ten years, 21,000 x $3.00		$63,000
Rebonding ten per cent Weld Bonds, 3,500 x 75c each,	$2,625	
Cost bonding car outfit,	2,500	
		5,125
Net saving in favor of Electric Weld Bonds,		$57,875

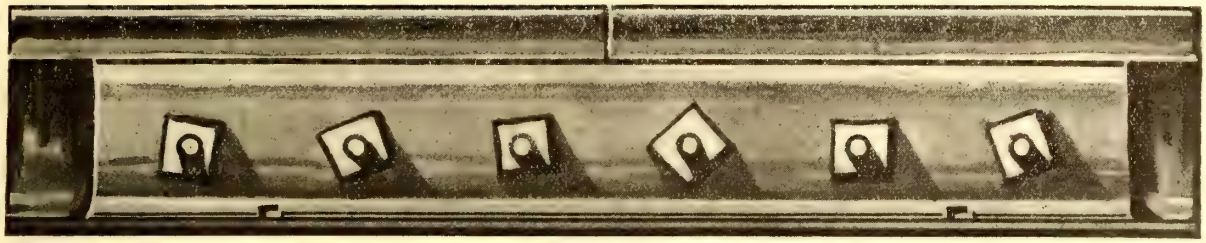
The above computations show a net saving of $57,875 in the cost of rebonding 100 miles of paved city work, in favor of Electric Weld Bonds.

As the steel companies do not charge extra for drilling high rail for bond terminals, we have assumed the first cost of installing Plug Bonds and Electric Weld Bonds on new work to be the same.



The saving in this instance would therefore be due to the longer life of Electric Weld Bonds and the difference in cost of rebonding.

Electric Railway Improvement Co.,



ds vs. Plug Bonds

Cost of Rebonding Per Joint with Plug Bonds.

Opening and repaving 8 sq. ft. of pavement @ 20c per sq. ft.,	$1.60
Opening and replacing fish plates,	.50
Twelve new bolts @ 4c each,	.48
New bond,	.40
Removing, reaming and applying bond,	.20
Total cost per bond installed,	$3.18
Credit 1 lb. Scrap Copper,	.10
Net cost per bond installed,	$3.08

The longer life of Electric Weld Bonds is due to the fact that they are electrically fused to the rail. Copper and steel become, mechanically and electrically, one piece, without surface-to-surface contact. Moisture can never penetrate between them and start corrosion.

They are rapidly and economically applied by our light, compact bonding cars, which carry all necessary apparatus, and can be so quickly removed from and replaced upon the track as to offer minimum interference with traffic.



Write for our new Bonding Book.

6005 Carnegie Ave., Cleveland, Ohio



Electric Weld Bonds

Cost of Rebonding Per Joint With Electric Weld Rail Head Type Bond.

Opening and repaving per joint, 25c,		$ .25
Applying 4/0 rail head type bond,		.50
Total cost per bond installed.		$ .75
Rebonding sixty per cent of the protected bonds, per ten years, 21,000 x $3.00		$63,000
Rebonding ten per cent Weld Bonds, 3,500 x 75c each,	$2,625	
Cost bonding car outfit,	2,500	
		5,125
Net saving in favor of Electric Weld Bonds,		$57,875

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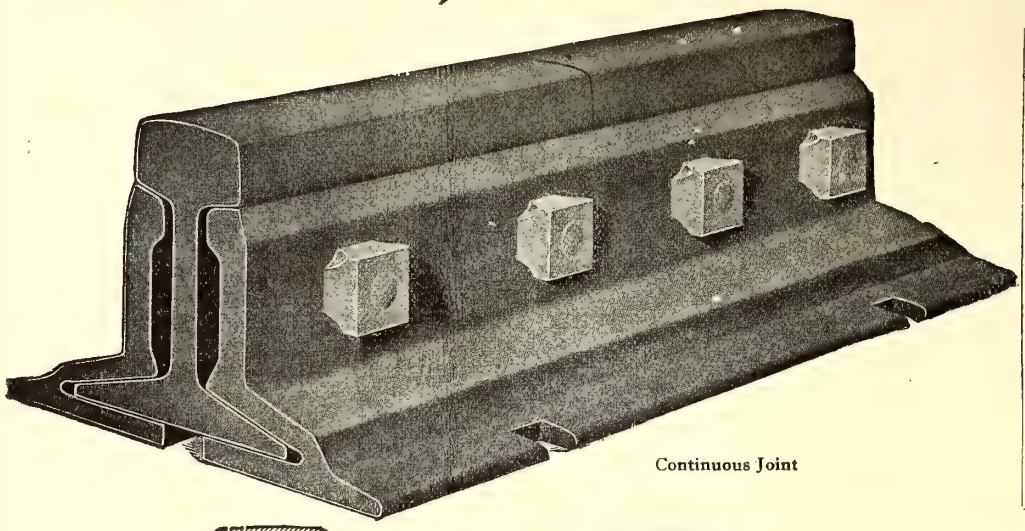
They are rapidly and economically applied by our light, compact bonding cars, which carry all necessary apparatus, and can be so quickly removed from and replaced upon the track as to offer minimum interference with traffic.



Write for our new Bonding Book.

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Over 50,000 Miles in Use

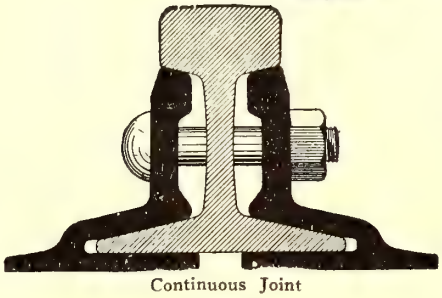


Continuous Joint

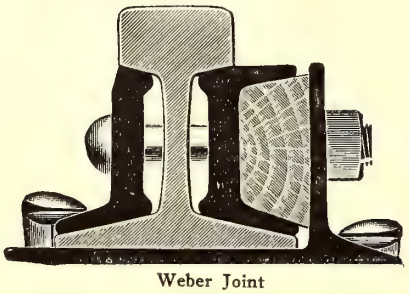
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Made from Rolled Steel to Fit over 145 Sections of Rails.

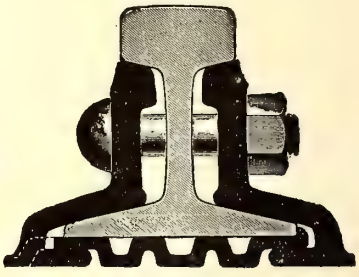
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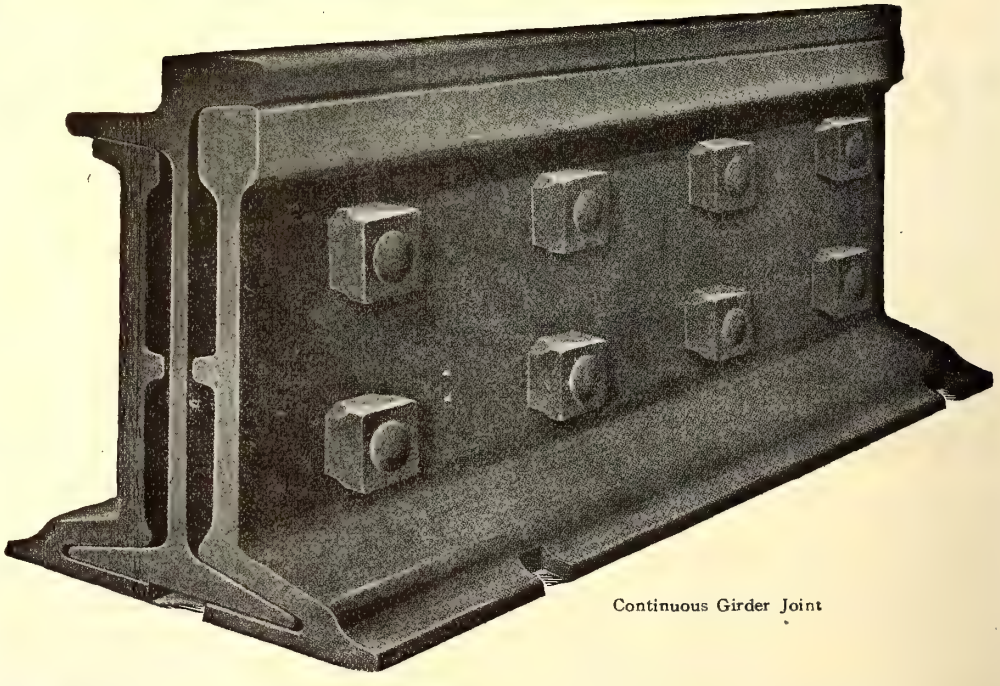
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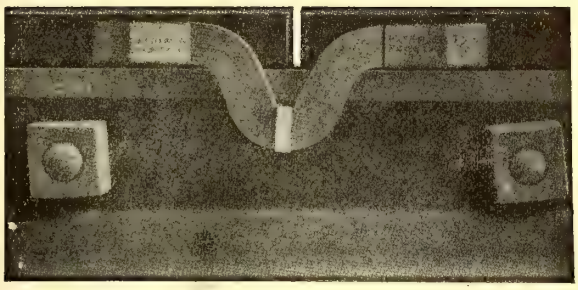
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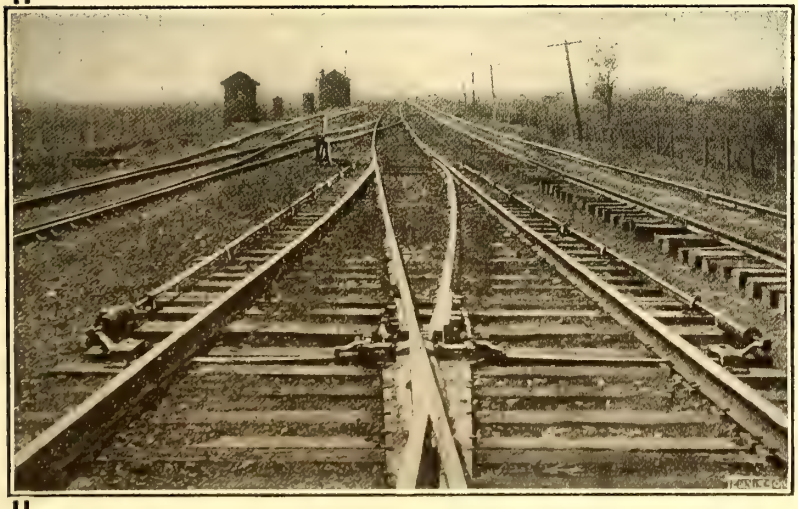
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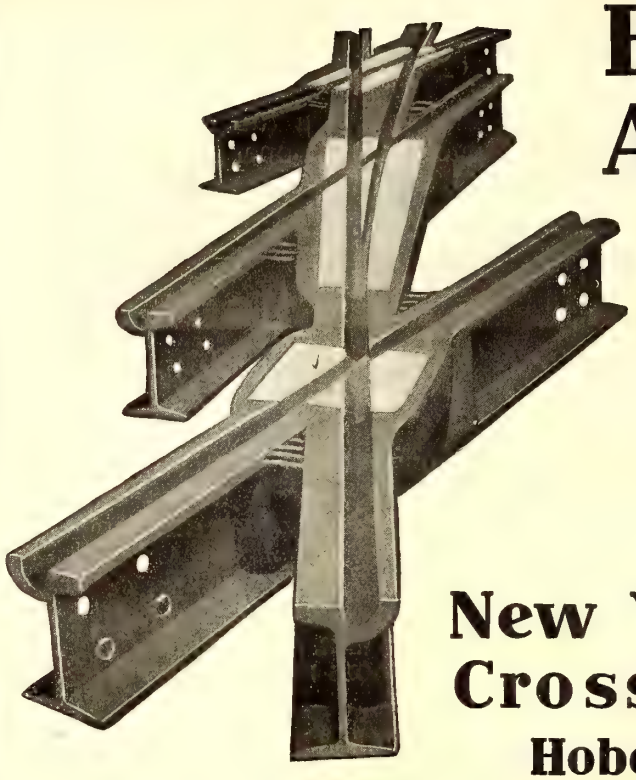
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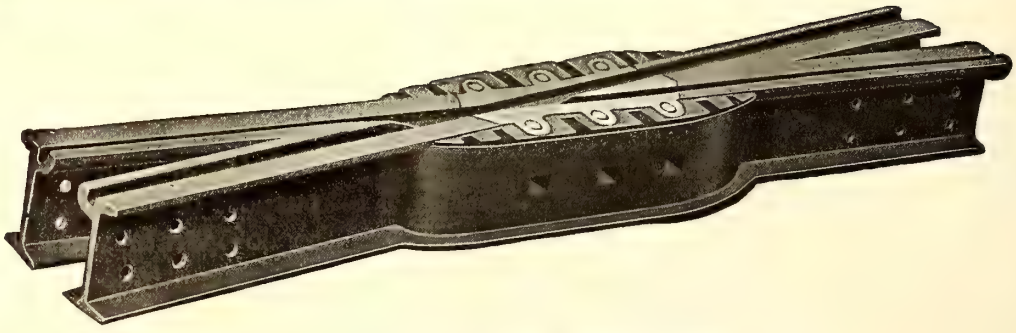


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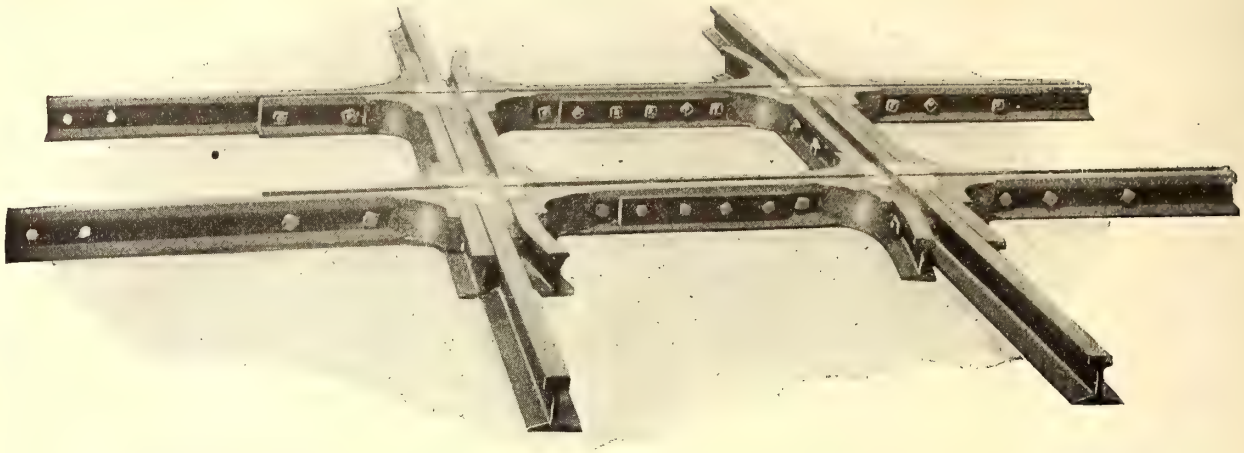
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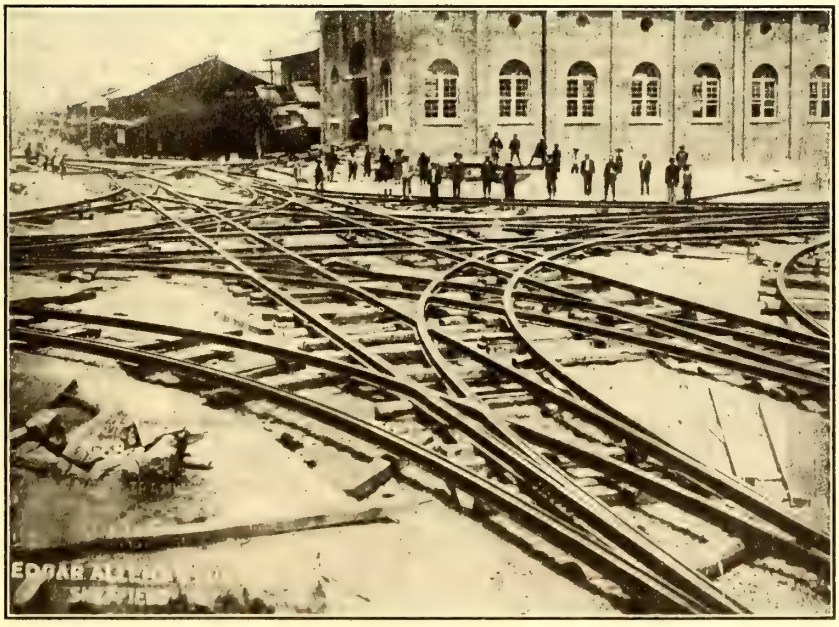
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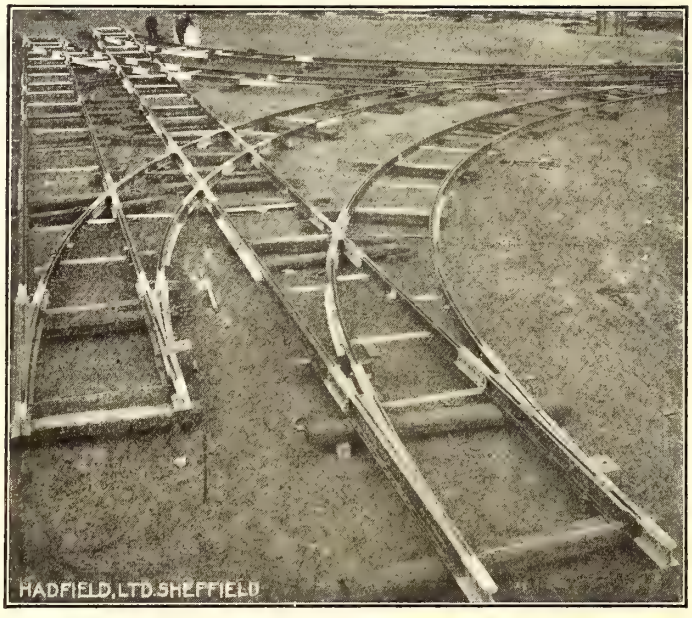
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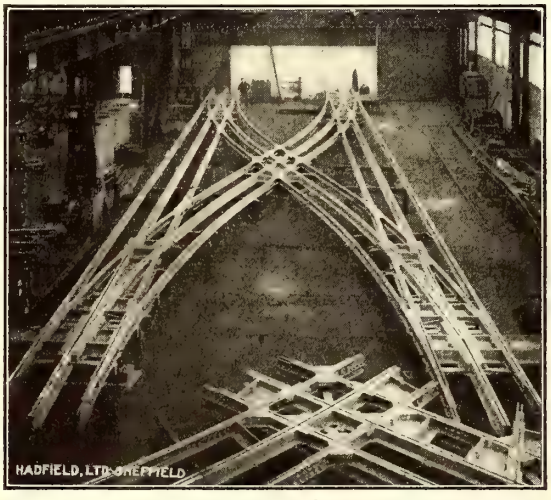


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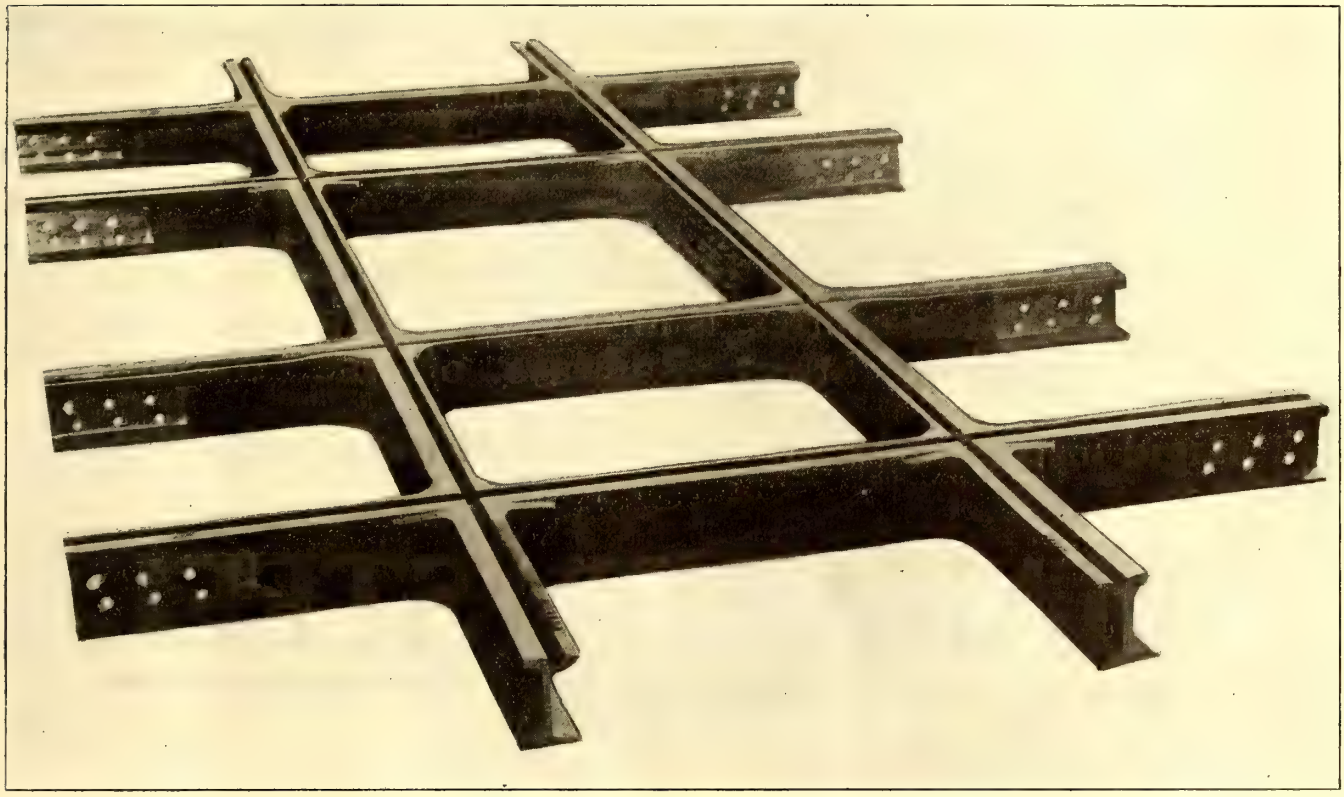
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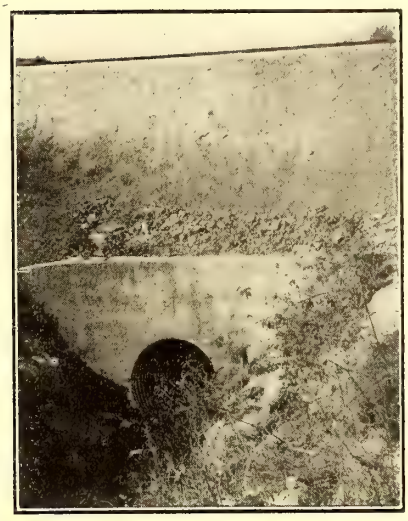
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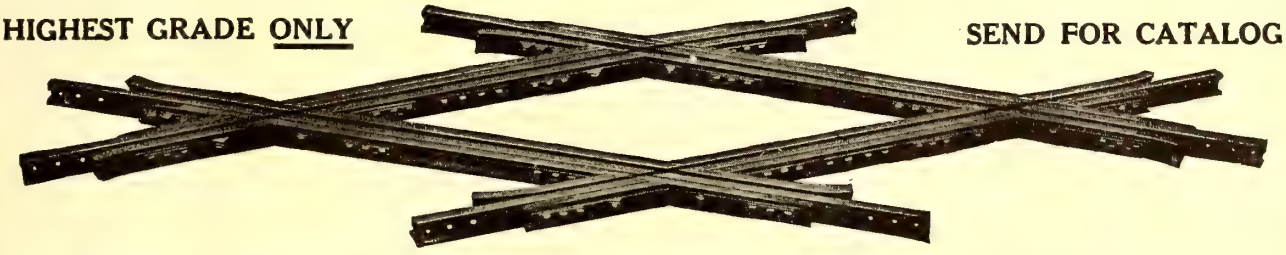
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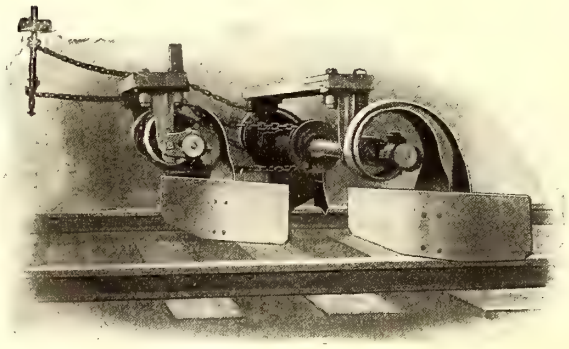
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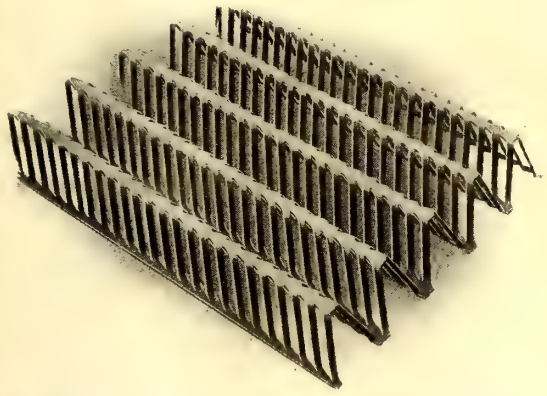
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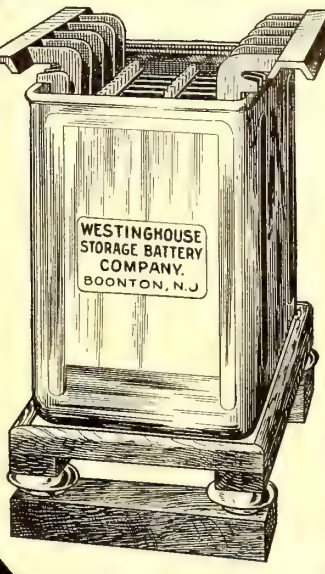
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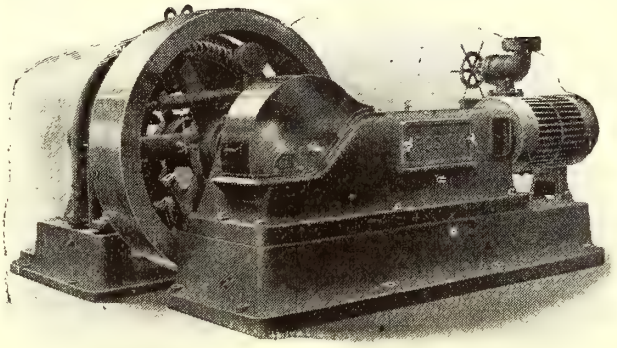
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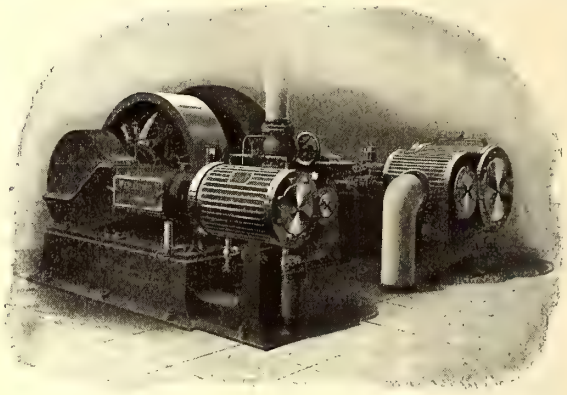
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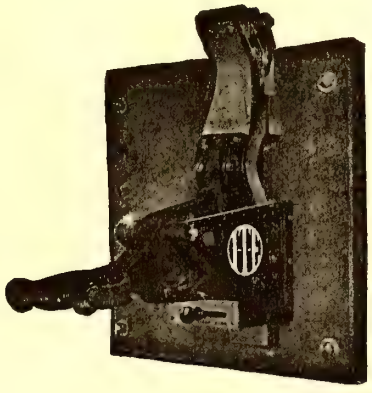
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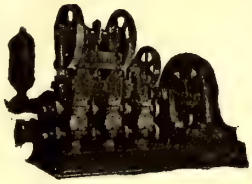
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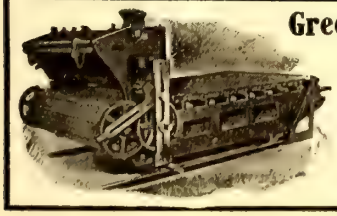
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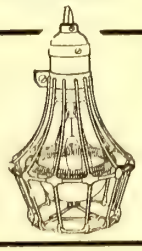
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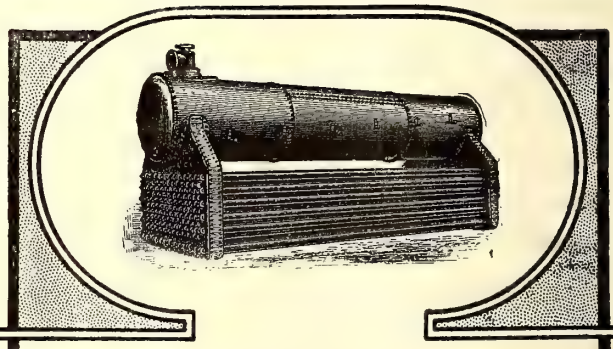
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automatically feeds the fuel, removes the refuse, and by insuring perfect combustion practically eliminates smoke, insuring economies otherwise not obtainable.
The illustration above shows the Cambria Steel Co. plant in full operation. No smoke there—264 Murphy Furnaces under 48,660 H.P. boilers prevent it.
Better investigate that Murphy. Book describes.

Murphy Iron Works 10 Walker St. Detroit, Mich.

New York Chicago Pittsburg Cleveland Buffalo
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Built Entirely of Flange Steel Plate

HEINE BOILERS

are completed and tested in the shop before shipment. When they are ready for shipment they are as nearly perfect as a boiler can be made.

HEINE SAFETY BOILER COMPANY
421 OLIVE STREET, ST. LOUIS, MO.

Dearborn Scientific Water Treatment

Dearborn Scientific Treatment of Boiler Waters

Preliminary — Analysis of the water. Investigation of plant conditions and present state of boilers.

Application — Preparation of treatment exactly adjusted to bring about proper reactions and satisfy the mineral salts in the water. Careful application of the treatment according to directions.

Results — Clean boilers. No expensive delays or shutdowns account of damaged boilers. Fuel saved. Repair bills lessened. Life of boilers and accessories greatly increased.

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85 Liberty Street - - - - NEW YORK

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Steam Superheaters. ═══ *Mechanical Stokers.*

Works: BARBERTON, OHIO—BAYONNE, N. J.

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WATER TUBE

EDGE MOOR IRON CO.
EDGE MOOR
DELAWARE

Special Features to Meet All Conditions.

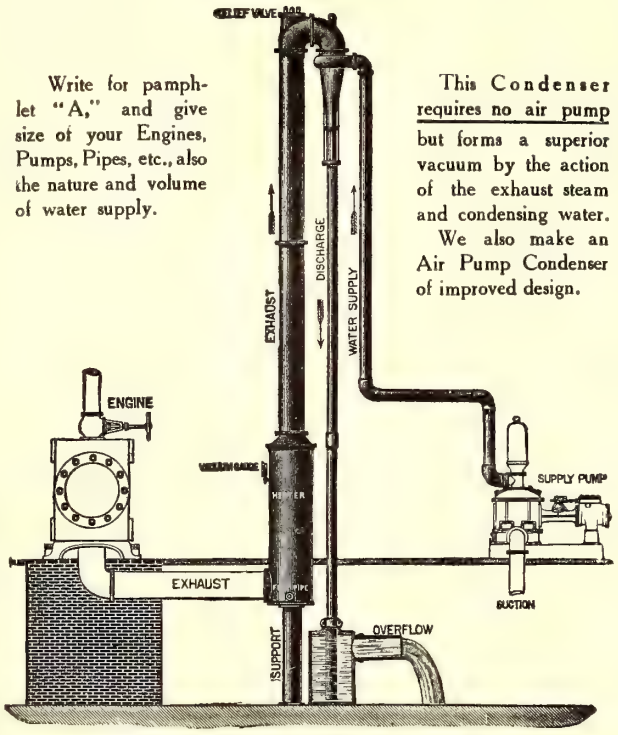
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Greatly Increase Efficiency and Power of Steam Turbines
POWER SPECIALTY CO.
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"Injector"
CONDENSER

Write for pamphlet "A," and give size of your Engines, Pumps, Pipes, etc., also the nature and volume of water supply.



This Condenser requires no air pump but forms a superior vacuum by the action of the exhaust steam and condensing water.
We also make an Air Pump Condenser of improved design.

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TRADE MARK
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For High-Duty Gas Engines Using Natural, Producer or Furnace Gas
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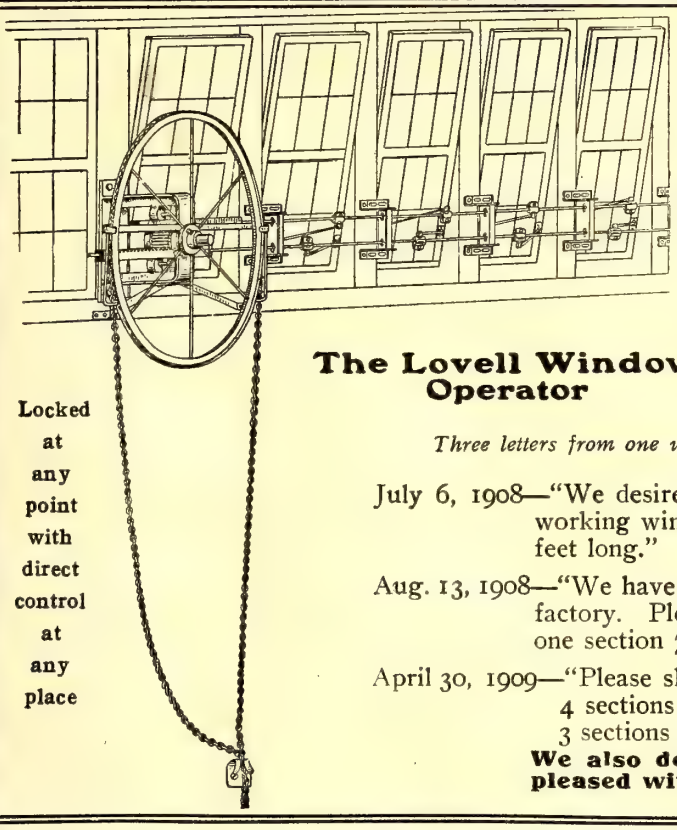


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Steel and Wood Rolling Doors

For Car Barns and Power Houses

Write for new Catalog "M," and Booklet "Car Barn Doors."

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Locked at any point with direct control at any place

In Your Shop

sash can be controlled with the

Lovell Window Operator

The Lovell Window Operator just as easily

Three letters from one user (name on request) that present the facts:

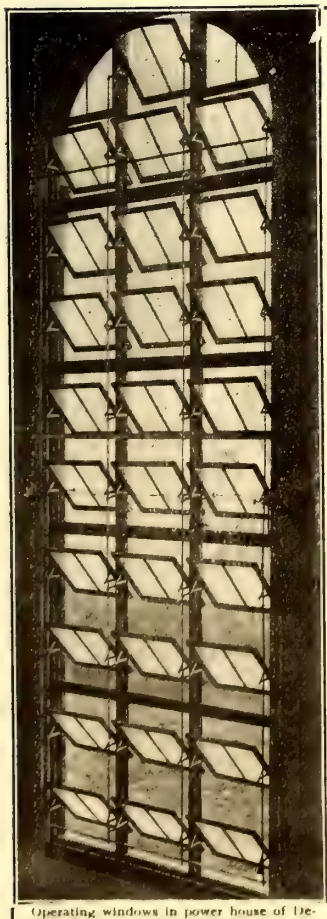
July 6, 1908—"We desire you to send us enough of your apparatus for working windows on three of our saw-teeth, each section 112 feet long."

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4 sections each 112 feet long, 28 windows to the section.
3 sections each 192 feet long, 48 windows to the section."
We also desire to add that we have been very much pleased with the apparatus which you furnished."

May we furnish you with details and prices?

THE G. DROUVÉ CO., - - - Bridgeport, Conn.
CHICAGO



Operating windows in power house of Detroit Edison Co., Delray, Mich., Messrs. Westinghouse, Church, Kerr & Co., Architects. These windows are ten sash high and three sash wide.

Pond Operating Device

(PATENTED)

Will do all we claim for it and much more. It has no equal.

Model sent on request.

We also manufacture

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and

Rolled Steel Windows

Send for Catalogue and Prices.

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SASH OPERATING APPARATUS



LORD & BURNHAM CO.,
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"Never put off till to=morrow the advertising you should do to=day."

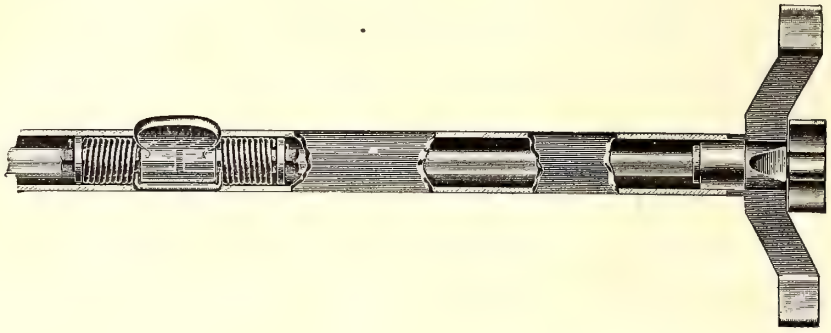
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ELECTRIC TRACTION EQUIPMENT AND SUPPLIES
SPECIAL ATTENTION GIVEN TO EXPORT TRADE
INQUIRIES INVITED

The Eclipse Curtain Fixture

Passengers cannot get it out of the grooves,

Easily removed by trainmen.

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Simple Durable Inexpensive.

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GENERAL RAILWAY SUPPLY CO.

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Flexolith Composition Flooring

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NATIONAL!

CURTAIN FIXTURES, SASH LOCKS, SASH BALANCES AND NUT LOCKS, COMPLETE CURTAINS

The National Lock Washer Company
NEWARK, NEW JERSEY
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Self Righting and Positive Holding Ring No. 88 and No. 89 Curtain Fixtures

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This is a slide-over seat, swung upon pivoted levers, whose pivots are not rigidly attached to the frame, thereby giving a smoothness and ease of motion in shifting the seat which is not attained by any other construction. This seat has the greatest possible strength and solidity and has no sliding parts to produce friction. It will work easily and stand the hardest service.

THE FORD & JOHNSON CO.

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TRADE
"PAOWNYC"
MARK

Edwards Sash Lock No. 13-0



will hold sash in any position. The sash moves without binding, but when the lock is released, it not only prevents the sash from falling but tightly wedges it so that rattling is absolutely impossible. Specify it on new cars and use it in overhauling old cars, and save damage suits for injury to passengers by falling sash.

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"The best is the cheapest in the long run."

The Distingu'shing Characteristics of our Car Seats are:

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They give more room, more comfort and more money-value than any other seat made.

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The National Standard for Car Curtains and Car Upholstery.

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THE more-than-pay-for-itself merits of our Indicating, Recording and Printing Register System have been tried out on hundreds of street and interurban railway properties through years of practical service, and they have saved thousands and thousands of dollars for users.



One of our various types of Indicating Recording and Printing Registers

As a result of our long experience, and the attainment of first position in the manufacturing world as manufacturers of devices for the proper protection and accounting of all classes of railway receipts, *our service will be better than ever during 1910.*

We have registers to meet *all possible requirements* in street and interurban railway operation.

OHMER FARE REGISTER CO.
Dayton, Ohio, U. S. A.

Our Prepayment System

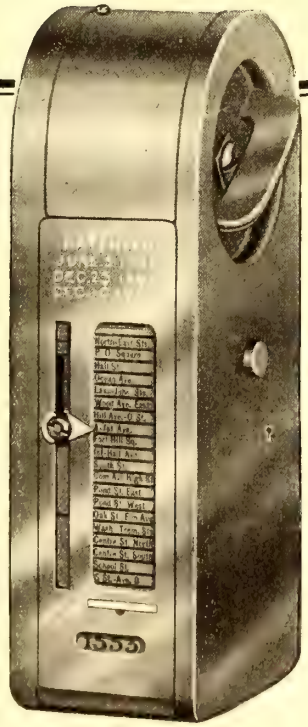
embraces in its totality a registration of all forms of receipts and the total

number of passengers carried. These results are accomplished automatically and outside of the volition of either passenger or conductor.

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You can do it by use of this transfer issuing machine.

Shall we send a representative to demonstrate every detail of its operation?

Write for full particulars.

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They become inseparable the moment you introduce our

"Registered-as-Paid" System of Enforced Registration

Further, the order of things is reversed. Registration precedes collection without delaying or impeding it. The conductor still gets immediate possession of collections, but every coin he gets is a registered coin.

Operating experience proves then the ROOKE SYSTEM is adapted to all conditions of service and all types of cars.

No investment needed to adopt this dividend-boomer.

Tell us to tell you all about it.

Rooke Automatic Register Co.
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Something new every week.

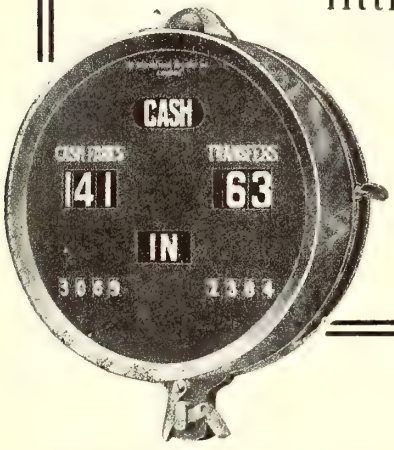
What You Want

in fare collection is a register of positively demonstrated reliability. This requirement is filled by

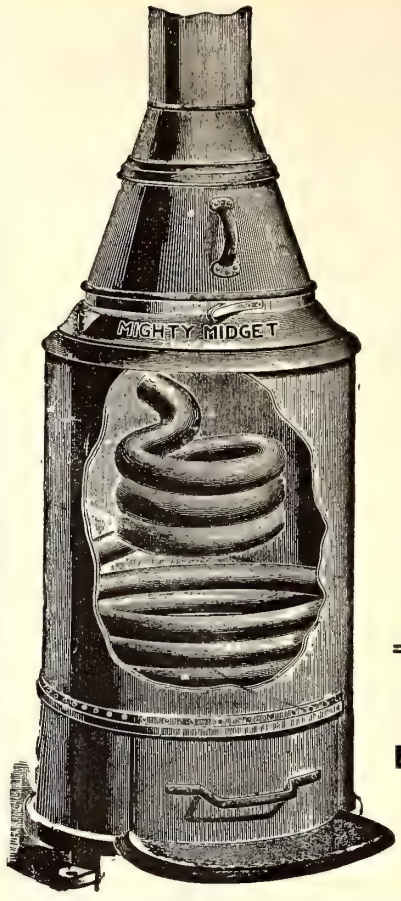
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They are easy to repair, yet seldom need repairs. The two largest register orders ever placed called for Internationals.

Write for details of these and all our other specialties—trolley cord, register fittings, bell cord, punches and badges.



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HOT WATER CAR HEATER

Adapted for Large Electric Cars and Long Distance Lines. Exclusively used on Largest Electric Systems. Ask for Catalog.

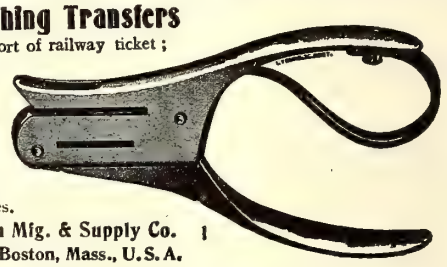
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10c. PER DAY

WILL HEAT YOUR CAR IF EQUIPPED WITH A
Cooper Hot Water Heater
The Cooper Heater Co., Dayton, Ohio

For Punching Transfers

or any other sort of railway ticket; our Cast Steel Ticket Punches are used almost universally. Send for complete catalogue of all kinds of railway supplies.



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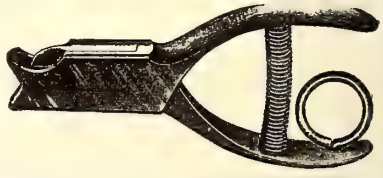
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For street and steam railway cars. Brackets suitable for all classes of fittings. Used the world over, wherever cars are run.
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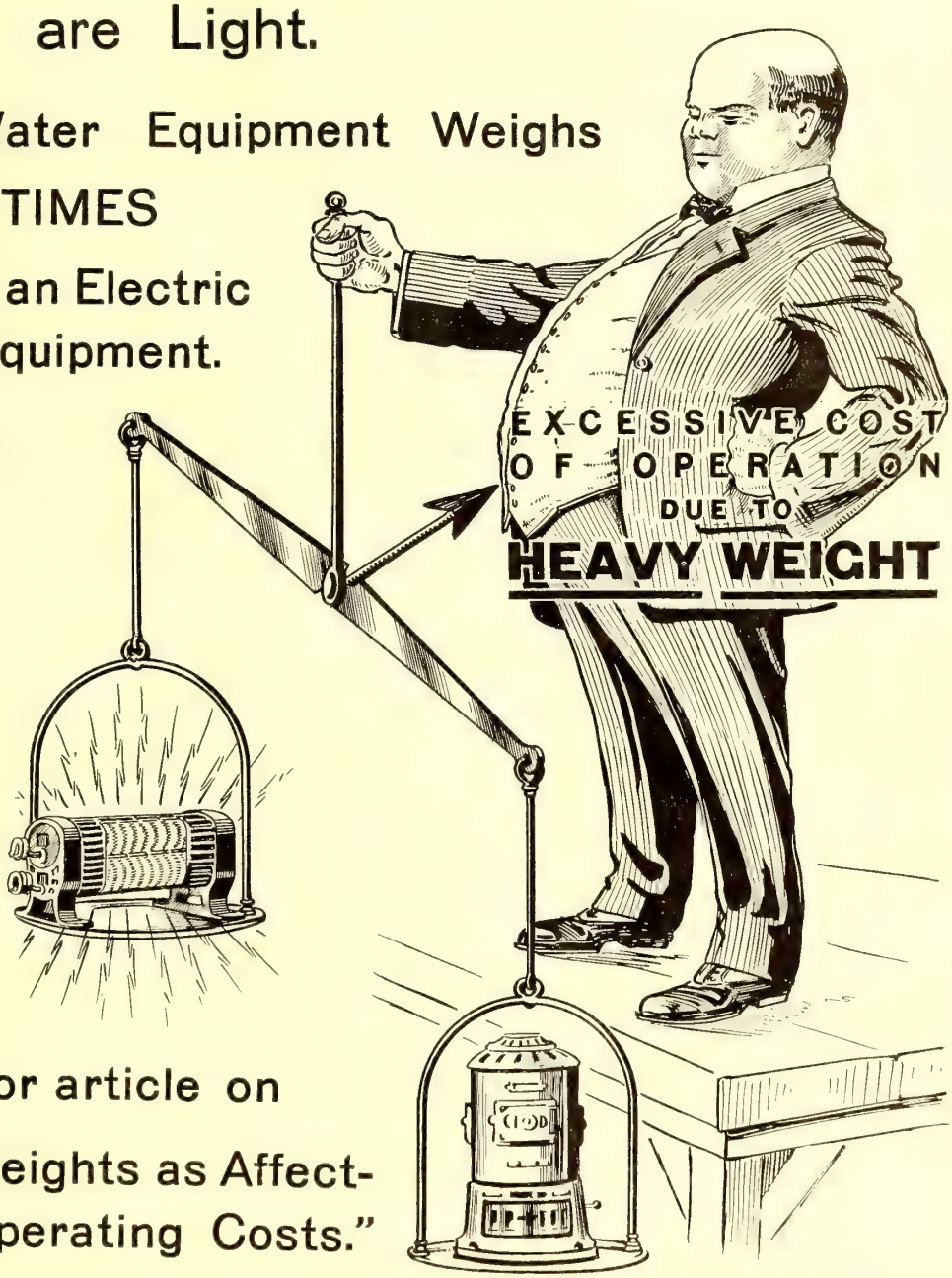
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A Hot Water Equipment Weighs

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The Odorless Chlorine Germicide



It will not harm the finest varnished surface, floor covering or upholstering.

To give you an opportunity to see for yourself what "Killitol" will do, we want to send you a liberal sample. Use it in your cars and stations and see how quickly all odors disappear.

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Spot Trolley Cord

SAMSON

Bell and Register Cord

outlasts any other brand on the market.

The smooth braid and finish insure minimum abrasion and maximum wear.

Samson Spot Trolley Cord has been proved by long years of use to be the most durable and economical under all conditions.

Samson Bell and Register Cord costs much less than leather or rawhide, but tests show that it wears on the average twice as long as either. All colors and sizes, with or without wire centre.

Send for samples and catalogue.



Samson Cordage Works

Boston, Mass.



Maintain Schedules

and avoid accidents by equpping all your cars with the

Ackley Adjustable Brake

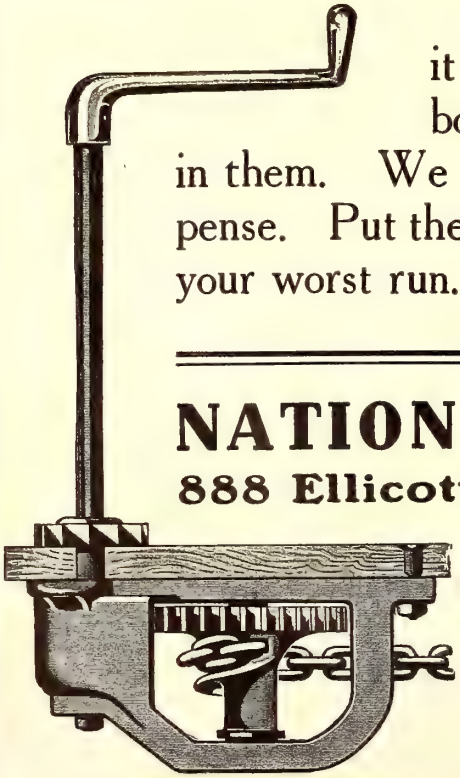


It is the crowning achievement of years of effort and experiment—in ease and speed of application and in positive braking power it has absolutely no superior.

It can be easily applied to cars where no other brakes will fit and it is protected by patents allowed or applied for in twenty-one countries.

The Peacock Brake

is used by the best managed roads all over this country. It is too well and favorably known to require further description.



Our Test-Before-Purchase Plan makes it possible for you to test a set of either or both of these brakes before you invest a cent in them. We will ship you the brakes for trial at our expense. Put them on your biggest car and test them out over your worst run. Don't keep them unless they make good.

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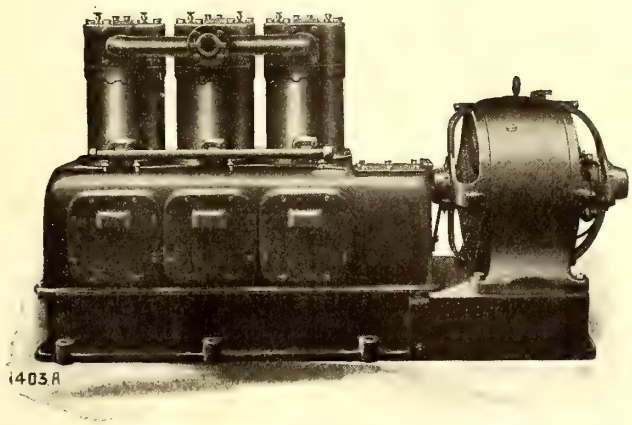
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Schmassmann & Co., 110 Bahnhofstrasse, Zurich

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National Air Compressors



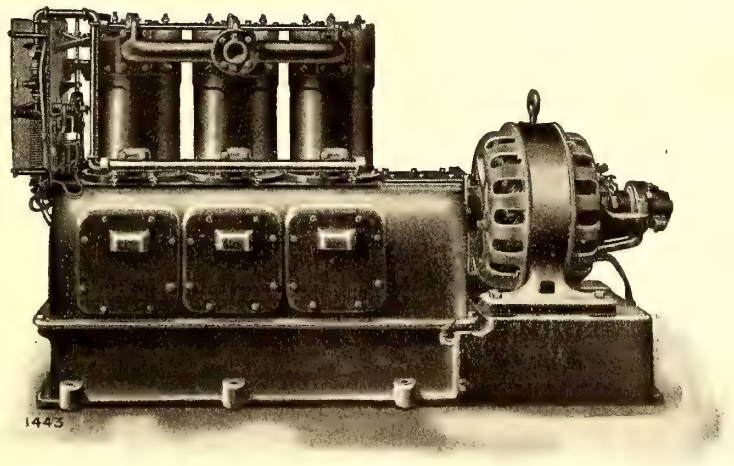
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Type "3VS"

THESE compressors are especially adapted for service in car shops and barns where compressed air is used for such operations as drilling, riveting, chipping, etc., as well as for blowing dust and other accumulations out of car motors, controllers and seats. Either direct or alternating current motors can be furnished to operate same.

AUTOMATIC controlling device, which embodies automatic starter, unloading device and water governor, can be furnished with these compressors.

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150 cu. ft. Type "3VS" Air Compressor with Alternating Current Motor and Combined Automatic Controlling Apparatus

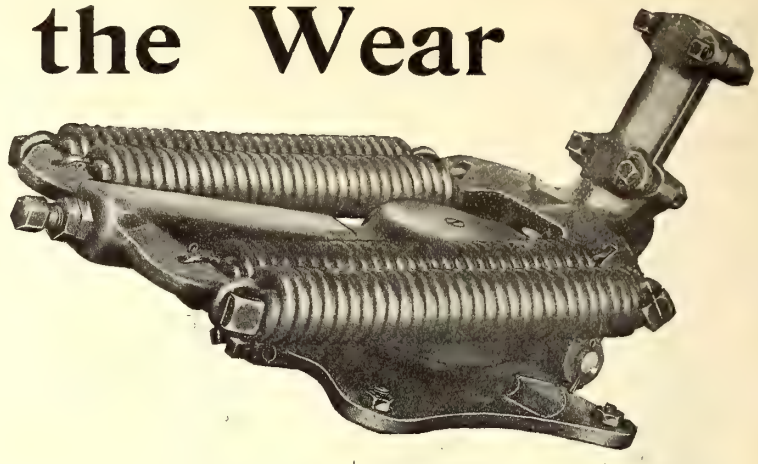
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The arcing, pounding and wrenching, unavoidable with the ordinary form of trolley base, is greatly lessened by using the

US-13 Trolley Base

The extreme sensitiveness of this type not only insures a minimum wear of trolley wheels, but also lessens the liability of the trolley wheel being thrown from the wire when sharp turns are taken at high speed.

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34 tool-steel rollers are carried in a bearing cup so constructed as to be both water and dust-proof and to form a retaining well for the lubricating oil. This method of construction gives a constant and uniform lubrication of the rollers, the oil being retained indefinitely.

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Pitting of rollers is prevented by the good contact obtained by having the center stud rest firmly on the stationary base.

Heavy Tension Springs

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Largest Manufacturer of Electrical Apparatus in the World

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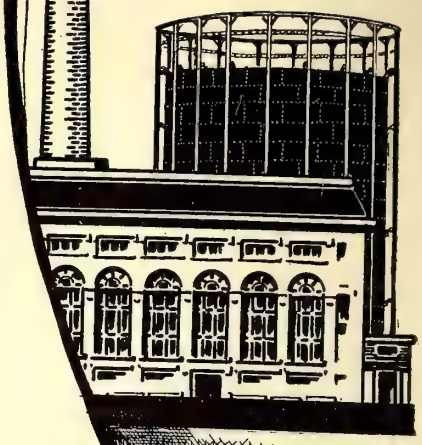
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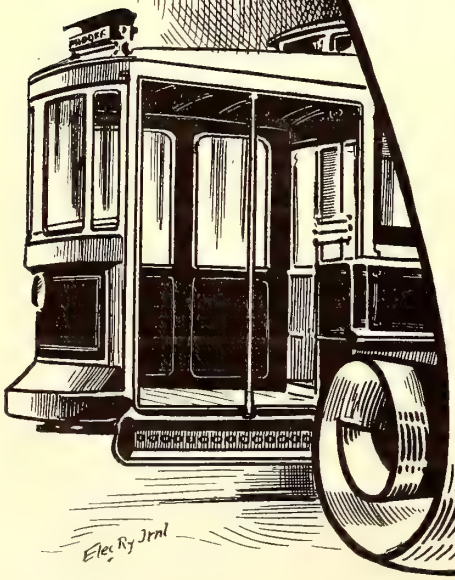
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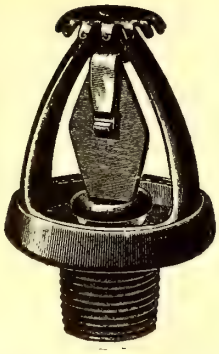
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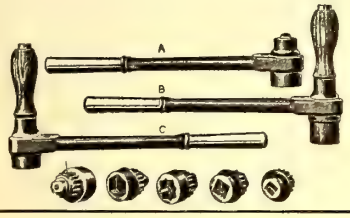
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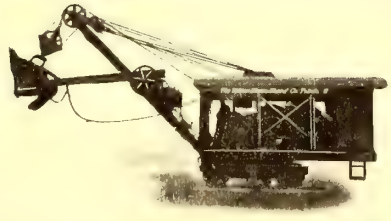
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Crocker-Wheeler Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Glue Heaters. (See Heaters, Glue.

Gongs. (See Bells and Gongs.)

Governors, Pump.
Williams Gauge Co.

Greases. (See Lubricants.)

Grinders & Grinding Wheels.
Abrasive Material Co.
Brown, Harold P.
Buda Co., The.
Hadfield's Steel Foundry Co., Ltd.
Niles-Bement-Pond Co.
Planet Co., The.
Q M S Co.
Western Electric Co.

Grounds.
Lord Electric Co.

Guards, Cattle. (See Stock Guards.)

Guards, Trolley.
National Railroad Trolley Guard Co.

Harps, Trolley.
Bayonet Trolley Harp Co.
Garton Co., W. R.
Holland Trolley Supply Co., The.
Lumen Bearing Co.
Nuttall Co., R. D.
Ridlon Co., Frank.
Star Brass Works.
Western Electric Co.

Headlights.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Ohio Brass Co.
Ridlon Co., Frank.
St. Louis Car Co.
Southern Railway Supply Co.
Trolley Supply Co.
Union Electric Co.
Westinghouse Elec. & Mfg. Co.
Zelnicker Supply Co., Walter A.

Headlining.
Pantasote Co., The.

Heaters, Car (Electric).
Consolidated Car Heating Co.
Johns-Manville Co., H. W.

Heaters, Car, Hot Air.
Smith Heater Co., Peter.

Heaters, Car, Hot Water.
Baker Heating & Supply Co., Wm. C.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
McGuire-Cummings Mfg. Co.

Heaters, Glue.
Advance Machinery Co.

Heaters and Purifiers, Feed-Water. (Including Feed-Water Regulators.)
Williams Gauge Co.

Heating & Ventilating Apparatus. (See also Mechanical Draft.)
General Electric Co.
*Howden & Co., Ltd., James.

Hoists. (See Cranes, Hoists and Lifts.)

Hoppers, Flush or Dry.
Duner Co.

Hose.
American Gen'l Eng'g Co.
Southern Railway Supply Co.
Zelnicker Supply Co., Walter A.

Hose Bridges.
Hadfield's Steel Foundry Co., Ltd.
Ohio Brass Co.

Hydraulic Machinery.
Hadfield's Steel Foundry Co., Ltd.
Hydrostatic Machinery Co.
Niles-Bement-Pond Co.
Secor, A. W.
Watson-Stillman Co.

Impregnating Apparatus. (See also Vacuum Drying & Impregnating Apparatus.)
Buffalo Fdy. & Machine Co.
Devine Co., J. P.

Inspection.
Gulick-Henderson Co.
Hildreth & Co.
Hunt & Co., Robt. W.
Nelson & Co., I. R.

Instruments, Electrical Measuring.
General Electric Co.
Johns-Manville Co., H. W.
Wagner Elec. & Mfg. Co.
Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Instruments, Testing and Recording.
General Electric Co.
Weston Electrical Instrument Co.

Insulations & Insulating Compounds. (See also Paints and Varnishes.)
American Gen'l Eng'g Co.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Elliott Elec. Co., The S. K.
Farrington Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Okonite Co., The.
Packard Elec. Co.
Standard Underground Cable Co.
Standard Varnish Works.
Stromberg-Carlson Tel. Mfg. Co.
Western Electric Co.

Insulating Cloths, Paper and Tape.
American Gen'l Eng'g Co.
American Vulcanized Fibre Co., The.
Electric Cable Co.
Elliott Elec. Co., The S. K.
Garton Co., W. R.
General Electric Co.
Hope Webbing Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Ohio Brass Co.
Okonite Co., The.
Packard Elec. Co.
Standard Paint Co.
Sterling Varnish Co.
Western Electric Co.

Insulators (Including Third-Rail). (See also Line Material.)
Amer. Carbon & Battery Co.
Anderson Mfg. Co., A. & J. M.
Creaghead Engineering Co.
Electric Service Supplies Co.
Elliott Elec. Co., The S. K.
Garton Co., W. R.
General Electric Co.
Hemingray Glass Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Union Electric Co.
Western Electric Co.

Inventions Developed & Perfected.
Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts.)
American Gen'l Eng'g Co.
American Car Co.
Brill Co., The J. G.
Buda Co., The.
Columbia Machine Works & Malleable Iron Co.
Duff Manufacturing Co.
Kuhlman Car Co., G. C.
Morden Frog & Crossing Co.
Ohio Brass Co.
Secor, A. W.
Southern Railway Supply Co.
Stephenson Co., John.
Union Electric Co.
Wason Mfg. Co.
Watson-Stillman Co.
Zelnicker Supply Co., Walter A.

Jack Boxes. (See also Telephone Apparatus.)
Matthews & Bro., W. N.
Stromberg-Carlson Tel. Mfg. Co.

Jacks, Pit.
Q M S Co.

Joints, Rail.
Falk Co., The.
Goldschmidt Thermit Co.
Hadfield's Steel Foundry Co., Ltd.
Lorain Steel Co.
Q M S Co.
Rail Joint Co., makers Continuous, Weber and Wolhaupter Joints.

Journal Boxes.
American Car Co.
Brill Co., The J. G.
Danville Car Co.
Kuhlman Car Co., G. C.
McCord & Co.
McGuire-Cummings Mfg. Co.
Stephenson Co., John.
Symington Co., T. H.
Wason Mfg. Co.

Journal Lubricators. (See Lubricating Devices.)

Lamp Guards and Fixtures.
Electric Service Supplies Co.
Matthews & Bro., W. N.

Lamps, Arc and Incandescent. (See also Headlights.)
American Gen'l Eng'g Co.
Anderson Mfg. Co., A. & J. M.
Buckeye Electric Co.
Creaghead Engineering Co.
General Electric Co.
Union Electric Co.
Western Electric Co.
Westinghouse Electric & Mfg. Co.

Lamp Parts. (See Clusters and Sockets.)

Lifters, Car Step.
Consolidated Car Fender Co.

Lifts. (See Cranes, Hoists and Lifts.)

Lightning Protection.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Elliott Elec. Co., The S. K.
Garton Co., W. R.
General Electric Co.
Lord Elec. Co.
Ohio Brass Co.
Stuart-Howland Co.
Union Electric Co.
Western Electric Co.
Westinghouse Electric & Mfg. Co.

Line Material. (See also Brackets and Cross Arms, Insulators, Wires and Cables.)
American Gen'l Eng'g Co.
Anderson Mfg. Co., A. & J. M.
Archbold-Brady Co.
*British Thomson-Houston Co.
Creaghead Engineering Co.
*Dick, Kerr & Co.
Dossert & Co.
Electric Ry. Equip. Co., Cincinnati.
Electric Service Supplies Co.
Elliott Elec. Co., The S. K.
Garton Co., W. R.
General Electric Co.
Gilbert & Sons Brass Foundry Co., A.
Indianapolis Brass Co.
Johns-Manville Co., H. W.
Macallen Co., The.
Matthews & Bro., W. N.
Ohio Brass Co.
Pittsburgh Pole & Forge Co.
Ridlon Co., Frank.
Southern Railway Supply Co.
Stuart-Howland Co.
Union Electric Co.
Western Electric Co.
Westinghouse Electric & Mfg. Co.

Lockers, Metal.
Edwards Co., The O. M.
General Fireproofing Co.

Lockers, Steel.
General Fireproofing Co.

Locks, Nuts and Washers. (See Nuts and Bolts.)

Locomotives, Electric.
American Car Co.
American Locomotive Co.
Baldwin Locomotive Works.
Brill Co., The J. G.
*British Thomson-Houston Co.
Danville Car Co.
General Electric Co.
Jeffrey Mfg. Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Stephenson Co., John.
Wason Mfg. Co.
Westinghouse Electric & Mfg. Co.

Lubricants, Oil & Grease.
Borne, Scrymser Co.
Dearborn Drug & Chemical Works.
Dixon Crucible Co., Jos.
Galena Signal Oil Co.
Graphite Lubricating Co.
Modoc Co., The.
Southern Railway Supply Co.
Whitmore Mfg. Co.

Lubricating Devices.
Armstrong Oiler Co.

Lubricators, Force Feed.
McCord & Co.

Lumber. (See Poles, Ties, Posts, Etc.)

Machine Tools.
Groff Drill & Mach. Tool Co.
Hydrostatic Machinery Co.
Niles-Bement-Pond Co.
Watson-Stillman Co.

Mail Bags.
American Railway Supply Co.

Mats.
Massachusetts Chemical Co.

Mechanical Draft Apparatus. (See also Heating and Ventilating Apparatus.)
Crocker-Wheeler Co.

Metals.
St. Louis Smelting & Refining Co.

Mirrors for Motormen.
Brown, Harold P.

Motors, Electric.
*British Thomson-Houston Co.
*British Westinghouse Elec. & Mfg. Co.
Crocker-Wheeler Co.
*Dick, Kerr & Co.
General Electric Co.
National Brake & Electric Co.
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Dossert & Co.

Movers, Car. (See Pushers, Car.)

Multiple Unit Control. (See Control Systems.)

Nuts and Bolts.

Condit Electrical Mfg. Co.
Frank, M. K.
Lorain Steel Co.
National Lock Washer Co.
Pennsylvania Steel Co.
Pittsburgh Pole & Forge Co.
Standard Motor Truck Co.
U. S. Metal & Mfg. Co.

Oils. (See Lubricants.)

Oils, Paint.

Sherwin-Williams Co.
Standard Paint Co.
Sterling Varnish Co.

Overhead Equipment. (See Line Material.)

Packing for Car Journals and Parts of Steam Machinery.

American Gen'l Eng'g Co.
Electric Service Supplies Co.
Garton Co., W. R.
Johns-Manville Co., H. W.
Post & Co., E. L.
Power Specialty Co.
Zelnicker Supply Co., Walter A.

Painting Cars by Contract.

Abel, G. T.
Nelson & Co., I. R.

Paints & Varnishes. (Insulating.)

American Gen'l Eng'g Co.
General Electric Co.
Massachusetts Chemical Co.
Packard Elec. Co.
Schenectady Varnish Co.
Sherwin-Williams Co.
Standard Paint Co.
Standard Varnish Works.
Sterling Varnish Co.

Paints & Varnishes. (Preservatives.)

Brown, Harold P.
Dixon Crucible Co., Jos.
Electric Cable Co.
Hascall Paint Co.
Massachusetts Chemical Co.
Schenectady Varnish Co.
Sherwin-Williams Co.
Standard Paint Co.
Sterling Varnish Co.

Paints & Varnishes for Woodwork.

Schenectady Varnish Co.
Willey Co., C. A.

Park Equipment.

Ingersoll Engineering & Constructing Co.
Langslow, H. R.

Paving Material.

American Brake Shoe & Fdy. Co.
U. S. Metal & Mfg. Co.
U. S. Wood Preserving Co.

Paving Pitch.

Barrett Manufacturing Co.

Pickups, Trolley Wire.

Electric Service Supplies Co.
Ohio Brass Co.

Pinions. (See Gears and Pinions.)

Pins, Wood and Iron.

Call, Clarence.
Pittsburgh Pole & Forge Co.

Pipe Fittings.

National Tube Co.
Power Specialty Co.
Standard Steel Works Co.

Planers. (See Machine Tools and Woodworking Machinery.)

Platforms, Extension.

Edwards Co., The O. M.

Pliers.

Norvell-Shapleigh Hardware Co.

Plows, Snow. (See Snow Plows. Sweepers and Brooms.)

Pole Clamps.

Bayonet Trolley Harp Co.

Pole Erectors.

Matthews & Bro., W. N.

Pole Reinforcing.

New York Pole Co.

Poles, Ties, Posts, Piling and Lumber.

Abeles & Taussig.
American Creosote Wks,, Inc.
American Tie & Timber Co.
Atlantic Creosote & Wood Preserving Co.
Baxter & Co., G. S.
California Pole & Piling Co.
Cherry River Boom & Lumber Co.
Cook & Co., Wm. P.
Empie, Theo. G.
Florida Tie & Lumber Co.
Garton Co., W. R.
Gulfport Creosoting Co.
Humbird Lumber Co.
Kaye & Carter.
Kennett Cypress & Hardwood Lumber Co.
Lindsley Bros. Co.
Morrison Lumber Co., J. W.
National Pole Co.
Naugle Pole & Tie Co.
Page & Hill Co.
Thompson, T. S.
Valentine-Clark Co.
Valley Tie & Lumber Co.
Warren-Newton Lumber Co.
Western Electric Co.
Western Lumber & Pole Co.
Worcester Co., C. H.

Poles, Trolley.

Columbia Machine Works & Malleable Iron Co.
Garton Co., W. R.
Holland Trolley Supply Co., The.
National Tube Co.
Pittsburgh Pole & Forge Co.
Stuart-Howland Co.

Poles, Metal Street.

American Bridge Co. of N. Y.
Creaghead Engineering Co.
Electric Railway Equipment Co., Cincinnati.
Franklin Steel Co.
National Tube Co.
Pittsburgh Pole & Forge Co.

Polishes, Metal.

Hoffman, Geo. W.

Posts, Fence. (See Fences and Fence Posts.)

Preservatives. (See Wood Preservatives.)

Presses, Hydraulic Wheel. (See Machine Tools.)

Pressure Regulators.

Ohio Brass Co.

Pumps. (See also Condensers.)

Buffalo Fdy. & Mach. Co.
Deming Co., The.
General Electric Co.
Watson-Stillman Co.

Punches, Hydraulic.

Secor, A. W.

Punches, Ticket.

American Railway Supply Co.
Bonney-Vehslage Tool Co.
International Register Co., The.
Woodman Mfg. & Supply Co., R.

Punching Machinery.

Secor, A. W.
Watson-Stillman Co.

Purifiers, Feed - Water. (See Heaters and Purifiers.)

Pushers, Car.

Woodman Mfg. & Supply Co., R.
Zelnicker Supply Co., Walter A.

Rails (See Track Work.)

Rail Welding.

Falk Co., The.
Goldschmidt Thermit Co.

Ratchets, Deck Sash.

General Railway Supply Co.

Rattan.

American Car Co.
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Mfg. Co.
Heywood Bros. & Wakefield Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Southern Railway Supply Co.
Stephenson Co., John.
St. Louis Car Co.
Wason Mfg. Co.

Registers & Register Fittings.

Cincinnati Car Co.
Electric Service Supplies Co.
International Register Co., The.
Langslow, H. R.
Ohmer Fare Register Co.
Ridlon Co., Frank.
Rooke Automatic Register Co.
Union Electric Co.
Woodman Mfg. & Supply Co., R.

Repair Shop Appliances. (See also Armature and Field Coils, Machines for Handling and Winding.)

American Gen'l Eng'g Co.
Buffalo Foundry & Machine Co.
Columbia Machine Works & Malleable Iron Co.
Groff Drill & Mach. Tool Co.
Hydrostatic Machinery Co.
Ridlon Co., Frank.

Repair Work. (See also Armature and Field Coils.)

American Car Co.
Brill Co., The J. G.
Cleveland Armature Works.
Columbia Machine Works & Malleable Iron Co.
Electric Cable Co.
Elliott Elec. Co., The S. K.
Jordan Bros.
Kuhlman Car Co., G. C.
McLeer Elec. & Mfg. Co.
Nelson & Co., I. R.
Ridlon Co., Frank.
Standard Steel Works Co.
Stephenson Co., John.
Stuart-Howland Co.
U. S. Metal & Mfg. Co.
Van Dorn Electric & Mfg. Co.
Wason Mfg. Co.

Replacers, Car.

Buda Co., The.
Hayes Track Appliance Co.
U. S. Metal & Mfg. Co.
Washburn Steel Castings & Coupler Co.

Reseating Machines.

Hadfield's Steel Foundry Co., Ltd.

Resistances, Wire and Tube.

General Electric Co.
Stromberg-Carlson Tel. Mfg. Co.
Westinghouse Electric & Mfg. Co.

Retrievers, Trolley. (See Catchers and Retrievers, Trolley.)

Rheostats.

General Electric Co.

Roofing.

General Fireproofing Co.
Johns-Manville Co., H. W.
Southern Railway Supply Co.
Standard Paint Co.
Zelnicker Supply Co., Walter A.

Rubber Specialties.

Massachusetts Chemical Co.

Sand Boxes. (Including Pneumatic Sanders.)

American Car Co.
Brill Co., The J. G.
Ham Sand Box Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.
Ridlon Co., Frank.
St. Louis Car Co.
Stephenson Co., John.
Wason Mfg. Co.

Sash Fixtures.

Drouvé Co., G.
Lupton's Sons Co., David.

Sash Fixtures, Car. (See also Curtains.)

American Car Co.
Brill Co., The J. G.
Edwards Co., The O. M.
Kuhlman Car Co., G. C.
National Lock Washer Co.
Stephenson Co., John.
Wason Mfg. Co.

Sash Operating Apparatus.

Drouvé Co., G.
Lord & Burnham Co.
Lupton's Sons Co., David.

Saws, Rail.

Hadfield's Steel Foundry Co., Ltd.

Scrap Iron.

Frank, M. K.

Scrapers, Track. (See Cleaners and Scrapers, Track.)

Screens, Car Window.

General Railway Supply Co.

Seating Materials. (See Curtains and Curtain Materials.)

Seats, Car.

American Car Co.
Brill Co., The J. G.
Danville Car Co.
Ford & Johnson Co.
Hale & Kilburn Mfg. Co.
Heywood Bros. & Wakefield Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Peters & Co., G. D.
St. Louis Car Co.
Stephenson Co., John.
Wason Mfg. Co.

Second-Hand Equipment. (See pages 76-78.)

Shades, Vestibule.

Electric Service Supplies Co.
Planet Co., The.

Shovels, Power.

Hicks Locomotive & Car Works.
Males Co.
Vulcan Steam Shovel Co.

Shutters, Steel Rolling. (See Doors, Steel Rolling.)

Signal Systems.

Blake Signal & Mfg. Co.
Kinsman Block System Co.
Nachod Signal Co.
National Electrical Manufacturing Co.
Ohio Brass Co.
Safety Switch & Signal Co.
Simmen Automatic Railway Signal Co.
U. S. Electric Signal Co.

Signals, Railway Crossing.

National Electrical Manufacturing Co.

Signs, Car and Track.

Columbia Machine Works & Malleable Iron Co.
Creaghead Engineering Co.
Western Electric Co.

Skids.

Garton Co., W. R.

Skylights.

Drouvé Co., G.
Lord & Burnham Co.
Lupton's Sons Co., David.

Sleet Cutters.

Bayonet Trolley Harp Co.
Garton Co., W. R.
Holland Trolley Supply Co., The.
Matthews & Bro., W. N.
Nuttall Co., R. D.
Stuart-Howland Co.

Sleeving. (See Tapes and Cloths.)

Sleeves, Protective, for Metal Poles.

Gherky, Wm. D.

Snow Plows, Sweepers and Brooms.

American Car Co.
Brill Co., The J. G.
Columbia Machine Works & Malleable Iron Co.
Consolidated Car Fender Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Stephenson Co., John.
Wason Mfg. Co.

Soaps. (See Cleaning Powders, Soaps and Washes.)

Solder and Solder Flux.

Blake Signal & Mfg. Co.
Condit Electrical Mfg. Co.
Lumen Bearing Co.

Speed Indicators.

Woodman Mfg. & Supply Co., R.

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Frank, M. K.
Severance Mfg. Co., S.

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Springs, Car & Truck.

American Car Co.
Brill Co., The J. G.
Danville Car Co.
Hanna Co., J. A.
Kuhlman Car Co., G. C.
Long Co., E. G.
McCord & Co.
McGuire-Cummings Mfg. Co.
Niles Car & Mfg. Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Stephenson Co., John.
Taylor Electric Truck Co.
Union Spring & Mfg. Co.
Wason Mfg. Co.

Sprinklers, Track & Road.

American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Stephenson Co., John.
Wason Mfg. Co.

Steps, Car.

Q M S Co.

Stock Guards.

American Bridge Co. of N. Y.

Stokers, Mechanical.

Babcock & Wilcox Co.
Box & Co., Alfred.
Green Engineering Co.
Jeffrey Mfg. Co.
Murphy Iron Works.
Westinghouse Machine Co.

Storage Batteries. (See Batteries, Storage.)

Stoves.

Buda Co., The.

Strike Breaker.

Reed, Edwin L.

Strips, Protecting. (See Paving Materials.)

Structural Iron Work. (See Bridges & Buildings.)

Superheaters.

Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow. (See Snow Plows, Sweepers and Brooms.)

Switchboard Mats.

Massachusetts Chemical Co.
Western Electric Co.

Switch Stands. (See also Track Work.)

Buda Co., The.
Hayes Track Appliance Co.
Indianapolis Switch & Frog Co.
Ramapo Iron Works.
Wharton, Jr., & Co., Inc., Wm.

Switches, Automatic.

American Auto. Switch Co.
Continuous Rail & Safety Switch Co.
Safety Switch & Signal Co.
Wonham, Magor & Sanger.

Switches, Track. (See also Track Work.)

American Auto. Switch Co.
American Frog & Switch Co.
Buda Co., The.
Continuous Rail & Safety Switch Co.
Frank, M. K.
Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
Morden Frog & Crossing Co.
Safety Switch & Signal Co.
Stuart-Howland Co.
Wharton, Jr., & Co., Inc., Wm.
Wonham, Magor & Sanger.
Zelnicker Supply Co., Walter A.

Switches & Switchboards.

Anderson Mfg. Co., A. & J. M.
*British Thomson-Houston Co.
*British Westinghouse Elec. & Mfg. Co.
Consolidated Car Heating Co.
Cutter Electrical & Mfg. Co.
Elliott Elec. Co., The S. K.
General Electric Co.
Ohio Brass Co.
Stromberg-Carlson Tel. Mfg. Co.
Wagner Elec. & Mfg. Co.
Western Electric Co.
Westinghouse Electric & Mfg. Co.

Tapes & Cloths. (See Insulating Cloths, Paper & Tape.)

Telephones & Parts.

Blake Signal & Mfg. Co.
Electric Service Supplies Co.
Matthews & Bro., W. N.
Stromberg-Carlson Tel. Mfg. Co.
Western Elec. Co.

Testing, Electrical.

American Gen'l Eng'g Co.
Gulick-Henderson Co.
Hildreth & Co.
Hunt & Co., Robert W.
Jackson, H. D.
Nelson & Co., I. R.
Stromberg-Carlson Tel. Mfg. Co.

Testing Instruments. (See Instruments, Electrical Measuring, and Bond Testers.)

Ticket Choppers and Destroyers.

Patten Co., Paul B.

Tickets & Transfers.

American Ry. Supply Co.

Ties. (See Poles and Ties.)

Tools, Track & Miscellaneous. (See also Grinders and Grinding Wheels.)

Buda Co., The.
Columbia Machine Works & Malleable Iron Co.
Electric Service Supplies Co.
Elliott Elec. Co., The S. K.
Groff Drill & Mach. Tool Co.
Hadfield's Steel Foundry Co., Ltd.
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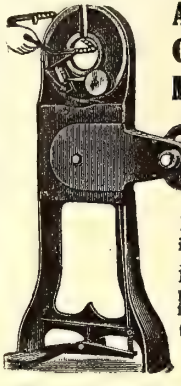
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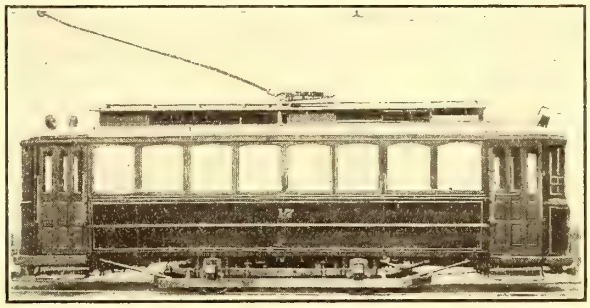
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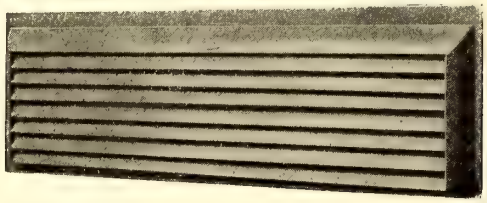
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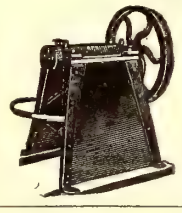


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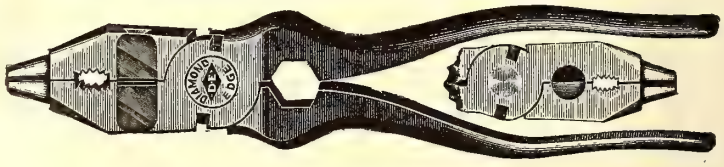
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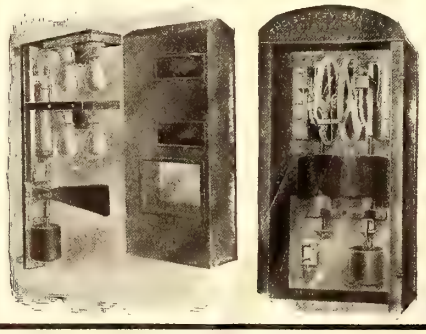
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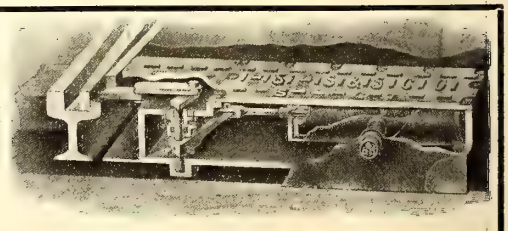
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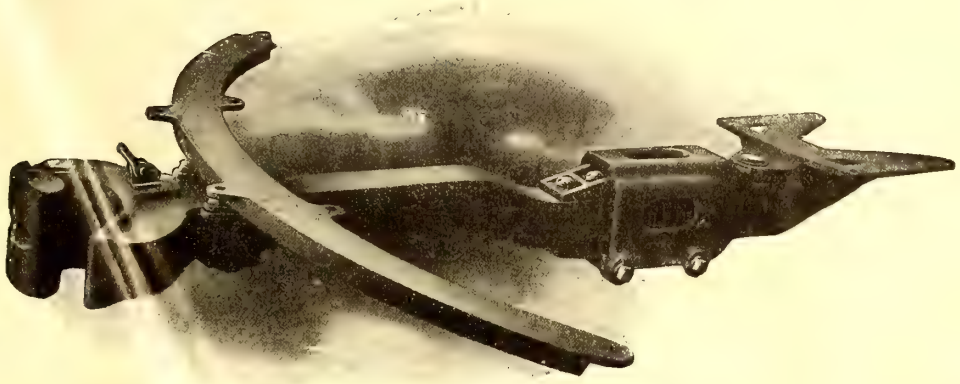
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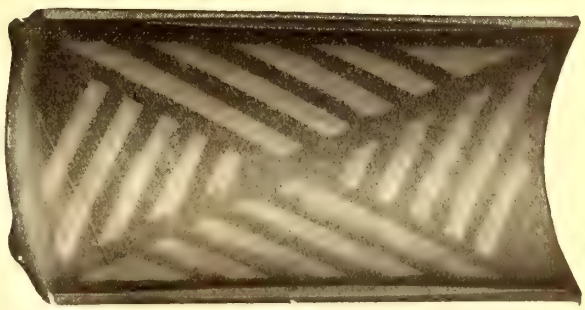
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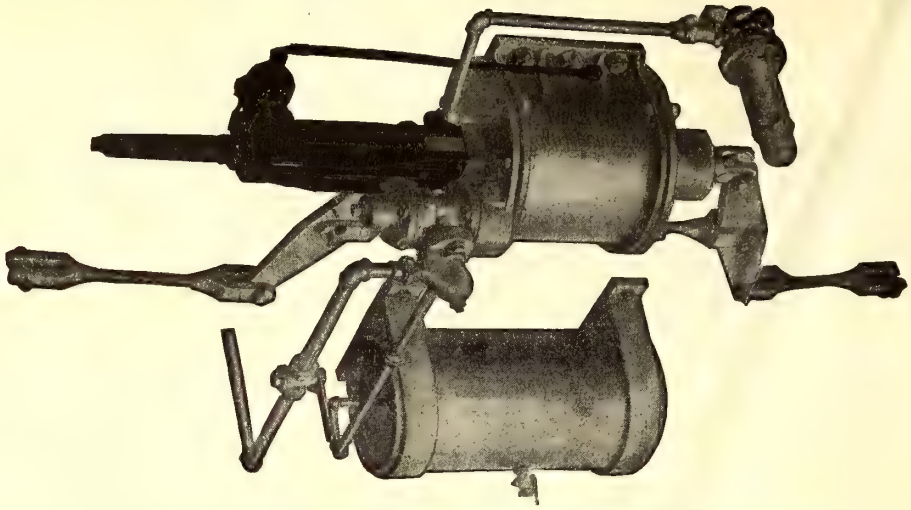


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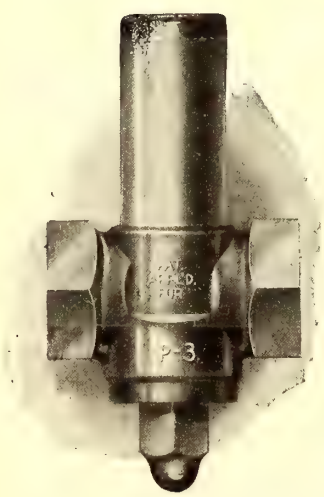
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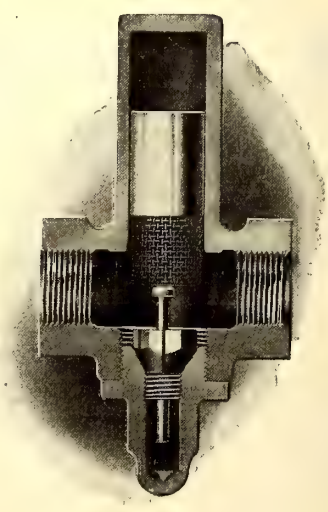
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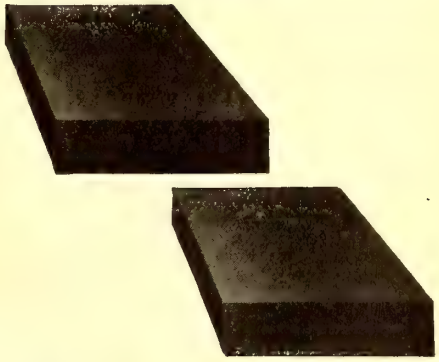
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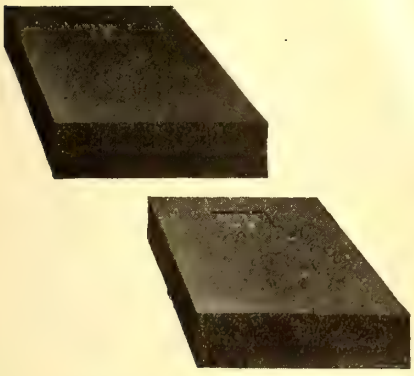
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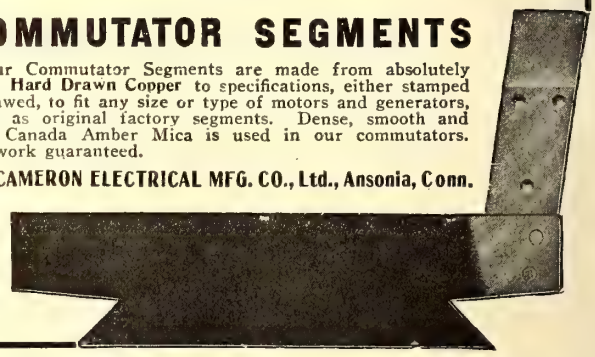
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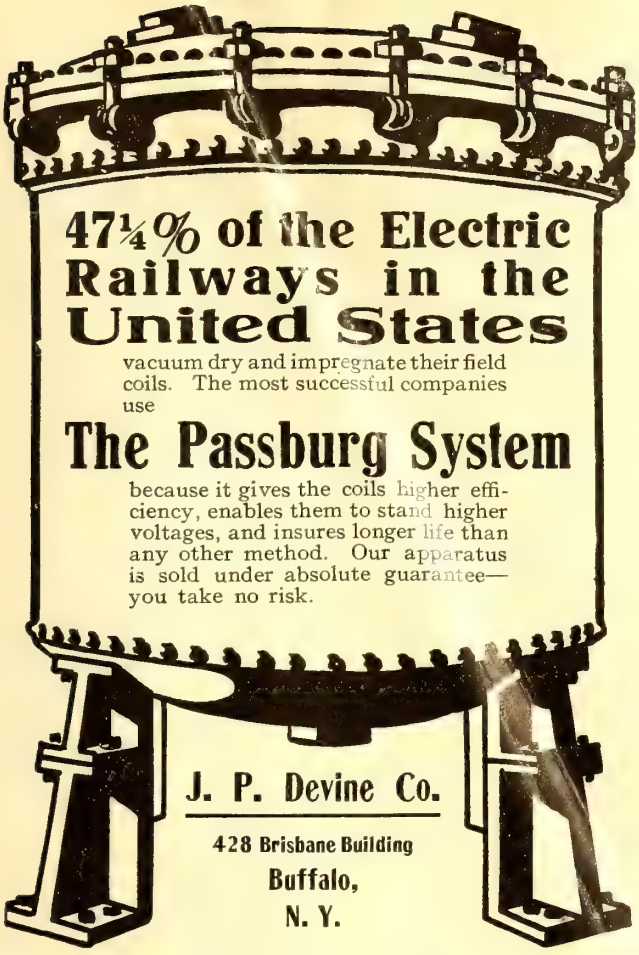
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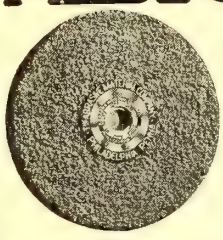
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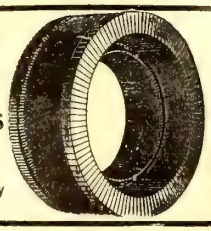
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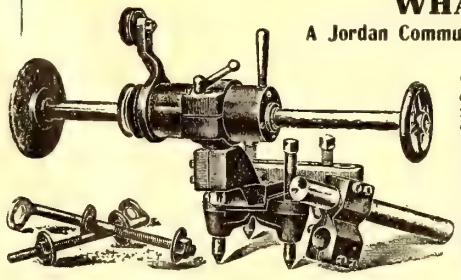
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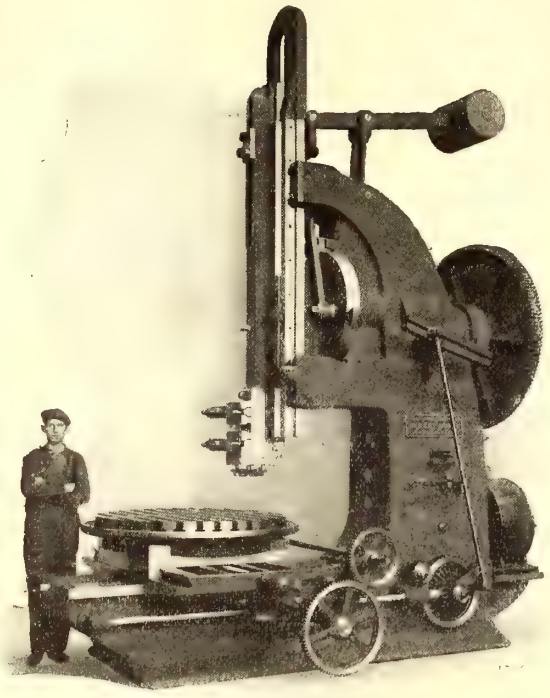
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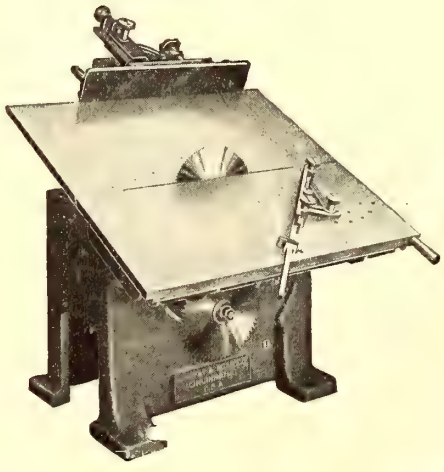
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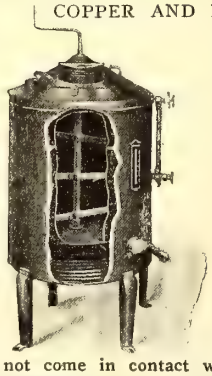
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of the
BUCKEYE ELECTRIC BLUE PRINTING MACHINE



should be in the files of every Railroad Company in the country. It contains information of value to the Purchasing Agent, Engineer, Draftsman and Blue Printer.

It will be mailed upon request.

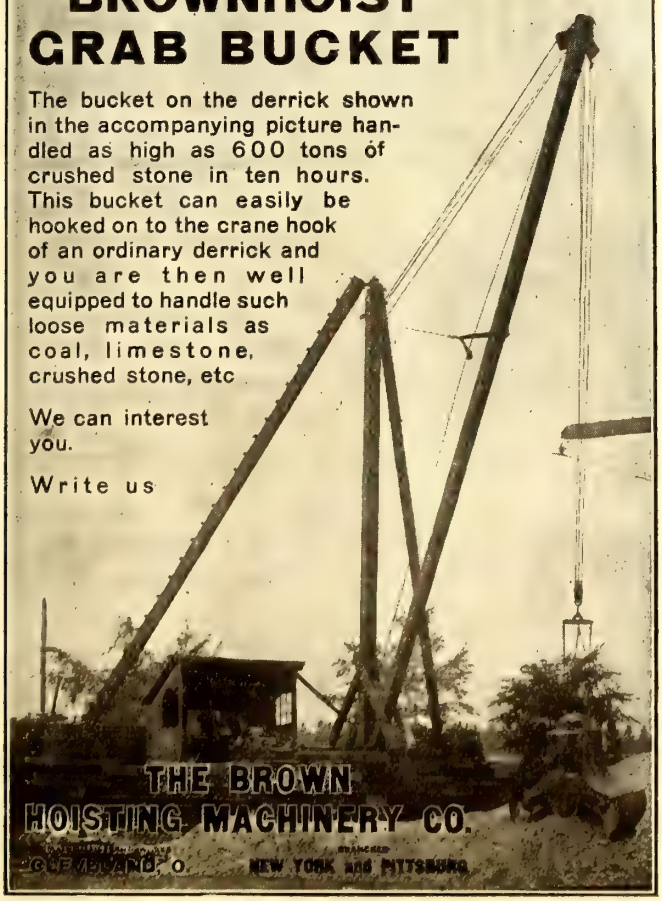
BUCKEYE ENGINE COMPANY
Specialty Dept. **SALEM, OHIO**
E.R.J. 18

"BROWNHOIST" GRAB BUCKET

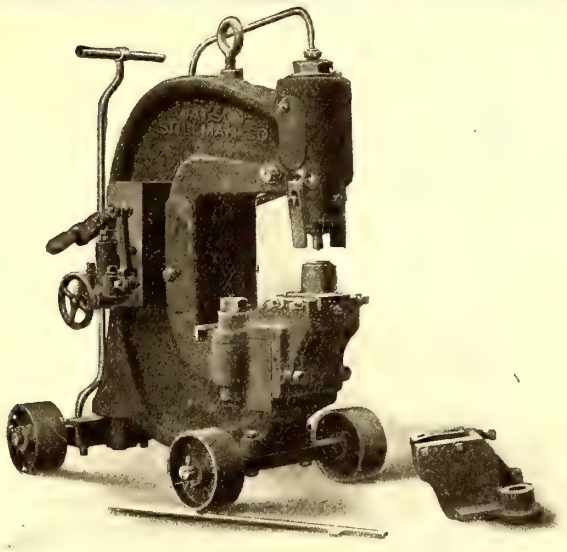
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We can interest you.

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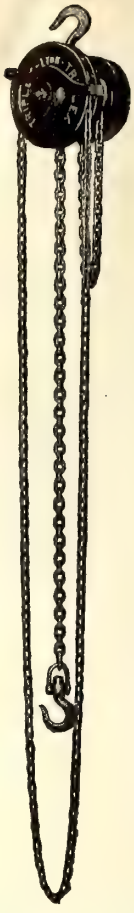
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With an Electric Hoist the handling is done with the same safety and precision, but quicker. Ready for every emergency in the Shop or Power House.

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41 sizes: An eighth of a ton to twenty tons.
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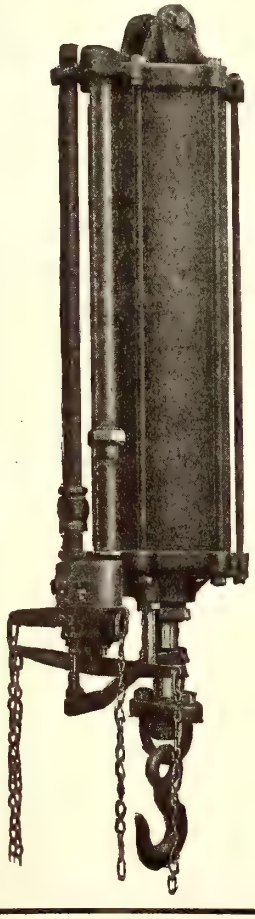
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POSITIVE
LOAD RETAINING
TWO SPEEDS

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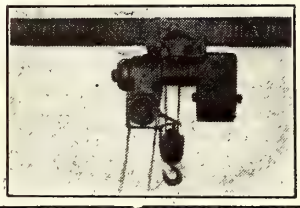
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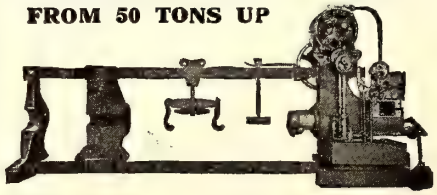
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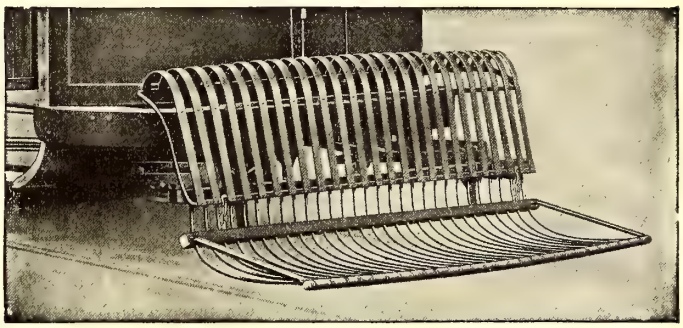
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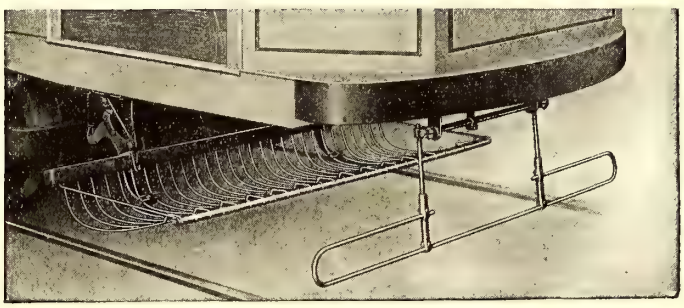
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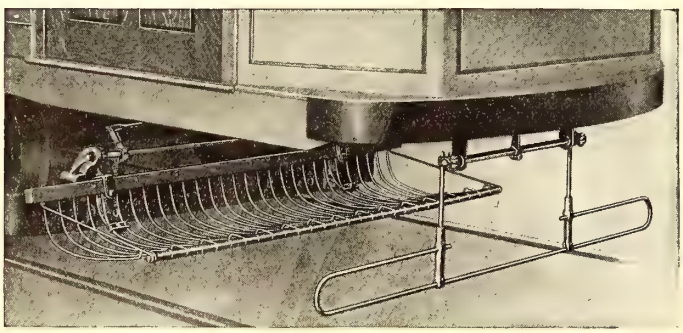
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Wheel Guard Attached to Frame



Wheel Guard Attached to Truck

is largely due to the materials employed in their construction. They are built throughout of malleable iron and spring steel.

Both fender and wheel guard are basket shaped, to retain any object which may lodge upon them. They are very elastic, and are not seriously harmed even by collision.

Our **Fenders** are dropped in two ways; by foot trip or application of emergency air brake —our **Wheel Guards** are operated in any one or all of three ways: by gate trip, foot trip or application of emergency air brake.

They are accelerated in dropping and held down by powerful springs. Can be reset from the platform.

The Consolidated Car Fender Co.

Manufacturers of the
Providence Fender and Wheel Guard

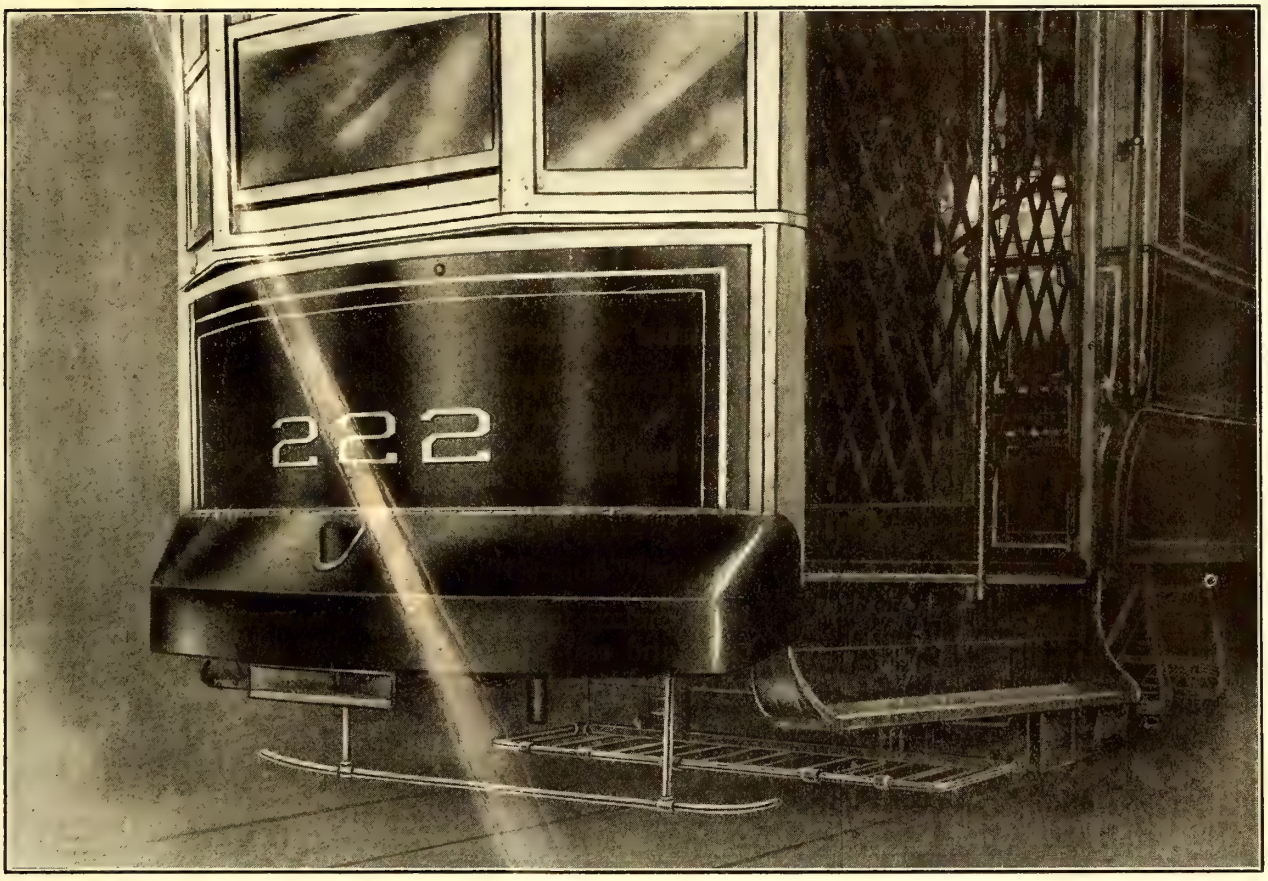
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1200 Parmenter Wheel Guards

have recently been ordered by the

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Five reasons why a wheel guard should be attached to the trucks:

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We are ready to demonstrate the truth of all our claims.

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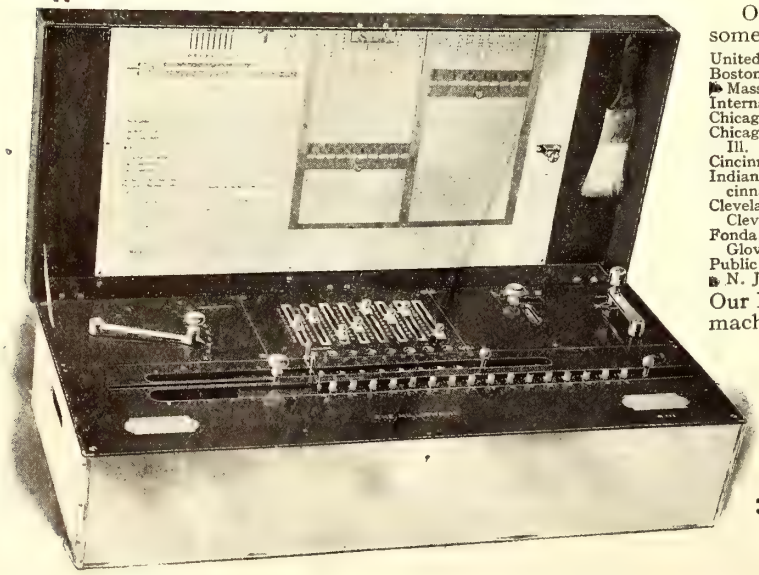
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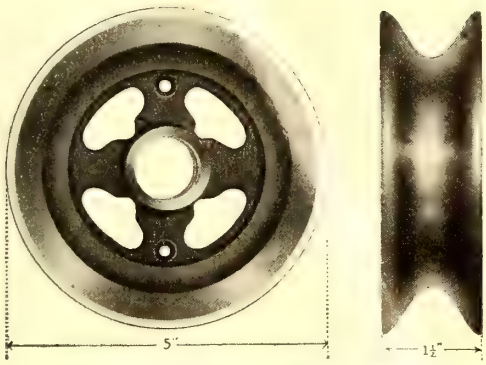
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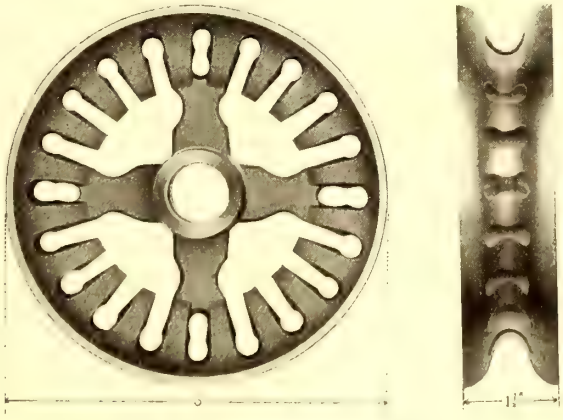


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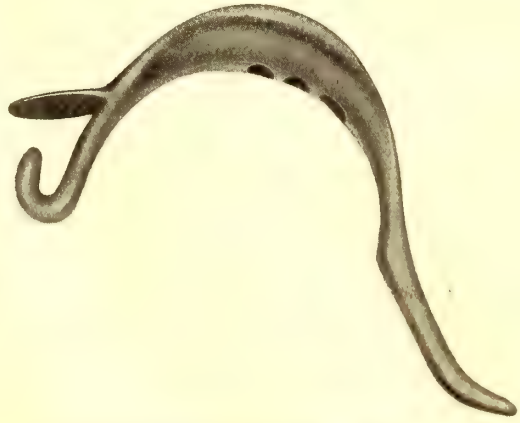
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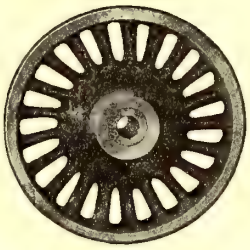
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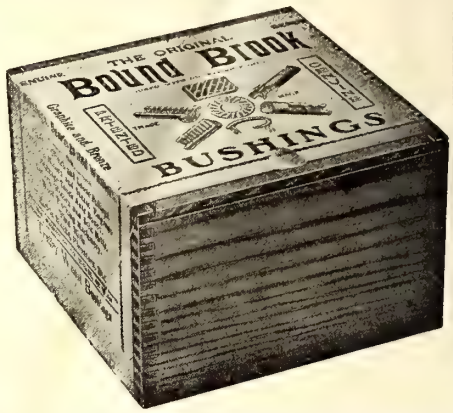
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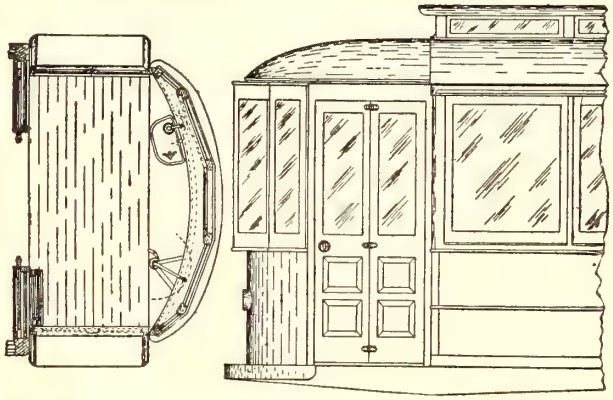
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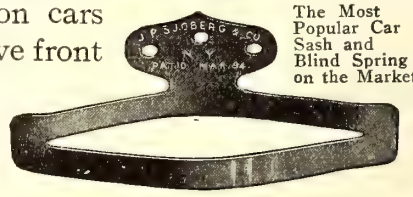
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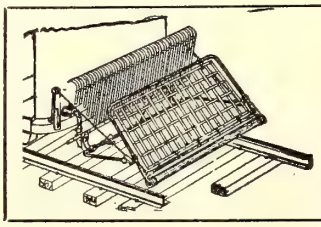
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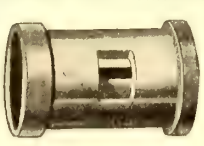
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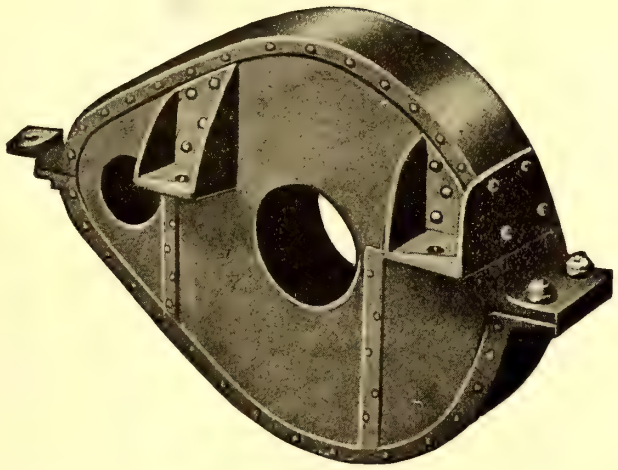
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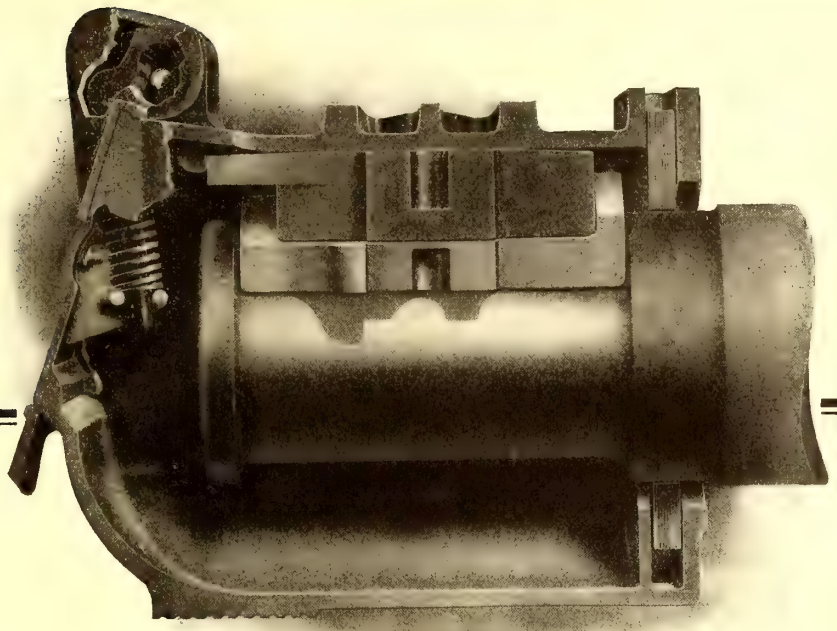
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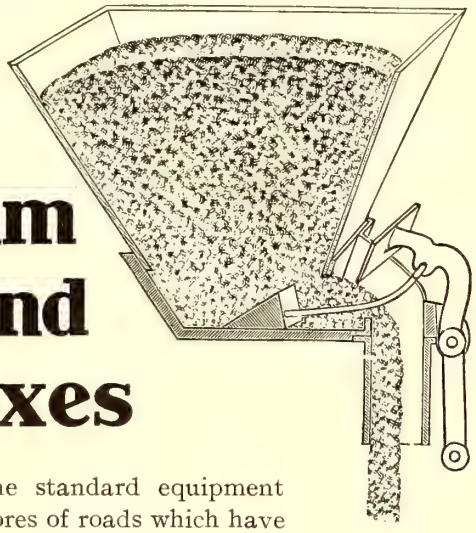
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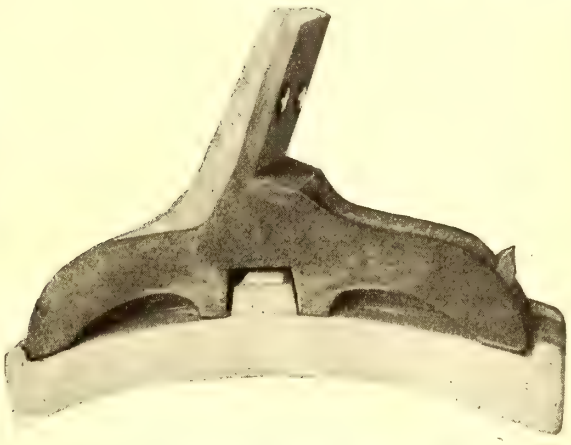
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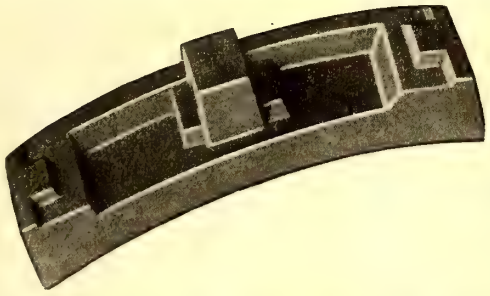
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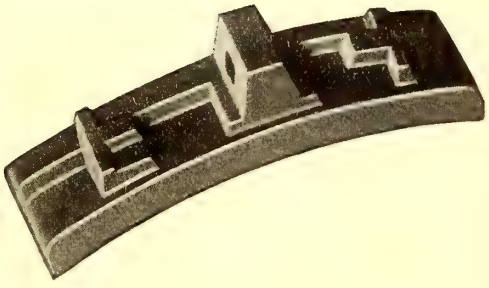
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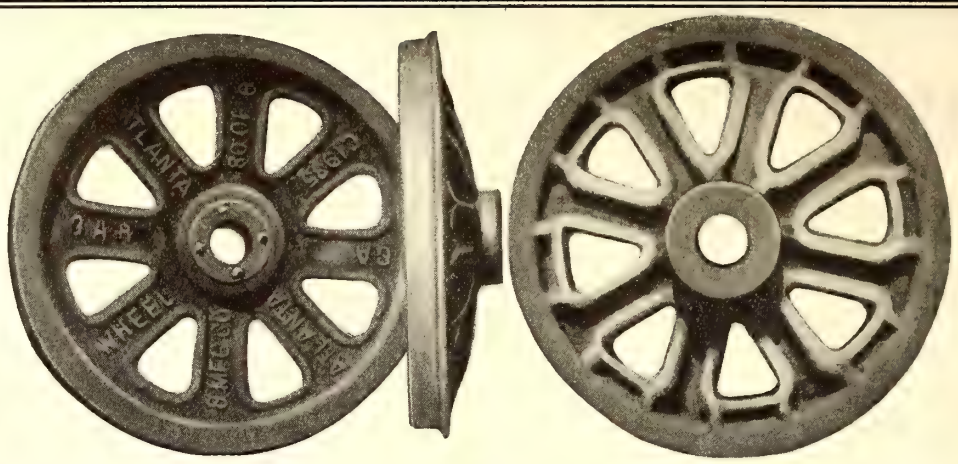


U. S. Brake Shoe Co.

Sales Office:
90 West St., New York

Foundries
Walton, N. Y., Corry, Pa.,
Pittsburg, Pa.





Reinforced Spoke Car Wheels

are especially adapted to high speed service. Their deep, uniform chill insures greater mileage. The strength of flanges insures maximum safety at high speeds, and make them superior for any service. We make a specialty of fitting and refitting.

Write for illustrated booklet.

Atlanta Car Wheel & Mfg. Co., ATLANTA, GA.

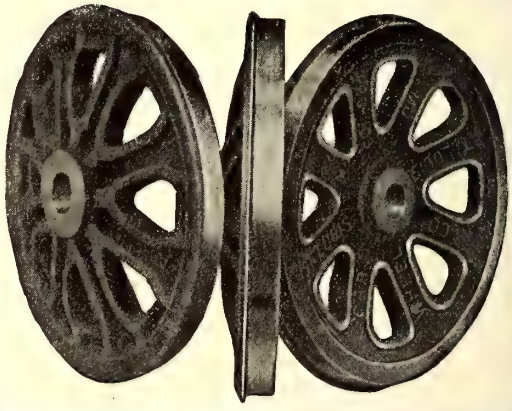
Re-Enforced Spoke Wheels FOR CITY AND SUBURBAN CARS

This Wheel is being substituted in place of the Old-Style Plate Wheel because it does not rumble and roar when on paved city streets. The only spoke wheel for Heavy, High-Speed Service.

Stronger Spokes **Stronger Flange** **Deep, Even Chill**
Greater Mileage **Absolute Safety**

Sample order will prove its superiority over the Old-Style Spoke Wheel.
Write for Booklet on Wheels.

ST. LOUIS CAR WHEEL CO., St. Louis, Mo.



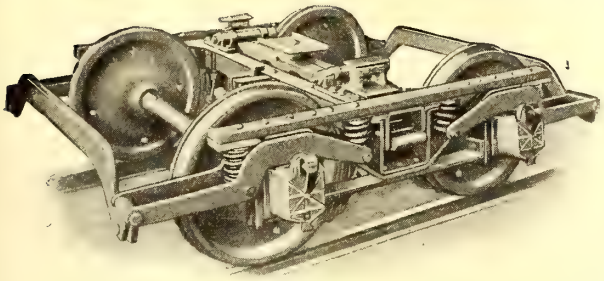
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OF EVERY DESCRIPTION
FOR ALL CLASSES OF SERVICE
IRON OR STEEL AXLES. REFITTING A SPECIALTY



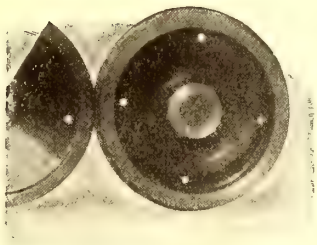
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Carefully designed to meet operating conditions, built of the highest grade materials and put together like a machine by experienced workmen.

Write for Catalog.

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Philadelphia, Pa., U. S. A.

Branch Offices:
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Standard Wheels

Solid forged, rolled and turned or steel tired as you prefer. Also highest grade axles, springs, etc. You can depend upon the quality of all "Standard" products.

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Standard Steel Works Co.
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San Francisco, Cal. Pittsburgh, Pa. Seattle, Wash.

Carbon Brushes

HAVE YOU EVER TRIED



Le Valley Vitae Brushes?

If not, then you don't know what they are or what they will do. We will let the man who has used them tell the story, or we will tell you ourselves if you write us.

Samples? Certainly. Write for some.

Le Valley Vitae Carbon Brush Co.
685 Tremont Avenue, New York

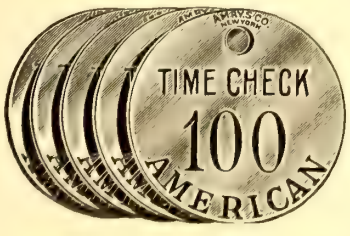
DIAMO

Carbon Brushes

are manufactured from carbon formed with integral coherency from the burned products of hydrocarbon. They have wonderful electrical conductivity, do not scratch, blacken nor discolor the commutator, and last much longer than any other. Non-sparking and self-lubricating.
Samples are yours for a word. Write!

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No other system has proved so simple, so inexpensive to install and so satisfactory in operation as the **TIME CHECK SYSTEM.**
Our pamphlet "Time Checks and Their Use" is well worth the three minutes necessary for a reading.

Send for our Form 13

American Railway Supply Company
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SOUTHERN RAILWAY SUPPLY CO.
GENERAL RAILWAY SUPPLIES
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"MODOC" CAR CLEANER

Preserves the finish. Not a soap nor an acid. The standard for 10 years.

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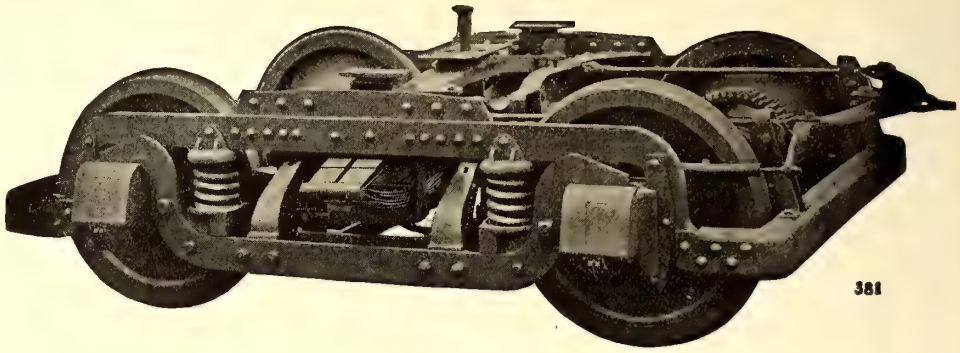
STANDARD HIGH-SPEED "INTERBOROUGH" DOUBLE TRUCK

TYPE C-60

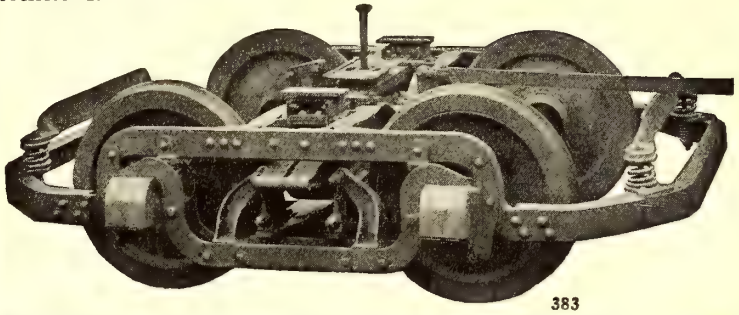
"Solid Forged"

WITHOUT WELDS

FRAMES ARE MADE FROM ROLLED OPEN-HEARTH STEEL WITHOUT WELDS. ALL WEARING BOLTS ARE TURNED AND CASE HARDENED, AND WEARING HOLES STEEL THIMBLED. M. C. B. STANDARD PRINCIPLES ARE FOLLOWED. WE ARE PREPARED TO BUILD TRUCKS IN ACCORDANCE WITH PURCHASER'S DESIGNS AND SPECIFICATIONS.



381



383

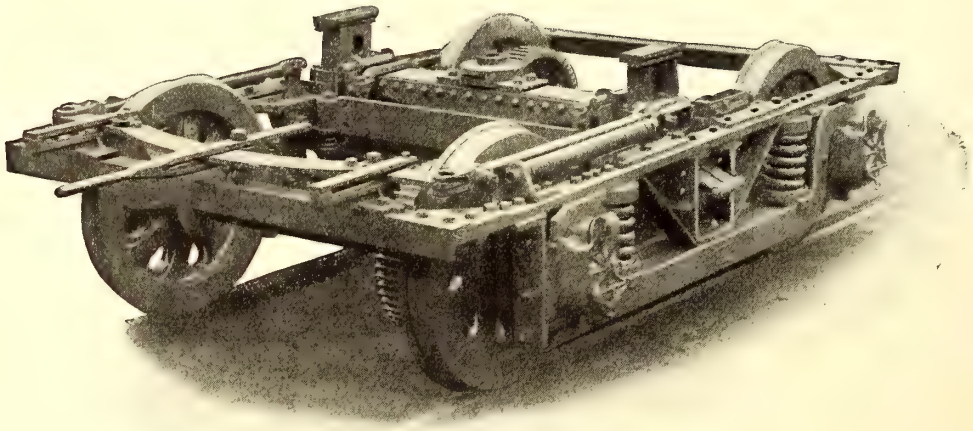
STANDARD "SHORT WHEEL BASE" CITY AND SUBURBAN DOUBLE TRUCK

TYPE O-50

STANDARD MOTOR TRUCK COMPANY, Frick Bldg., **PITTSBURGH, PENNSYLVANIA**

NEW YORK OFFICE: 170 BROADWAY WORKS: NEW CASTLE, PA. (2) CHICAGO OFFICE: FISHER BUILDING

HIGH-SPEED ELECTRIC MOTOR TRUCK



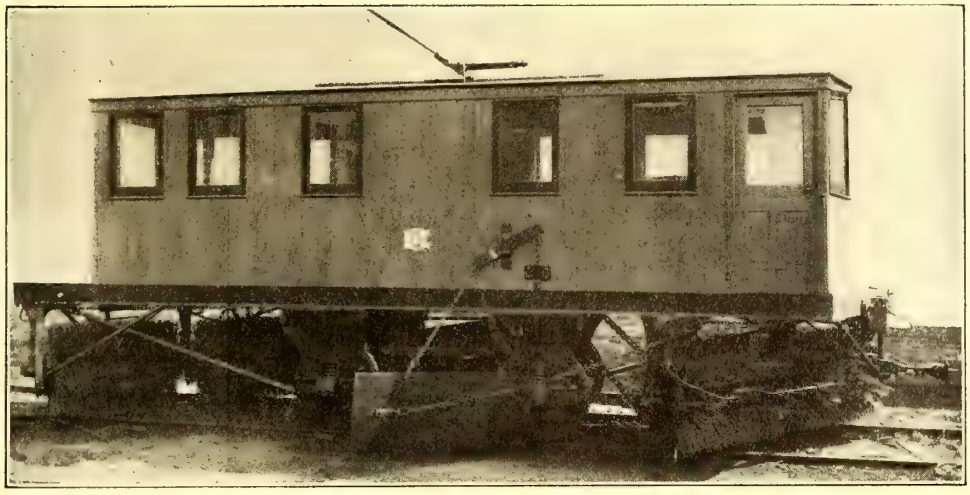
Type "B" Electric Motor Truck, built for a speed of from 30 to 50 miles an hour, and for a carrying capacity of from 20,000 to 30,000 pounds at center plate.

The frame is constructed of wrought iron bars, tied together at ends by heavy angles and reinforced at corners with plate steel gussets.

The frame construction of this type of truck presents advantages over the solid forged for quick repairs.

AMERICAN LOCOMOTIVE COMPANY, 30 Church Street NEW YORK 4

McGuire-Cummings Mfg. Co.



McGUIRE-CUMMINGS MFG. CO.'S SINGLE TRUCK SWEEPER (Patented)

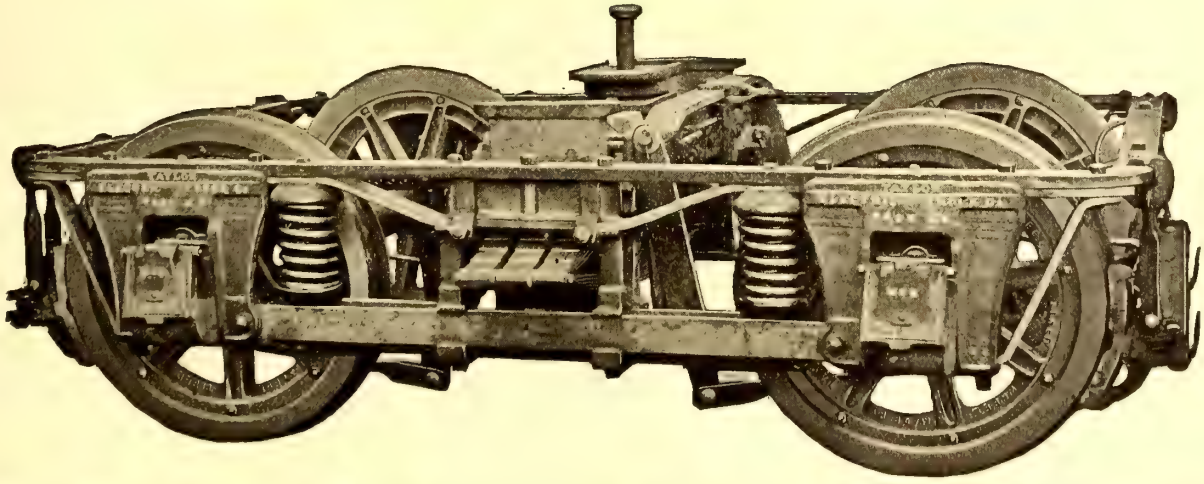
Single and Double Truck Snow Sweepers and Plows, Cars, Trucks and Sprinklers.

Works: CHICAGO and PARIS, ILL. General Offices: CHICAGO, ILL.

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M. C. B. DOUBLE TRUCK

IS SUPERIOR TO ALL OTHERS FOR HIGH-SPEED SERVICE

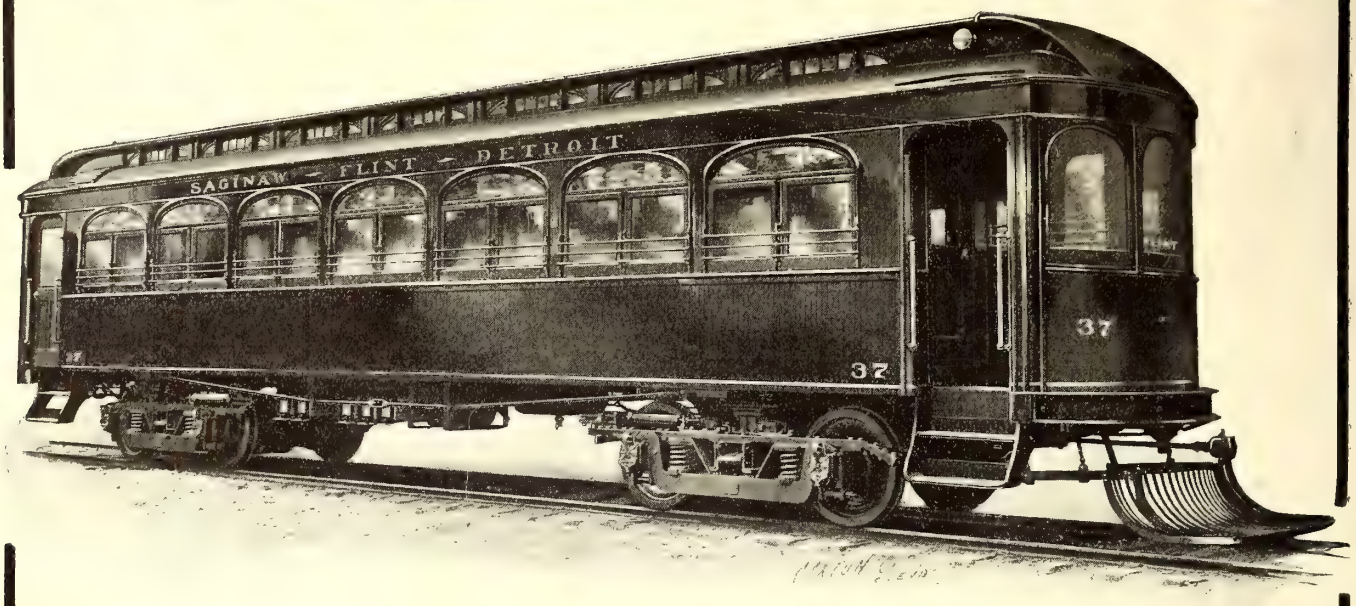


TAYLOR ELECTRIC TRUCK CO., TROY, N. Y. U. S. A.

MANUFACTURERS OF

Highest-Grade Electric Car Trucks
Coil and Elliptic Springs for any type of truck
Steel-Tired Wheels with Malleable Center

NILES CARS



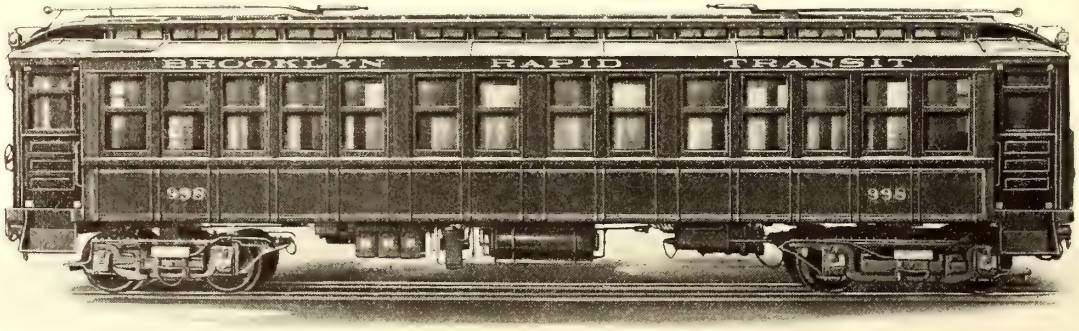
NILES CAR AND MFG. CO.

Works: Niles Ohio—Sales Office: 312 Electric Building, Cleveland

Makers of all Classes of Cars for Electric Railways Catalogs, Specifications and Prices for Prospective Purchasers.

PRESSED STEEL CAR COMPANY

STEEL PASSENGER CARS AND TRUCKS
For STEAM and ELECTRIC RAILWAYS



Steel Passenger Car, "Easy Access" Type.

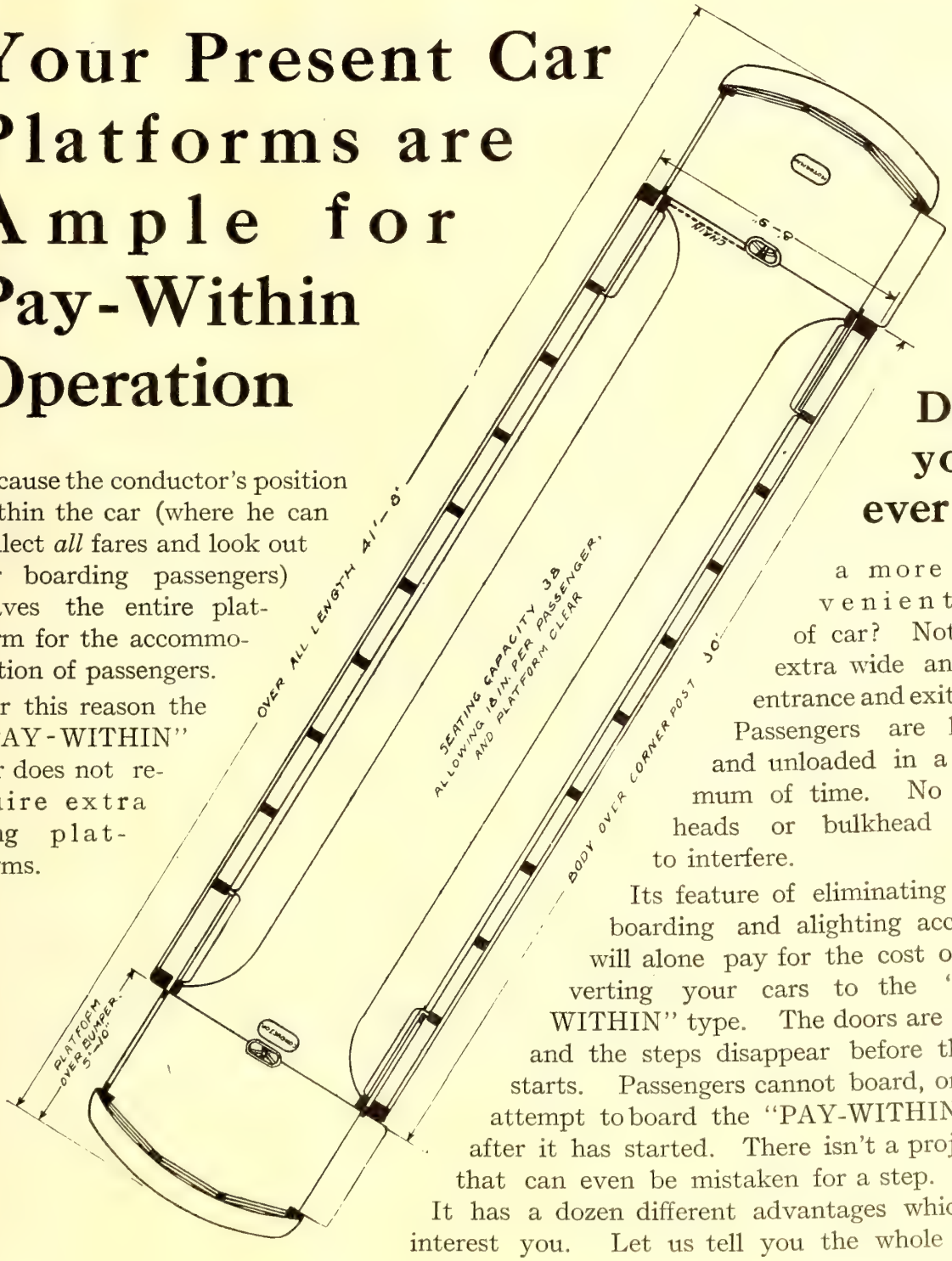
STEEL and COMPOSITE FREIGHT CARS

Offices: New York Chicago Pittsburg St. Louis Atlanta Mexico City

Your Present Car Platforms are Ample for Pay-Within Operation

because the conductor's position within the car (where he can collect *all* fares and look out for boarding passengers) leaves the entire platform for the accommodation of passengers.

For this reason the "PAY-WITHIN" car does not require extra long platforms.



Did you ever see

a more convenient type of car? Note the extra wide and free entrance and exit ways. Passengers are loaded and unloaded in a minimum of time. No bulkheads or bulkhead doors to interfere.

Its feature of eliminating ALL boarding and alighting accidents will alone pay for the cost of converting your cars to the "PAY-WITHIN" type. The doors are closed and the steps disappear before the car starts. Passengers cannot board, or even attempt to board the "PAY-WITHIN" car after it has started. There isn't a projection that can even be mistaken for a step.

It has a dozen different advantages which will interest you. Let us tell you the whole story.

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Railway Material & Electrical Supplies

PHILADELPHIA — General Sales Agent for — CHICAGO

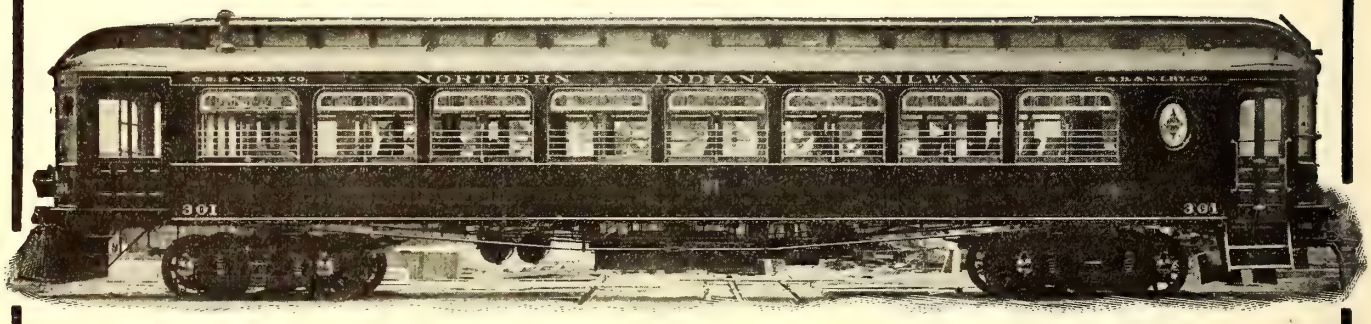
THE PAY-WITHIN CAR CO.

THE CINCINNATI CAR COMPANY

Winton Place, Cincinnati, Ohio



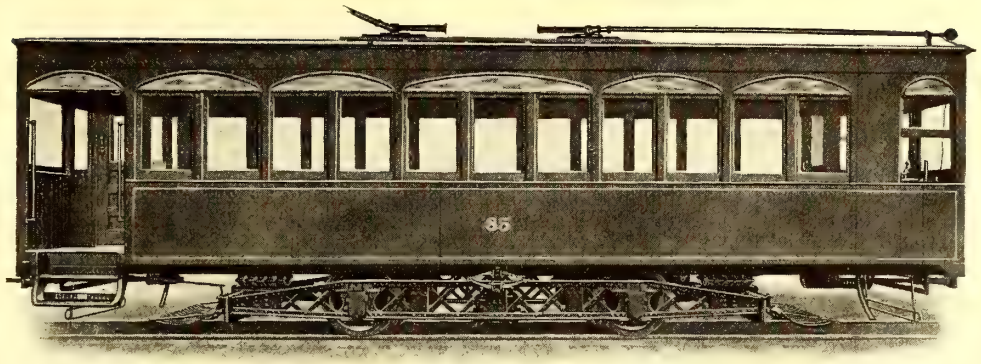
Type "Pay-As-You-Enter" Cars. Built for The Capital Traction Co., Washington, D. C.



High-Speed Interurban Cars on Lines of Chicago, South Bend & Northern Indiana Railway.

Builders and Designers of all types of elevated, interurban and surface cars

SPECIFICATIONS AND DRAWINGS PROMPTLY FURNISHED



Can You Afford To Operate "Standard" Cars

when, with equal carrying capacity, you can cut your maintenance and operating expenses practically in two by using

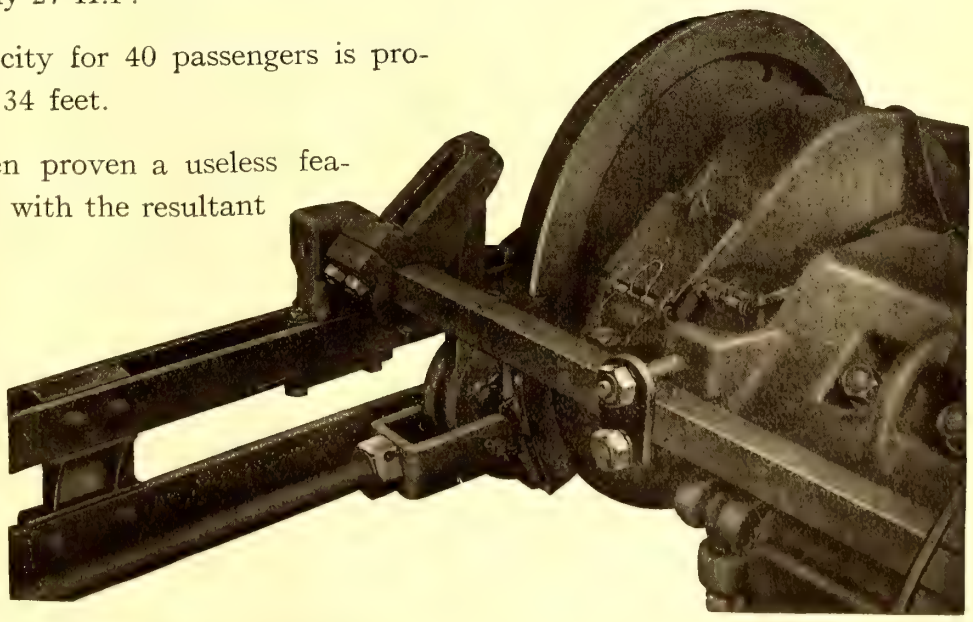
The Barber Car

Its light weight—only 11 tons—is due largely to the unique construction of its single truck, which gives practically double-truck support and does away with the disagreeable galloping motion common to other single-truck cars. Its current consumption at 28 miles per hour is only 40 amperes at 500 volts—practically 27 H.P.

Comfortable seating capacity for 40 passengers is provided in a length of only 34 feet.

The monitor, having been proven a useless feature, has been eliminated, with the resultant gain of all the advantages of the semi-convertible type. If you are responsible for results, we have a message for you.

Write!



Barber Car Company

York, Pa.



Pay-as-You-Enter Car of the Chicago City Railway Co., Chicago

Accident Reduction

in Chicago

"Pay-As-You-Enter Cars have practically eliminated platform accidents."—*President T. E. Mitten.*

Accidents of all kinds have been very substantially reduced on all Chicago lines operating Pay-As-You-Enter Cars.

Both the Chicago City Railway Co. and the Chicago Railways Co. confidently expect to show a still further accident reduction when their other lines are also equipped for Pay-As-You-Enter operation, and this reduction has invariably followed the use of Pay-As-You-Enter Cars in other cities.

The Pay-As-You-Enter Car has

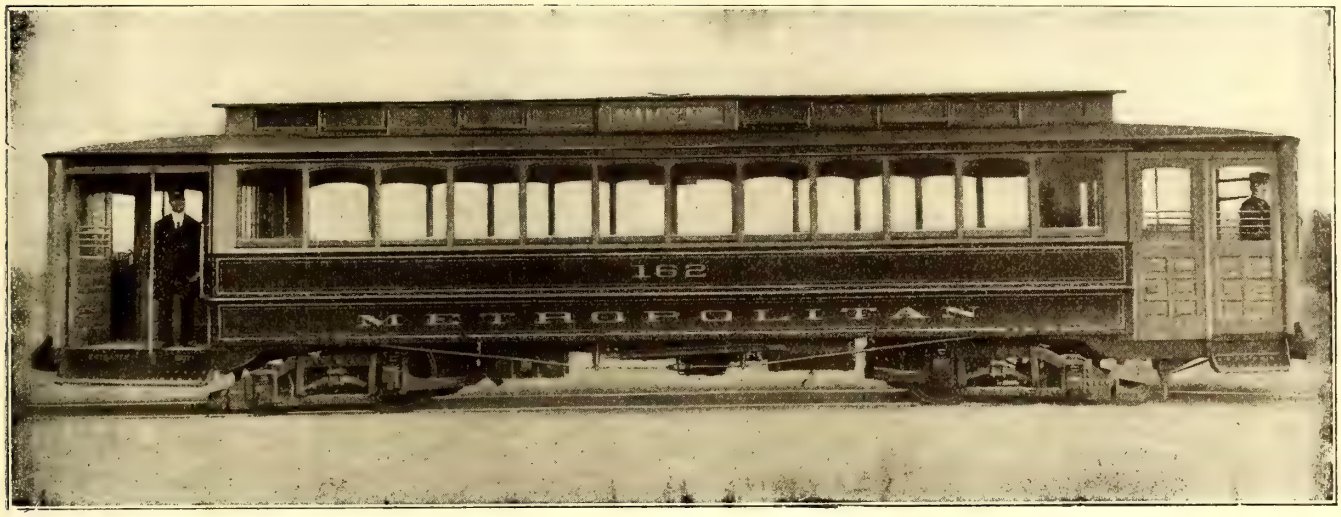
We license manufacturers and railways to build and use the Pay-As-You-Enter Car, the patents on which are owned by

The Pay-As-You-Enter Car Corporation

DUNCAN McDONALD
President

50 Church Street, New York

THOS. W. CASEY
Manager



Pay-as-You-Enter Car of the Metropolitan Street Railway Co., New York

Accident Reduction

in New York

Both the Metropolitan and Third Ave. roads find a very material decrease of accidents on lines equipped for Pay-As-You-Enter operation.

The New York Telegram quotes Mr. Root as saying that "Thirty per cent. of the accidents on surface cars occur in getting on and off," and that the Pay-As-You-Enter cars "make accidents of this sort practically impossible."

Mr. Maher, Gen'l Mgr. for the Receiver of the Third Ave. road, states that on lines on which he operates Pay-As-You-Enter Cars, "a marked decrease" has been shown "in the number of platform accidents."

reduced accidents on 37 roads

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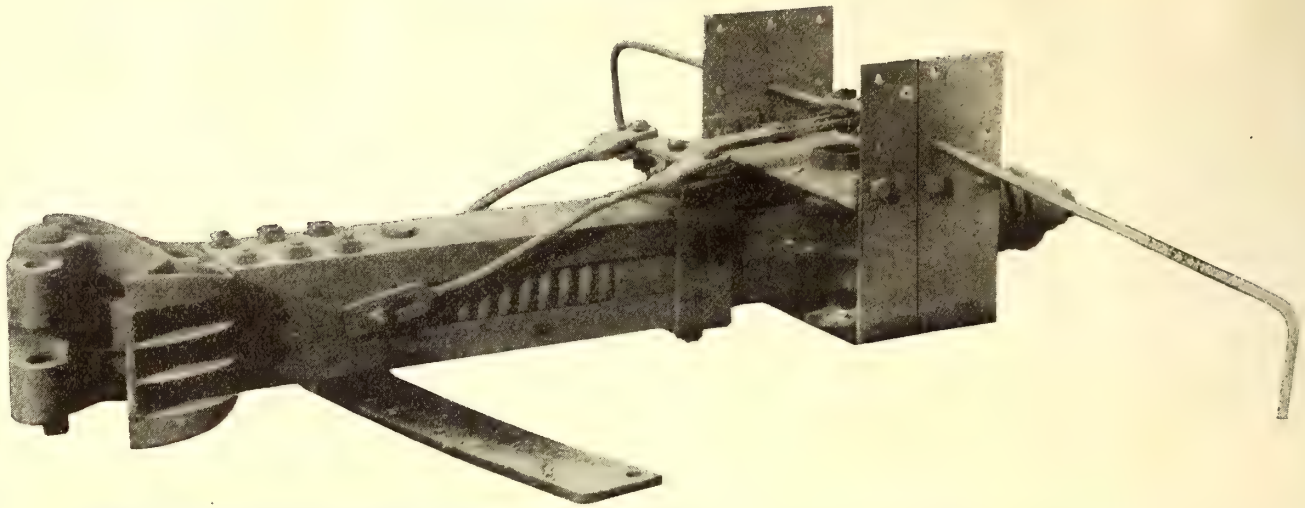
The Pay-As-You-Enter Car Corporation

DUNCAN McDONALD, President — **50 Church Street, New York** — THOS. W. CASEY, Manager

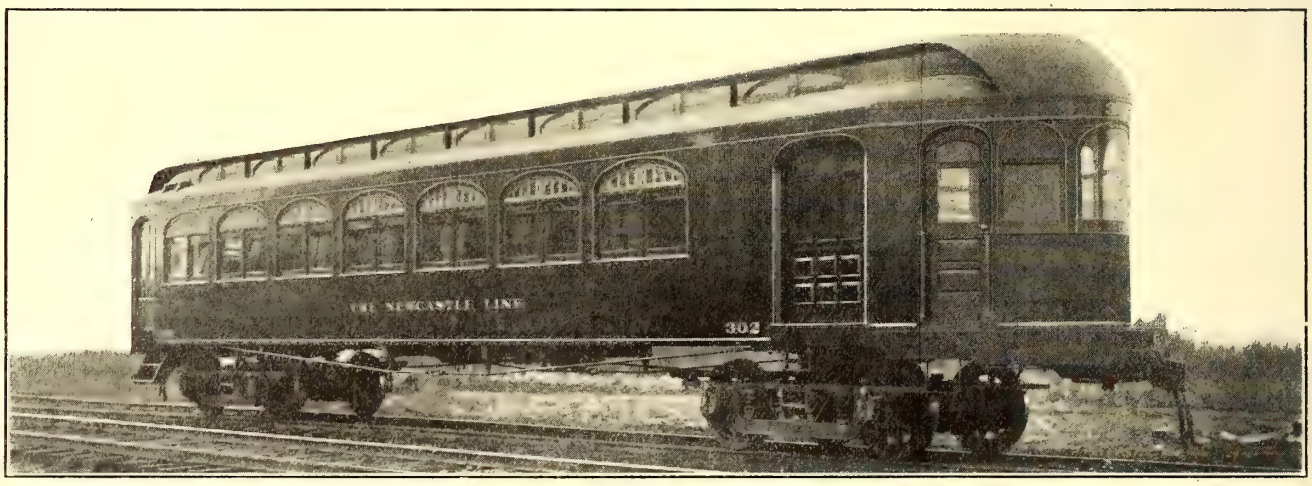
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The Jewett Car Company

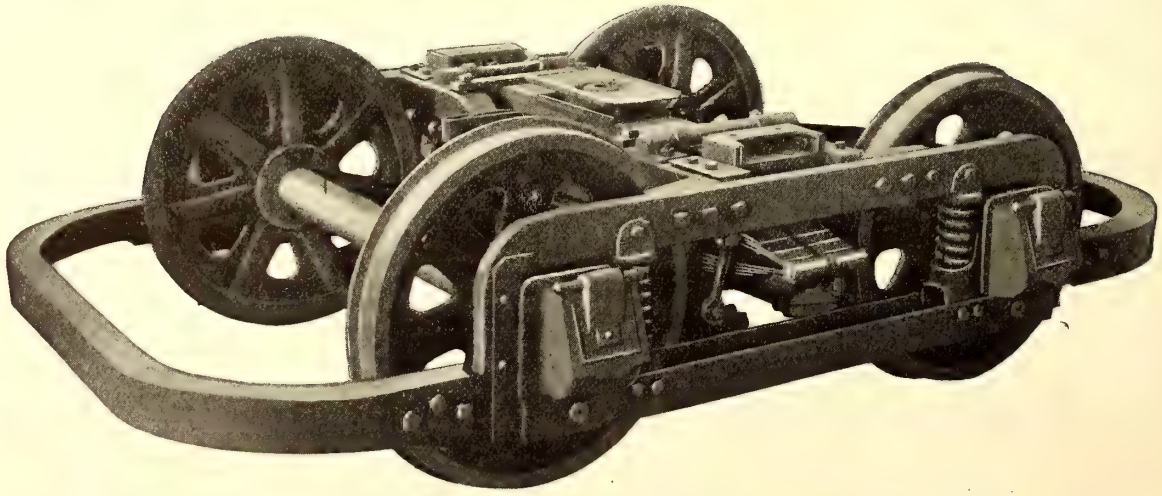
Newark, Ohio



Self-Centering Radiating M. C. B. Draw Bar with Remote Disconnecting Levers



Latest Type High-Speed Interurban Car

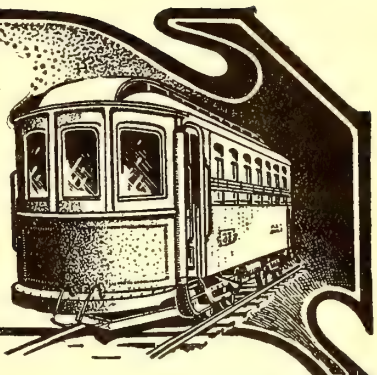


Short Wheel Base M. C. B. Type Truck with Side Equalizers and Swing Bolster

Builders and Designers of all Types of Electric Cars



ST. LOUIS CAR CO.



ST. LOUIS, MISSOURI



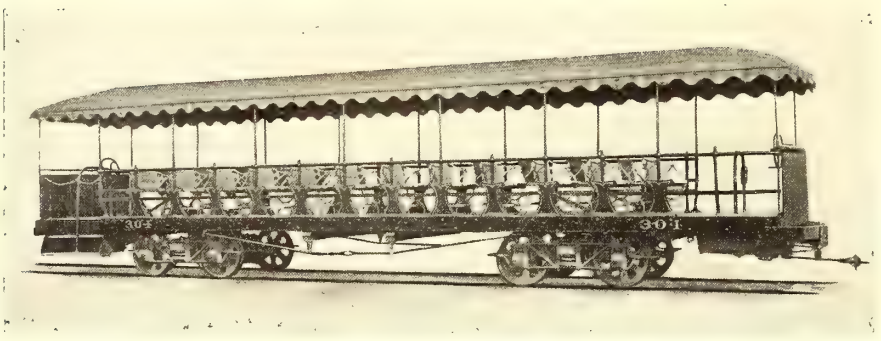
Above cut represents one of ten (10) cars of

"Pay-on-Platform" Type

recently built and delivered to the Chicago & Milwaukee Electric Railroad Company by St. Louis Car Company, St. Louis, Mo.

Electric and Steam Railway Coaches, Steel Cars, Trucks, Journal Bearings, Curtains, Seats, Rattan Bronze Trimmings, Miscellaneous Car Supplies.

BRILL



Forty-Foot Excursion Trail Car for "Moonlight" Service

WE may be able to be of assistance to you in your plans for ways and means to increase the income of your road during the coming year. Perhaps you have plans for developing extra excursion business during the slack hours of the summer season. We shall be glad to submit specifications and prices on various types of open cars, excursion cars, or trail cars. Perhaps you have discovered that you can save money by hauling your own coal and ashes. We shall be glad to submit photographs, specifications and prices on ash cars of various types which you may be able to use for hauling coal or ashes for other corporations in your town, or for some additional service. We also build various types of work cars, from the simplest flat car to cars with cranes and devices which adapt them to special service. Perhaps one of these would be of service to you and with a little skirmishing around town among the manufacturers and shippers you would discover that the car could be utilized to secure additional income in handling materials for others.

THE J. G. BRILL COMPANY

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THE BRILL COMPANIES ARE

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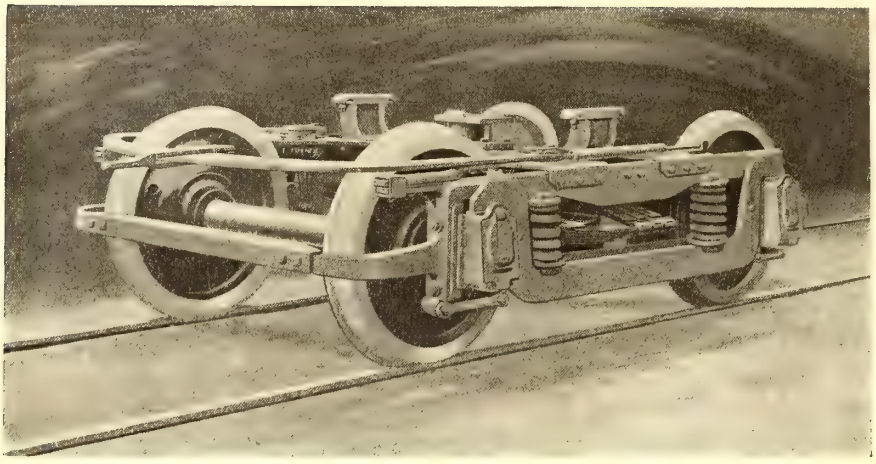
Twenty-eight Foot Pay-As-You-Enter Car Mounted on Brill No. 22 Special Single-Motor Trucks—Weight Complete 36,550 lbs.

PERHAPS the subject of weights of equipment and the relation they bear to operating economy appeals to you, particularly in connection with Pay-As-You-Enter cars, and if so the figures for a car of the above type will be of interest. The car shown has a length over end panels of 28 ft. 0 in.; width over posts 8 ft. 0 in. The weight of the car body is 15,779 lbs. The car is mounted on Brill No. 22 Special single-motor trucks, each carrying one of the new type 65-h.p. inter-polar motors. With this equipment the weight is: Trucks 8,728 lbs.; motors, air brakes and electrical equipment 12,043 lbs., making the total weight of the car complete 36,550 lbs. This weight has been secured without any sacrifice of strength and is unusual for a car of the type. The side-sills are plated with $15\frac{1}{2}$ x $\frac{3}{8}$-in. steel, and the platform side knees have steel reinforcing. Some saving in weight has been secured by the platform framing construction and elsewhere in the underframe. We shall be glad to furnish further particulars.

THE J. G. BRILL COMPANY

PHILADELPHIA, - - - - - PENNA.

BRILL



The Brill No. 27 M. C. B. Truck with Side Frames, Including Pedestals, Solid-Forged in a Single Piece

THE BRILL No. 27 M. C. B. truck is the only truck of the M. C. B. class in which the side frames including yokes are forged solid in a single piece. Beginning with superiority in this fundamental part the No. 27 M. C. B. has many other features. The method by which the ample gusset plates are folded over the side frames and bolted through them ties the transoms to the side frames with minimum number of bolts in shear, makes the transom construction most substantial and insures the continued squareness of the truck under severe service. The bolster is cast steel. The bolster and transom chafing plates are of such proportion and ample size as to wear uniformly and support the bolster against tilting. They can be renewed without removing the bolster. The usual type of tie bar with longitudinal bolts, which have their threads in shear, is eliminated and channel tie bars connect the inner pedestals and short tie bars connect each pair of pedestals. The pedestal tie bars are bolted through the frame in such a manner that they form a rigid reinforcement of the pedestals and by a simple device absolutely remove the shearing strain from the bolts.

THE J. G. BRILL COMPANY

PHILADELPHIA, - - - - PENNA.

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WASON MANUFACTURING COMPANY
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Cleveland, Ohio

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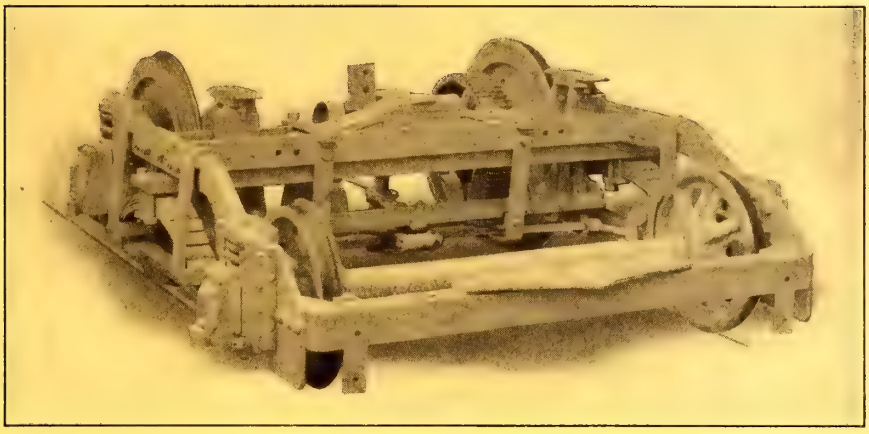
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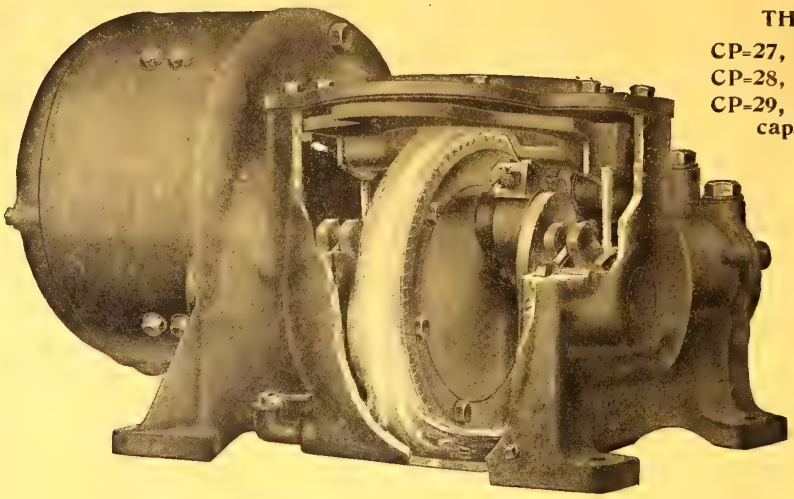


The Brill No. 39-E. Center-Bearing Single-Motor Truck

TO date 1412 Brill No. 39-E trucks have been sold—all within a period of fifteen months. We doubt if any other type of truck has an equal record for rapid adoption by electric railways. But an analysis of the situation shows the reason. In the first place the No. 39-E is just a little bit better in design than any single-motor truck previously placed on the market. Its reversed position under the car body to reduce platform overhang is one point of advantage. The arrangement of the equalized brake rigging with a center pull lever is another of the many advantages of the design. But undoubtedly one of the principal factors in the success of the No. 39-E is the opportunity it offers for a saving in initial cost, operating and maintenance expenses, because with a single 65-h.p. motor the No. 39-E will give service for city lines equivalent to that of a two-motor truck. There is saving in the cost of the equipment to start with; there is less weight to carry around and only two motors per car to take care of. The proposition can be reduced to figures to show the actual saving for any given number of cars.

THE J. G. BRILL COMPANY
PHILADELPHIA, - - - - - PENNA.

All bearings automatically lubricated with only one place to oil



THREE TYPES:
CP-27, capacity 15 cu. ft.
CP-28, " 25 cu. ft.
CP-29, (600-1200 volts), **capacity 25 cu. ft.**

Air Compressors

(Motor Driven)

There are no oil rings in this compressor.

The oiling system is positive in action and continuously delivers oil to all the bearings.

The driving gear picks up oil from the well and throws it in a steady stream into an oil pan on the underside of the crank chamber cover. The distribution to bearings is effected through large channels formed in the oil pan, from which the oil flows to the various bearings. *All* parts of the compressor are perfectly lubricated, even when the oil level is below the connecting rods.

Many other interesting features of this compressor are described in Bulletin 4699.

General Electric Company

Largest Manufacturer of Electrical Apparatus in the World.

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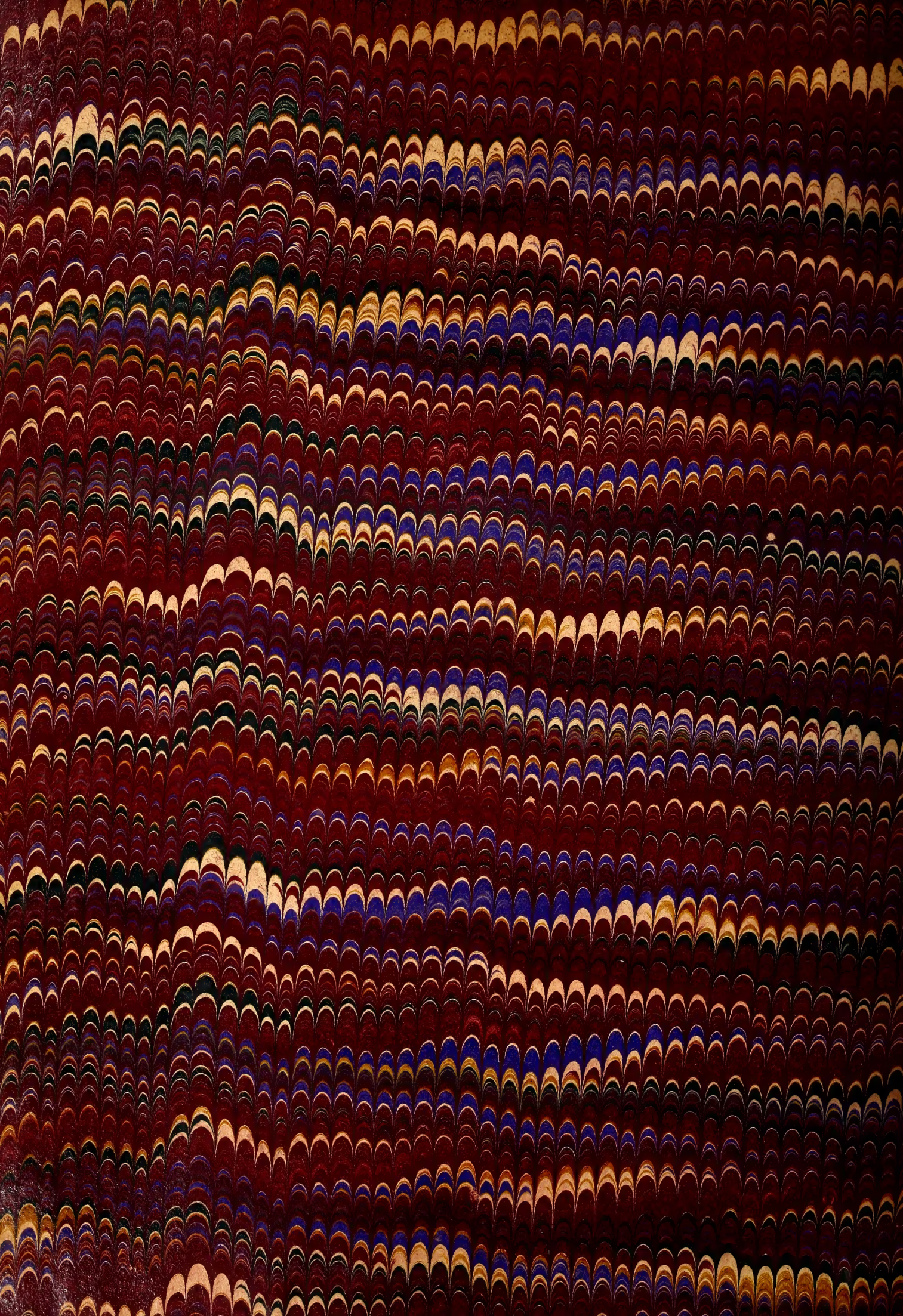
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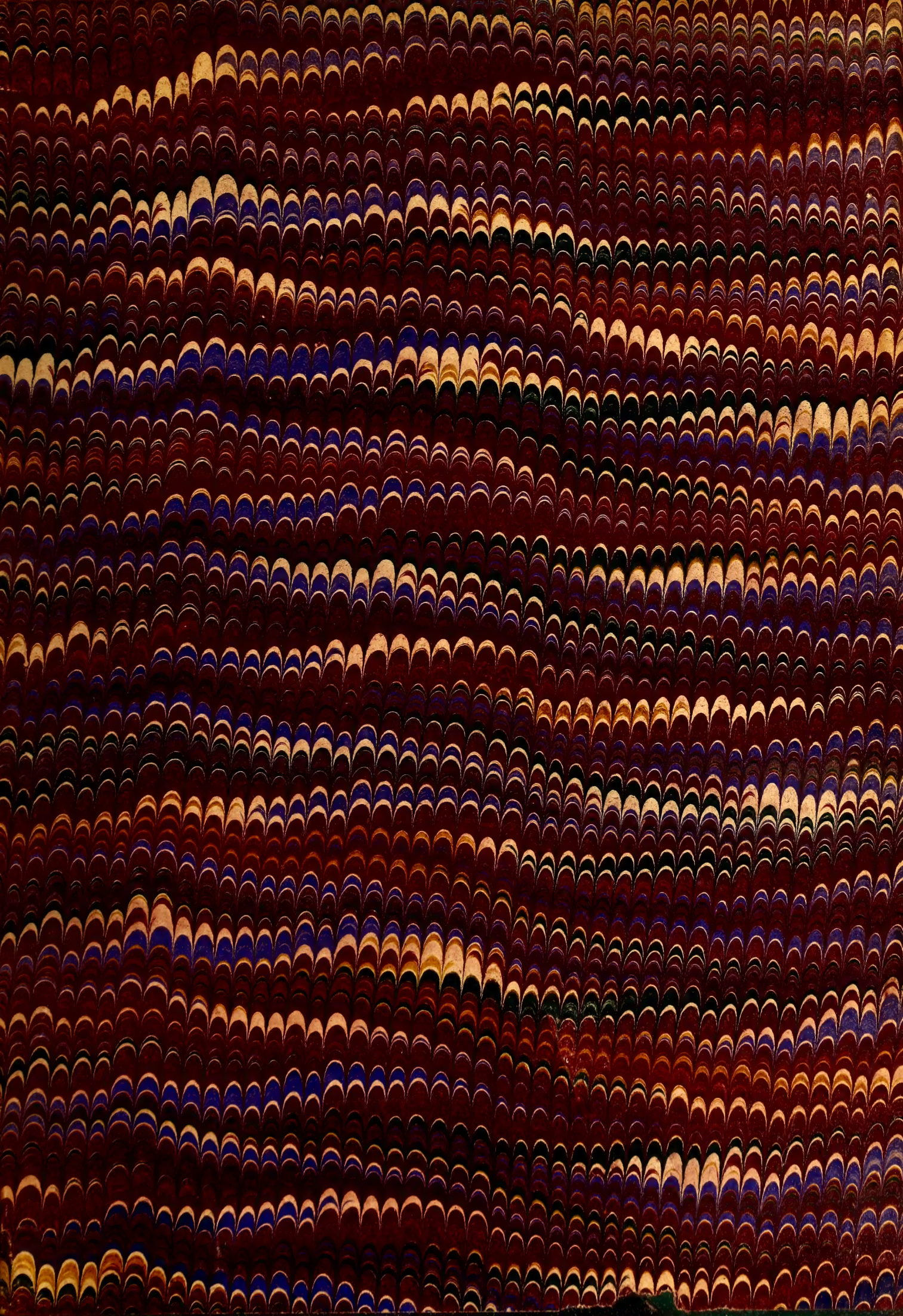
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